Documentation 4.4

ZABBIX

01.07.2025

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Zabbix Manual

Welcome to the user manual for Zabbix software. These pages are created to help users successfully manage their monitoring tasks with Zabbix, from the simple to the more complex.

1. Introduction

Please use the sidebar to access content in the Introduction section.

1 Manual structure

Structure

The content of this Zabbix 4.4 manual is divided into sections and subsections to provide easy access to particular subjects of interest.

When you navigate to respective sections, make sure that you expand section folders to reveal full content of what is included in subsections and individual pages.

Cross-linking between pages of related content is provided as much as possible to make sure that relevant information is not missed by the users.

Sections

Introduction provides general information about current Zabbix software. Reading this section should equip you with some good reasons to choose Zabbix.

Zabbix concepts explain the terminology used in Zabbix and provides details on Zabbix components.

Installation and Quickstart sections should help you to get started with Zabbix. Zabbix appliance is an alternative for getting a quick taster of what it is like to use Zabbix.

Configuration is one of the largest and more important sections in this manual. It contains loads of essential advice about how to set up Zabbix to monitor your environment, from setting up hosts to getting essential data to viewing data to configuring notifications and remote commands to be executed in case of problems.

IT services section details how to use Zabbix for a high-level overview of your monitoring environment.

Web monitoring should help you learn how to monitor the availability of web sites.

Virtual machine monitoring presents a how-to for configuring VMware environment monitoring.

Maintenance, Regular expressions, Event acknowledgement and XML export/import are further sections that reveal how to use these various aspects of Zabbix software.

Discovery contains instructions for setting up automatic discovery of network devices, active agents, file systems, network interfaces, etc.

Distributed monitoring deals with the possibilities of using Zabbix in larger and more complex environments.

Encryption helps explaining the possibilities of encrypting communications between Zabbix components.

Web interface contains information specific for using the web interface of Zabbix.

API section presents details of working with Zabbix API.

Detailed lists of technical information are included in Appendixes. This is where you will also find a FAQ section.

2 What is Zabbix

Overview

Zabbix was created by Alexei Vladishev, and currently is actively developed and supported by Zabbix SIA.

Zabbix is an enterprise-class open source distributed monitoring solution.

Zabbix is software that monitors numerous parameters of a network and the health and integrity of servers. Zabbix uses a flexible notification mechanism that allows users to configure e-mail based alerts for virtually any event. This allows a fast reaction to server problems. Zabbix offers excellent reporting and data visualisation features based on the stored data. This makes Zabbix ideal for capacity planning.

Zabbix supports both polling and trapping. All Zabbix reports and statistics, as well as configuration parameters, are accessed through a web-based frontend. A web-based frontend ensures that the status of your network and the health of your servers can be assessed from any location. Properly configured, Zabbix can play an important role in monitoring IT infrastructure. This is equally true for small organisations with a few servers and for large companies with a multitude of servers.

Zabbix is free of cost. Zabbix is written and distributed under the GPL General Public License version 2. It means that its source code is freely distributed and available for the general public.

Commercial support is available and provided by Zabbix Company.

Learn more about Zabbix features.

Users of Zabbix

Many organisations of different size around the world rely on Zabbix as a primary monitoring platform.

3 Zabbix features

Overview

Zabbix is a highly integrated network monitoring solution, offering a multiplicity of features in a single package.

Data gathering

- availability and performance checks
- support for SNMP (both trapping and polling), IPMI, JMX, VMware monitoring
- custom checks
- gathering desired data at custom intervals
- performed by server/proxy and by agents

Flexible threshold definitions

- you can define very flexible problem thresholds, called triggers, referencing values from the backend database

Highly configurable alerting

- sending notifications can be customized for the escalation schedule, recipient, media type
- notifications can be made meaningful and helpful using macro variables
- automatic actions include remote commands

Real-time graphing

- monitored items are immediately graphed using the built-in graphing functionality

Web monitoring capabilities

- Zabbix can follow a path of simulated mouse clicks on a web site and check for functionality and response time

Extensive visualisation options

- ability to create custom graphs that can combine multiple items into a single view
- network maps
- custom screens and slide shows for a dashboard-style overview
- reports
- high-level (business) view of monitored resources

Historical data storage

- data stored in a database
- configurable history
- built-in housekeeping procedure

Easy configuration

- add monitored devices as hosts
- hosts are picked up for monitoring, once in the database
- apply templates to monitored devices

Use of templates

- grouping checks in templates
- templates can inherit other templates

Network discovery

- automatic discovery of network devices
- agent autoregistration
- discovery of file systems, network interfaces and SNMP OIDs

Fast web interface

- a web-based frontend in PHP
- accessible from anywhere
- you can click your way through
- audit log

Zabbix API

- Zabbix API provides programmable interface to Zabbix for mass manipulations, 3rd party software integration and other purposes.

Permissions system

- secure user authentication
- certain users can be limited to certain views

Full featured and easily extensible agent

- deployed on monitoring targets
- can be deployed on both Linux and Windows

Binary daemons

- written in C, for performance and small memory footprint
- easily portable

Ready for complex environments

- remote monitoring made easy by using a Zabbix proxy

4 Zabbix overview

Architecture

Zabbix consists of several major software components, the responsibilities of which are outlined below.

Server

Zabbix server is the central component to which agents report availability and integrity information and statistics. The server is the central repository in which all configuration, statistical and operational data are stored.

Database storage

All configuration information as well as the data gathered by Zabbix is stored in a database.

Web interface

For an easy access to Zabbix from anywhere and from any platform, the web-based interface is provided. The interface is part of Zabbix server, and usually (but not necessarily) runs on the same physical machine as the one running the server.

Proxy

Zabbix proxy can collect performance and availability data on behalf of Zabbix server. A proxy is an optional part of Zabbix deployment; however, it may be very beneficial to distribute the load of a single Zabbix server.

Agent

Zabbix agents are deployed on monitoring targets to actively monitor local resources and applications and report the gathered data to Zabbix server.

Data flow

In addition it is important to take a step back and have a look at the overall data flow within Zabbix. In order to create an item that gathers data you must first create a host. Moving to the other end of the Zabbix spectrum you must first have an item to create a trigger. You must have a trigger to create an action. Thus if you want to receive an alert that your CPU load it too high on *Server X* you must first create a host entry for *Server X* followed by an item for monitoring its CPU, then a trigger which activates if the CPU is too high, followed by an action which sends you an email. While that may seem like a lot of steps, with the use of templating it really isn't. However, due to this design it is possible to create a very flexible setup.

5 What's new in Zabbix 4.4.0

Zabbix agent 2 A new-generation Zabbix agent has been developed called Zabbix agent 2. Some of the goals set when developing the new agent 2 were to:

- reduce the number of TCP connections
- have greater check concurrency
- be easily extendible with plugins
- be a drop-in replacement for Zabbix agent (in that it supports all the previous functionality)

Agent 2 is written in Go (with some C code of Zabbix agent reused). A configured Go version 1.12+ environment is required for building Zabbix agent 2.

Zabbix agent 2 is available in pre-compiled Zabbix packages. To compile Zabbix agent 2 from sources you have to specify the `--enable-agent2` configure option.

Agent 2 is currently supported for the Linux platform only; with support for a Windows agent on its way. Currently Agent 2 is in experimental status, with a production-ready status expected in the next major release.

See also: Zabbix agent 2

Webhooks in alerting In the new version you may write your own JavaScript code to extend Zabbix alerting capabilities. While in previous versions that could only be done by some external scripts, now all the alerting logic can be kept inside Zabbix, more specifically, using the new Webhook media type.

A webhook may be used for easy integration of Zabbix alerting with a third-party helpdesk system, chat, messenger, etc. Moreover, it is possible to return some data about created tickets that's then displayed in Zabbix.

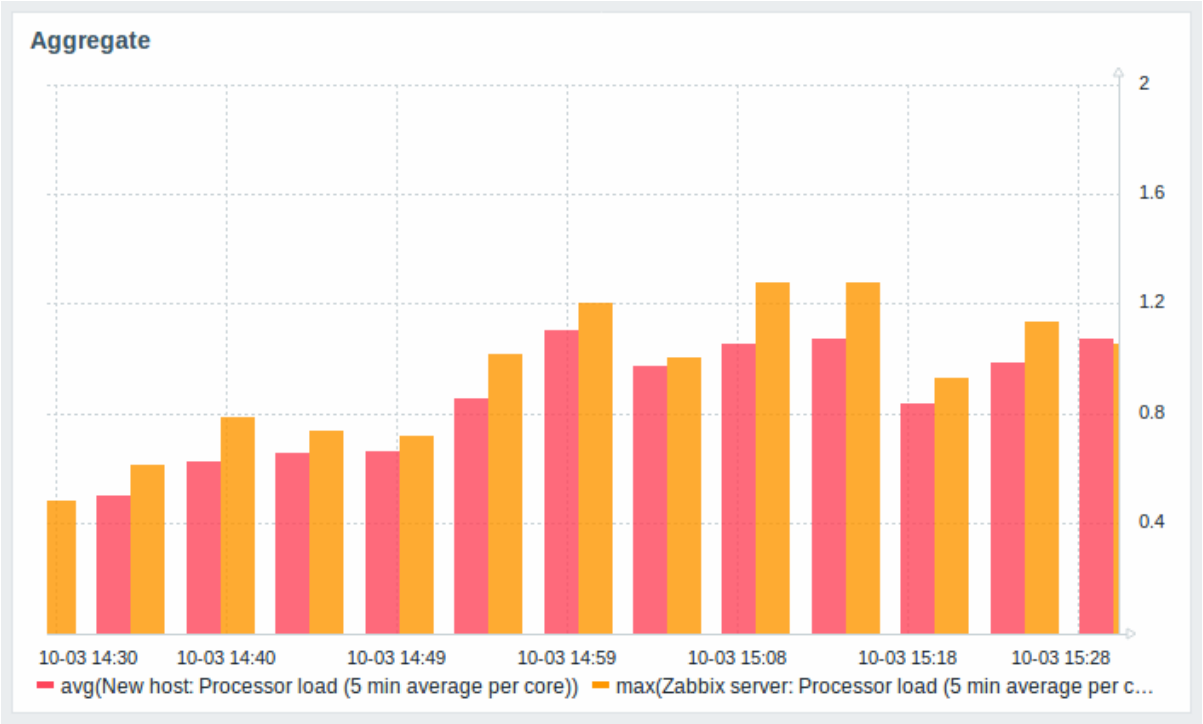
TimescaleDB officially supported Support for TimescaleDB, first added on experimental basis in Zabbix 4.2, is now official.
See also: Migration to TimescaleDB

Aggregation functions in graphs Along with data display in graphs as bars, the new version also introduces the possibility of creating data aggregations in a graph.

So you can select the desired period (5 minutes, an hour, a day) and then display an aggregated value for this period, instead of all values. The aggregation options are as follows:

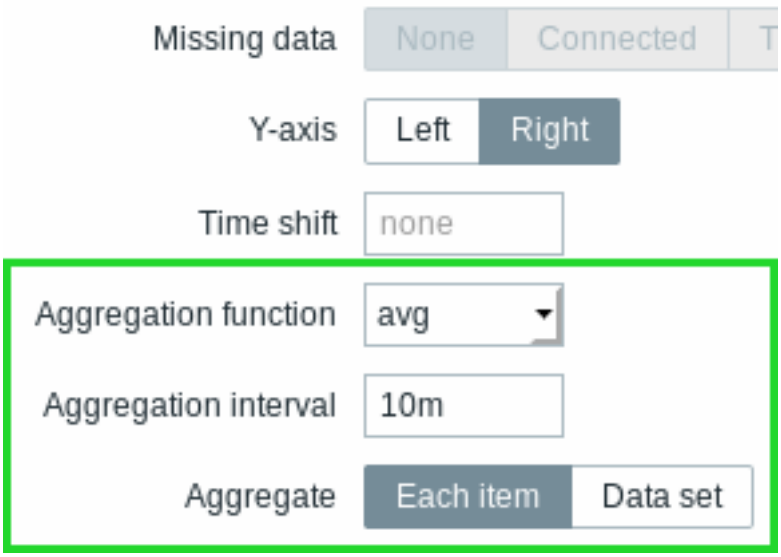
- min
- max
- avg
- count
- sum
- first (first value displayed)
- last (last value displayed)

The most exciting use of data aggregation is the possibility to create nice side-by-side comparisons of data for some period:



Aggregation can be configured in the data set settings when configuring a graph widget.

You may pick the aggregation function and the time interval. Since a data set may comprise several items, there is also another option allowing to show aggregated data for each item separately or for all data set items as one aggregated value:

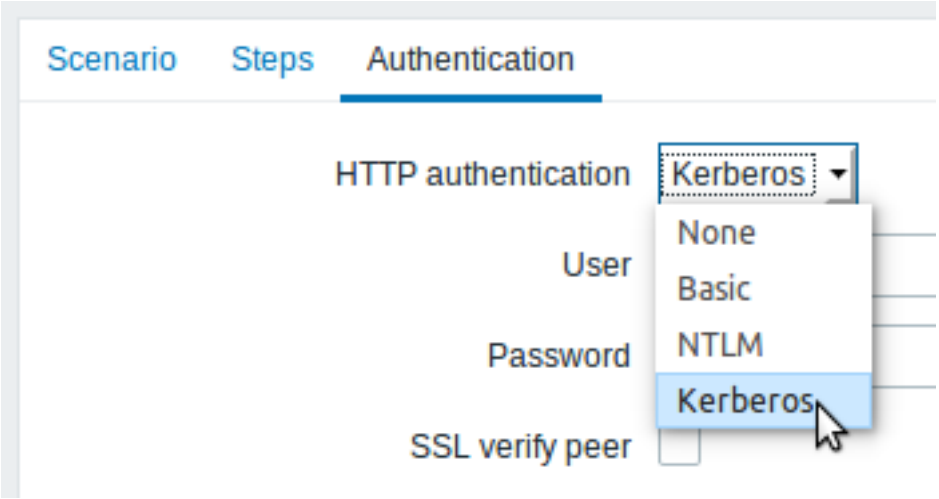


See also: Aggregation in graphs

Dependent item limit raised The maximum number of allowed dependent items for one master item has been raised from 999 to 29999.

Kerberos authentication Kerberos authentication is now supported in:

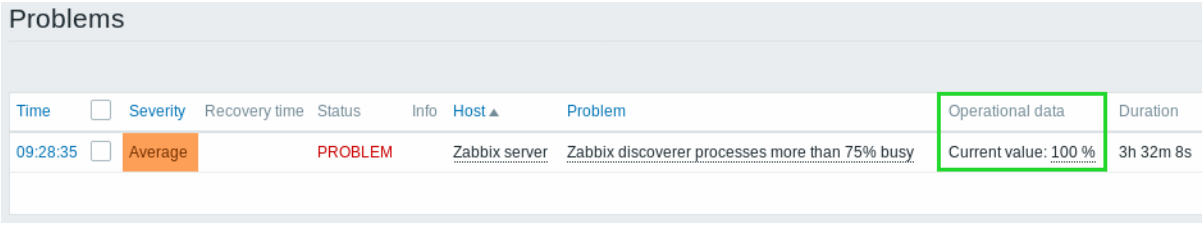
- Web monitoring
- HTTP items



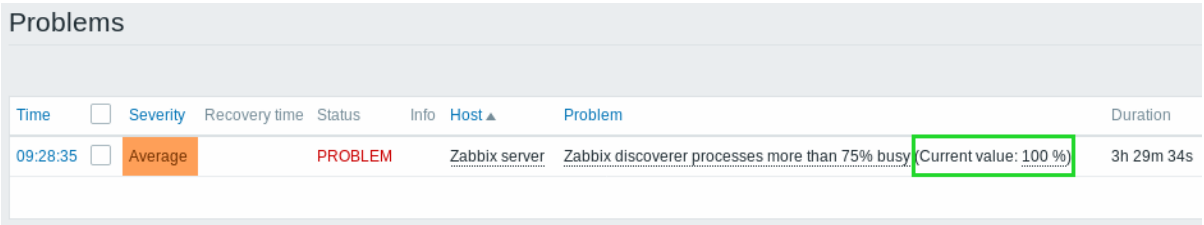
Live/operational data of problems It is now possible to configure ways of displaying operational data for current problems, i.e. the latest item values as opposed to the item values at the time of the problem.

Operational data display can be configured in the filter of *Monitoring → Problems* or in the configuration of the respective dashboard widget, by selecting one of the three options:

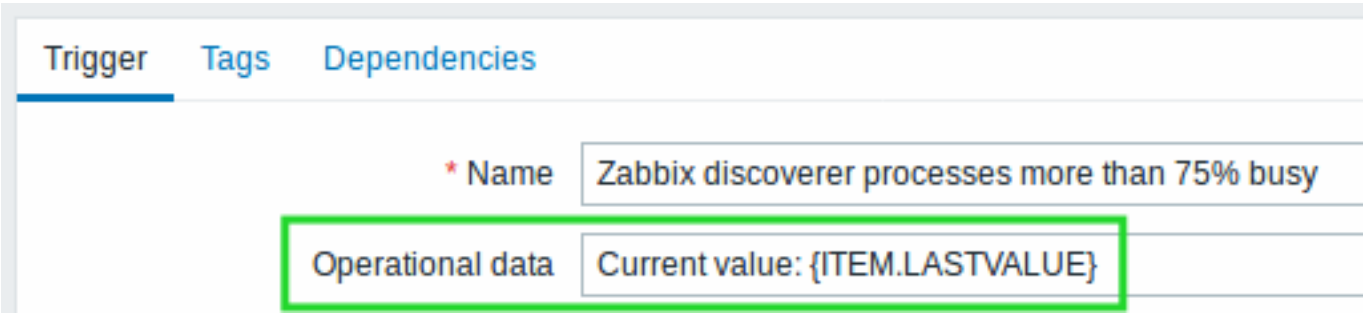
- *None* - no operational data is displayed
- *Separately* - operational data is displayed in a separate column (in this case it replaces the *Latest values* column from the previous version)



- *With problem name* - operational data is appended to the problem name and in parentheses



The content of operational data can be configured with each trigger that now has a new *Operational data* field. This field accepts an arbitrary string with macros, most importantly, the {ITEM.LASTVALUE<1-9>} macro.



Operational data can also be included in notifications using the new {EVENT.OPDATA} macro.

Database monitor may return multiple rows/columns A new database monitor item has been added:

`db.odbc.get[unique_description,data_source_name]`

Compared to the `db.odbc.select[]` item that has already been available in previous versions, the new item is capable of returning values from **multiple** rows and columns, formatted as JSON.

Thus it may be used as a master item gathering all required metrics in one system call. JSONPath preprocessing can be used in dependent items to extract individual values from this master item.

The new item may also be used for low-level discovery using ODBC SQL queries.

Compared to the `db.odbc.discovery[]` item from previous versions, this item does not define low-level discovery macros in the returned JSON, however, these macros can be defined by the user as required, using the custom LLD macro functionality with JSONPath to point to the required values in the returned JSON.

Low-level discovery Low-level discovery of block devices

Low-level discovery of block devices and their type is supported using a new built-in discovery key:

```
vfs.dev.discovery
```

The discovery will return a JSON with the values of two macros - {#DEVNAME} and {#DEVTYPE}, identifying the block device name and type respectively.

These macros can be used to create item prototypes using the `vfs.dev.read[]` and `vfs.dev.write[]` agent items, i.e. `vfs.dev.read[{#DEVNAME},sps]`. See also: Discovery of block devices.

Low-level discovery of systemd services

Low-level discovery of systemd units (services, by default) is supported using a new built-in discovery key:

```
systemd.unit.discovery
```

> **Attention:**
> This item key is only supported in Zabbix agent 2.

The discovery will return a JSON with the values of several macros, identifying various systemd unit properties. These macros can be used to create item prototypes using the new `systemd.unit.info[]` item key, for example `systemd.unit.info["{#UNIT.NAME}",Loac`

See also:

- Discovery of systemd services
- Zabbix agent items (new item keys)

JMX MBean discovery with non-ASCII characters

There is now a new item for JMX MBean discovery that does not generate low-level discovery macros and therefore can return values without the limitations associated with LLD macro name generation (for example, hyphens, square brackets and non-ASCII characters):

`jmx.get[<discovery_mode>,<object_name>]`

The `jmx.discovery[]` item from previous versions, if it encountered JMX MBean properties that could not be converted into a macro name (because of characters not supported in LLD macro name generation), had to ignore these properties.

The new `jmx.get[]` item does not generate LLD macro names in the returned JSON. Instead, LLD macro names may be defined in the custom macro tab of a discovery rule, using JSONPath for pointing to the required values.

See also: Discovery of JMX objects

WMI discovery

A new Windows agent item has been added:

`wmi.getall[<namespace>,<query>]`

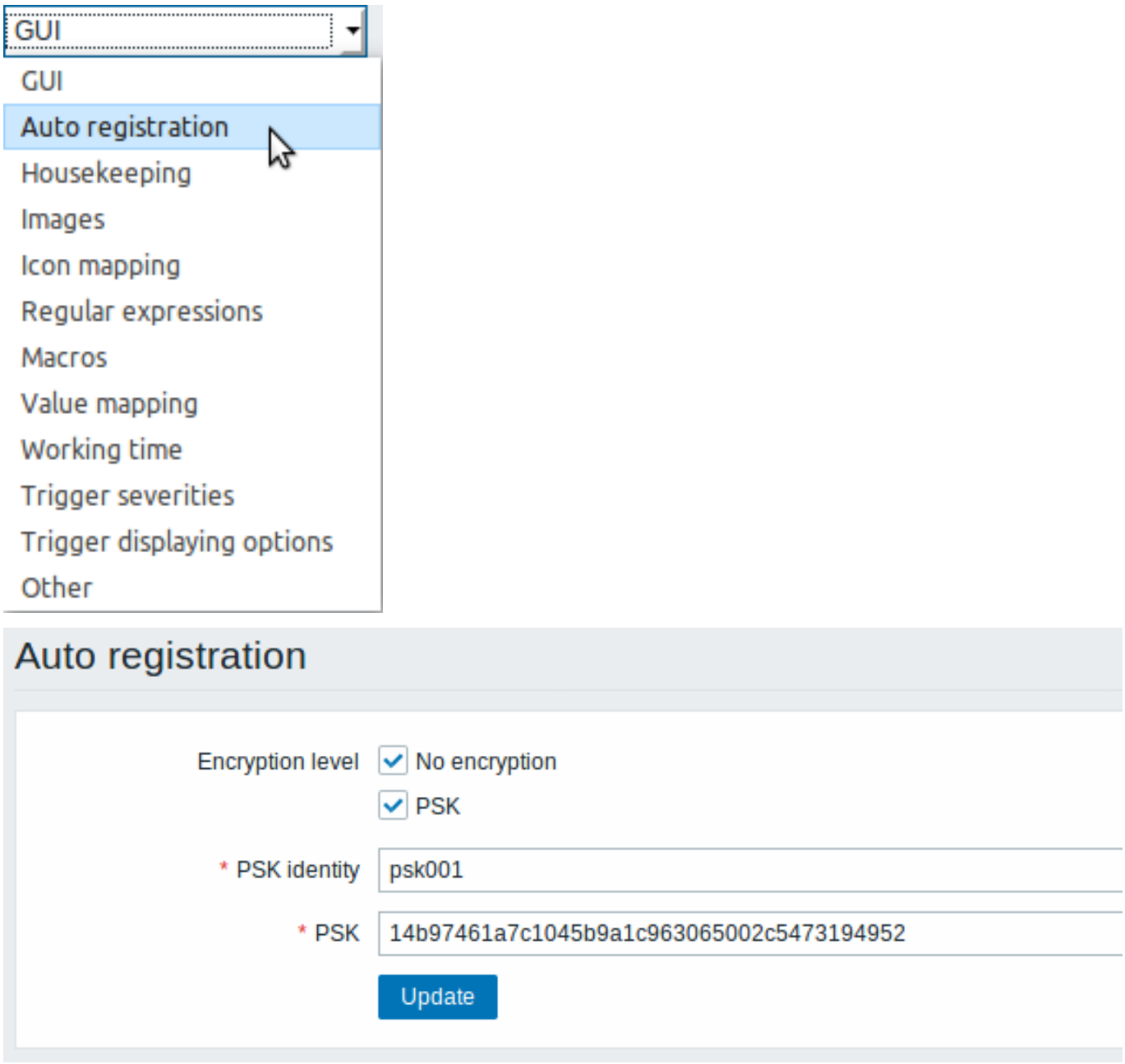
Compared to the `wmi.get[]` item that has already been available in previous versions, the new item is capable of returning the entire response of the query, formatted as JSON. JSONPath preprocessing can be used to point to more specific values in the returned JSON.

The new item may be used for low-level discovery using WMI queries.

Even though this item does not define low-level discovery macros in the returned JSON, the macros can be defined by the user as required, using the custom LLD macro functionality with JSONPath to point to the required values in the returned JSON.

Secure autoregistration Previously all communications during agent autoregistration were performed unencrypted. In the new version a secure way of autoregistration is possible by configuring PSK-based authentication with encrypted connections.

The level of encryption is configured globally in *Administration* → *General*, in the new Autoregistration section accessible through the dropdown to the right. It is possible to select no encryption, TLS encryption with PSK authentication or both (so that some hosts may register without encryption while others through encryption):



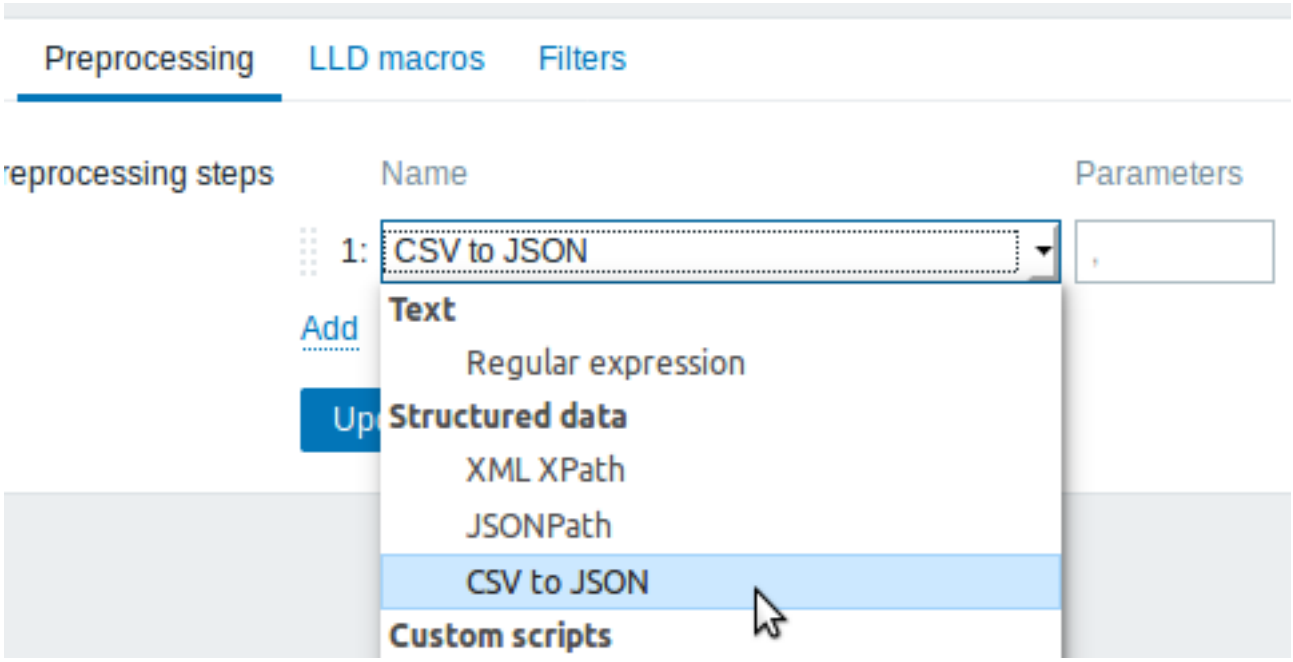
Authentication by PSK is verified by Zabbix server before adding a host. If successful, the host is added and *Connections from/to host* are set to 'PSK' only with identity/pre-shared key the same as in the global autoregistration setting.

Autoregistration with DNS name It is now possible to specify that the host should be autoregistered with the DNS name as the default agent interface. To do that, the DNS name should be specified/returned as the value of either 'HostInterface' or 'HostInterfaceItem' configuration parameters. Note that if the value of one of the two parameters changes, the autoregistered host interface is updated. So it is possible to update the default interface to another DNS name or an IP address. For the changes to take effect though, the agent has to be restarted. 'HostInterface' or 'HostInterfaceItem' configuration parameters are supported since Zabbix 4.4.

Longer host names allowed in discovery Maximum allowed length of a host name has been lifted from 64 characters to 128 characters in host discovery and active agent auto-registration.

Extended item value preprocessing options CSV to JSON conversion

It is now possible to convert CSV file data into JSON format.



See also: CSV to JSON preprocessing

Custom error handling

Custom error handling is now also available for the following preprocessing steps:

```
* Check for error in JSON
* Check for error in XML
* Check for error using regular expression
```

The *Custom on fail* checkbox is available in these preprocessing steps for regular items and item prototypes. For low-level discovery rules the *Custom on fail* checkbox is made available for 'Check for error in JSON' and 'Check for error in XML' preprocessing steps.

In a typical use case of custom error handling, data can be skipped if an error message is found.

More options for LLD rule preprocessing

More preprocessing options have been added to low-level discovery rules:

- XML Xpath
- CSV to JSON (new in 4.4)
- Check for error in XML

Host names included in real-time export Host names are now included in the real-time export of events, item values and trends (previously only the visible host name was exported). Note that the export protocol has changed with host name information now an object, rather than a string/array.

Value types included in real-time export Value types are now included in the real-time export of item values and trends. See the export protocol for more details.

New templates New official templates are available for monitoring:

Linux

The new Linux monitoring templates come in three flavours:

- *Template OS Linux by Zabbix agent*, *Template OS Linux by Zabbix agent active* - Linux monitored via Zabbix agent (modular)
  - depend on *Template Module Zabbix agent*, which should be imported/updated first
- *Template OS Linux by Prom* - Linux monitored via node exporter (monolithic)
- *Template OS Linux SNMPv2* - Linux monitored via SNMPv2 (modular)
  - depends on *Template Module Generic SNMPv2*, which should be imported/updated first
  - depends on *Template Module Interfaces SNMPv2*, which should be imported/updated first

Windows

- *Template OS Windows by Zabbix agent*, *Template OS Windows by Zabbix agent active* - Windows monitored via Zabbix agent. These templates are supported for Windows Server 2008/Vista and above.

Cisco UCS server

- *Template Server Cisco UCS SNMPv2* - Cisco UCS server monitoring template

Nginx

- *Template App Nginx by Zabbix agent* - collects metrics by polling ngx_stub_status_module locally with Zabbix agent (see description);
- *Template App Nginx by HTTP* - collects metrics by polling ngx_stub_status_module with HTTP agent remotely (see description).

Apache

- *Template App Apache by Zabbix agent* - collects metrics by polling mod_status locally with Zabbix agent (see description);
- *Template App Apache by HTTP* - collects metrics by polling mod_status with HTTP agent remotely (see description).

RabbitMQ

- *Template App RabbitMQ cluster by Zabbix agent* and *Template App RabbitMQ node by Zabbix agent* - collect metrics by polling RabbitMQ management plugin with Zabbix agent locally;
- *Template App RabbitMQ cluster by HTTP* and *Template App RabbitMQ node by HTTP* - collect metrics by polling RabbitMQ management plugin with HTTP agent remotely.

MySQL/MariaDB

- *Template DB MySQL by Zabbix agent* - see requirements for operating this template.

PostgreSQL

- *Template DB PostgreSQL* - see requirements for operating this template.

You can get these templates:

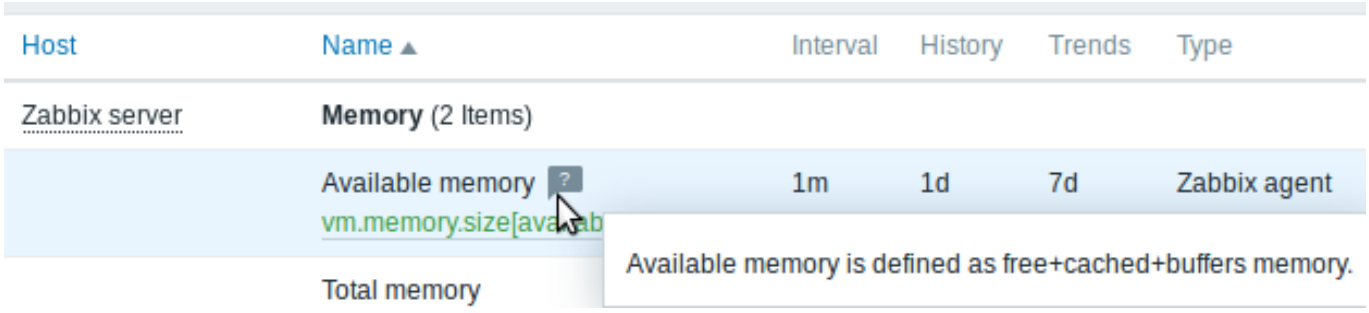
- In *Configuration → Templates* in new installations;
- If you are upgrading from previous versions, you can download the latest templates from the Zabbix Git repository. Then, while in *Configuration → Templates* you can import them manually into Zabbix. If templates with the same names already exist, the *Delete missing* options should be checked when importing to achieve a clean import. This way the old items that are no longer in the updated template will be removed (note that it will mean losing history of these old items).

Internal knowledge base Item and trigger descriptions allow to share knowledge in Zabbix across various users. These descriptions may explain what an item does or what the nature of the problem is. Now it is easier to notice and view this information in latest data and problem screens.

Item description in latest data

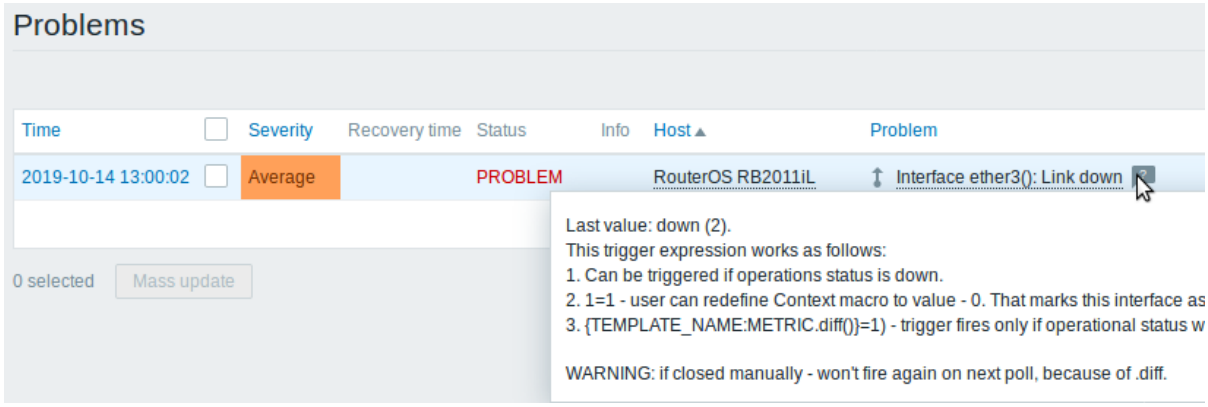
Item description now can be viewed in the *Latest data* section.

An icon with a question mark is displayed next to the item name for all items that have a description. If you position the mouse cursor on this icon, the item description is displayed as a tooltip.



Trigger description for problems

An icon with a question mark is displayed next to the problem name for all problems that have a description. If you position the mouse cursor on this icon, the description of the underlying trigger is displayed as a tooltip.



Problem description is also available in event details.

Jabber, Ez Texting media types removed Jabber and Ez Texting media types for delivering notifications have been removed.

If these media types are present in your existing installation, during the upgrade they will be replaced by a script media type with all relevant parameters preserved. However, notifications via Jabber and Ez Texting will not work any more.

Export/import Media type export

For easier sharing of media types, including the new webhooks, media types can now be exported and imported.

The export files support the new human-readable format (see below) implemented for host/template export.

Human-readable export files of hosts/templates

Previous implementation of XML/JSON import required the presence of all attributes, even if they were empty or irrelevant. That made the export files extremely long and hardly readable.

In the new version much smaller and simpler export files are produced:

- There is a very limited number of mandatory attributes
- Non-mandatory attributes are exported only if they have a value and the value is different from the default
- Attribute values are now exported in a readable string format, replacing many integers

|<| |<| |-| |<|

See also:

- Template export format
- Host export format

Including triggers within host tags

Previously all triggers in host/template export were listed after the host information. Now, to achieve better readability, triggers that are based on one host item only in problem and recovery expression are listed within the tags of the respective host item.

Additionally the expression tag of these triggers does not reference the host or item, but only the function (`{last()}<>0` in the example):

```
    <hosts>
        <host>
            <host>Host</host>
            ...
            <items>
                <item>
                    <name>Item</name>
                    <key>item.key</key>
                    ...
                    <triggers>
                        <trigger>
                            <expression>{last()}<>0</expression>
                            <name>Item value not 0</name>
                        </trigger>
                    </triggers>
                </item>
            </items>
```

```
        </host>
    </hosts>
```

The same change affects simple trigger prototypes that are placed under <item_prototype><trigger_prototypes>.

However, triggers that are more complex and contain several host items are listed within separate <triggers> tags, as before.

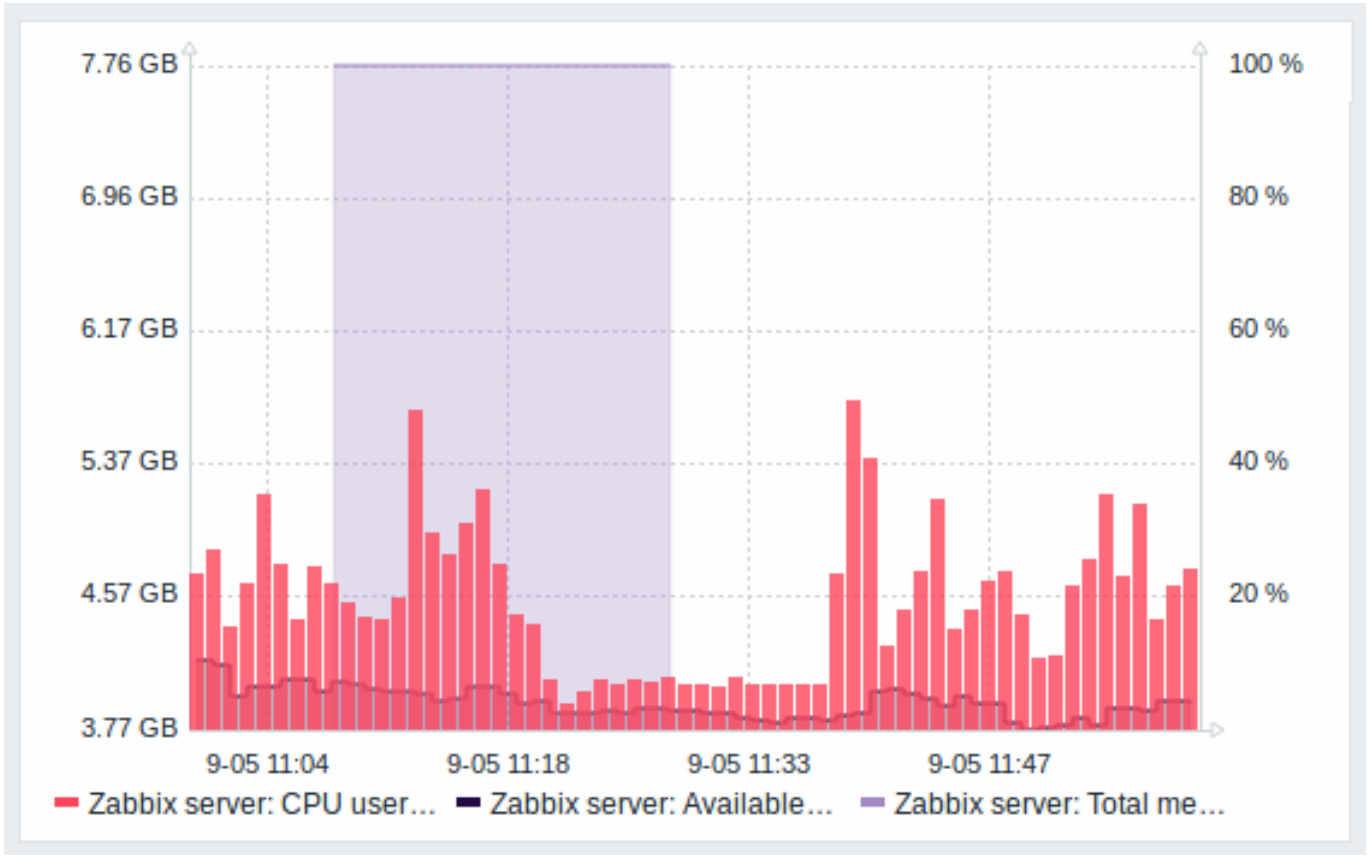
Frontend Default dashboard

The default dashboard shipped with new installations (*Global view*) has been improved:

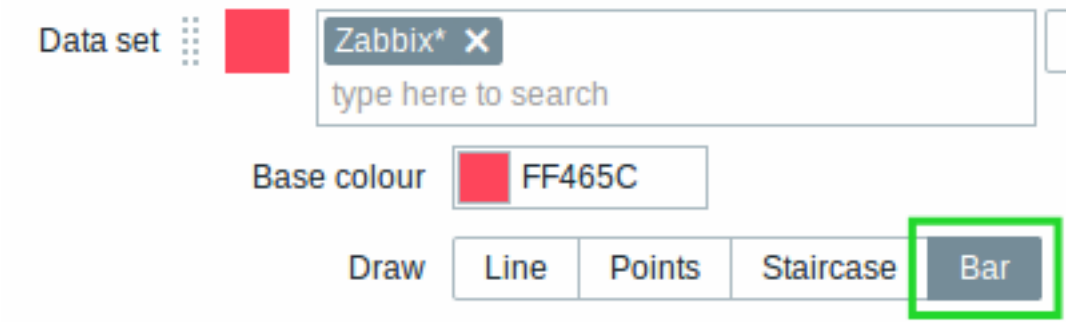
- An aggregated view of problems has been added with the updated *Problems by severity* widget
- The new *Host availability* widget has been added
- Several widgets now have hidden headers including the *Clock* widget

Bar graphs

Graph values in the graph widget can now be displayed as bars.



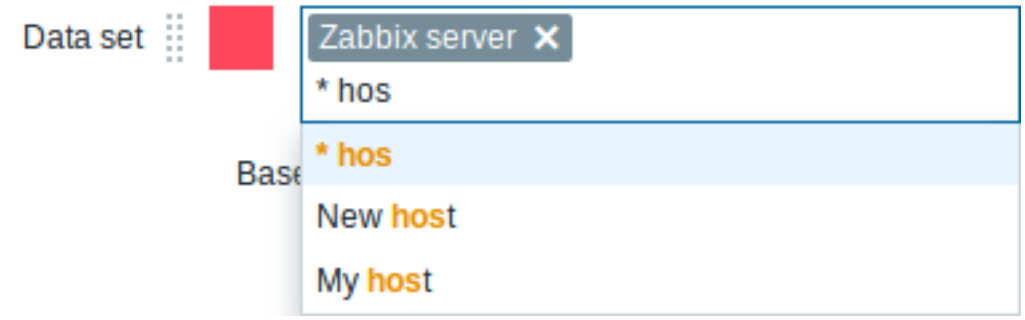
To display values as bars, when configuring the data set of the graph, select *Bar* as the draw option:



Multi-select field for selecting graph items

Previously multiple item selection in the new graph widget (introduced in Zabbix 4.0) worked by separating the items with a comma. That created a limitation for selecting items already having a comma, a legitimate symbol, in the name.

To lift this limitation, in the new version, both host and item selection is implemented as multi-select fields where a comma is no longer needed as a separator. The functionality to specify host/item names with a wildcard is also retained. To specify a name with wildcard, just enter the string manually and press *Enter*. While you are typing, note how all matching entities are displayed in the dropdown.

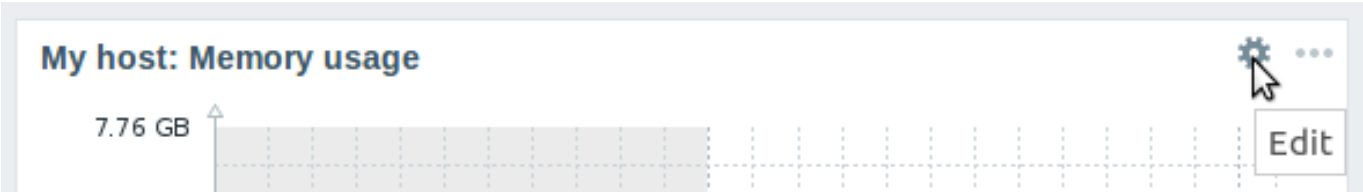


24 column grid in dashboard

The horizontal limit of allowed dashboard widgets has been raised from 12 to 24 columns.

Instant editing for dashboard widgets

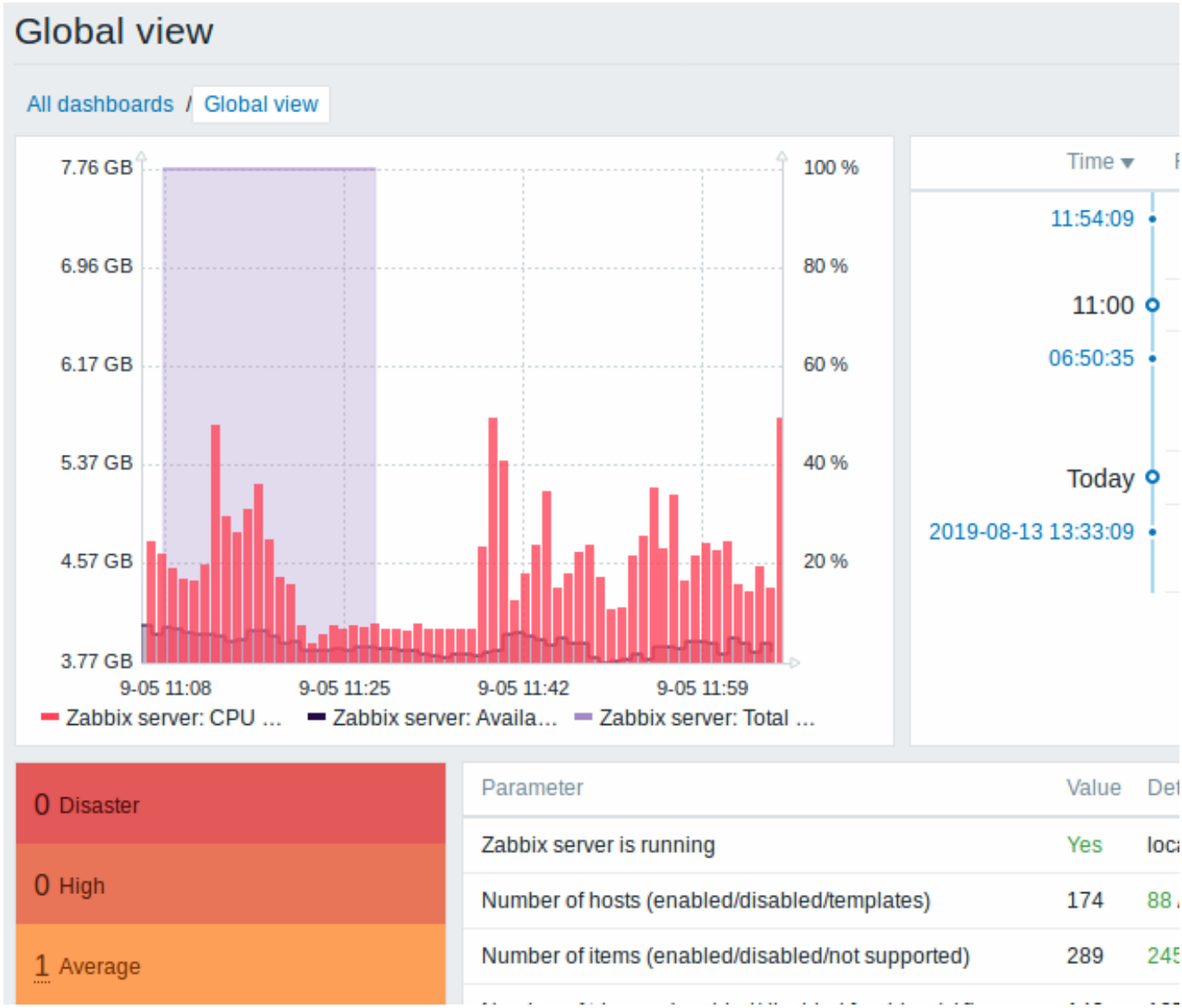
Dashboard widget editing can now be accessed with one mouse click.



Once the editing button is clicked, the widget editing form is opened and the whole dashboard goes into editing mode.

Hiding widget headers

To use dashboard space more efficiently, a possibility to hide widget headers has been added, allowing to show more content in the widgets. This setting can be configured individually for each widget in their configuration (the **Show headers** checkbox). If the headers are set to be hidden, they'll still appear on widget focusing by mouse or keyboard.



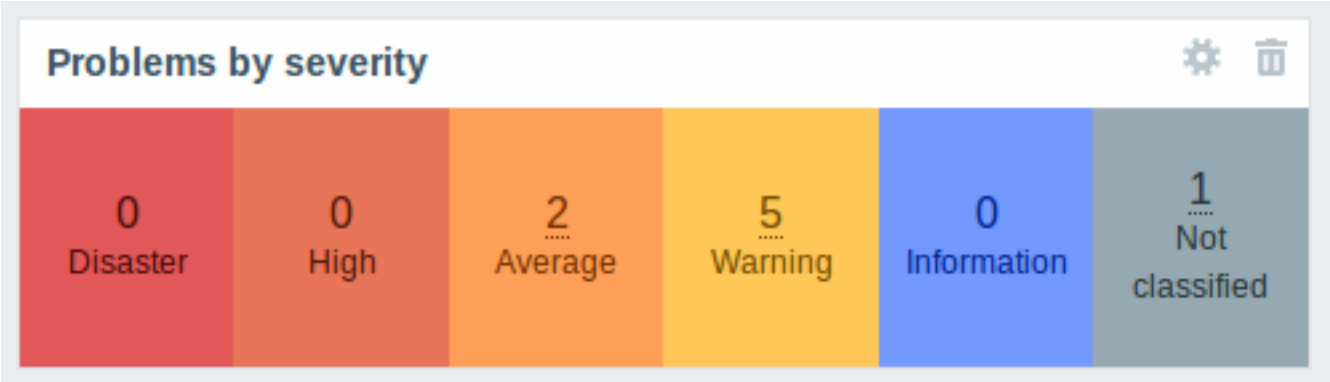
Dashboard usability

- The widget editing experience has been improved. Several fixes have been made related to better widget focusing while in the edit mode, more usable widget resizing and repositioning.
- The last widget type is now remembered - when adding a new widget to the dashboard, its type is selected based on the widget that was last selected.

Problems by severity widget extended

The *Problems by severity* widget has been extended with the option to show problem totals for multiple selected host groups and hosts:

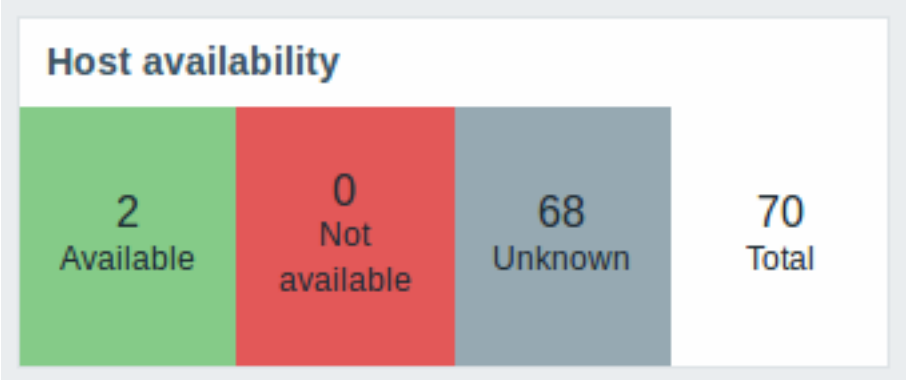
The totals can be displayed in horizontally or vertically stacked blocks:

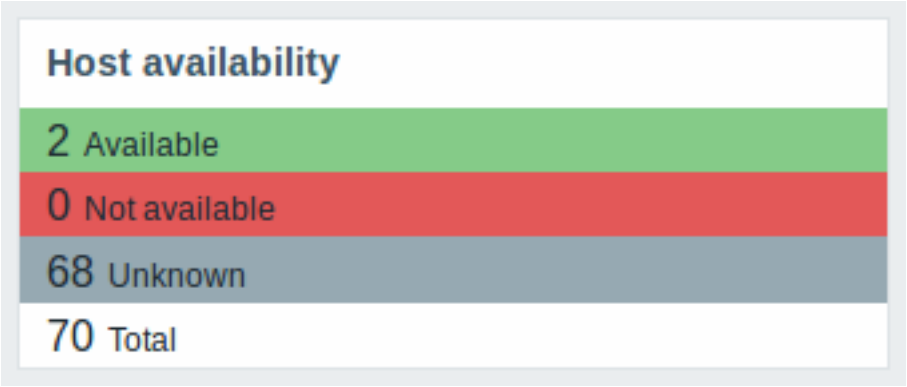


New host availability widget

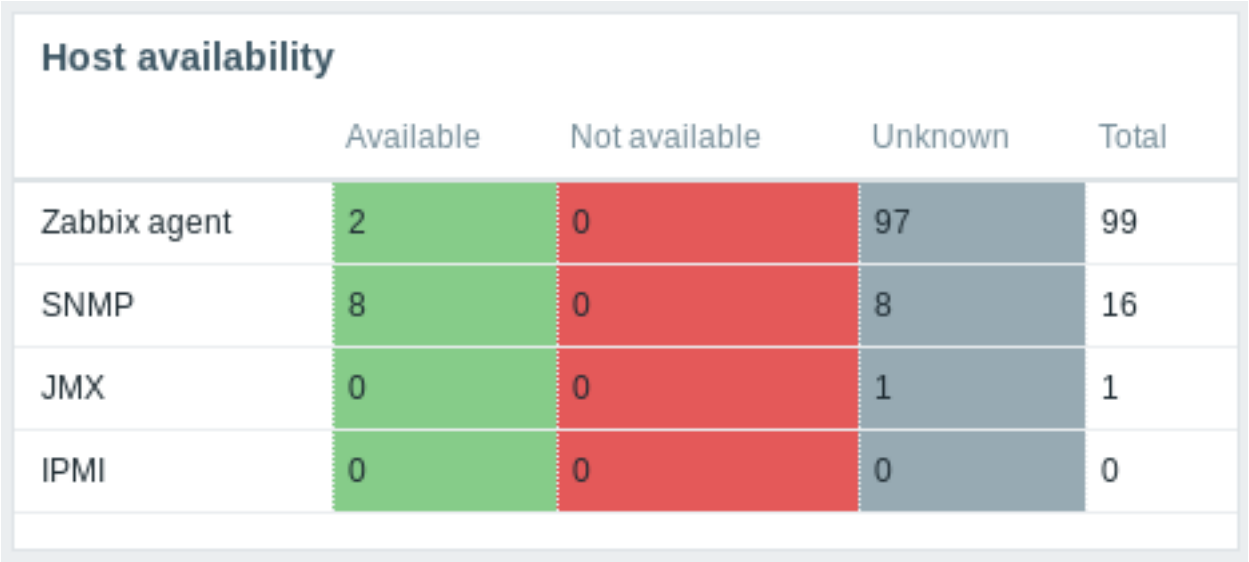
A new host availability widget has been added to available dashboard widgets. This widget is similar as the *Host info* screen element and displays high-level statistics of host availability based on the selected host groups.

The availability statistics can be displayed in horizontally or vertically stacked blocks:



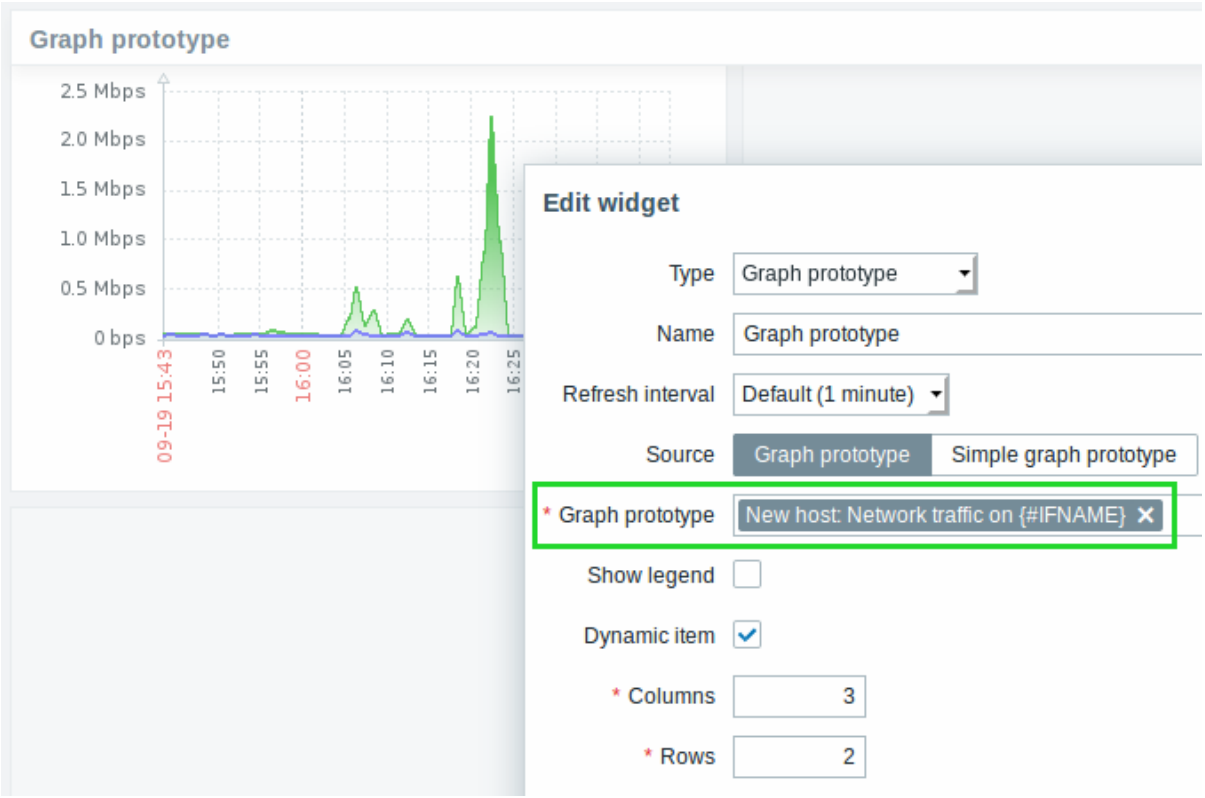


In this widget it is also possible to separately display host availability statistics for any number of host interface types (Zabbix agent, SNMP, JMX, IPMI).



New graph prototype widget

A new graph prototype widget has been added to the dashboard. In it you can display a grid of one or more graphs created from a single graph prototype by low-level discovery.



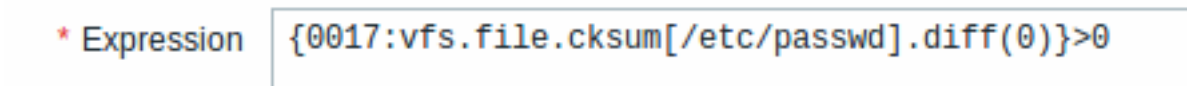
Cannot support audio notification notice

"Cannot support notification audio for this device." message will be displayed when notification sounds on the device cannot be played.

Monospaced fonts in trigger expression/command fields

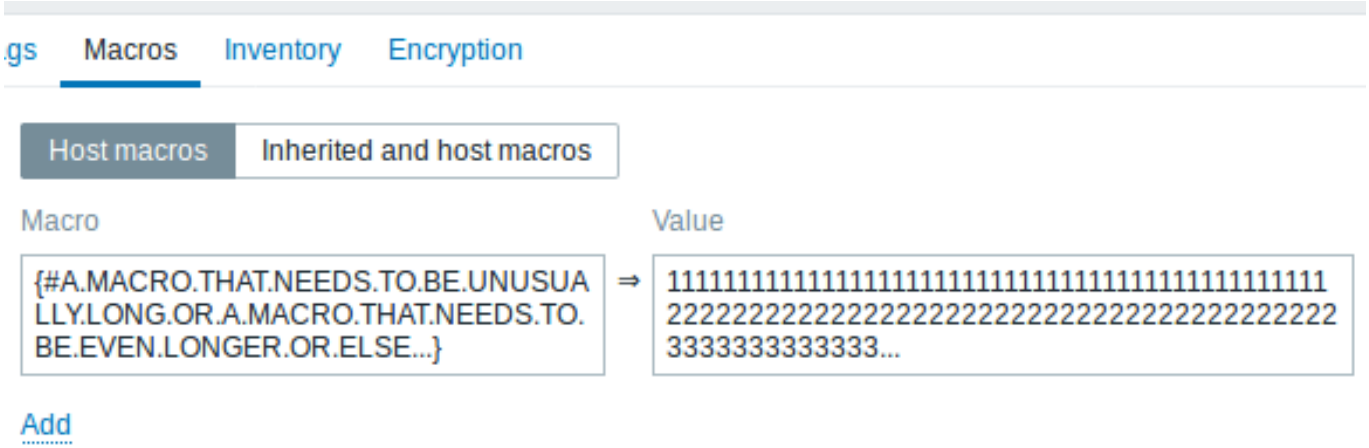
For better readability, text area fonts have been changed to monospace in the following locations:

- Trigger expression and recovery expression field
- Executed script field of SSH/Telnet agent items
- Formula field of calculated items
- SQL query field of database monitor items
- Command field of global scripts
- Remote command field in action configuration



Longer input fields

Input fields that potentially may hold long names or values have been increased to 300 pixels and are also increasing dynamically to a new line when typing:



This change has been implemented in:

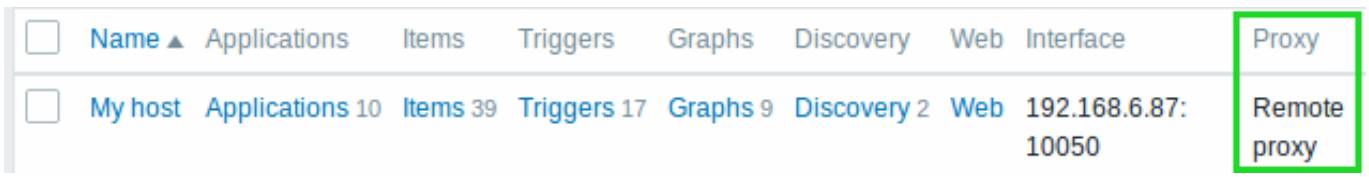
- Host and template configuration forms (tags and macros)
- Trigger and trigger prototype configuration forms (tags)
- Host, template and trigger mass update forms (tags)
- Low-level discovery rule configuration form (LLD macros)
- *Administration* → *General* → *Macros*
- Item, item prototype and LLD rule configuration forms (test item preprocessing)

Separate proxy columns

Proxy information has been split into a separate column in several places in the frontend:

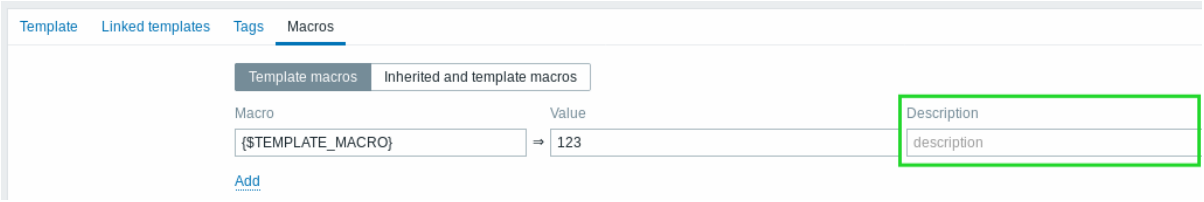
- the host list in *Configuration* → *Hosts*
- the discovery rule list in *Configuration* → *Discovery*
- *Administration* → *Queue* (with *Details* selected in the dropdown)

So, for example, if previously host names of the hosts monitored by a proxy were prefixed with the proxy name, now the proxy name is listed in a separate column.



Macros

- {EVENT.ID} is now supported in trigger URLs, allowing to construct complete URLs to problem details.
- It is now possible to add a description to user macros:



Performance Items table split

The `items` table was previously used by both frontend and the server, resulting in undesirable locking of rows at times when, for example, the server would update fields related to 'log' items. To resolve this situation, realtime fields (*lastlogsize*, *state*, *mtime*, *error*) have been split into a separate table called `item_rtdata`.

6 What's new in Zabbix 4.4.1

Macros

A new {EVENT.RECOVERY.NAME} macro is supported, returning the recovery event name.

{TRIGGER.ID} macro is now supported in trigger tag values. It may be useful for identifying triggers created from trigger prototypes and, for example, suppressing problems from these triggers during maintenance.

Acknowledged problems in trigger overview

The icon that indicates an acknowledged problem in Monitoring → Overview now is displayed only if all problems or resolved problems of the trigger are acknowledged. Previously it was enough for the last problem to be acknowledged.

7 What's new in Zabbix 4.4.2

Problem export to CSV

Export to CSV in *Monitoring* → *Problems* now exports problems from all pages, not just the selected page. Filter settings are still obeyed.

Macros

Support for the new {EVENT.TAGS.<tag name>} macro has been added. For more information, see Supported macros.

Agent 2 configuration parameters

The following general configuration parameters have been moved to plugin configuration parameters:

- EnableRemoteCommands → Plugins.SystemRun.EnableRemoteCommands
- LogRemoteCommands → Plugins.SystemRun.LogRemoteCommands
- MaxLinesPerSecond → Plugins.Log.MaxLinesPerSecond

The internal plugin Configurator API also has been changed: another parameter has been added to the Configure() function, the format of passed plugin parameters to the Configure() function has been changed and the Validate() function has been added to validate plugin specific configuration.

Guest user disabled

The "guest" user is now disabled by default in new installations.

Guest user info

In previous versions, when logged in as guest, there was no way to tell what user you were logged in as, because the profile icon was hidden for the guest user. In the new version a slightly different version of the profile icon is displayed when you are logged in as guest - . This icon is not clickable and does not lead to the user profile. When the mouse is positioned over it, info is displayed with the name 'guest' to suggest the currently logged in user.

Webhook media type test usability improved

When performing a webhook media type test, it is now possible to see webhook script response type and webhook script response data in the test modal window.

8 What's new in Zabbix 4.4.3

This minor version contains no functional changes.

9 What's new in Zabbix 4.4.4

Webhook integrations

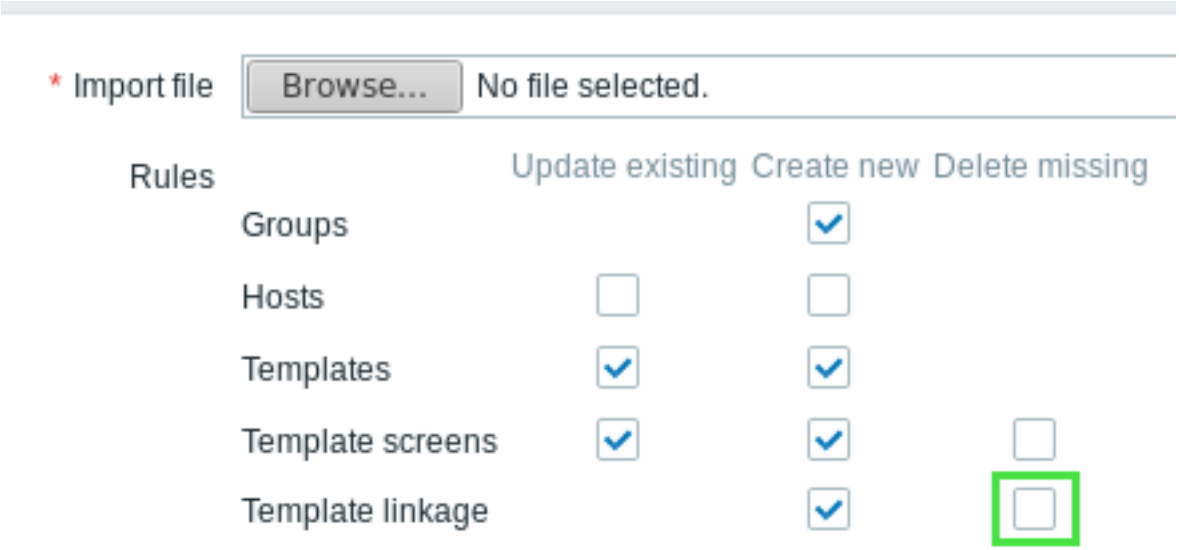
Several new integrations are available allowing to use webhook media types for pushing Zabbix notifications to:

- Opsgenie
- Mattermost
- Pushover

See also: Webhook media type

Import option to remove existing template linkage

During host or template import it is now possible to update template linkage using the *Delete missing* option. If using this option any template linkage that does not also exist in the import file will be deleted from the existing host/template along with **all** entities inherited from these unlinked templates (items, triggers, etc).



By default this option is unchecked and before it is possible to mark this checkbox a warning message is displayed that all inherited entities may be lost as a result.

Zabbix agent 2 (Windows)

Zabbix agent 2 can now be compiled from sources on the Windows platform.

Escaping special characters from LLD macro values in JSONPath

When low-level discovery macros are used in JSONPath preprocessing and their values are resolved, new rules of escaping special characters are applied:

- only backslash (\) and double quote (") characters are considered for escaping;
- if the resolved macro value contains these characters, each of them is escaped with a backslash;
- if they are already escaped with a backslash, it is not considered as escaping and both the backslash and the following special characters are escaped once again.

For more information, see Escaping special characters from LLD macro values in JSONPath.

10 What's new in Zabbix 4.4.5

Webhook integrations

New integrations are available allowing to use the webhook media type for pushing Zabbix notifications to:

- Pagerduty
- Slack

Redis agent plugin

A Redis plugin in Zabbix agent 2 is now available as part of the out-of-the-box monitoring of Redis instances and clusters.

New items

A new `vfs.fs.get` agent item has been added that returns a JSON with filesystem data including such details as the mountpoint name, mountpoint type, filesystem size and inode metrics.

See a working example of how this item can be used in discovery.

Zabbix JS utility

zabbix_js is a new command line utility that can be used for embedded script testing. See more information.

Cannot support audio notification notice

"Cannot support notification audio for this device." message will be displayed when notification sounds on the device cannot be played.

New templates

HAProxy

- *Template App HAProxy by HTTP* - collects metrics by polling HAProxy Stats Page with HTTP agent remotely (see description);
- *Template App HAProxy by Zabbix agent* - collects metrics by polling HAProxy Stats Page locally with Zabbix agent (see description).

Redis

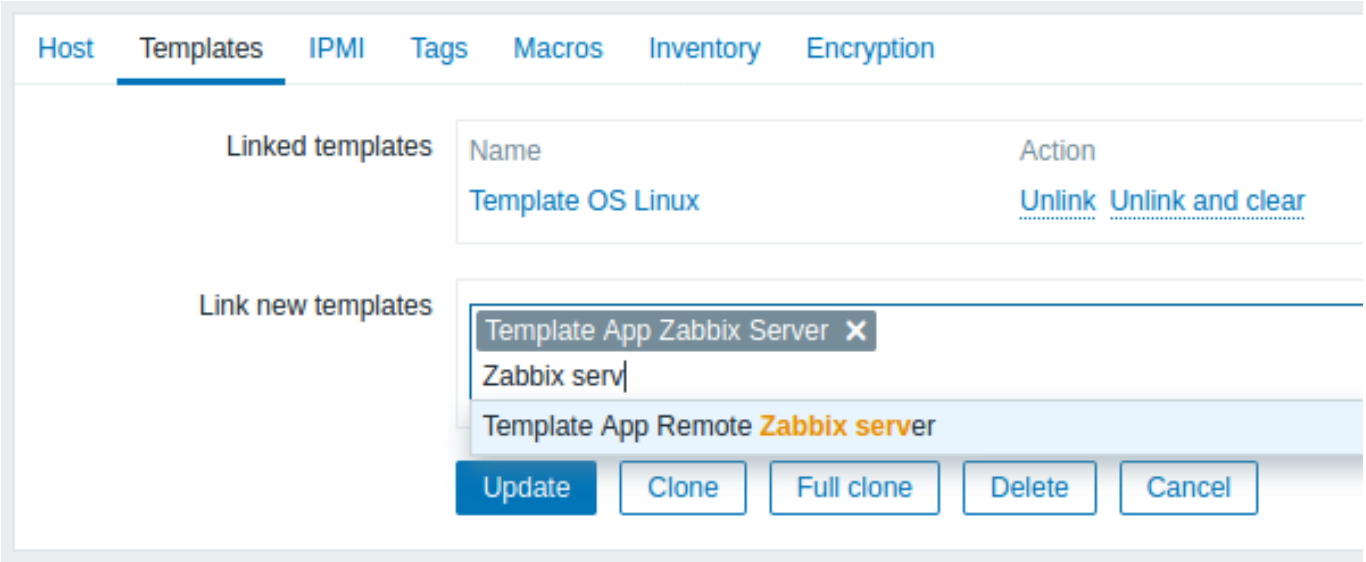
- *Template DB Redis* - collects metrics from Redis by polling the new Zabbix agent 2 (see description).

You can get these templates:

- In *Configuration* → *Templates* in new installations;
- If you are upgrading from previous versions, you can download these templates from Zabbix Git repository or find them in the `templates` directory of the downloaded latest Zabbix version. Then, while in *Configuration* → *Templates* you can import them manually into Zabbix.

Template linkage

When linking a template to a host or another template, it is now possible to start typing the template name in the *Link new templates* field and then scroll down to select the template from the list of matching template names.



Alternatively, it is also possible to click on *Select* next to the field and select one or more templates from the list in a popup window.

The templates that have been selected in the *Link new templates* field are linked to the host/template as soon as the configuration form is saved/updated.

11 What's new in Zabbix 4.4.6

Discord webhook integration

Discord integration is available allowing to use the webhook media type for pushing Zabbix notifications to Discord

libssh support

Support of the libssh library (starting from version 0.6.0) has been added. Previously only libssh2 was supported for SSH checks.

New template

Template DB MySQL by ODBC has been added. See requirements for operating this template.

DB character set and collation check

A check for the correct character set and collation is now performed on the database, database tables and table fields during the initial frontend installation. If the check fails a warning message is displayed.

A warning message is also displayed in *Reports* → *System information*.

See also instructions for changing database character set and collation in MySQL.

Internal events can be disabled

Internal events will not be created, if all internal actions for them are disabled --- this can be useful for reducing the amount of event records and controlling the size of the event tables. See more information.

12 What's new in Zabbix 4.4.7

Log items

Two new options have been added to the `log`, `log.count`, `logrt` and `logrt.count` items:

- *mtime-reread* - non-unique records, reread file if its modification time changes but size does not
- *mtime-noreread* - non-unique records, do not reread file if its modification time changes but size does not

For `log` and `log.count` items these options have been added as a new <options> parameter, e.g.

`log[file,<regexp>,<encoding>,<maxlines>,<mode>,<output>,<maxdelay>,<options>]`

For `logrt` and `logrt.count` these options have been added to the already existing <options> parameter.

Zabbix agent 2

A new command line option has been added to Zabbix agent 2:

`-v, --verbose`

to be used with `-t`/`-p` options. It will print debugging information, which might be useful for plugin developers.

JSONPath

Zabbix implementation of JSONPath now supports the extraction of matching element names with a ~ suffix. It returns the name of the matched object or an index in string format of the matched array item.

Encryption

User-configured ciphersuites are now supported for GnuTLS and OpenSSL.

13 What's new in Zabbix 4.4.8

Javascript functions

The support of base64 encoding/decoding functions has been added to Javascript preprocessing and webhooks.

Use of relative URLs

Relative paths are now allowed in a URL field.

Zabbix agent 2

Now Zabbix agent 2 can be compiled with older OpenSSL versions (starting from 1.0.1) for using on RHEL 6 and 7, CentOS 6 and 7, Ubuntu 14.04 and 16.04.

Redis plugin update

Configuration parameter `Plugins.Redis.Password` was removed and an opportunity to pass a password as a key parameter has now been added. See Redis plugin metrics for details.

Webhook integrations

New integration is available allowing to use the webhook media type for pushing Zabbix notifications to Telegram.

14 What's new in Zabbix 4.4.9

Cache size configuration parameter

The maximum value of the CacheSize configuration parameter for Zabbix server/proxy has been increased from 8GB to 64GB.

15 What's new in Zabbix 4.4.10

Modification time ignored in log, log.count items

File modification time is now ignored in log and log.count items.

16 What's new in Zabbix 4.4.11

2. Definitions

Overview In this section you can learn the meaning of some terms commonly used in Zabbix.

Definitions ***host***

- a networked device that you want to monitor, with IP/DNS.

host group

- a logical grouping of hosts; it may contain hosts and templates. Hosts and templates within a host group are not in any way linked to each other. Host groups are used when assigning access rights to hosts for different user groups.

item

- a particular piece of data that you want to receive off of a host, a metric of data.

value preprocessing

- a transformation of received metric value before saving it to the database.

trigger

- a logical expression that defines a problem threshold and is used to "evaluate" data received in items.

When received data are above the threshold, triggers go from 'Ok' into a 'Problem' state. When received data are below the threshold, triggers stay in/return to an 'Ok' state.

event

- a single occurrence of something that deserves attention such as a trigger changing state or a discovery/agent auto-registration taking place.

event tag

- a pre-defined marker for the event. It may be used in event correlation, permission granulation, etc.

event correlation

- a method of correlating problems to their resolution flexibly and precisely.

For example, you may define that a problem reported by one trigger may be resolved by another trigger, which may even use a different data collection method.

problem

- a trigger that is in "Problem" state.

problem update

- problem management options provided by Zabbix, such as adding comment, acknowledging, changing severity or closing manually.

action

- a predefined means of reacting to an event.

An action consists of operations (e.g. sending a notification) and conditions (*when* the operation is carried out)

escalation

- a custom scenario for executing operations within an action; a sequence of sending notifications/executing remote commands.

media

- a means of delivering notifications; delivery channel.

notification

- a message about some event sent to a user via the chosen media channel.

remote command

- a pre-defined command that is automatically executed on a monitored host upon some condition.

template

- a set of entities (items, triggers, graphs, screens, applications, low-level discovery rules, web scenarios) ready to be applied to one or several hosts.

The job of templates is to speed up the deployment of monitoring tasks on a host; also to make it easier to apply mass changes to monitoring tasks. Templates are linked directly to individual hosts.

application

- a grouping of items in a logical group.

web scenario

- one or several HTTP requests to check the availability of a web site.

frontend

- the web interface provided with Zabbix.

dashboard

- customizable section of the web interface displaying summaries and visualisations of important information in visual units called widgets.

widget

- visual unit displaying information of a certain kind and source (a summary, a map, a graph, the clock, etc), used in the dashboard.

Zabbix API

- Zabbix API allows you to use the JSON RPC protocol to create, update and fetch Zabbix objects (like hosts, items, graphs and others) or perform any other custom tasks.

Zabbix server

- a central process of Zabbix software that performs monitoring, interacts with Zabbix proxies and agents, calculates triggers, sends notifications; a central repository of data.

Zabbix agent

- a process deployed on monitoring targets to actively monitor local resources and applications.

Zabbix proxy

- *a process that may collect data on behalf of Zabbix server, taking some processing load off of the server.*

encryption

- *support of encrypted communications between Zabbix components (server, proxy, agent, zabbix_sender and zabbix_get utilities)* using Transport Layer Security (TLS) protocol.

network discovery

- *automated discovery of network devices*.

low-level discovery

- *automated discovery of low-level entities on a particular device* (e.g. file systems, network interfaces, etc).

low-level discovery rule

- *set of definitions for automated discovery of low-level entities* on a device.

item prototype

- *a metric with certain parameters as variables, ready for low-level discovery*. After low-level discovery the variables are automatically substituted with the real discovered parameters and the metric automatically starts gathering data.

trigger prototype

- *a trigger with certain parameters as variables, ready for low-level discovery*. After low-level discovery the variables are automatically substituted with the real discovered parameters and the trigger automatically starts evaluating data.

Prototypes of some other Zabbix entities are also in use in low-level discovery - graph prototypes, host prototypes, host group prototypes, application prototypes.

agent auto-registration

- *automated process whereby a Zabbix agent itself is registered* as a host and started to monitor.

3. Zabbix processes

Please use the sidebar to access content in the Zabbix process section.

1 Server

Overview

Zabbix server is the central process of Zabbix software.

The server performs the polling and trapping of data, it calculates triggers, sends notifications to users. It is the central component to which Zabbix agents and proxies report data on availability and integrity of systems. The server can itself remotely check networked services (such as web servers and mail servers) using simple service checks.

The server is the central repository in which all configuration, statistical and operational data is stored, and it is the entity in Zabbix that will actively alert administrators when problems arise in any of the monitored systems.

The functioning of a basic Zabbix server is broken into three distinct components; they are: Zabbix server, web frontend and database storage.

All of the configuration information for Zabbix is stored in the database, which both the server and the web frontend interact with. For example, when you create a new item using the web frontend (or API) it is added to the items table in the database. Then, about once a minute Zabbix server will query the items table for a list of the items which are active that is then stored in a cache within the Zabbix server. This is why it can take up to two minutes for any changes made in Zabbix frontend to show up in the latest data section.

Running server

If installed as package

Zabbix server runs as a daemon process. The server can be started by executing:

```
shell> service zabbix-server start
```

This will work on most of GNU/Linux systems. On other systems you may need to run:

```
shell> /etc/init.d/zabbix-server start
```

Similarly, for stopping/restarting/viewing status, use the following commands:

```
shell> service zabbix-server stop
shell> service zabbix-server restart
shell> service zabbix-server status
```

Start up manually

If the above does not work you have to start it manually. Find the path to the zabbix_server binary and execute:

```
shell> zabbix_server
```

You can use the following command line parameters with Zabbix server:

```
-c --config <file>              path to the configuration file (default is /usr/local/etc/zabbix_server.co
-f --foreground                 run Zabbix server in foreground
-R --runtime-control <option>   perform administrative functions
-h --help                       give this help
-V --version                    display version number
```

Note:
Runtime control is not supported on OpenBSD and NetBSD.

Examples of running Zabbix server with command line parameters:

```
shell> zabbix_server -c /usr/local/etc/zabbix_server.conf
shell> zabbix_server --help
shell> zabbix_server -V
```

Runtime control

Runtime control options:

Option	Description	Target
config_cache_reload	Reload configuration cache. Ignored if cache is being currently loaded.	
housekeeper_execute	Start the housekeeping procedure. Ignored if the housekeeping procedure is currently in progress.	
log_level_increase[=<**target**>]	Increase log level, affects all processes if target is not specified.	**process type** - All processes of specified type (e.g., poller) See all server process types. **process type,N** - Process type and number (e.g., poller,3) **pid** - Process identifier (1 to 65535). For larger values specify target as 'process type,N'.
log_level_decrease[=<**target**>]	Decrease log level, affects all processes if target is not specified.	

Example of using runtime control to reload the server configuration cache:

```
shell> zabbix_server -c /usr/local/etc/zabbix_server.conf -R config_cache_reload
```

Example of using runtime control to trigger execution of housekeeper:

```
shell> zabbix_server -c /usr/local/etc/zabbix_server.conf -R housekeeper_execute
```

Examples of using runtime control to change log level:

```
Increase log level of all processes:
shell> zabbix_server -c /usr/local/etc/zabbix_server.conf -R log_level_increase

Increase log level of second poller process:
```

```
shell> zabbix_server -c /usr/local/etc/zabbix_server.conf -R log_level_increase=poller,2

Increase log level of process with PID 1234:
shell> zabbix_server -c /usr/local/etc/zabbix_server.conf -R log_level_increase=1234

Decrease log level of all http poller processes:
shell> zabbix_server -c /usr/local/etc/zabbix_server.conf -R log_level_decrease="http poller"
```

Process user

Zabbix server is designed to run as a non-root user. It will run as whatever non-root user it is started as. So you can run server as any non-root user without any issues.

If you will try to run it as 'root', it will switch to a hardcoded 'zabbix' user, which must be present on your system. You can only run server as 'root' if you modify the 'AllowRoot' parameter in the server configuration file accordingly.

If Zabbix server and agent are run on the same machine it is recommended to use a different user for running the server than for running the agent. Otherwise, if both are run as the same user, the agent can access the server configuration file and any Admin level user in Zabbix can quite easily retrieve, for example, the database password.

Configuration file

See the configuration file options for details on configuring zabbix_server.

Start-up scripts

The scripts are used to automatically start/stop Zabbix processes during system's start-up/shutdown. The scripts are located under directory misc/init.d.

Server process types

- `alert manager` - manager of alerter tasks
- `alerter` - process for sending notifications
- `configuration syncer` - process for managing in-memory cache of configuration data
- `discoverer` - process for discovery of devices
- `escalator` - process for escalation of actions
- `history syncer` - history DB writer
- `housekeeper` - process for removal of old historical data
- `http poller` - web monitoring poller
- `icmp pinger` - poller for icmpping checks
- `ipmi manager` - IPMI poller manager
- `ipmi poller` - poller for IPMI checks
- `java poller` - poller for Java checks
- `lld manager` - manager process of low-level discovery tasks
- `lld worker` - worker process of low-level discovery tasks
- `poller` - normal poller for passive checks
- `preprocessing manager` - manager of preprocessing tasks
- `preprocessing worker` - process for data preprocessing
- `proxy poller` - poller for passive proxies
- `self-monitoring` - process for collecting internal server statistics
- `snmp trapper` - trapper for SNMP traps
- `task manager` - process for remote execution of tasks requested by other components (e.g. close problem, acknowledge problem, check item value now, remote command functionality)
- `timer` - timer for processing maintenances
- `trapper` - trapper for active checks, traps, proxy communication
- `unreachable poller` - poller for unreachable devices
- `vmware collector` - VMware data collector responsible for data gathering from VMware services

The server log file can be used to observe these process types.

Various types of Zabbix server processes can be monitored using the **zabbix[process,<type>,<mode>,<state>]** internal item.

Supported platforms

Due to the security requirements and mission-critical nature of server operation, UNIX is the only operating system that can consistently deliver the necessary performance, fault tolerance and resilience. Zabbix operates on market leading versions.

Zabbix server is tested on the following platforms:

- Linux
- Solaris

- AIX
- HP-UX
- Mac OS X
- FreeBSD
- OpenBSD
- NetBSD
- SCO Open Server
- Tru64/OSF1

Note:
Zabbix may work on other Unix-like operating systems as well.

Locale

Note that the server requires a UTF-8 locale so that some textual items can be interpreted correctly. Most modern Unix-like systems have a UTF-8 locale as default, however, there are some systems where that may need to be set specifically.

2 Agent

Overview

Zabbix agent is deployed on a monitoring target to actively monitor local resources and applications (hard drives, memory, processor statistics etc).

The agent gathers operational information locally and reports data to Zabbix server for further processing. In case of failures (such as a hard disk running full or a crashed service process), Zabbix server can actively alert the administrators of the particular machine that reported the failure.

Zabbix agents are extremely efficient because of use of native system calls for gathering statistical information.

Passive and active checks

Zabbix agents can perform passive and active checks.

In a passive check the agent responds to a data request. Zabbix server (or proxy) asks for data, for example, CPU load, and Zabbix agent sends back the result.

Active checks require more complex processing. The agent must first retrieve a list of items from Zabbix server for independent processing. Then it will periodically send new values to the server.

Whether to perform passive or active checks is configured by selecting the respective monitoring item type. Zabbix agent processes items of type 'Zabbix agent' or 'Zabbix agent (active)'.

Supported platforms

Zabbix agent is supported for:

- Linux
- IBM AIX
- FreeBSD
- NetBSD
- OpenBSD
- HP-UX
- Mac OS X
- Solaris: 9, 10, 11
- Windows: all desktop and server versions since XP

Agent on UNIX-like systems

Zabbix agent on UNIX-like systems is run on the host being monitored.

Installation

See the package installation section for instructions on how to install Zabbix agent as package.

Alternatively see instructions for manual installation if you do not want to use packages.

Attention:
In general, 32bit Zabbix agents will work on 64bit systems, but may fail in some cases.

If installed as package

Zabbix agent runs as a daemon process. The agent can be started by executing:

```
shell> service zabbix-agent start
```

This will work on most of GNU/Linux systems. On other systems you may need to run:

```
shell> /etc/init.d/zabbix-agent start
```

Similarly, for stopping/restarting/viewing status of Zabbix agent, use the following commands:

```
shell> service zabbix-agent stop
shell> service zabbix-agent restart
shell> service zabbix-agent status
```

Start up manually

If the above does not work you have to start it manually. Find the path to the zabbix_agentd binary and execute:

```
shell> zabbix_agentd
```

Agent on Windows systems

Zabbix agent on Windows runs as a Windows service.

Preparation

Zabbix agent is distributed as a zip archive. After you download the archive you need to unpack it. Choose any folder to store Zabbix agent and the configuration file, e. g.

```
C:\zabbix
```

Copy bin\zabbix_agentd.exe and conf\zabbix_agentd.conf files to c:\zabbix.

Edit the c:\zabbix\zabbix_agentd.conf file to your needs, making sure to specify a correct ”Hostname” parameter.

Installation

After this is done use the following command to install Zabbix agent as Windows service:

```
C:\> c:\zabbix\zabbix_agentd.exe -c c:\zabbix\zabbix_agentd.conf -i
```

Now you should be able to configure ”Zabbix agent” service normally as any other Windows service.

See more details on installing and running Zabbix agent on Windows.

Other agent options

It is possible to run multiple instances of the agent on a host. A single instance can use the default configuration file or a configuration file specified in the command line. In case of multiple instances each agent instance must have its own configuration file (one of the instances can use the default configuration file).

The following command line parameters can be used with Zabbix agent:

Parameter	Description
UNIX and Windows agent	
-c --config <config-file>	Path to the configuration file. You may use this option to specify a configuration file that is not the default one. On UNIX, default is /usr/local/etc/zabbix_agentd.conf or as set by compile-time variables *--sysconfdir* or *--prefix* On Windows, default is c:\zabbix_agentd.conf
-p --print	Print known items and exit. *Note*: To return user parameter results as well, you must specify the configuration file (if it is not in the default location).
-t --test <item key>	Test specified item and exit. *Note*: To return user parameter results as well, you must specify the configuration file (if it is not in the default location).
-h --help	Display help information
-V --version	Display version number

Parameter	Description
UNIX agent only	
-R --runtime-control <option>	Perform administrative functions. See runtime control.
Windows agent only	
-m --multiple-agents	Use multiple agent instances (with -i,-d,-s,-x functions). To distinguish service names of instances, each service name will include the Hostname value from the specified configuration file.
Windows agent only (functions)	
-i --install	Install Zabbix Windows agent as service
-d --uninstall	Uninstall Zabbix Windows agent service
-s --start	Start Zabbix Windows agent service
-x --stop	Stop Zabbix Windows agent service

Specific **examples** of using command line parameters:

- printing all built-in agent items with values
- testing a user parameter with "mysql.ping" key defined in the specified configuration file
- installing a "Zabbix Agent" service for Windows using the default path to configuration file c:\zabbix_agentd.conf
- installing a "Zabbix Agent [Hostname]" service for Windows using the configuration file zabbix_agentd.conf located in the same folder as agent executable and make the service name unique by extending it by Hostname value from the config file

```
shell> zabbix_agentd --print
shell> zabbix_agentd -t "mysql.ping" -c /etc/zabbix/zabbix_agentd.conf
shell> zabbix_agentd.exe -i
shell> zabbix_agentd.exe -i -m -c zabbix_agentd.conf
```

Runtime control

With runtime control options you may change the log level of agent processes.

Option	Description	Target
log_level_increase[=<target>]	Increase log level. If target is not specified, all processes are affected.	Target can be specified as: **process type** - all processes of specified type (e.g., listener) See all agent process types. **process type,N** - process type and number (e.g., listener,3) **pid** - process identifier (1 to 65535). For larger values specify target as 'process-type,N'.
log_level_decrease[=<target>]	Decrease log level. If target is not specified, all processes are affected.	

Examples:

- increasing log level of all processes
- increasing log level of the third listener process
- increasing log level of process with PID 1234
- decreasing log level of all active check processes

```
shell> zabbix_agentd -R log_level_increase
shell> zabbix_agentd -R log_level_increase=listener,3
shell> zabbix_agentd -R log_level_increase=1234
shell> zabbix_agentd -R log_level_decrease="active checks"
```

Note:
Runtime control is not supported on OpenBSD, NetBSD and Windows.

Agent process types

- `active checks` - process for performing active checks

- `collector` - process for data collection
- `listener` - process for listening to passive checks

The agent log file can be used to observe these process types.

Process user

Zabbix agent on UNIX is designed to run as a non-root user. It will run as whatever non-root user it is started as. So you can run agent as any non-root user without any issues.

If you will try to run it as 'root', it will switch to a hardcoded 'zabbix' user, which must be present on your system. You can only run agent as 'root' if you modify the 'AllowRoot' parameter in the agent configuration file accordingly.

Configuration file

For details on configuring Zabbix agent see the configuration file options for zabbix_agentd or Windows agent.

Locale

Note that the agent requires a UTF-8 locale so that some textual agent items can return the expected content. Most modern Unix-like systems have a UTF-8 locale as default, however, there are some systems where that may need to be set specifically.

Exit code

Before version 2.2 Zabbix agent returned 0 in case of successful exit and 255 in case of failure. Starting from version 2.2 and higher Zabbix agent returns 0 in case of successful exit and 1 in case of failure.

3 Agent 2

Overview

Zabbix agent 2 is a new generation of Zabbix agent and may be used in place of Zabbix agent. Zabbix agent 2 has been developed to:

- reduce the number of TCP connections
- have greater check concurrency
- be easily extendible with plugins. A plugin should be able to:
  - provide trivial checks consisting of only a few simple lines of code
  - provide complex checks consisting of long-running scripts and standalone data gathering with periodic sending back of the data
- be a drop-in replacement for Zabbix agent (in that it supports all the previous functionality)

Warning:
Currently the support of Zabbix agent 2 is experimental.

Agent 2 is written in Go (with some C code of Zabbix agent reused). A configured Go version 1.12+ environment is required for building Zabbix agent 2.

Agent 2 does not support daemonization.

Passive checks work similarly to Zabbix agent. Active checks support scheduled/flexible intervals and check concurrency within one active server.

** Check concurrency **

Checks from different plugins can be executed concurrently. The number of concurrent checks within one plugin is limited by the plugin capacity setting. Each plugin may have a hardcoded capacity setting (100 being default) that can be lowered using the `Plugins.<Plugin name>.Capacity=N` setting in the *Plugins* configuration parameter.

Supported platforms

Agent 2 is supported for Linux and Windows platforms.

Note:
Agent 2 for Windows is supported since Zabbix 4.4.4. Currently, only a limited number of items is available on Windows.

If installing from packages, Agent 2 is supported on:

- RHEL/CentOS 8
- SLES 15 SP1+

- Debian 9, 10
- Ubuntu 18.04

Installation

Zabbix agent 2 is available in pre-compiled Zabbix packages. To compile Zabbix agent 2 from sources you have to specify the `--enable-agent2` configure option.

Options

The following command line parameters can be used with Zabbix agent 2:

Parameter	Description
-c --config <config-file>	Path to the configuration file. You may use this option to specify a configuration file that is not the default one. On UNIX, default is /usr/local/etc/zabbix_agent2.conf or as set by compile-time variables *--sysconfdir* or *--prefix*
-f --foreground	Run Zabbix agent in foreground (default: true).
-p --print	Print known items and exit. *Note*: To return user parameter results as well, you must specify the configuration file (if it is not in the default location).
-t --test <item key>	Test specified item and exit. *Note*: To return user parameter results as well, you must specify the configuration file (if it is not in the default location).
-h --help	Print help information and exit.
-v --verbose	Print debugging information. Use this option with -p and -t options. This option is supported since Zabbix 4.4.7.
-V --version	Print agent version number and exit.
-R --runtime-control <option>	Perform administrative functions. See runtime control.

Specific **examples** of using command line parameters:

- print all built-in agent items with values
- test a user parameter with "mysql.ping" key defined in the specified configuration file

```
shell> zabbix_agent2 --print
shell> zabbix_agent2 -t "mysql.ping" -c /etc/zabbix/zabbix_agentd.conf
```

Runtime control

Runtime control provides some options for remote control.

Option	Description
loglevel increase	Increase log level.
loglevel decrease	Decrease log level.
metrics	List available metrics.
version	Display agent version.
help	Display help information on runtime control.

Examples:

- increasing log level for agent 2
- print runtime control options

```
shell> zabbix_agent2 -R "loglevel increase"
shell> zabbix_agent2 -R help
```

Configuration file

The configuration parameters of agent 2 are mostly compatible with Zabbix agent with some exceptions.

New parameters	Description
ControlSocket	The runtime control socket path. Agent 2 uses a control socket for runtime commands.
Plugins	Plugins may have their own parameters, in the format `Plugins.<Plugin name>.<Parameter>=<value>`. A common plugin parameter is *Capacity*, setting the limit of checks that can be executed at the same time.
StatusPort	The port agent 2 will be listening on for HTTP status request and display of a list of configured plugins and some internal parameters
Dropped parameters	Description
AllowRoot, *User*	Not supported because daemonization is not supported.
LoadModule, *LoadModulePath*	Loadable modules are not supported.
StartAgents	This parameter was used in Zabbix agent to increase passive check concurrency or disable them. In Agent 2, the concurrency is configured at a plugin level and can be limited by a capacity setting. Whereas disabling passive checks is not currently supported.
HostInterface, *HostInterfaceItem*	Not yet supported.

For more details see the configuration file options for zabbix_agent2.

Exit codes

Starting from version 4.4.8 Zabbix agent 2 can also be compiled with older OpenSSL versions (1.0.1, 1.0.2).

In this case Zabbix provides mutexes for locking in OpenSSL. If a mutex lock or unlock fails then an error message is printed to the standard error stream (STDERR) and Agent 2 exits with return code 2 or 3, respectively.

Writing plugins

Overview

A plugin is a Go package that defines structure and implements one or several plugin interfaces (Exporter, Collector, Runner, Watcher):

- plugin.Exporter

Exporter is the simplest interface that performs a poll and returns a value (values), nothing, error. It accepts a preparsed item key, parameters and context. Exporter interface is the only interface that can be accessed concurrently. All other plugin interface access is exclusive and no method can be called when a plugin is already performing some task. Also there is limit of 100 maximum concurrent Export() calls per plugin, which can be reduced as necessary for each plugin.

- plugin.Collector

Collector is used when a plugin needs to collect data at regular intervals. This interface usually is used together with the Exporter interface to export the collected data.

- plugin.Runner

Runner interface provides the means of performing some initialization when a plugin is started (activated) and deinitialization when a plugin is stopped (deactivated). For example a plugin could start/stop some background goroutine by implementing the Runner interface.

- plugin.Watcher

Watcher allows the plugin to implement its own metric polling, without using the agent's internal scheduler, for example in trap-based plugins.

Plugins by default are inactive and activated only when a metric provided by the plugin is being monitored.

Plugins are located in the plugin directory tree, grouped by meaning, for example `plugins/system/uptime/uptime.go`.

Implementation steps

A plugin must import the `go/internal/plugin` package.

```
import "go/internal/plugin"
```

A plugin must define structure and embed the `plugin.Base` structure.

```
type Plugin struct {
    plugin.Base
}
var impl Plugin
```

A plugin must implement one or several plugin interfaces.

```
func (p *Plugin) Export(key string, params []string) (result interface{}, err error) {
    if len(params) > 0 {
        p.Debugf("received %d parameters while expected none", len(params))
        return nil, errors.New("Too many parameters")
    }
    return time.Now().Format(time.RFC3339)
}
```

A plugin must register itself during initialization.

```
func init() {
    plugin.RegisterMetric(&impl, "Time", "system.time", "Returns time string in RFC 3999 format.")
}
```

where RegisterMetric parameters are:

- Pointer to the plugin implementation
- Plugin name (upper camel case)
- Metric name (item key)
- Plugin description (starting with uppercase character and ending with a dot)

If logging is necessary the plugin must use the logging functionality provided by plugin.Base (see the example above). It's basically a wrapper around standard logging, but it will prefix log messages with [<plugin name>].

4 Proxy

Overview

Zabbix proxy is a process that may collect monitoring data from one or more monitored devices and send the information to the Zabbix server, essentially working on behalf of the server. All collected data is buffered locally and then transferred to the Zabbix server the proxy belongs to.

Deploying a proxy is optional, but may be very beneficial to distribute the load of a single Zabbix server. If only proxies collect data, processing on the server becomes less CPU and disk I/O hungry.

A Zabbix proxy is the ideal solution for centralized monitoring of remote locations, branches and networks with no local administrators.

Zabbix proxy requires a separate database.

> **Attention:**
> Note that databases supported with Zabbix proxy are SQLite, MySQL and PostgreSQL. Using Oracle or IBM DB2 is at your own risk and may contain some limitations as, for example, in return values of low-level discovery rules.

See also: Using proxies in a distributed environment

Running proxy

If installed as package

Zabbix proxy runs as a daemon process. The proxy can be started by executing:

```
shell> service zabbix-proxy start
```

This will work on most of GNU/Linux systems. On other systems you may need to run:

```
shell> /etc/init.d/zabbix-proxy start
```

Similarly, for stopping/restarting/viewing status of Zabbix proxy, use the following commands:

```
shell> service zabbix-proxy stop
shell> service zabbix-proxy restart
shell> service zabbix-proxy status
```

Start up manually

If the above does not work you have to start it manually. Find the path to the zabbix_proxy binary and execute:

```
shell> zabbix_proxy
```

You can use the following command line parameters with Zabbix proxy:

```
-c --config <file>              path to the configuration file
-f --foreground                 run Zabbix proxy in foreground
-R --runtime-control <option>   perform administrative functions
-h --help                       give this help
-V --version                    display version number
```

Note:
Runtime control is not supported on OpenBSD and NetBSD.

Examples of running Zabbix proxy with command line parameters:

```
shell> zabbix_proxy -c /usr/local/etc/zabbix_proxy.conf
shell> zabbix_proxy --help
shell> zabbix_proxy -V
```

Runtime control

Runtime control options:

Option	Description	Target
config_cache_reload	Reload configuration cache. Ignored if cache is being currently loaded. Active Zabbix proxy will connect to the Zabbix server and request configuration data.	
housekeeper_execute	Start the housekeeping procedure. Ignored if the housekeeping procedure is currently in progress.	
log_level_increase[=<**target**>]	Increase log level, affects all processes if target is not specified.	**process type** - All processes of specified type (e.g., poller) See all proxy process types. **process type,N** - Process type and number (e.g., poller,3) **pid** - Process identifier (1 to 65535). For larger values specify target as 'process type,N'.
log_level_decrease[=<**target**>]	Decrease log level, affects all processes if target is not specified.	

Example of using runtime control to reload the proxy configuration cache:

```
shell> zabbix_proxy -c /usr/local/etc/zabbix_proxy.conf -R config_cache_reload
```

Example of using runtime control to trigger execution of housekeeper

```
shell> zabbix_proxy -c /usr/local/etc/zabbix_proxy.conf -R housekeeper_execute
```

Examples of using runtime control to change log level:

```
Increase log level of all processes:
shell> zabbix_proxy -c /usr/local/etc/zabbix_proxy.conf -R log_level_increase

Increase log level of second poller process:
shell> zabbix_proxy -c /usr/local/etc/zabbix_proxy.conf -R log_level_increase=poller,2
```

```
Increase log level of process with PID 1234:
shell> zabbix_proxy -c /usr/local/etc/zabbix_proxy.conf -R log_level_increase=1234

Decrease log level of all http poller processes:
shell> zabbix_proxy -c /usr/local/etc/zabbix_proxy.conf -R log_level_decrease="http poller"
```

Process user

Zabbix proxy is designed to run as a non-root user. It will run as whatever non-root user it is started as. So you can run proxy as any non-root user without any issues.

If you will try to run it as 'root', it will switch to a hardcoded 'zabbix' user, which must be present on your system. You can only run proxy as 'root' if you modify the 'AllowRoot' parameter in the proxy configuration file accordingly.

Configuration file

See the configuration file options for details on configuring zabbix_proxy.

Proxy process types

- `configuration syncer` - process for managing in-memory cache of configuration data
- `data sender` - proxy data sender
- `discoverer` - process for discovery of devices
- `heartbeat sender` - proxy heartbeat sender
- `history syncer` - history DB writer
- `housekeeper` - process for removal of old historical data
- `http poller` - web monitoring poller
- `icmp pinger` - poller for icmpping checks
- `ipmi manager` - IPMI poller manager
- `ipmi poller` - poller for IPMI checks
- `java poller` - poller for Java checks
- `poller` - normal poller for passive checks
- `preprocessing manager` - manager of preprocessing tasks
- `preprocessing worker` - process for data preprocessing
- `self-monitoring` - process for collecting internal server statistics
- `snmp trapper` - trapper for SNMP traps
- `task manager` - process for remote execution of tasks requested by other components (e.g. close problem, acknowledge problem, check item value now, remote command functionality)
- `trapper` - trapper for active checks, traps, proxy communication
- `unreachable poller` - poller for unreachable devices
- `vmware collector` - VMware data collector responsible for data gathering from VMware services

The proxy log file can be used to observe these process types.

Various types of Zabbix proxy processes can be monitored using the **zabbix[process,<type>,<mode>,<state>]** internal item.

Supported platforms

Zabbix proxy runs on the same list of server#supported platforms as Zabbix server.

Locale

Note that the proxy requires a UTF-8 locale so that some textual items can be interpreted correctly. Most modern Unix-like systems have a UTF-8 locale as default, however, there are some systems where that may need to be set specifically.

5 Java gateway

Overview

Native support for monitoring JMX applications exists in the form of a Zabbix daemon called "Zabbix Java gateway", available since Zabbix 2.0. Zabbix Java gateway is a daemon written in Java. To find out the value of a particular JMX counter on a host, Zabbix server queries Zabbix Java gateway, which uses the JMX management API to query the application of interest remotely. The application does not need any additional software installed, it just has to be started with `-Dcom.sun.management.jmxremote` option on the command line.

Java gateway accepts incoming connection from Zabbix server or proxy and can only be used as a "passive proxy". As opposed to Zabbix proxy, it may also be used from Zabbix proxy (Zabbix proxies cannot be chained). Access to each Java gateway is

configured directly in Zabbix server or proxy configuration file, thus only one Java gateway may be configured per Zabbix server or Zabbix proxy. If a host will have items of type **JMX agent** and items of other type, only the **JMX agent** items will be passed to Java gateway for retrieval.

When an item has to be updated over Java gateway, Zabbix server or proxy will connect to the Java gateway and request the value, which Java gateway in turn retrieves and passes back to the server or proxy. As such, Java gateway does not cache any values.

Zabbix server or proxy has a specific type of processes that connect to Java gateway, controlled by the option **StartJavaPollers**. Internally, Java gateway starts multiple threads, controlled by the **START_POLLERS** option. On the server side, if a connection takes more than **Timeout** seconds, it will be terminated, but Java gateway might still be busy retrieving value from the JMX counter. To solve this, since Zabbix 2.0.15, Zabbix 2.2.10 and Zabbix 2.4.5 there is the **TIMEOUT** option in Java gateway that allows to set timeout for JMX network operations.

Zabbix server or proxy will try to pool requests to a single JMX target together as much as possible (affected by item intervals) and send them to the Java gateway in a single connection for better performance.

It is suggested to have **StartJavaPollers** less than or equal to **START_POLLERS**, otherwise there might be situations when no threads are available in the Java gateway to service incoming requests; in such a case Java gateway uses ThreadPoolExecutor.CallerRunsPolicy, meaning that the main thread will service the incoming request and temporarily will not accept any new requests.

Getting Java gateway

You can install Java gateway either from the sources or packages downloaded from Zabbix website.

Using the links below you can access information how to get and run Zabbix Java gateway, how to configure Zabbix server (or Zabbix proxy) to use Zabbix Java gateway for JMX monitoring, and how to configure Zabbix items in Zabbix frontend that correspond to particular JMX counters.

Installation from	Instructions	Instructions
Sources	Installation	Setup
RHEL/CentOS packages	Installation	Setup
Debian/Ubuntu packages	Installation	Setup

1 Setup from sources

Overview

If installed from sources, the following information will help you in setting up Zabbix Java gateway.

Overview of files

If you obtained Java gateway from sources, you should have ended up with a collection of shell scripts, JAR and configuration files under $PREFIX/sbin/zabbix_java. The role of these files is summarized below.

`bin/zabbix-java-gateway-$VERSION.jar`

Java gateway JAR file itself.

```
lib/logback-core-0.9.27.jar
lib/logback-classic-0.9.27.jar
lib/slf4j-api-1.6.1.jar
lib/android-json-4.3_r3.1.jar
```

Dependencies of Java gateway: Logback, SLF4J, and Android JSON library.

```
lib/logback.xml
lib/logback-console.xml
```

Configuration files for Logback.

```
shutdown.sh
startup.sh
```

Convenience scripts for starting and stopping Java gateway.

`settings.sh`

Configuration file that is sourced by startup and shutdown scripts above.

Configuring and running Java gateway

By default, Java gateway listens on port 10052. If you plan on running Java gateway on a different port, you can specify that in settings.sh script. See the description of Java gateway configuration file for how to specify this and other options.

> **Warning:**
> Port 10052 is not IANA registered.

Once you are comfortable with the settings, you can start Java gateway by running the startup script:

```
$ ./startup.sh
```

Likewise, once you no longer need Java gateway, run the shutdown script to stop it:

```
$ ./shutdown.sh
```

Note that unlike server or proxy, Java gateway is lightweight and does not need a database.

Configuring server for use with Java gateway

With Java gateway up and running, you have to tell Zabbix server where to find Zabbix Java gateway. This is done by specifying JavaGateway and JavaGatewayPort parameters in the server configuration file. If the host on which JMX application is running is monitored by Zabbix proxy, then you specify the connection parameters in the proxy configuration file instead.

```
JavaGateway=192.168.3.14
JavaGatewayPort=10052
```

By default, server does not start any processes related to JMX monitoring. If you wish to use it, however, you have to specify the number of pre-forked instances of Java pollers. You do this in the same way you specify regular pollers and trappers.

```
StartJavaPollers=5
```

Do not forget to restart server or proxy, once you are done with configuring them.

Debugging Java gateway

In case there are any problems with Java gateway or an error message that you see about an item in the frontend is not descriptive enough, you might wish to take a look at Java gateway log file.

By default, Java gateway logs its activities into /tmp/zabbix_java.log file with log level ”info”. Sometimes that information is not enough and there is a need for information at log level ”debug”. In order to increase logging level, modify file lib/logback.xml and change the level attribute of <root> tag to ”debug”:

```
<root level="debug">
  <appender-ref ref="FILE" />
</root>
```

Note that unlike Zabbix server or Zabbix proxy, there is no need to restart Zabbix Java gateway after changing logback.xml file - changes in logback.xml will be picked up automatically. When you are done with debugging, you can return the logging level to ”info”.

If you wish to log to a different file or a completely different medium like database, adjust logback.xml file to meet your needs. See Logback Manual for more details.

Sometimes for debugging purposes it is useful to start Java gateway as a console application rather than a daemon. To do that, comment out PID_FILE variable in settings.sh. If PID_FILE is omitted, startup.sh script starts Java gateway as a console application and makes Logback use lib/logback-console.xml file instead, which not only logs to console, but has logging level ”debug” enabled as well.

Finally, note that since Java gateway uses SLF4J for logging, you can replace Logback with the framework of your choice by placing an appropriate JAR file in lib directory. See SLF4J Manual for more details.

JMX monitoring

See JMX monitoring page for more details.

2 Setup from RHEL/CentOS packages

Overview

If installed from RHEL/CentOS packages, the following information will help you in setting up Zabbix Java gateway.

Configuring and running Java gateway

Configuration parameters of Zabbix Java gateway may be tuned in the file:

```
/etc/zabbix/zabbix_java_gateway.conf
```

For more details, see Zabbix Java gateway configuration parameters.

To start Zabbix Java gateway:

```
# service zabbix-java-gateway restart
```

To automatically start Zabbix Java gateway on boot:

RHEL 7 and later:

```
# systemctl enable zabbix-java-gateway
```

RHEL prior to 7:

```
# chkconfig --level 12345 zabbix-java-gateway on
```

Configuring server for use with Java gateway

With Java gateway up and running, you have to tell Zabbix server where to find Zabbix Java gateway. This is done by specifying JavaGateway and JavaGatewayPort parameters in the server configuration file. If the host on which JMX application is running is monitored by Zabbix proxy, then you specify the connection parameters in the proxy configuration file instead.

```
JavaGateway=192.168.3.14
JavaGatewayPort=10052
```

By default, server does not start any processes related to JMX monitoring. If you wish to use it, however, you have to specify the number of pre-forked instances of Java pollers. You do this in the same way you specify regular pollers and trappers.

```
StartJavaPollers=5
```

Do not forget to restart server or proxy, once you are done with configuring them.

Debugging Java gateway

Zabbix Java gateway log file is:

```
/var/log/zabbix/zabbix_java_gateway.log
```

If you like to increase the logging, edit the file:

```
/etc/zabbix/zabbix_java_gateway_logback.xml
```

and change `level="info"` to ”debug” or even ”trace” (for deep troubleshooting):

```
<configuration scan="true" scanPeriod="15 seconds">
[...]
      <root level="info">
              <appender-ref ref="FILE" />
      </root>

</configuration>
```

JMX monitoring

See JMX monitoring page for more details.

3 Setup from Debian/Ubuntu packages

Overview

If installed from Debian/Ubuntu packages, the following information will help you in setting up Zabbix Java gateway.

Configuring and running Java gateway

Java gateway configuration may be tuned in the file:

```
/etc/zabbix/zabbix_java_gateway.conf
```

For more details, see Zabbix Java gateway configuration parameters.

To start Zabbix Java gateway:

```
# service zabbix-java-gateway restart
```

To automatically start Zabbix Java gateway on boot:

```
# systemctl enable zabbix-java-gateway
```

Configuring server for use with Java gateway

With Java gateway up and running, you have to tell Zabbix server where to find Zabbix Java gateway. This is done by specifying JavaGateway and JavaGatewayPort parameters in the server configuration file. If the host on which JMX application is running is monitored by Zabbix proxy, then you specify the connection parameters in the proxy configuration file instead.

```
JavaGateway=192.168.3.14
JavaGatewayPort=10052
```

By default, server does not start any processes related to JMX monitoring. If you wish to use it, however, you have to specify the number of pre-forked instances of Java pollers. You do this in the same way you specify regular pollers and trappers.

```
StartJavaPollers=5
```

Do not forget to restart server or proxy, once you are done with configuring them.

Debugging Java gateway

Zabbix Java gateway log file is:

```
/var/log/zabbix/zabbix_java_gateway.log
```

If you like to increase the logging, edit the file:

```
/etc/zabbix/zabbix_java_gateway_logback.xml
```

and change `level="info"` to ”debug” or even ”trace” (for deep troubleshooting):

```
<configuration scan="true" scanPeriod="15 seconds">
[...]
      <root level="info">
              <appender-ref ref="FILE" />
      </root>

</configuration>
```

JMX monitoring

See JMX monitoring page for more details.

6 Sender

Overview

Zabbix sender is a command line utility that may be used to send performance data to Zabbix server for processing.

The utility is usually used in long running user scripts for periodical sending of availability and performance data.

For sending results directly to Zabbix server or proxy, a trapper item type must be configured.

Running Zabbix sender

An example of running Zabbix UNIX sender:

```
shell> cd bin
shell> ./zabbix_sender -z zabbix -s "Linux DB3" -k db.connections -o 43
```

where:

- z - Zabbix server host (IP address can be used as well)
- s - technical name of monitored host (as registered in Zabbix frontend)
- k - item key
- o - value to send

Attention:
Options that contain whitespaces, must be quoted using double quotes.

Zabbix sender can be used to send multiple values from an input file. See the Zabbix sender manpage for more information.

If a configuration file is specified, Zabbix sender uses all addresses defined in the agent ServerActive configuration parameter for sending data. If sending to one address fails, the sender tries sending to the other addresses. If sending of batch data fails to one address, the following batches are not sent to this address.

Zabbix sender accepts strings in UTF-8 encoding (for both UNIX-like systems and Windows) without byte order mark (BOM) first in the file.

Zabbix sender on Windows can be run similarly:

```
zabbix_sender.exe [options]
```

Since Zabbix 1.8.4, zabbix_sender realtime sending scenarios have been improved to gather multiple values passed to it in close succession and send them to the server in a single connection. A value that is not further apart from the previous value than 0.2 seconds can be put in the same stack, but maximum pooling time still is 1 second.

Note:
Zabbix sender will terminate if invalid (not following *parameter=value* notation) parameter entry is present in the specified configuration file.

7 Get

Overview

Zabbix get is a command line utility which can be used to communicate with Zabbix agent and retrieve required information from the agent.

The utility is usually used for the troubleshooting of Zabbix agents.

Running Zabbix get

An example of running Zabbix get under UNIX to get the processor load value from the agent:

```
shell> cd bin
shell> ./zabbix_get -s 127.0.0.1 -p 10050 -k system.cpu.load[all,avg1]
```

Another example of running Zabbix get for capturing a string from a website:

```
shell> cd bin
shell> ./zabbix_get -s 192.168.1.1 -p 10050 -k "web.page.regexp[www.zabbix.com,,,\"USA: ([a-zA-Z0-9.-]+)\"
```

Note that the item key here contains a space so quotes are used to mark the item key to the shell. The quotes are not part of the item key; they will be trimmed by the shell and will not be passed to Zabbix agent.

Zabbix get accepts the following command line parameters:

```
  -s --host <host name or IP>      Specify host name or IP address of a host.
  -p --port <port number>          Specify port number of agent running on the host. Default is 10050.
  -I --source-address <IP address> Specify source IP address.
  -k --key <item key>              Specify key of item to retrieve value of.
  -h --help                        Give this help.
  -V --version                     Display version number.
```

See also Zabbix get manpage for more information.

Zabbix get on Windows can be run similarly:

```
zabbix_get.exe [options]
```

8 JS

Overview

zabbix_js is a command line utility that can be used for embedded script testing.

This utility will execute a user script with a string parameter and print the result. Scripts are executed using the embedded Zabbix scripting engine.

Attention:
This uility is supported since Zabbix 4.4.5.

In case of compilation or execution errors zabbix_js will print the error in stderr and exit with code 1.

Usage

```
zabbix_js -s script-file -p input-param [-l log-level] [-t timeout]
zabbix_js -s script-file -i input-file [-l log-level] [-t timeout]
zabbix_js -h
zabbix_js -V
```

zabbix_js accepts the following command line parameters:

```
  -s, --script script-file          Specify the file name of the script to execute. If '-' is specified as
  -i, --input input-file            Specify the file name of the input parameter. If '-' is specified as f
  -p, --param input-param           Specify the input parameter.
  -l, --loglevel log-level          Specify the log level.
  -t, --timeout timeout             Specify the timeout in seconds.
  -h, --help                        Display help information.
  -V, --version                     Display the version number.
```

Example:

```
zabbix_js -s script-file.js -p example
```

4. Installation

Please use the sidebar to access content in the Installation section.

1 Getting Zabbix

Overview

There are four ways of getting Zabbix:

- Install it from the distribution packages
- Download the latest source archive and compile it yourself
- Install it from the containers
- Download the virtual appliance

To download the latest distribution packages, pre-compiled sources or the virtual appliance, go to the Zabbix download page, where direct links to latest versions are provided.

Getting Zabbix source code

There are several ways of getting Zabbix source code:

- You can download the released stable versions from the official Zabbix website
- You can download nightly builds from the official Zabbix website developer page
- You can get the latest development version from the Git source code repository system:
  - The primary location of the full repository is at https://git.zabbix.com/scm/zbx/zabbix.git
  - Master and supported releases are also mirrored to Github at https://github.com/zabbix/zabbix

A Git client must be installed to clone the repository. The official commandline Git client package is commonly called **git** in distributions. To install, for example, on Debian/Ubuntu, run:

```
sudo apt-get update
sudo apt-get install git
```

To grab all Zabbix source, change to the directory you want to place the code in and execute:

```
git clone https://git.zabbix.com/scm/zbx/zabbix.git
```

Hardware

Memory

Zabbix requires both physical and disk memory. 128 MB of physical memory and 256 MB of free disk space could be a good starting point. However, the amount of required disk memory obviously depends on the number of hosts and parameters that are being monitored. If you're planning to keep a long history of monitored parameters, you should be thinking of at least a couple of gigabytes to have enough space to store the history in the database. Each Zabbix daemon process requires several connections to a database server. Amount of memory allocated for the connection depends on configuration of the database engine.

Note:
The more physical memory you have, the faster the database (and therefore Zabbix) works!

CPU

Zabbix and especially Zabbix database may require significant CPU resources depending on number of monitored parameters and chosen database engine.

Other hardware

A serial communication port and a serial GSM modem are required for using SMS notification support in Zabbix. USB-to-serial converter will also work.

Examples of hardware configuration

The table provides several examples of hardware configurations:

Name	Platform	CPU/Memory	Database	Monitored hosts
Small	CentOS	Virtual Appliance	MySQL InnoDB	100
Medium	CentOS	2 CPU cores/2GB	MySQL InnoDB	500
Large	RedHat Enterprise Linux	4 CPU cores/8GB	RAID10 MySQL InnoDB or PostgreSQL	>1000
Very large	RedHat Enterprise Linux	8 CPU cores/16GB	Fast RAID10 MySQL InnoDB or PostgreSQL	>10000

Note:
Actual configuration depends on the number of active items and refresh rates very much (see database size section of this page for details). It is highly recommended to run the database on a separate box for large installations.

Supported platforms

Due to security requirements and mission-critical nature of monitoring server, UNIX is the only operating system that can consistently deliver the necessary performance, fault tolerance and resilience. Zabbix operates on market leading versions.

Zabbix is tested on the following platforms:

- Linux
- IBM AIX
- FreeBSD
- NetBSD
- OpenBSD
- HP-UX
- Mac OS X
- Solaris
- Windows: all desktop and server versions since XP (Zabbix agent only)

Note:
Zabbix may work on other Unix-like operating systems as well.

Attention:
Zabbix disables core dumps if compiled with encryption and does not start if system does not allow disabling of core dumps.

Required software

Zabbix is built around modern web servers, leading database engines, and PHP scripting language.

Database management system

Software	Version	Comments
MySQL	5.0.3 - 8.0.x	Required if MySQL is used as Zabbix backend database. InnoDB engine is required. MariaDB also works with Zabbix.
Oracle	10g or later	Required if Oracle is used as Zabbix backend database.
PostgreSQL	8.1 or later	Required if PostgreSQL is used as Zabbix backend database. It is suggested to use at least PostgreSQL 8.3, which introduced much better VACUUM performance.
TimescaleDB	1.0 or later, OSS (free) version	Required if TimescaleDB is used as Zabbix backend database.
IBM DB2	9.7 or later	Required if IBM DB2 is used as Zabbix backend database.
SQLite	3.3.5 or later	SQLite is only supported with Zabbix proxies. Required if SQLite is used as Zabbix proxy database.

Attention:
IBM DB2 support is experimental!

Frontend

The minimum supported screen width for Zabbix frontend is 1200px.

Software	Version	Comments
Apache	1.3.12 or later	
PHP	5.4.0 or later	
PHP extensions:		
gd	2.0.28 or later	PHP GD extension must support PNG images (*--with-png-dir*), JPEG (*--with-jpeg-dir*) images and FreeType 2 (*--with-freetype-dir*).
bcmath		php-bcmath (*--enable-bcmath*)
ctype		php-ctype (*--enable-ctype*)
libXML	2.6.15 or later	php-xml or php5-dom, if provided as a separate package by the distributor.
xmlreader		php-xmlreader, if provided as a separate package by the distributor.
xmlwriter		php-xmlwriter, if provided as a separate package by the distributor.
session		php-session, if provided as a separate package by the distributor.
sockets		php-net-socket (*--enable-sockets*). Required for user script support.
mbstring		php-mbstring (*--enable-mbstring*)
gettext		php-gettext (*--with-gettext*). Required for translations to work.
ldap		php-ldap. Required only if LDAP authentication is used in the frontend.

Software	Version	Comments
ibm_db2		Required if IBM DB2 is used as Zabbix backend database.
mysqli		Required if MySQL is used as Zabbix backend database.
oci8		Required if Oracle is used as Zabbix backend database.
pgsql		Required if PostgreSQL is used as Zabbix backend database.

Note:
Zabbix may work on previous versions of Apache, MySQL, Oracle, and PostgreSQL as well.

Attention:
For other fonts than the default DejaVu, PHP function imagerotate might be required. If it is missing, these fonts might be rendered incorrectly when a graph is displayed. This function is only available if PHP is compiled with bundled GD, which is not the case in Debian and other distributions.

Web browser on client side

Cookies and Java Script must be enabled.

Latest versions of Google Chrome, Mozilla Firefox, Microsoft Internet Explorer and Opera are supported. Other browsers (Apple Safari, Konqueror) may work with Zabbix as well.

Warning:
The same origin policy for IFrames is implemented, which means that Zabbix cannot be placed in frames on a different domain.

Still, pages placed into a Zabbix frame will have access to Zabbix frontend (through JavaScript) if the page that is placed in the frame and Zabbix frontend are on the same domain. A page like `http://secure-zabbix.com/cms/page.html`, if placed into screens or dashboards on `http://secure-zabbix.com/zabbix/`, will have full JS access to Zabbix.

Server

Mandatory requirements are needed always. Optional requirements are needed for the support of the specific function.

Requirement	Status	Description
libpcre	Mandatory	PCRE library is required for Perl Compatible Regular Expression (PCRE) support. The naming may differ depending on the GNU/Linux distribution, for example 'libpcre3' or 'libpcre1'. Note that you need exactly PCRE (v8.x); PCRE2 (v10.x) library is not used.
libevent		Required for bulk metric support and IPMI monitoring. Version 1.4 or higher. Note that for Zabbix proxy this requirement is optional; it is needed for IPMI monitoring support.
libpthread		Required for mutex and read-write lock support.
zlib		Required for compression support.
OpenIPMI	Optional	Required for IPMI support.
libssh2 or *libssh*		Required for SSH checks. Version 1.0 or higher (libssh2); 0.6.0 or higher (libssh). libssh is supported since Zabbix 4.4.6.
fping		Required for ICMP ping items.

Requirement	Status	Description
libcurl		Required for web monitoring, VMware monitoring, SMTP authentication, `web.page.*` Zabbix agent items, HTTP agent items and Elasticsearch (if used). Version 7.28.0 or higher is recommended. Libcurl version requirements: - SMTP authentication: version 7.20.0 or higher - Elasticsearch: version 7.28.0 or higher
libxml2		Required for VMware monitoring and XML XPath preprocessing.
net-snmp		Required for SNMP support.
GnuTLS, *OpenSSL*, *LibreSSL* or *mbed TLS*		Required when using encryption.

Agent

Requirement	Status	Description
libpcre	Mandatory	PCRE library is required for Perl Compatible Regular Expression (PCRE) support. The naming may differ depending on the GNU/Linux distribution, for example 'libpcre3' or 'libpcre1'. Note that you need exactly PCRE (v8.x); PCRE2 (v10.x) library is not used.
GnuTLS, *OpenSSL*, *LibreSSL* or *mbed TLS*	Optional	Required when using encryption. On Microsoft Windows systems OpenSSL 1.1.1 or later is required.

Agent 2

Agent 2 (experimental) is supported on 64-bit Linux.

Requirement	Status	Description
libpcre	Mandatory	PCRE library is required for Perl Compatible Regular Expression (PCRE) support. The naming may differ depending on the GNU/Linux distribution, for example 'libpcre3' or 'libpcre1'. Note that you need exactly PCRE (v8.x); PCRE2 (v10.x) library is not used.
OpenSSL	Optional	Required when using encryption. OpenSSL 1.1.0 or later is required for Agent 2 in Zabbix 4.4.0-4.4.7. OpenSSL 1.0.1 and later can be used since Zabbix 4.4.8. The OpenSSL library must have PSK support enabled. LibreSSL is not supported.

Java gateway

If you obtained Zabbix from the source repository or an archive, then the necessary dependencies are already included in the source tree.

If you obtained Zabbix from your distribution's package, then the necessary dependencies are already provided by the packaging system.

In both cases above, the software is ready to be used and no additional downloads are necessary.

If, however, you wish to provide your versions of these dependencies (for instance, if you are preparing a package for some Linux distribution), below is the list of library versions that Java gateway is known to work with. Zabbix may work with other versions of these libraries, too.

The following table lists JAR files that are currently bundled with Java gateway in the original code:

Library	License	Website	Comments
logback-core-0.9.27.jar	EPL 1.0, LGPL 2.1	http://logback.qos.ch/	Tested with 0.9.27, 1.0.13, and 1.1.1.
logback-classic-0.9.27.jar	EPL 1.0, LGPL 2.1	http://logback.qos.ch/	Tested with 0.9.27, 1.0.13, and 1.1.1.
slf4j-api-1.6.1.jar	MIT License	http://www.slf4j.org/	Tested with 1.6.1, 1.6.6, and 1.7.6.
android-json-4.3_r3.1.jar	Apache License 2.0	https://android.googlesource.com/platform/libcore/+/master/json	Tested with 2.3.3_r1.1 and 4.3_r3.1. See src/zabbix_java/lib/README for instructions on creating a JAR file.

Java gateway compiles and runs with Java 1.6 and above. It is recommended that those who provide a precompiled version of the gateway for others use Java 1.6 for compilation, so that it runs on all versions of Java up to the latest one.

Database size

Zabbix configuration data require a fixed amount of disk space and do not grow much.

Zabbix database size mainly depends on these variables, which define the amount of stored historical data:

- Number of processed values per second

This is the average number of new values Zabbix server receives every second. For example, if we have 3000 items for monitoring with refresh rate of 60 seconds, the number of values per second is calculated as 3000/60 = **50**.

It means that 50 new values are added to Zabbix database every second.

- Housekeeper settings for history

Zabbix keeps values for a fixed period of time, normally several weeks or months. Each new value requires a certain amount of disk space for data and index.

So, if we would like to keep 30 days of history and we receive 50 values per second, total number of values will be around (**30***24*3600)* **50** = 129.600.000, or about 130M of values.

Depending on the database engine used, type of received values (floats, integers, strings, log files, etc), the disk space for keeping a single value may vary from 40 bytes to hundreds of bytes. Normally it is around 90 bytes per value for numeric items[2]. In our case, it means that 130M of values will require 130M * 90 bytes = **10.9GB** of disk space.

Note:
The size of text/log item values is impossible to predict exactly, but you may expect around 500 bytes per value.

- Housekeeper setting for trends

Zabbix keeps a 1-hour max/min/avg/count set of values for each item in the table **trends**. The data is used for trending and long period graphs. The one hour period can not be customised.

Zabbix database, depending on database type, requires about 90 bytes per each total. Suppose we would like to keep trend data for 5 years. Values for 3000 items will require 3000*24*365* **90** = **2.2GB** per year, or **11GB** for 5 years.

- Housekeeper settings for events

Each Zabbix event requires approximately 250 bytes of disk space[1]. It is hard to estimate the number of events generated by Zabbix daily. In the worst case scenario, we may assume that Zabbix generates one event per second.

For each recovered event an event_recovery record is created. Normally most of events will be recovered so we can assume one event_recovery record per event. That means additional 80 bytes per event.

Optionally events can have tags, each tag record requiring approximately 100 bytes of disk space[1]. The number of tags per event (#tags) depends on configuration. So each will need an additional #tags * 100 bytes of disk space.

It means that if we want to keep 3 years of events, this would require 3*365*24*3600* (250+80+#tags*100) = **~30GB**+#tags*100B disk space[2].

Note:
[1] More when having non-ASCII event names, tags and values.
[2] The size approximations are based on MySQL and might be different for other databases.

The table contains formulas that can be used to calculate the disk space required for Zabbix system:

Parameter	Formula for required disk space (in bytes)
Zabbix configuration	Fixed size. Normally 10MB or less.
History	days*(items/refresh rate)*24*3600*bytes items : number of items days : number of days to keep history refresh rate : average refresh rate of items bytes : number of bytes required to keep single value, depends on database engine, normally ~90 bytes.
Trends	days*(items/3600)*24*3600*bytes items : number of items days : number of days to keep history bytes : number of bytes required to keep single trend, depends on database engine, normally ~90 bytes.
Events	days*events*24*3600*bytes events : number of event per second. One (1) event per second in worst case scenario. days : number of days to keep history bytes : number of bytes required to keep single trend, depends on database engine, normally ~330 + average number of tags per event * 100 bytes.

So, the total required disk space can be calculated as:
Configuration + History + Trends + Events
The disk space will NOT be used immediately after Zabbix installation. Database size will grow then it will stop growing at some point, which depends on housekeeper settings.

Time synchronisation

It is very important to have precise system time on server with Zabbix running. ntpd is the most popular daemon that synchronizes the host's time with the time of other machines. It's strongly recommended to maintain synchronised system time on all systems Zabbix components are running on.

Best practices for secure Zabbix setup

Overview

This section contains best practices that should be observed in order to set up Zabbix in a secure way.

The practices contained here are not required for the functioning of Zabbix. They are recommended for better security of the system.

Principle of least privilege

The principle of least privilege should be used at all times for Zabbix. This principle means that user accounts (in Zabbix frontend) or process user (for Zabbix server/proxy or agent) have only those privileges that are essential to perform intended functions. In other words, user accounts at all times should run with as few privileges as possible.

Attention:
Giving extra permissions to 'zabbix' user will allow it to access configuration files and execute operations that can compromise the overall security of infrastructure.

When implementing the least privilege principle for user accounts, Zabbix frontend user types should be taken into account. It is important to understand that while a "Zabbix Admin" user type has less privileges than "Zabbix Super Admin" user type, it has administrative permissions that allow managing configuration and execute custom scripts.

Note:
Some information is available even for non-privileged users. For example, while *Administration → Scripts* is not available for non-Super Admins, scripts themselves are available for retrieval by using Zabbix API. Limiting script permissions and not adding sensitive information (like access credentials, etc) should be used to avoid exposure of sensitive information available in global scripts.

Secure user for Zabbix agent

In the default configuration, Zabbix server and Zabbix agent processes share one 'zabbix' user. If you wish to make sure that the agent cannot access sensitive details in server configuration (e.g. database login information), the agent should be run as a different user:

1. Create a secure user
2. Specify this user in the agent configuration file ('User' parameter)
3. Restart the agent with administrator privileges. Privileges will be dropped to the specified user.

UTF-8 encoding

UTF-8 is the only encoding supported by Zabbix. It is known to work without any security flaws. Users should be aware that there are known security issues if using some of the other encodings.

Setting up SSL for Zabbix frontend

On RHEL/Centos, install mod_ssl package:

```
yum install mod_ssl
```

Create directory for SSL keys:

```
mkdir -p /etc/httpd/ssl/private
chmod 700 /etc/httpd/ssl/private
```

Create SSL certificate:

```
openssl req -x509 -nodes -days 365 -newkey rsa:2048 -keyout /etc/httpd/ssl/private/apache-selfsigned.key -
```

Fill out the prompts appropriately. The most important line is the one that requests the Common Name. You need to enter the domain name that you want to be associated with your server. You can enter the public IP address instead if you do not have a domain name. We will use *example.com* in this article.

```
Country Name (2 letter code) [XX]:
State or Province Name (full name) []:
Locality Name (eg, city) [Default City]:
Organization Name (eg, company) [Default Company Ltd]:
Organizational Unit Name (eg, section) []:
Common Name (eg, your name or your server's hostname) []:example.com
Email Address []:
```

Edit Apache SSL configuration:

```
/etc/httpd/conf.d/ssl.conf

DocumentRoot "/usr/share/zabbix"
ServerName example.com:443
SSLCertificateFile /etc/httpd/ssl/apache-selfsigned.crt
SSLCertificateKeyFile /etc/httpd/ssl/private/apache-selfsigned.key
```

Restart the Apache service to apply the changes:

```
systemctl restart httpd.service
```

Enabling Zabbix on root directory of URL

Add a virtual host to Apache configuration and set permanent redirect for document root to Zabbix SSL URL. Do not forget to replace *example.com* with the actual name of the server.

```
/etc/httpd/conf/httpd.conf

#Add lines

<VirtualHost *:*>
    ServerName example.com
    Redirect permanent / http://example.com
</VirtualHost>
```

Restart the Apache service to apply the changes:

```
systemctl restart httpd.service
```

Enabling HTTP Strict Transport Security (HSTS) on web server

To protect Zabbix frontend against protocol downgrade attacks, we recommend to enable HSTS policy on webserver.

For example, to enable HSTS policy for your Zabbix frontend in Apache configuration:

```
/etc/httpd/conf/httpd.conf
```

add the following directive to your virtual host's configuration:

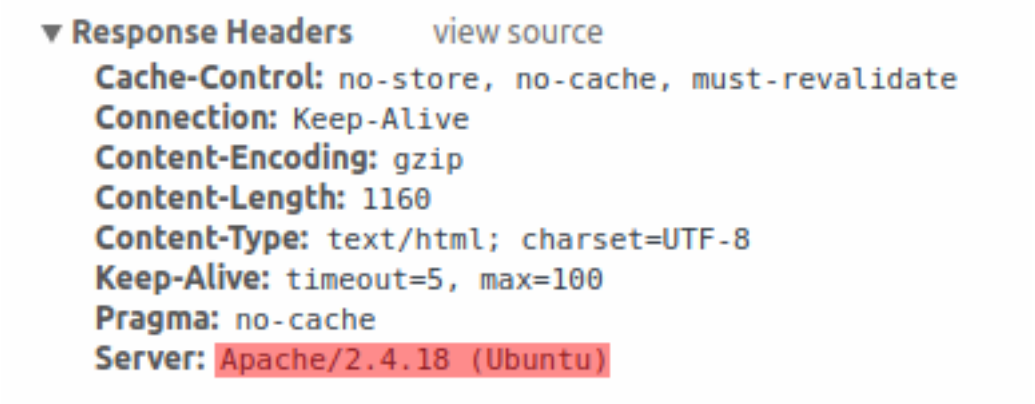
```
<VirtualHost *:443>
   Header set Strict-Transport-Security "max-age=31536000"
</VirtualHost>
```

Restart the Apache service to apply the changes:

```
systemctl restart httpd.service
```

Disabling web server information exposure

It is recommended to disable all web server signatures as part of the web server hardening process. The web server is exposing software signature by default:



The signature can be disabled by adding two lines to the Apache (used as an example) configuration file:

```
ServerSignature Off
ServerTokens Prod
```

PHP signature (X-Powered-By HTTP header) can be disabled by changing the php.ini configuration file (signature is disabled by default):

```
expose_php = Off
```

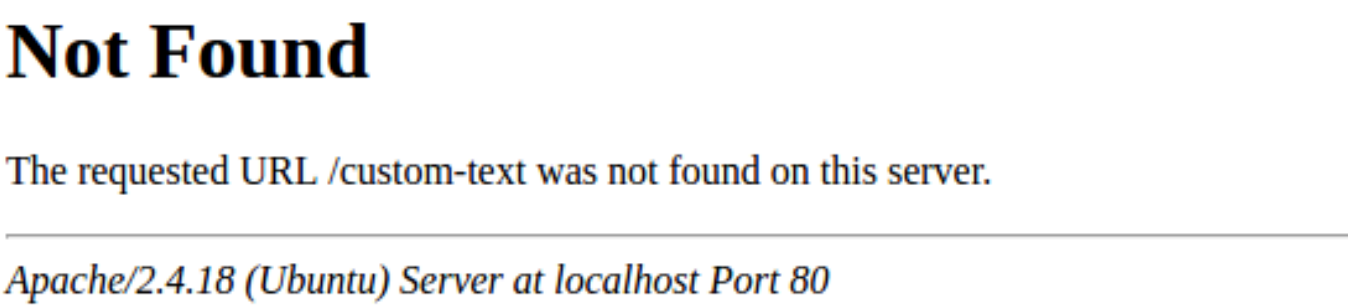
Web server restart is required for configuration file changes to be applied.

Additional security level can be achieved by using the mod_security (package libapache2-mod-security2) with Apache. mod_security allows to remove server signature instead of only removing version from server signature. Signature can be altered to any value by changing "SecServerSignature" to any desired value after installing mod_security.

Please refer to documentation of your web server to find help on how to remove/change software signatures.

Disabling default web server error pages

It is recommended to disable default error pages to avoid information exposure. Web server is using built-in error pages by default:

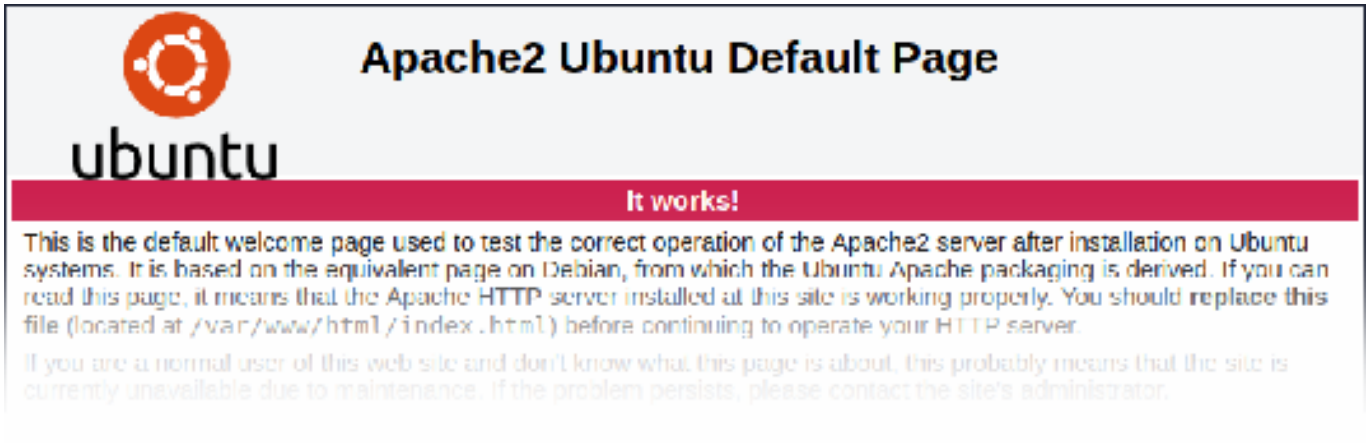


Default error pages should be replaced/removed as part of the web server hardening process. The "ErrorDocument" directive can be used to define a custom error page/text for Apache web server (used as an example).

Please refer to documentation of your web server to find help on how to replace/remove default error pages.

Removing web server test page

It is recommended to remove the web server test page to avoid information exposure. By default, web server webroot contains a test page called index.html (Apache2 on Ubuntu is used as an example):



The test page should be removed or should be made unavailable as part of the web server hardening process.

3 Installation from sources

You can get the very latest version of Zabbix by compiling it from the sources.

A step-by-step tutorial for installing Zabbix from the sources is provided here.

1 Installing Zabbix daemons

1 Download the source archive

Go to the Zabbix download page and download the source archive. Once downloaded, extract the sources, by running:

```
$ tar -zxvf zabbix-4.4.0.tar.gz
```

> **Note:**
> Enter the correct Zabbix version in the command. It must match the name of the downloaded archive.

2 Create user account

For all of the Zabbix daemon processes, an unprivileged user is required. If a Zabbix daemon is started from an unprivileged user account, it will run as that user.

However, if a daemon is started from a 'root' account, it will switch to a 'zabbix' user account, which must be present. To create such a user account (in its own group, "zabbix"),

on a RedHat-based system, run:

```
groupadd --system zabbix
useradd --system -g zabbix -d /usr/lib/zabbix -s /sbin/nologin -c "Zabbix Monitoring System" zabbix
```

on a Debian-based system, run:

```
addgroup --system --quiet zabbix
adduser --quiet --system --disabled-login --ingroup zabbix --home /var/lib/zabbix --no-create-home zabbix
```

Attention:
Zabbix processes do not need a home directory, which is why we do not recommend creating it. However, if you are using some functionality that requires it (e. g. store MySQL credentials in `$HOME/.my.cnf`) you are free to create it using the following commands.

On RedHat-based systems, run:
```
mkdir -m u=rwx,g=rwx,o= -p /usr/lib/zabbix
chown zabbix:zabbix /usr/lib/zabbix
```
On Debian-based systems, run:
```
mkdir -m u=rwx,g=rwx,o= -p /var/lib/zabbix
chown zabbix:zabbix /var/lib/zabbix
```

A separate user account is not required for Zabbix frontend installation.

If Zabbix server and agent are run on the same machine it is recommended to use a different user for running the server than for running the agent. Otherwise, if both are run as the same user, the agent can access the server configuration file and any Admin level user in Zabbix can quite easily retrieve, for example, the database password.

Attention:
Running Zabbix as `root`, `bin`, or any other account with special rights is a security risk.

3 Create Zabbix database

For Zabbix server and proxy daemons, as well as Zabbix frontend, a database is required. It is not needed to run Zabbix agent.

SQL scripts are provided for creating database schema and inserting the dataset. Zabbix proxy database needs only the schema while Zabbix server database requires also the dataset on top of the schema.

Having created a Zabbix database, proceed to the following steps of compiling Zabbix.

4 Configure the sources

When configuring the sources for a Zabbix server or proxy, you must specify the database type to be used. Only one database type can be compiled with a server or proxy process at a time.

To see all of the supported configuration options, inside the extracted Zabbix source directory run:

```
./configure --help
```

To configure the sources for a Zabbix server and agent, you may run something like:

```
./configure --enable-server --enable-agent --with-mysql --enable-ipv6 --with-net-snmp --with-libcurl --wit
```

Note:
For virtual machine monitoring `--with-libcurl` and `--with-libxml2` configuration options are required; `--with-libcurl` is also required for SMTP authentication and `web.page.*` Zabbix agent items. Note that cURL 7.20.0 or higher is required with the `--with-libcurl` configuration option.

Attention:
Since version 3.4.0, Zabbix will always compile with the PCRE library; installing it is not optional. `--with-libpcre=[DIR]` only allows pointing to a specific base install directory, instead of searching through a number of common places for the libpcre files.

To configure the sources for a Zabbix server (with PostgreSQL etc.), you may run:

```
./configure --enable-server --with-postgresql --with-net-snmp
```

To configure the sources for a Zabbix proxy (with SQLite etc.), you may run:

```
./configure --prefix=/usr --enable-proxy --with-net-snmp --with-sqlite3 --with-ssh2
```

To configure the sources for a Zabbix agent, you may run:

```
./configure --enable-agent
```

or, for Zabbix agent 2:

```
./configure --enable-agent2
```

You may use the --enable-static flag to statically link libraries. If you plan to distribute compiled binaries among different servers, you must use this flag to make these binaries work without required libraries. Note that --enable-static does not work in Solaris.

Attention:
Using --enable-static option is not recommended when building server.

In order to build the server statically you must have a static version of every external library needed. There is no strict check for that in configure script.

Attention:
If ./configure fails due to missing libraries or some other circumstance, please take a look at the `config.log` file for more detailed error description. For example, if we have missing *libssl*, the error message may be misleading:

```
checking for main in -lmysqlclient... no
configure: error: Not found mysqlclient library
```

But, if we look at `config.log`, it has a more detailed description for configuration failure:

```
/usr/bin/ld: cannot find -lssl
/usr/bin/ld: cannot find -lcrypto
```

Note:
Command-line utilities zabbix_get and zabbix_sender are compiled if --enable-agent option is used.

Note:
Add optional path to the MySQL configuration file --with-mysql=/<path_to_the_file>/mysql_config to select the desired MySQL client library when there is a need to use one that is not located in the default location.
It is useful when there are several versions of MySQL installed or MariaDB installed alongside MySQL on the same system.

Note:
Use --with-ibm-db2 flag to specify location of the CLI API.
Use --with-oracle flag to specify location of the OCI API.

For encryption support see Compiling Zabbix with encryption support.

See also: known issues with compiling Zabbix agent on HP-UX.

5 Make and install everything

Note:
If installing from Zabbix Git repository, it is required to run first:

```
$ make dbschema
```

```
make install
```

This step should be run as a user with sufficient permissions (commonly 'root', or by using `sudo`).

Running `make install` will by default install the daemon binaries (zabbix_server, zabbix_agentd, zabbix_proxy) in /usr/local/sbin and the client binaries (zabbix_get, zabbix_sender) in /usr/local/bin.

Note:
To specify a different location than /usr/local, use a --prefix key in the previous step of configuring sources, for example --prefix=/home/zabbix. In this case daemon binaries will be installed under <prefix>/sbin, while utilities under <prefix>/bin. Man pages will be installed under <prefix>/share.

6 Review and edit configuration files

- edit the Zabbix agent configuration file **/usr/local/etc/zabbix_agentd.conf**

You need to configure this file for every host with zabbix_agentd installed.

You must specify the Zabbix server **IP address** in the file. Connections from other hosts will be denied.

- edit the Zabbix server configuration file **/usr/local/etc/zabbix_server.conf**

You must specify the database name, user and password (if using any).

The rest of the parameters will suit you with their defaults if you have a small installation (up to ten monitored hosts). You should change the default parameters if you want to maximize the performance of Zabbix server (or proxy) though. See the performance tuning section for more details.

- if you have installed a Zabbix proxy, edit the proxy configuration file **/usr/local/etc/zabbix_proxy.conf**

You must specify the server IP address and proxy hostname (must be known to the server), as well as the database name, user and password (if using any).

> **Note:**
> With SQLite the full path to database file must be specified; DB user and password are not required.

7 Start up the daemons

Run zabbix_server on the server side.

```
shell> zabbix_server
```

> **Note:**
> Make sure that your system allows allocation of 36MB (or a bit more) of shared memory, otherwise the server may not start and you will see "Cannot allocate shared memory for <type of cache>." in the server log file. This may happen on FreeBSD, Solaris 8.
> See the "See also" section at the bottom of this page to find out how to configure shared memory.

Run zabbix_agentd on all the monitored machines.

```
shell> zabbix_agentd
```

> **Note:**
> Make sure that your system allows allocation of 2MB of shared memory, otherwise the agent may not start and you will see "Cannot allocate shared memory for collector." in the agent log file. This may happen on Solaris 8.

If you have installed Zabbix proxy, run zabbix_proxy.

```
shell> zabbix_proxy
```

2 Installing Zabbix web interface

Copying PHP files

Zabbix frontend is written in PHP, so to run it a PHP supported webserver is needed. Installation is done by simply copying the PHP files from frontends/php to the webserver HTML documents directory.

Common locations of HTML documents directories for Apache web servers include:

- /usr/local/apache2/htdocs (default directory when installing Apache from source)
- /srv/www/htdocs (OpenSUSE, SLES)
- /var/www/html (Debian, Ubuntu, Fedora, RHEL, CentOS)

It is suggested to use a subdirectory instead of the HTML root. To create a subdirectory and copy Zabbix frontend files into it, execute the following commands, replacing the actual directory:

```
mkdir <htdocs>/zabbix
cd frontends/php
cp -a . <htdocs>/zabbix
```

If installing from Zabbix Git repository and planning to use any other language than English, you must generate translation files. To do so, run:

```
locale/make_mo.sh
```

`msgfmt` utility from gettext package is required.

> **Note:**
> Additionally, to use any other language than English, its locale should be installed on the web server. See the "See also" section in the "User profile" page to find out how to install it if required.

Installing frontend

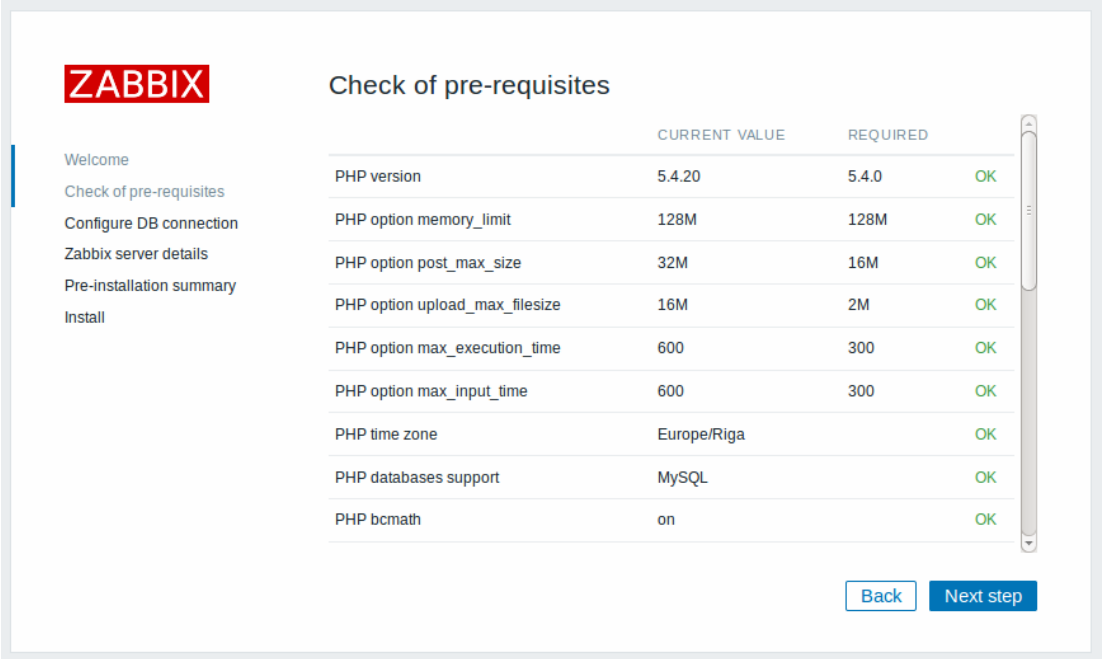
Step 1

In your browser, open Zabbix URL: http://<server_ip_or_name>/zabbix

You should see the first screen of the frontend installation wizard.

Step 2

Make sure that all software prerequisites are met.



Pre-requisite	Minimum value	Description
PHP version	5.4.0	
PHP memory_limit option	128MB	In php.ini: memory_limit = 128M
PHP post_max_size option	16MB	In php.ini: post_max_size = 16M
PHP upload_max_filesize option	2MB	In php.ini: upload_max_filesize = 2M
PHP max_execution_time option	300 seconds (values 0 and -1 are allowed)	In php.ini: max_execution_time = 300
PHP max_input_time option	300 seconds (values 0 and -1 are allowed)	In php.ini: max_input_time = 300

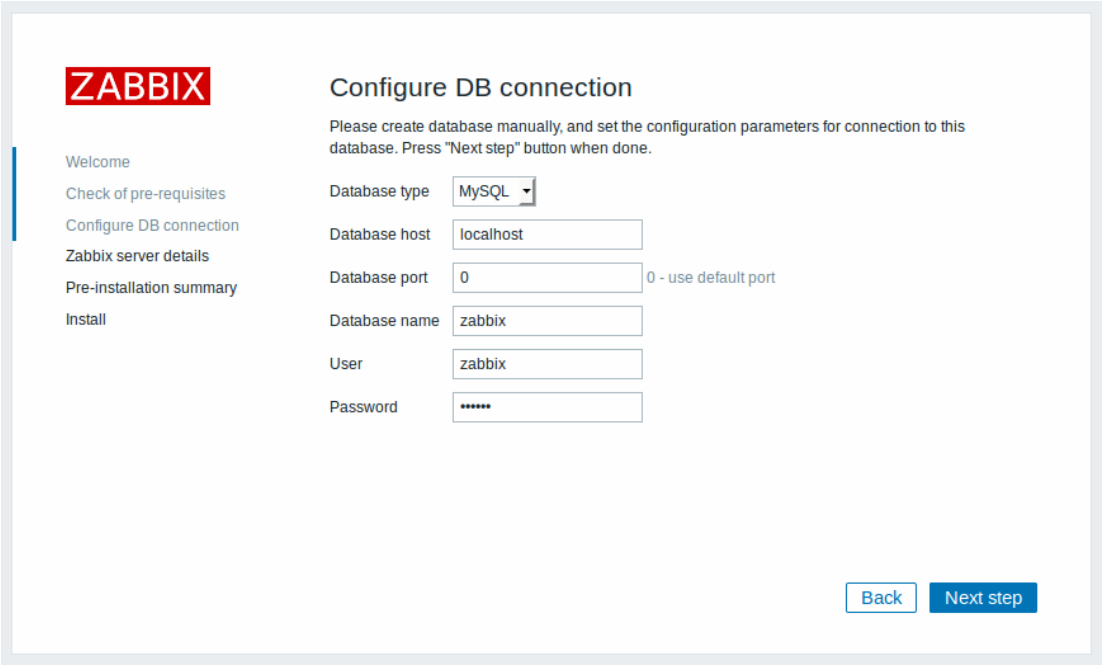
Pre-requisite	Minimum value	Description
PHP session.auto_start option	must be disabled	In php.ini: session.auto_start = 0
Database support	One of: MySQL, Oracle, PostgreSQL, IBM DB2	One of the following modules must be installed: mysql, oci8, pgsql, ibm_db2
bcmath		php-bcmath
mbstring		php-mbstring
PHP mbstring.func_overload option	must be disabled	In php.ini: mbstring.func_overload = 0
PHP always_populate_raw_post_data option	must be disabled	Required only for PHP versions 5.6.0 or newer. In php.ini: always_populate_raw_post_data = -1
sockets		php-net-socket. Required for user script support.
gd	2.0.28	php-gd. PHP GD extension must support PNG images (*--with-png-dir*), JPEG (*--with-jpeg-dir*) images and FreeType 2 (*--with-freetype-dir*).
libxml	2.6.15	php-xml or php5-dom
xmlwriter		php-xmlwriter
xmlreader		php-xmlreader
ctype		php-ctype
session		php-session
gettext		php-gettext Since Zabbix 2.2.1, the PHP gettext extension is not a mandatory requirement for installing Zabbix. If gettext is not installed, the frontend will work as usual, however, the translations will not be available.

Optional pre-requisites may also be present in the list. A failed optional prerequisite is displayed in orange and has a *Warning* status. With a failed optional pre-requisite, the setup may continue.

Attention:
If there is a need to change the Apache user or user group, permissions to the session folder must be verified. Otherwise Zabbix setup may be unable to continue.

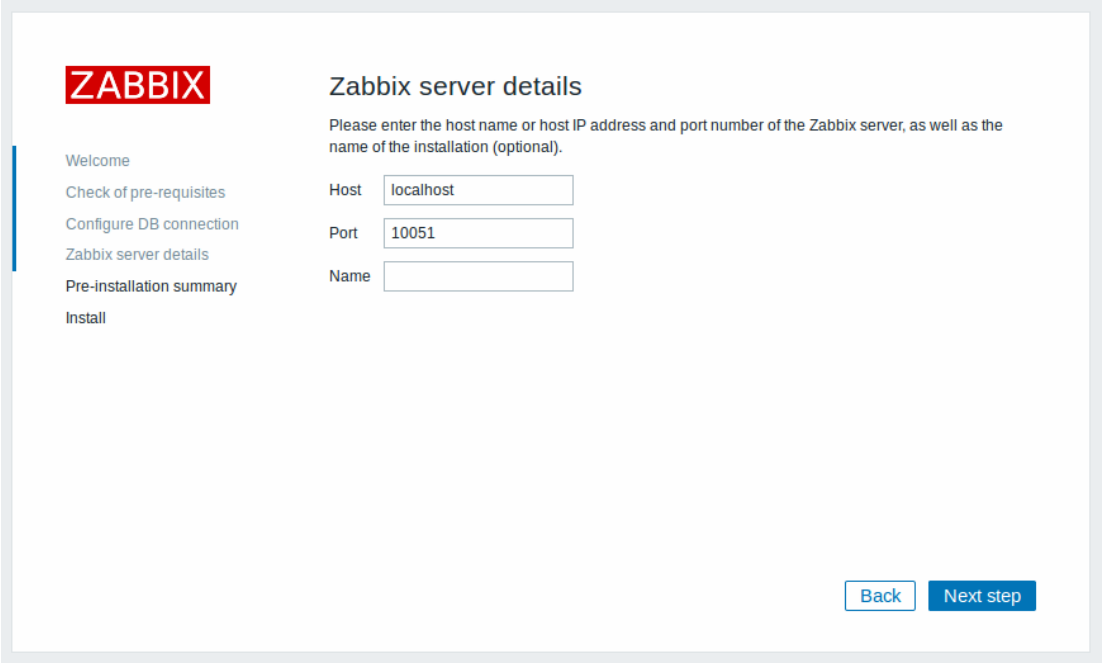
Step 3

Enter details for connecting to the database. Zabbix database must already be created.



Step 4

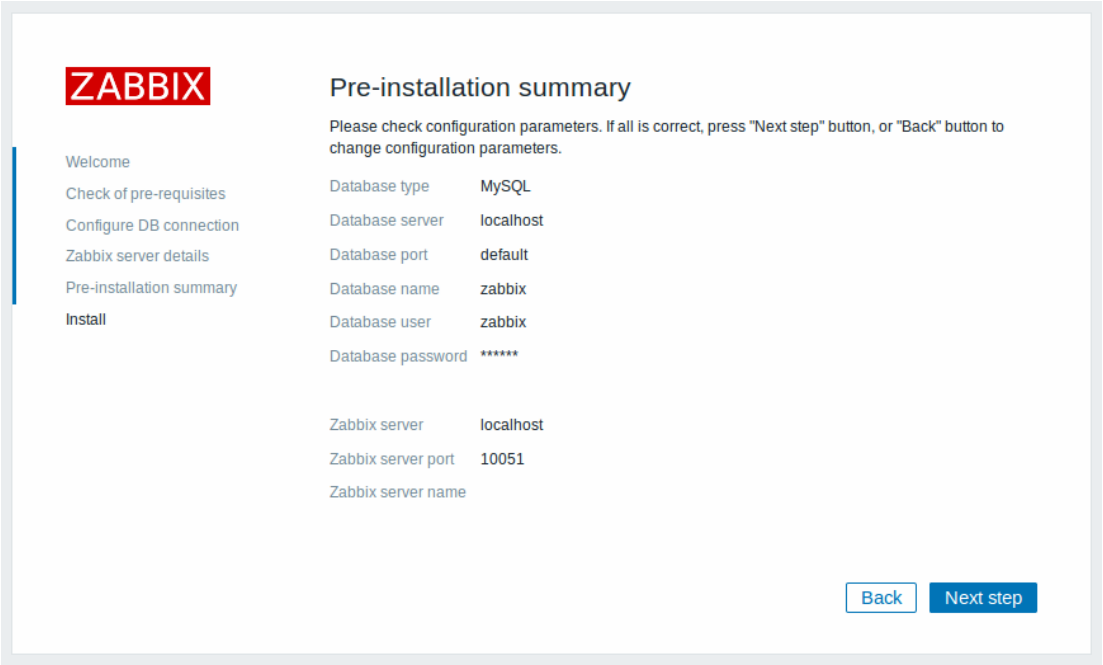
Enter Zabbix server details.



Entering a name for Zabbix server is optional, however, if submitted, it will be displayed in the menu bar and page titles.

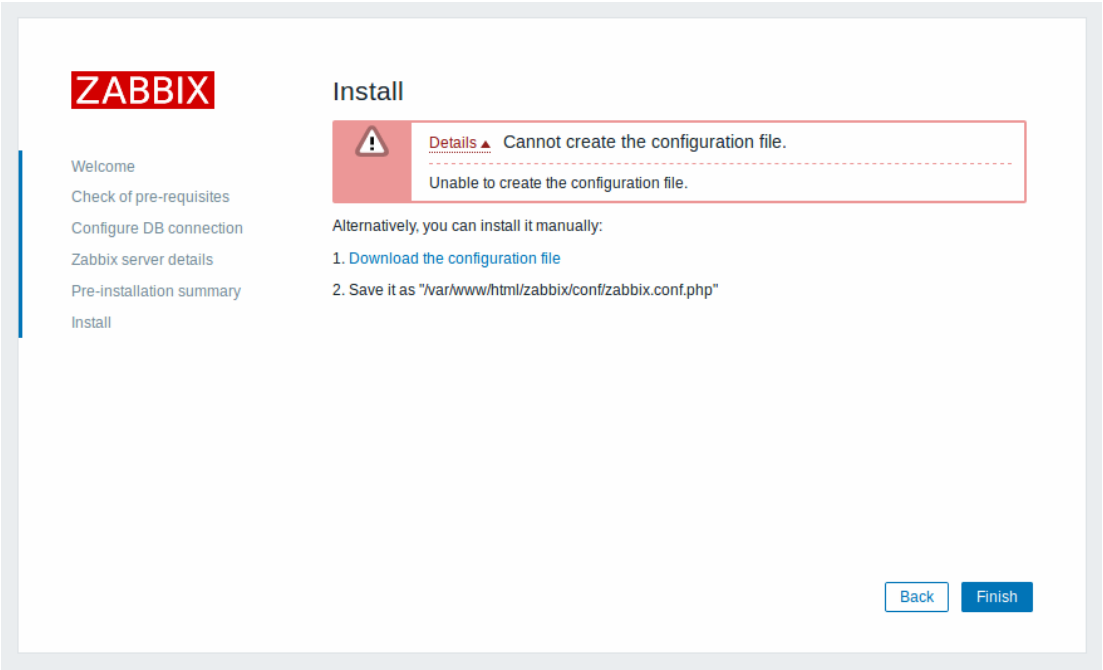
Step 5

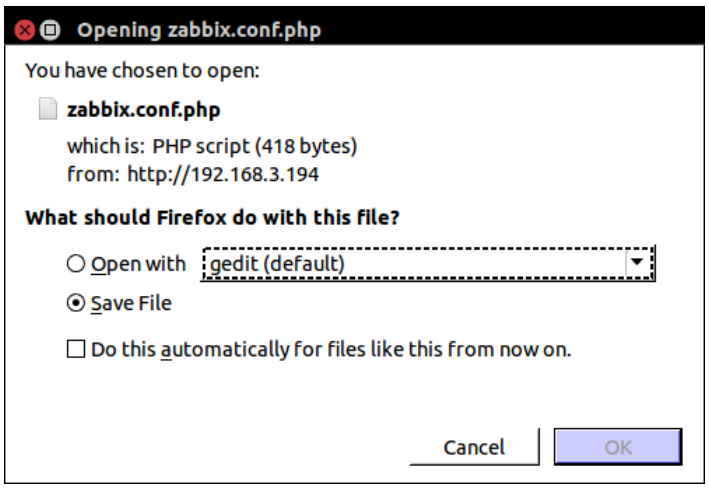
Review a summary of settings.



Step 6

Download the configuration file and place it under conf/ in the webserver HTML documents subdirectory where you copied Zabbix PHP files to.

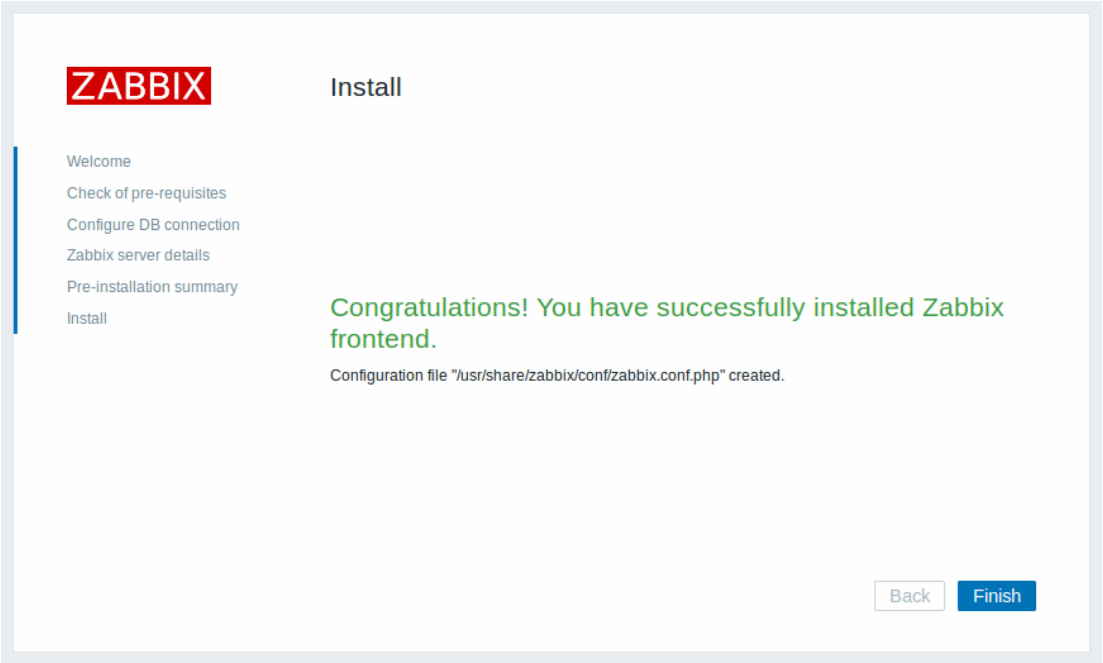




Note:
Providing the webserver user has write access to conf/ directory the configuration file would be saved automatically and it would be possible to proceed to the next step right away.

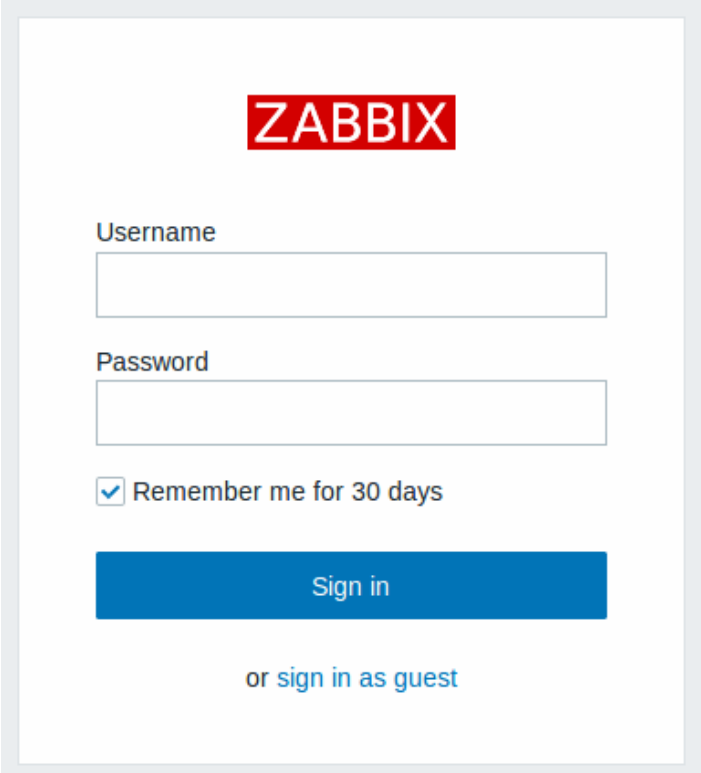
Step 7

Finish the installation.



Step 8

Zabbix frontend is ready! The default user name is **Admin**, password **zabbix**.



Proceed to getting started with Zabbix.

3 Installing Java gateway

It is required to install Java gateway only if you want to monitor JMX applications. Java gateway is lightweight and does not require a database.

To install from sources, first download and extract the source archive.

To compile Java gateway, run the `./configure` script with `--enable-java` option. It is advisable that you specify the `--prefix` option to request installation path other than the default /usr/local, because installing Java gateway will create a whole directory tree, not just a single executable.

```
$ ./configure --enable-java --prefix=$PREFIX
```

To compile and package Java gateway into a JAR file, run `make`. Note that for this step you will need `javac` and `jar` executables in your path.

```
$ make
```

Now you have a zabbix-java-gateway-$VERSION.jar file in src/zabbix_java/bin. If you are comfortable with running Java gateway from src/zabbix_java in the distribution directory, then you can proceed to instructions for configuring and running Java gateway. Otherwise, make sure you have enough privileges and run `make install`.

```
$ make install
```

Proceed to setup for more details on configuring and running Java gateway.

See also

1. How to configure shared memory for Zabbix daemons

Building Zabbix agent 2 on Windows

Overview

This section demonstrates how to build Zabbix agent 2 for Windows from sources

> **Attention:**
> Agent 2 is supported on Windows since Zabbix version 4.4.4.

> **Note:**
> Note, that Zabbix agent 2 (Windows) currently supports only the following items: **agent.*, log.*, eventlog.*, system.run **.
> Additional checks will be added in the future.

Compiling MinGW

1. Download MinGW-w64 with SJLJ (set jump/long jump) Exception Handling and Windows threads (look for *x86_64-8.1.0-release-win32-sjlj-rt_v6-rev0.7z*)
2. Extract and move to *c:\mingw*
3. Setup environmental variable

```
@echo off
set PATH=%PATH%;c:\bin\mingw\bin
cmd
```

When compiling use Windows prompt instead of MSYS terminal provided by MinGW

Compiling PCRE

The following instructions will compile and install 64-bit PCRE libraries in *c:\dev\pcre* and 32-bit libraries in *c:\dev\pcre32*:

1. Download PCRE library version 8.XX from pcre.org (ftp://ftp.pcre.org/pub/pcre/) and extract
2. Open *cmd* and navigate to the extracted sources

Build 64bit PCRE

1. Delete old configuration/cache if exists:

```
del CMakeCache.txt
rmdir /q /s CMakeFiles
```

2. Run cmake (CMake can be installed from https://cmake.org/download/):

```
cmake -G "MinGW Makefiles" -DCMAKE_C_COMPILER=gcc -DCMAKE_C_FLAGS="-O2 -g" -DCMAKE_CXX_FLAGS="-O2 -g" -DCM
```

3. Next, run:

```
mingw32-make clean
mingw32-make install
```

Build 32bit PCRE

1. Run:

```
mingw32-make clean
```

2. Delete *CMakeCache.txt*:

```
del CMakeCache.txt
rmdir /q /s CMakeFiles
```

3. Run cmake:

```
cmake -G "MinGW Makefiles" -DCMAKE_C_COMPILER=gcc -DCMAKE_C_FLAGS="-m32 -O2 -g" -DCMAKE_CXX_FLAGS="-m32 -O
```

4. Next, run:

```
mingw32-make install
```

Compiling OpenSSL

1. Donwload 32 and 64 bit builds from https://bintray.com/vszakats/generic/openssl/1.1.1d
2. Extract files into *c:\dev\openssl32* and *c:\dev\openssl* directories accordingly.
3. After that remove extracted **.dll.a* (dll call wrapper libraries) as MinGW prioritizes them before static libraries.

Compiling Zabbix agent 2

32 bit

Open MinGW environment (Windows command prompt) and navigate to *build/mingw* directory in the Zabbix source tree.

Run:

```
mingw32-make clean
mingw32-make ARCH=x86 PCRE=c:\dev\pcre32 OPENSSL=c:\dev\openssl32
```

64 bit

Open MinGW environment (Windows command prompt) and navigate to *build/mingw* directory in the Zabbix source tree.

Run:

```
mingw32-make clean
mingw32-make PCRE=c:\dev\pcre OPENSSL=c:\dev\openssl
```

> **Note:**
> Both 32- and 64- bit versions can be built on a 64-bit platform, but only a 32-bit version can be built on a 32-bit platform. When working on the 32-bit platform, follow the same steps as for 64-bit version on 64-bit platform.

Building Zabbix agent on macOS

Overview

This section demonstrates how to build Zabbix macOS agent binaries from sources with or without TLS.

Prerequisites

You will need command line developer tools (Xcode is not required), Automake, pkg-config and PCRE (v8.x). If you want to build agent binaries with TLS, you will also need OpenSSL or GnuTLS.

To install Automake and pkg-config, you will need a Homebrew package manager from https://brew.sh/. To install it, open terminal and run the following command:

```
$ /usr/bin/ruby -e "$(curl -fsSL https://raw.githubusercontent.com/Homebrew/install/master/install)"
```

Then install Automake and pkg-config:

```
$ brew install automake
$ brew install pkg-config
```

Preparing PCRE, OpenSSL and GnuTLS libraries depends on the way how they are going to be linked to the agent.

If you intend to run agent binaries on a macOS machine that already has these libraries, you can use precompiled libraries that are provided by Homebrew. These are typically macOS machines that use Homebrew for building Zabbix agent binaries or for other purposes.

If agent binaries will be used on macOS machines that don't have the shared version of libraries, you should compile static libraries from sources and link Zabbix agent with them.

Building agent binaries with shared libraries

Install PCRE:

```
$ brew install pcre
```

When building with TLS, install OpenSSL and/or GnuTLS:

```
$ brew install openssl
$ brew install gnutls
```

Download Zabbix source:

```
$ git clone https://git.zabbix.com/scm/zbx/zabbix.git
```

Build agent without TLS:

```
$ cd zabbix
$
$ ./bootstrap.sh
$ ./configure --sysconfdir=/usr/local/etc/zabbix --enable-agent --enable-ipv6
$ make
$ make install
```

Build agent with OpenSSL:

```
$ cd zabbix
$ ./bootstrap.sh
$ ./configure --sysconfdir=/usr/local/etc/zabbix --enable-agent --enable-ipv6 --with-openssl=/usr/local/op
$ make
$ make install
```

Build agent with GnuTLS:

```
$ cd zabbix
$ ./bootstrap.sh
$ ./configure --sysconfdir=/usr/local/etc/zabbix --enable-agent --enable-ipv6 --with-gnutls=/usr/local/opt
$ make
$ make install
```

Building agent binaries with static libraries without TLS

Let's assume that PCRE static libraries will be installed in `$HOME/static-libs`. We will use PCRE 8.42.

```
$ PCRE_PREFIX="$HOME/static-libs/pcre-8.42"
```

Download and build PCRE with Unicode properties support:

```
$ mkdir static-libs-source
$ cd static-libs-source
$ curl --remote-name https://ftp.pcre.org/pub/pcre/pcre-8.42.tar.gz
$ tar xf pcre-8.42.tar.gz
$ cd pcre-8.42
$ ./configure --prefix="$PCRE_PREFIX" --disable-shared --enable-static --enable-unicode-properties
$ make
$ make check
$ make install
```

Download Zabbix source and build agent:

```
$ git clone https://git.zabbix.com/scm/zbx/zabbix.git
$ cd zabbix
$ git checkout 4.4.10 -b 4.4.10 # replace 4.4.10 with the latest release available
$ ./bootstrap.sh
$ ./configure --sysconfdir=/usr/local/etc/zabbix --enable-agent --enable-ipv6 --with-libpcre="$PCRE_PREFIX
```

```
$ make
$ make install
```

Building agent binaries with static libraries with OpenSSL

When building OpenSSL, it's recommended to run `make test` after successful building. Even if building was successful, tests sometimes fail. If this is the case, problems should be researched and resolved before continuing.

Let's assume that PCRE and OpenSSL static libraries will be installed in `$HOME/static-libs`. We will use PCRE 8.42 and OpenSSL 1.1.1a.

```
$ PCRE_PREFIX="$HOME/static-libs/pcre-8.42"
$ OPENSSL_PREFIX="$HOME/static-libs/openssl-1.1.1a"
```

Let's build static libraries in `static-libs-source`:

```
$ mkdir static-libs-source
$ cd static-libs-source
```

Download and build PCRE with Unicode properties support:

```
$ curl --remote-name https://ftp.pcre.org/pub/pcre/pcre-8.42.tar.gz
$ tar xf pcre-8.42.tar.gz
$ cd pcre-8.42
$ ./configure --prefix="$PCRE_PREFIX" --disable-shared --enable-static --enable-unicode-properties
$ make
$ make check
$ make install
$ cd ..
```

Download and build OpenSSL:

```
$ curl --remote-name https://www.openssl.org/source/openssl-1.1.1a.tar.gz
$ tar xf openssl-1.1.1a.tar.gz
$ cd openssl-1.1.1a
$ ./Configure --prefix="$OPENSSL_PREFIX" --openssldir="$OPENSSL_PREFIX" --api=1.1.0 no-shared no-capieng n
$ make
$ make test
$ make install_sw
$ cd ..
```

Download Zabbix source and build agent:

```
$ git clone https://git.zabbix.com/scm/zbx/zabbix.git
$ cd zabbix
$ git checkout 4.4.10 -b 4.4.10 # replace 4.4.10 with the latest release available
$ ./bootstrap.sh
$ ./configure --sysconfdir=/usr/local/etc/zabbix --enable-agent --enable-ipv6 --with-libpcre="$PCRE_PREFIX
$ make
$ make install
```

Building agent binaries with static libraries with GnuTLS

GnuTLS depends on the Nettle crypto backend and GMP arithmetic library. Instead of using full GMP library, this guide will use mini-gmp which is included in Nettle.

When building GnuTLS and Nettle, it's recommended to run `make check` after successful building. Even if building was successful, tests sometimes fail. If this is the case, problems should be researched and resolved before continuing.

Let's assume that PCRE, Nettle and GnuTLS static libraries will be installed in `$HOME/static-libs`. We will use PCRE 8.42, Nettle 3.4.1 and GnuTLS 3.6.5.

```
$ PCRE_PREFIX="$HOME/static-libs/pcre-8.42"
$ NETTLE_PREFIX="$HOME/static-libs/nettle-3.4.1"
$ GNUTLS_PREFIX="$HOME/static-libs/gnutls-3.6.5"
```

Let's build static libraries in `static-libs-source`:

```
$ mkdir static-libs-source
$ cd static-libs-source
```

Download and build Nettle:

```
$ curl --remote-name https://ftp.gnu.org/gnu/nettle/nettle-3.4.1.tar.gz
$ tar xf nettle-3.4.1.tar.gz
$ cd nettle-3.4.1
$ ./configure --prefix="$NETTLE_PREFIX" --enable-static --disable-shared --disable-documentation --disable
$ make
$ make check
$ make install
$ cd ..
```

Download and build GnuTLS:

```
$ curl --remote-name https://www.gnupg.org/ftp/gcrypt/gnutls/v3.6/gnutls-3.6.5.tar.xz
$ tar xf gnutls-3.6.5.tar.xz
$ cd gnutls-3.6.5
$ PKG_CONFIG_PATH="$NETTLE_PREFIX/lib/pkgconfig" ./configure --prefix="$GNUTLS_PREFIX" --enable-static --d
$ make
$ make check
$ make install
$ cd ..
```

Download Zabbix source and build agent:

```
$ git clone https://git.zabbix.com/scm/zbx/zabbix.git
$ cd zabbix
$ git checkout 4.4.10 -b 4.4.10 # replace 4.4.10 with the latest release available
$ ./bootstrap.sh
$ CFLAGS="-Wno-unused-command-line-argument -framework Foundation -framework Security" \
> LIBS="-lgnutls -lhogweed -lnettle" \
> LDFLAGS="-L$GNUTLS_PREFIX/lib -L$NETTLE_PREFIX/lib" \
> ./configure --sysconfdir=/usr/local/etc/zabbix --enable-agent --enable-ipv6 --with-libpcre="$PCRE_PREFIX
$ make
$ make install
```

Building Zabbix agent on Windows

Overview

This section demonstrates how to build Zabbix Windows agent binaries from sources with or without TLS.

Compiling OpenSSL

The following steps will help you to compile OpenSSL from sources on MS Windows 10 (64-bit).

1. For compiling OpenSSL you will need on Windows machine:
    1. C compiler (e.g. VS 2017 RC),
    2. NASM (https://www.nasm.us/),
    3. Perl (e.g. Strawberry Perl from http://strawberryperl.com/),
    4. Perl module Text::Template (cpan Text::Template).
2. Get OpenSSL sources from https://www.openssl.org/. OpenSSL 1.1.1 is used here.
3. Unpack OpenSSL sources, for example, in E:\openssl-1.1.1.
4. Open a commandline window e.g. the x64 Native Tools Command Prompt for VS 2017 RC.
5. Go to the OpenSSL source directory, e.g. E:\openssl-1.1.1.
    1. Verify that NASM can be found:`e:\openssl-1.1.1> nasm --version  NASM version 2.13.01 compiled on May  1 2017`
6. Configure OpenSSL, for example:`e:\openssl-1.1.1> perl E:\openssl-1.1.1\Configure VC-WIN64A no-shared no-capieng no-srp no-gost no-dgram no-dtls1-method no-dtls1_2-method  --api=1.1.0 --prefix=C:\OpenSSL --openssldir=C:\OpenSSL-Win64-111-static`
    - Note the option 'no-shared': if 'no-shared' is used then the OpenSSL static libraries libcrypto.lib and libssl.lib will be 'self-sufficient' and resulting Zabbix binaries will include OpenSSL in themselves, no need for external OpenSSL DLLs. Advantage: Zabbix binaries can be copied to other Windows machines without OpenSSL libraries. Disadvantage: when a new OpenSSL bugfix version is released, Zabbix agent needs to recompiled and reinstalled.
    - If 'no-shared' is not used, then the static libraries libcrypto.lib and libssl.lib will be using OpenSSL DLLs at runtime. Advantage: when a new OpenSSL bugfix version is released, probably you can upgrade only OpenSSL DLLs, without recompiling Zabbix agent. Disadvantage: copying Zabbix agent to another machine requires copying OpenSSL DLLs, too.

7. Compile OpenSSL, run tests, install:`e:\openssl-1.1.1> nmake e:\openssl-1.1.1> nmake test ... All tests successful. Files=152, Tests=1152, 501 wallclock secs ( 0.67 usr + 0.61 sys = 1.28 CPU) Result: PASS e:\openssl-1.1.1> nmake install_sw`'install_sw' installs only software components (i.e. libraries, header files, but no documentation). If you want everything, use "nmake install".

Compiling PCRE

1. Download PCRE library (mandatory library since Zabbix 4.0) from pcre.org, version 8.XX; not pcre2 (ftp://ftp.csx.cam.ac.uk/pub/software/8.41.zip)
2. Extract to directory *E:\pcre-8.41*
3. Install CMake from https://cmake.org/download/, during install select: and ensure that cmake\bin is on your path (tested version 3.9.4).
4. Create a new, empty build directory, preferably a subdirectory of the source dir. For example, *E:\pcre-8.41\build*.
5. Open a commandline window e.g. the x64 Native Tools Command Prompt for VS 2017 and from that shell environment run cmake-gui. Do not try to start Cmake from the Windows Start menu, as this can lead to errors.
6. Enter *E:\pcre-8.41* and *E:\pcre-8.41\build* for the source and build directories, respectively.
7. Hit the "Configure" button.
8. When specifying the generator for this project select "NMake Makefiles".
9. Create a new, empty install directory. For example, *E:\pcre-8.41-install*.
10. The GUI will then list several configuration options. Make sure the following options are selected:
    - **PCRE_SUPPORT_UNICODE_PROPERTIES** ON
    - **PCRE_SUPPORT_UTF** ON
    - **CMAKE_INSTALL_PREFIX** *E:\pcre-8.41-install*
11. Hit "Configure" again. The adjacent "Generate" button should now be active.
12. Hit "Generate".
13. In the event that errors occur, it is recommended that you delete the CMake cache before attempting to repeat the CMake build process. In the CMake GUI, the cache can be deleted by selecting "File > Delete Cache".
14. The build directory should now contain a usable build system - *Makefile*.
15. Open a commandline window e.g. the x64 Native Tools Command Prompt for VS 2017 and navigate to the *Makefile* mentioned above.
16. Run NMake command: `E:\pcre-8.41\build> nmake install`

Compiling Zabbix

The following steps will help you to compile Zabbix from sources on MS Windows 10 (64-bit). When compiling Zabbix with/without TLS support the only significant difference is in step 4.

1. On a Linux machine check out the source from git:`$ git clone https://git.zabbix.com/scm/zbx/zabbix.git $ cd zabbix $ git checkout 4.4.10 -b 4.4.10 # replace 4.4.10 with the latest release available $ ./bootstrap.sh $ ./configure --enable-agent --enable-ipv6 --prefix=`pwd` $ make dbschema $ make dist`
2. Copy and unpack the archive, e.g. zabbix-4.4.0.tar.gz, on a Windows machine.
3. Let's assume that sources are in e:\zabbix-4.4.0. Open a commandline window e.g. the x64 Native Tools Command Prompt for VS 2017 RC. Go to E:\zabbix-4.4.0\build\win32\project.
4. Compile zabbix_get, zabbix_sender and zabbix_agent.
    - without TLS: `E:\zabbix-4.4.0\build\win32\project> nmake /K PCREINCDIR=E:\pcre-8.41-install\include PCRELIBDIR=E:\pcre-8.41-install\lib`
    - with TLS: `E:\zabbix-4.4.0\build\win32\project> nmake /K -f Makefile_get TLS=openssl TLSINCDIR=C:\Ope TLSLIBDIR=C:\OpenSSL-Win64-111-static\lib PCREINCDIR=E:\pcre-8.41-install\include PCRELIBDIR=E:\p E:\zabbix-4.4.0\build\win32\project> nmake /K -f Makefile_sender TLS=openssl TLSINCDIR="C:\OpenSS TLSLIBDIR="C:\OpenSSL-Win64-111-static\lib" PCREINCDIR=E:\pcre-8.41-install\include PCRELIBDIR=E:\pcre-8.41-install\lib E:\zabbix-4.4.0\build\win32\project> nmake /K -f Makefile_agent TLS=openssl TLSINCDIR=C:\OpenSSL-Win64-111-static\include TLSLIBDIR=C:\OpenSSL-Win PCREINCDIR=E:\pcre-8.41-install\include PCRELIBDIR=E:\pcre-8.41-install\lib`
5. New binaries are located in e:\zabbix-4.4.0\bin\win64. Since OpenSSL was compiled with 'no-shared' option, Zabbix binaries contain OpenSSL within themselves and can be copied to other machines that do not have OpenSSL.

Compiling Zabbix with LibreSSL

The process is similar to compiling with OpenSSL, but you need to make small changes in files located in the `build\win32\project` directory:

* In ''Makefile_tls'' delete ''/DHAVE_OPENSSL_WITH_PSK''. i.e. find <code>

CFLAGS = $(CFLAGS) /DHAVE_OPENSSL /DHAVE_OPENSSL_WITH_PSK</code>and replace it with CFLAGS = $(CFLAGS) /DHAVE_OPENSSL

* In ''Makefile_common.inc'' add ''/NODEFAULTLIB:LIBCMT'' i.e. find <code>

/MANIFESTUAC:”level=’asInvoker’ uiAccess=’false’” /DYNAMICBASE:NO /PDB:$(TARGETDIR)\$(TARGETNAME).pdb</code>and replace it with `/MANIFESTUAC:"level='asInvoker' uiAccess='false'" /DYNAMICBASE:NO /PDB:$(TARGETDIR)\$(TARGETNAME) /NODEFAULTLIB:LIBCMT`

4 Installation from packages

From distribution packages

Several popular OS distributions have Zabbix packages provided. These are not supported by Zabbix. Only the ones from Zabbix Official Repository are.

> **Note:**
> OS distributions may lack the latest version of Zabbix in their repositiories.

From Zabbix official repository

Zabbix SIA provides official RPM and DEB packages for:

- Red Hat Enterprise Linux/CentOS
- Debian/Ubuntu/Raspbian
- SUSE Linux Enterprise Server

Package files are available at repo.zabbix.com. Yum and apt repositories are also available on the server.

1 Red Hat Enterprise Linux/CentOS

Overview

Official Zabbix packages are available for:

RHEL 8, CentOS 8 and Oracle Linux 8	Download
RHEL 7, CentOS 7 and Oracle Linux 7	Download

In this documentation we will refer to all 3 using the term `RHEL`.

Some agent and proxy packages are available for RHEL 6 and RHEL 5 as well.

Adding Zabbix repository

Install the repository configuration package. This package contains yum (software package manager) configuration files.

RHEL 8:

```
# rpm -Uvh https://repo.zabbix.com/zabbix/4.4/rhel/8/x86_64/zabbix-release-4.4-1.el8.noarch.rpm
```

RHEL 7:

```
# rpm -Uvh https://repo.zabbix.com/zabbix/4.4/rhel/7/x86_64/zabbix-release-4.4-1.el7.noarch.rpm
```

RHEL 6:

```
# rpm -Uvh https://repo.zabbix.com/zabbix/4.4/rhel/6/x86_64/zabbix-release-4.4-1.el6.noarch.rpm
```

RHEL 5:

```
# rpm -Uvh https://repo.zabbix.com/zabbix/4.4/rhel/5/x86_64/zabbix-release-4.4-1.el5.noarch.rpm
```

Frontend installation prerequisites

Zabbix frontend requires additional packages not available in basic installation. You need to enable repository of optional rpms in the system you will run Zabbix frontend on:

RHEL 7:

```
# yum-config-manager --enable rhel-7-server-optional-rpms
```

Server/proxy/frontend installation

To install Zabbix server on RHEL 7/8 (deprecated on RHEL 6) with MySQL support:

```
# yum install zabbix-server-mysql
```

To install Zabbix proxy with MySQL support:

```
# yum install zabbix-proxy-mysql
```

Substitute 'mysql' in the commands with 'pgsql' to use PostgreSQL, or with 'sqlite3' to use SQLite3 (proxy only).

To install Zabbix frontend on RHEL 8 with MySQL/Apache support:

```
# yum install zabbix-web-mysql zabbix-apache-conf
```

To install Zabbix frontend on RHEL 7 (deprecated on RHEL 6) with MySQL/Apache support:

```
# yum install zabbix-web-mysql
```

To install Zabbix frontend on RHEL 7/8 with MySQL/Nginx support:

```
# yum install epel-release
# yum install zabbix-web-mysql zabbix-nginx-conf
```

Note that Nginx for RHEL is available only in EPEL.

Creating database

For Zabbix server and proxy daemons a database is required. It is not needed to run Zabbix agent.

Warning:
Separate databases are needed for Zabbix server and Zabbix proxy; they cannot use the same database. Therefore, if they are installed on the same host, their databases must be created with different names!

Create the database using the provided instructions for MySQL or PostgreSQL.

Importing data

Now import initial schema and data for the **server** with MySQL:

```
# zcat /usr/share/doc/zabbix-server-mysql*/create.sql.gz | mysql -uzabbix -p zabbix
```

You will be prompted to enter your newly created database password.

With PostgreSQL:

```
# zcat /usr/share/doc/zabbix-server-pgsql*/create.sql.gz | sudo -u zabbix psql zabbix
```

With TimescaleDB, in addition to the previous command, also run:

```
# zcat /usr/share/doc/zabbix-server-pgsql*/timescaledb.sql.gz | sudo -u zabbix psql zabbix
```

Warning:
TimescaleDB is supported with Zabbix server only.

For **proxy**, import initial schema:

```
# zcat /usr/share/doc/zabbix-proxy-mysql*/schema.sql.gz | mysql -uzabbix -p zabbix
```

For proxy with PostgreSQL (or SQLite):

```
# zcat /usr/share/doc/zabbix-proxy-pgsql*/schema.sql.gz | sudo -u zabbix psql zabbix
# zcat /usr/share/doc/zabbix-proxy-sqlite3*/schema.sql.gz | sqlite3 zabbix.db
```

Configure database for Zabbix server/proxy

Edit zabbix_server.conf (and zabbix_proxy.conf) to use their respective databases. For example:

```
# vi /etc/zabbix/zabbix_server.conf
DBHost=localhost
DBName=zabbix
DBUser=zabbix
DBPassword=<password>
```

In DBPassword use Zabbix database password for MySQL; PosgreSQL user password for PosgreSQL.

Use `DBHost=` with PostgreSQL. You might want to keep the default setting `DBHost=localhost` (or an IP address), but this would make PostgreSQL use a network socket for connecting to Zabbix. See **SELinux configuration** below for instructions.

Starting Zabbix server process

To start Zabbix server process on RHEL8:

```
# service zabbix-server httpd php-fpm start
```

On RHEL 7:

```
# service zabbix-server httpd start
```

On RHEL 7/8 with Nginx:

```
# service zabbix-server nginx php-fpm start
```

To make it start at system boot on RHEL 8:

```
# systemctl enable zabbix-server httpd php-fpm
```

On RHEL 7:

```
# systemctl enable zabbix-server httpd
```

On RHEL 7/8 with Nginx:

```
# systemctl enable zabbix-server nginx php-fpm
```

RHEL prior to 7:

```
# chkconfig --level 12345 zabbix-server on
```

Substitute 'zabbix-server' with 'zabbix-proxy' if you are installing Zabbix proxy.

Zabbix frontend configuration

Depending on the web server used (Apache/Nginx) edit the corresponding configuration file for Zabbix frontend:

- For Apache the configuration file is located in `/etc/httpd/conf.d/zabbix.conf`. Some PHP settings are already configured. Note that in RHEL 7 (but not in RHEL 8) it's necessary to uncomment and set the right date.timezone setting for you.

```
php_value max_execution_time 300
php_value memory_limit 128M
php_value post_max_size 16M
php_value upload_max_filesize 2M
php_value max_input_time 300
php_value max_input_vars 10000
php_value always_populate_raw_post_data -1
# php_value date.timezone Europe/Riga
```

- The zabbix-nginx-conf package installs a separate Nginx server for Zabbix frontend. Its configuration file is located in `/etc/nginx/conf.d/zabbix.conf`. For Zabbix frontend to work, it's necessary to uncomment and set `listen` and/or `server_name` directives.

```
# listen 80;
# server_name example.com;
```

- Zabbix uses its own dedicated php-fpm connection pool:
  - In RHEL 8 with both Apache and Nginx
  - In RHEL 7 only with Nginx

Its configuration file is located in `/etc/php-fpm.d/zabbix.conf`. Some PHP settings are already configured. But it's necessary to set the right date.timezone setting for you in this file.

```
php_value[max_execution_time] = 300
php_value[memory_limit] = 128M
php_value[post_max_size] = 16M
php_value[upload_max_filesize] = 2M
php_value[max_input_time] = 300
php_value[max_input_vars] = 10000
; php_value[date.timezone] = Europe/Riga
```

Now you are ready to proceed with frontend installation steps which will allow you to access your newly installed Zabbix.

Note that a Zabbix proxy does not have a frontend; it communicates with Zabbix server only.

Note:
Zabbix official repository provides fping, iksemel, libssh2 packages as well. These packages are located in the *non-supported* directory.

If you use RHEL 6 please read the section about using Zabbix frontend on RHEL 6 on how to configure the frontend.

SELinux configuration

Having SELinux status enabled in enforcing mode, you need to execute the following commands to enable communication between Zabbix frontend and server:

RHEL 7 and later:

```
# setsebool -P httpd_can_connect_zabbix on
If the database is accessible over network (including 'localhost' in case of PostgreSQL), you need to allo
# setsebool -P httpd_can_network_connect_db on
```

RHEL prior to 7:

```
# setsebool -P httpd_can_network_connect on
# setsebool -P zabbix_can_network on
```

As frontend and SELinux configuration is done, you need to restart Apache web server:

```
# service httpd restart
```

Zabbix frontend and server on RHEL 6

Zabbix frontend on RHEL 6 is not supported because of PHP version. Since Zabbix 3.0 the requirements are to have PHP 5.4.0 or later while RHEL 6 latest version is 5.3.3 .

In most cases Zabbix server and frontend are installed on the same machine. When upgrading 2.2 to 3.0 Zabbix server will perform database upgrade and frontend will stop working. There is no way to roll back the database changes so users will be forced to upgrade PHP using 3rd party packages. This is why Zabbix server is also deprecated on RHEL 6.

If you still want to use Zabbix frontend on RHEL 6 and upgraded your PHP using 3rd party packages you would need to enable `zabbix-deprecated` repository first:

- open file /etc/yum.repos.d/zabbix.repo
- find section [zabbix-deprecated]
- set enabled=1
- save the file

You will have to do some more manual configuration. This is because we cannot identify the Apache version required for your PHP which makes it impossible for us to provide proper Apache configuration for Zabbix frontend. We have included 2 Apache configuration files to our zabbix-web package, one for Apache 2.2 and another for 2.4, which you would need to integrate with the Apache configuration yourself:

- httpd22-example.conf
- httpd24-example.conf

To get the full path to the files execute:

```
$ rpm -ql zabbix-web | grep example.conf
```

Agent installation

To install the agent, run

```
# yum install zabbix-agent
```

To start the agent, run:

```
# service zabbix-agent start
```

Substitute 'zabbix-agent' with 'zabbix-agent2' in these commands if using Zabbix agent 2 (only RHEL/CentOS 8).

If you want to run Zabbix agent as root, see here https://www.zabbix.com/documentation/4.4/manual/appendix/install/run_agent_as_root.

Java gateway installation

It is required to install Java gateway only if you want to monitor JMX applications. Java gateway is lightweight and does not require a database.

Once the required repository is added, you can install Zabbix Java gateway by running:

```
# yum install zabbix-java-gateway
```

Proceed to setup for more details on configuring and running Java gateway.

Installing debuginfo packages

Debuginfo packages are currently available for RHEL/CentOS versions 7, 6 and 5. ::: To enable debuginfo repository edit */etc/yum.repos.d/zabbix.repo* file. Change `enabled=0` to `enabled=1` for zabbix-debuginfo repository.

```
[zabbix-debuginfo]
name=Zabbix Official Repository debuginfo - $basearch
baseurl=http://repo.zabbix.com/zabbix/4.4/rhel/7/$basearch/debuginfo/
enabled=0
gpgkey=file:///etc/pki/rpm-gpg/RPM-GPG-KEY-ZABBIX-A14FE591
gpgcheck=1
```

This will allow you to install the zabbix-debuginfo package.

```
# yum install zabbix-debuginfo
```

This single packages contains debug information for all binary Zabbix componets.

2 Debian/Ubuntu/Raspbian

Overview

Official Zabbix packages are available for:

Debian 10 (Buster)	Download
Debian 9 (Stretch)	Download
Debian 8 (Jessie)	Download
Ubuntu 20.04 (Focal Fossa) LTS	Download
Ubuntu 18.04 (Bionic Beaver) LTS	Download
Ubuntu 16.04 (Xenial Xerus) LTS	Download
Ubuntu 14.04 (Trusty Tahr) LTS	Download
Raspbian (Buster)	Download
Raspbian (Stretch)	Download

Adding Zabbix repository

Install the repository configuration package. This package contains apt (software package manager) configuration files.

For **Debian 10**, run the following commands:

Note! For Debian 9, substitute 'buster' with 'stretch' in the commands. For Debian 8, substitute 'buster' with 'jessie' in the commands.

```
# wget https://repo.zabbix.com/zabbix/4.4/debian/pool/main/z/zabbix-release/zabbix-release_4.4-1+buster_al
# dpkg -i zabbix-release_4.4-1+buster_all.deb
# apt update
```

For **Ubuntu 20.04 (focal)**, run the following commands:

```
# wget https://repo.zabbix.com/zabbix/4.4/ubuntu/pool/main/z/zabbix-release/zabbix-release_4.4-1+focal_all
# dpkg -i zabbix-release_4.4-1+focal_all.deb
# apt update
```

- For Ubuntu 18.04, substitute 'focal' with 'bionic' in the commands.
- For Ubuntu 16.04, substitute 'focal' with 'xenial' in the commands.
- For Ubuntu 14.04, substitute 'focal' with 'trusty' in the commands.

For **Raspbian**, run the following commands:

```
# wget https://repo.zabbix.com/zabbix/4.4/raspbian/pool/main/z/zabbix-release/zabbix-release_4.4-1+buster_
# dpkg -i zabbix-release_4.4-1+buster_all.deb
# apt update
```

Server/proxy/frontend installation

To install Zabbix server with MySQL support:

```
# apt install zabbix-server-mysql
```

To install Zabbix proxy with MySQL support:

```
# apt install zabbix-proxy-mysql
```

Substitute 'mysql' in the commands with 'pgsql' to use PostgreSQL, or with 'sqlite3' to use SQLite3 (proxy only).

To install Zabbix frontend:

```
# apt install zabbix-frontend-php zabbix-apache-conf
```

Substitute 'apache' in the command with 'nginx' if using the Nginx web server.

Creating database

For Zabbix server and proxy daemons a database is required. It is not needed to run Zabbix agent.

> **Warning:**
> Separate databases are needed for Zabbix server and Zabbix proxy; they cannot use the same database. Therefore, if they are installed on the same host, their databases must be created with different names!

Create the database using the provided instructions for MySQL or PostgreSQL.

Importing data

Now import initial schema and data for the **server** with MySQL:

```
# zcat /usr/share/doc/zabbix-server-mysql/create.sql.gz | mysql -uzabbix -p zabbix
```

You will be prompted to enter your newly created database password.

With PostgreSQL:

```
# zcat /usr/share/doc/zabbix-server-pgsql/create.sql.gz | sudo -u zabbix psql zabbix
```

With TimescaleDB, in addition to the previous command, also run:

```
# zcat /usr/share/doc/zabbix-server-pgsql*/timescaledb.sql.gz | sudo -u zabbix psql zabbix
```

> **Warning:**
> TimescaleDB is supported with Zabbix server only.

For **proxy**, import initial schema:

```
# zcat /usr/share/doc/zabbix-proxy-mysql/schema.sql.gz | mysql -uzabbix -p zabbix
```

For proxy with PostgreSQL (or SQLite):

```
# zcat /usr/share/doc/zabbix-proxy-pgsql/schema.sql.gz | sudo -u zabbix psql zabbix
# zcat /usr/share/doc/zabbix-proxy-sqlite3/schema.sql.gz | sqlite3 zabbix.db
```

Configure database for Zabbix server/proxy

Edit zabbix_server.conf (and zabbix_proxy.conf) to use their respective databases. For example:

```
# vi /etc/zabbix/zabbix_server.conf
DBHost=localhost
DBName=zabbix
DBUser=zabbix
DBPassword=<password>
```

In DBPassword use Zabbix database password for MySQL; PosgreSQL user password for PosgreSQL.

Use `DBHost=` with PostgreSQL. You might want to keep the default setting `DBHost=localhost` (or an IP address), but this would make PostgreSQL use a network socket for connecting to Zabbix. Refer to the respective section for RHEL/CentOS for instructions.

Starting Zabbix server process

It's time to start Zabbix server process and make it start at system boot:

```
# service zabbix-server apache2 php-fpm start
# update-rc.d zabbix-server apache2 php-fpm enable
```

Substitute 'zabbix-server' with 'zabbix-proxy' to start Zabbix proxy process. Substitute 'apache2' with 'nginx' for Nginx web server.

SELinux configuration

Refer to the respective section for RHEL/CentOS.

As frontend and SELinux configuration is done, you need to restart Apache web server:

```
# service apache2 restart
```

Frontend configuration

Depending on the web server used (Apache/Nginx) edit the corresponding configuration file for Zabbix frontend:

- For Apache the configuration file is located in `/etc/zabbix/apache.conf`. Some PHP settings are already configured. But it's necessary to uncomment the "date.timezone" setting and set the right timezone for you.

```
php_value max_execution_time 300
php_value memory_limit 128M
php_value post_max_size 16M
php_value upload_max_filesize 2M
php_value max_input_time 300
php_value max_input_vars 10000
php_value always_populate_raw_post_data -1
# php_value date.timezone Europe/Riga
```

- The zabbix-nginx-conf package installs a separate Nginx server for Zabbix frontend. Its configuration file is located in `/etc/zabbix/nginx.conf`. For Zabbix frontend to work, it's necessary to uncomment and set `listen` and/or `server_name` directives.

```
# listen 80;
# server_name example.com;
```

- Zabbix uses its own dedicated php-fpm connection pool with Nginx:

Its configuration file is located in `/etc/zabbix/php-fpm.conf`. Some PHP settings are already configured. But it's necessary to set the right date.timezone setting for you.

```
php_value[max_execution_time] = 300
php_value[memory_limit] = 128M
php_value[post_max_size] = 16M
php_value[upload_max_filesize] = 2M
php_value[max_input_time] = 300
php_value[max_input_vars] = 10000
; php_value[date.timezone] = Europe/Riga
```

Now you are ready to proceed with frontend installation steps which will allow you to access your newly installed Zabbix.

Note that a Zabbix proxy does not have a frontend; it communicates with Zabbix server only.

Agent installation

To install the agent, run

```
# apt install zabbix-agent
```

To start the agent, run:

```
# service zabbix-agent start
```

Substitute 'zabbix-agent' with 'zabbix-agent2' in these commands if using Zabbix agent 2 (only Debian 9/10, Ubuntu 18.04/20.04).

If you want to run Zabbix agent as root, see here https://www.zabbix.com/documentation/4.4/manual/appendix/install/run_agent_as_root.

Java gateway installation

It is required to install Java gateway only if you want to monitor JMX applications. Java gateway is lightweight and does not require a database.

Once the required repository is added, you can install Zabbix Java gateway by running:

```
# apt install zabbix-java-gateway
```

Proceed to setup for more details on configuring and running Java gateway.

3 SUSE Linux Enterprise Server

Overview

Official Zabbix packages are available for:

SUSE Linux Enterprise Server 15	Download
SUSE Linux Enterprise Server 12	Download

Adding Zabbix repository

Install the repository configuration package. This package contains yum (software package manager) configuration files.

SLES 15:

```
# rpm -Uvh --nosignature https://repo.zabbix.com/zabbix/4.4/sles/15/x86_64/zabbix-release-4.4-1.el15.noarc
# zypper --gpg-auto-import-keys refresh 'Zabbix Official Repository'
```

SLES 12:

```
# rpm -Uvh --nosignature https://repo.zabbix.com/zabbix/4.4/sles/12/x86_64/zabbix-release-4.4-1.el12.noarc
# zypper --gpg-auto-import-keys refresh 'Zabbix Official Repository'
```

Server/frontend/agent installation

To be able to install Zabbix frontend `Web and Scripting Module` must be activated. It contains the necessary PHP dependencies.

SLES 15:

```
# SUSEConnect -p sle-module-web-scripting/15/x86_64
```

SLES 12:

```
# SUSEConnect -p sle-module-web-scripting/12/x86_64
```

To install Zabbix server/frontend/agent with MySQL support:

```
# zypper install zabbix-server-mysql zabbix-web-mysql zabbix-apache-conf zabbix-agent
```

Substitute 'apache' in the command with 'nginx' if using the package for Nginx web server. See also: Nginx setup for Zabbix on SLES 12/15.

Substitute 'zabbix-agent' with 'zabbix-agent2' in these commands if using Zabbix agent 2 (only SLES 15 SP1+).

To install Zabbix proxy with MySQL support:

```
# zypper install zabbix-proxy-mysql
```

Substitute 'mysql' in the commands with 'pgsql' to use PostgreSQL.

Creating database

For Zabbix server and proxy daemons a database is required. It is not needed to run Zabbix agent.

Warning:
Separate databases are needed for Zabbix server and Zabbix proxy; they cannot use the same database. Therefore, if they are installed on the same host, their databases must be created with different names!

Create the database using the provided instructions for MySQL or PostgreSQL.

Importing data

Now import initial schema and data for the **server** with MySQL:

```
# zcat /usr/share/doc/packages/zabbix-server-mysql*/create.sql.gz | mysql -uzabbix -p zabbix
```

You will be prompted to enter your newly created database password.

With PostgreSQL:

```
# zcat /usr/share/doc/packages/zabbix-server-pgsql*/create.sql.gz | sudo -u <username> psql zabbix
```

With TimescaleDB, in addition to the previous command, also run:

```
# zcat /usr/share/doc/packages/zabbix-server-pgsql*/timescaledb.sql.gz | sudo -u <username> psql zabbix
```

Warning:
TimescaleDB is supported with Zabbix server only.

For **proxy**, import initial schema:

```
# zcat /usr/share/doc/packages/zabbix-proxy-mysql*/schema.sql.gz | mysql -uzabbix -p zabbix
```

For proxy with PostgreSQL:

```
# zcat /usr/share/doc/packages/zabbix-proxy-pgsql*/schema.sql.gz | sudo -u <username> psql zabbix
```

Configure database for Zabbix server/proxy

Edit /etc/zabbix/zabbix_server.conf (and zabbix_proxy.conf) to use their respective databases. For example:

```
# vi /etc/zabbix/zabbix_server.conf
DBHost=localhost
DBName=zabbix
DBUser=zabbix
DBPassword=<password>
```

In DBPassword use Zabbix database password for MySQL; PosgreSQL user password for PosgreSQL.

Use DBHost= with PostgreSQL. You might want to keep the default setting DBHost=localhost (or an IP address), but this would make PostgreSQL use a network socket for connecting to Zabbix.

Zabbix frontend configuration

Depending on the web server used (Apache/Nginx) edit the corresponding configuration file for Zabbix frontend:

- For Apache the configuration file is located in /etc/apache2/conf.d/zabbix.conf. Some PHP settings are already configured. But it's necessary to uncomment the "date.timezone" setting and set the right timezone for you.

```
php_value max_execution_time 300
php_value memory_limit 128M
php_value post_max_size 16M
php_value upload_max_filesize 2M
php_value max_input_time 300
php_value max_input_vars 10000
php_value always_populate_raw_post_data -1
# php_value date.timezone Europe/Riga
```

- The zabbix-nginx-conf package installs a separate Nginx server for Zabbix frontend. Its configuration file is located in /etc/nginx/conf.d/zabbix.conf. For Zabbix frontend to work, it's necessary to uncomment and set listen and/or server_name directives.

```
# listen 80;
# server_name example.com;
```

- Zabbix uses its own dedicated php-fpm connection pool with Nginx:

Its configuration file is located in /etc/php7/fpm/php-fpm.d/zabbix.conf. Some PHP settings are already configured. But it's necessary to set the right date.timezone setting for you.

```
php_value[max_execution_time] = 300
php_value[memory_limit] = 128M
php_value[post_max_size] = 16M
php_value[upload_max_filesize] = 2M
php_value[max_input_time] = 300
php_value[max_input_vars] = 10000
; php_value[date.timezone] = Europe/Riga
```

Now you are ready to proceed with frontend installation steps which will allow you to access your newly installed Zabbix.

Note that a Zabbix proxy does not have a frontend; it communicates with Zabbix server only.

Starting Zabbix server/agent process

Start Zabbix server and agent processes and make it start at system boot.

With Apache web server:

```
# systemctl restart zabbix-server zabbix-agent apache2 php-fpm
# systemctl enable zabbix-server zabbix-agent apache2 php-fpm
```

Substitute 'apache2' with 'nginx' for Nginx web server.

Installing debuginfo packages

To enable debuginfo repository edit */etc/zypp/repos.d/zabbix.repo* file. Change `enabled=0` to `enabled=1` for zabbix-debuginfo repository.

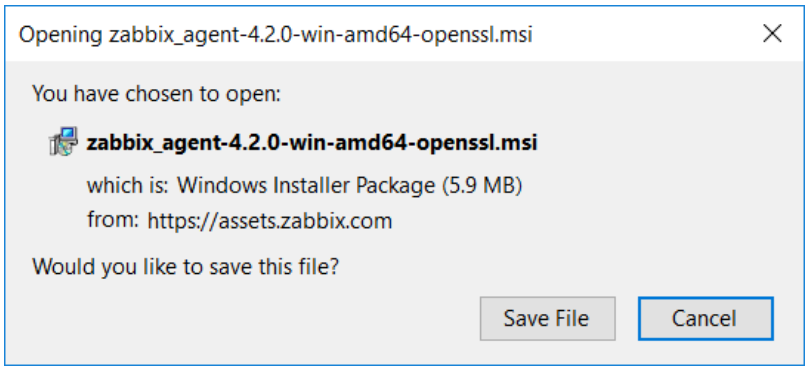
```
[zabbix-debuginfo]
name=Zabbix Official Repository debuginfo
type=rpm-md
baseurl=http://repo.zabbix.com/zabbix/4.4/sles/15/x86_64/debuginfo/
gpgcheck=1
gpgkey=http://repo.zabbix.com/zabbix/4.4/sles/15/x86_64/debuginfo/repodata/repomd.xml.key
enabled=0
update=1
```

This will allow you to install zabbix-***<component>***-debuginfo packages.

4 Windows agent installation from MSI

Overview

Zabbix Windows agent can be installed from Windows MSI installer packages (32-bit or 64-bit) available for download:



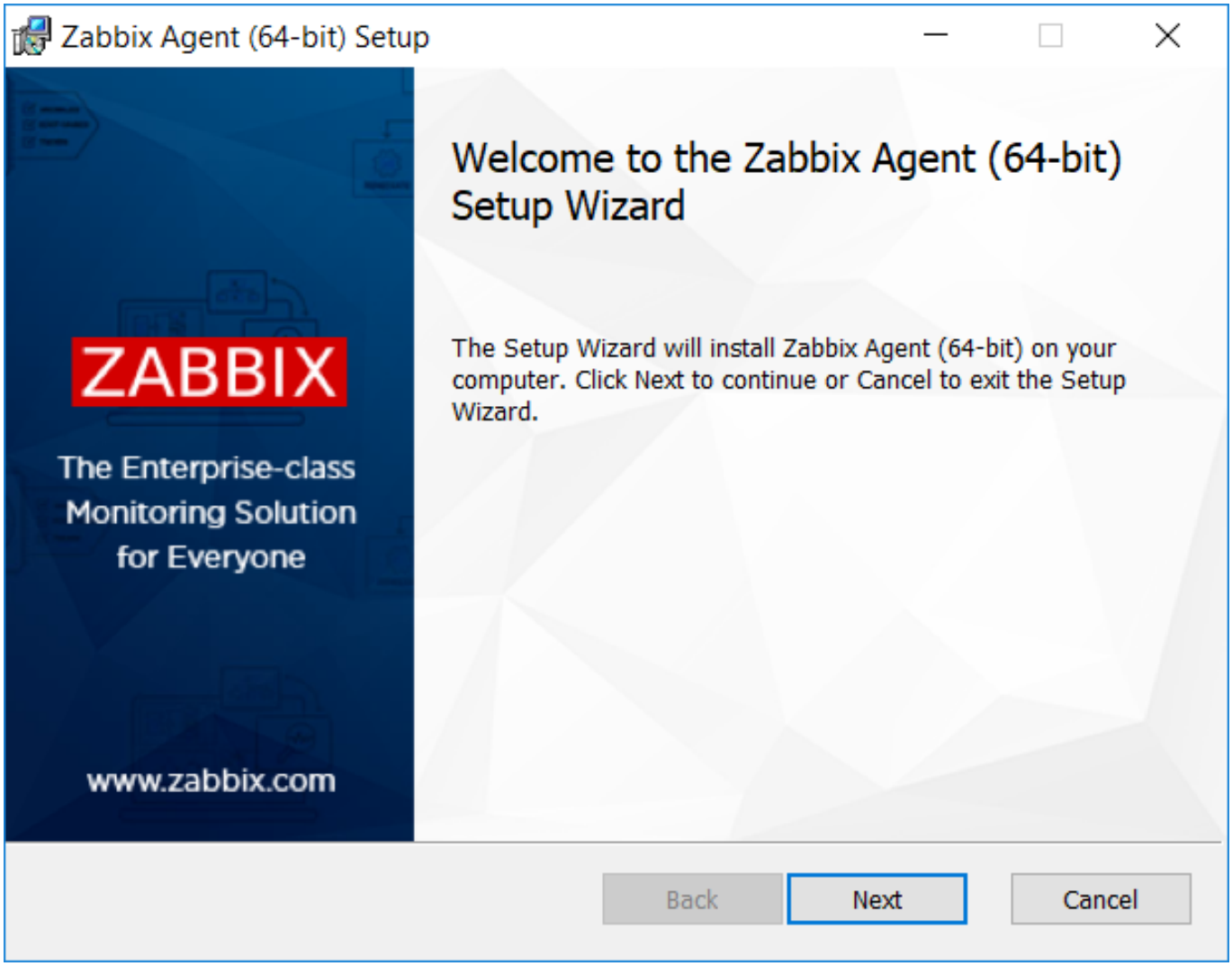
32-bit package cannot be installed on a 64-bit Windows.

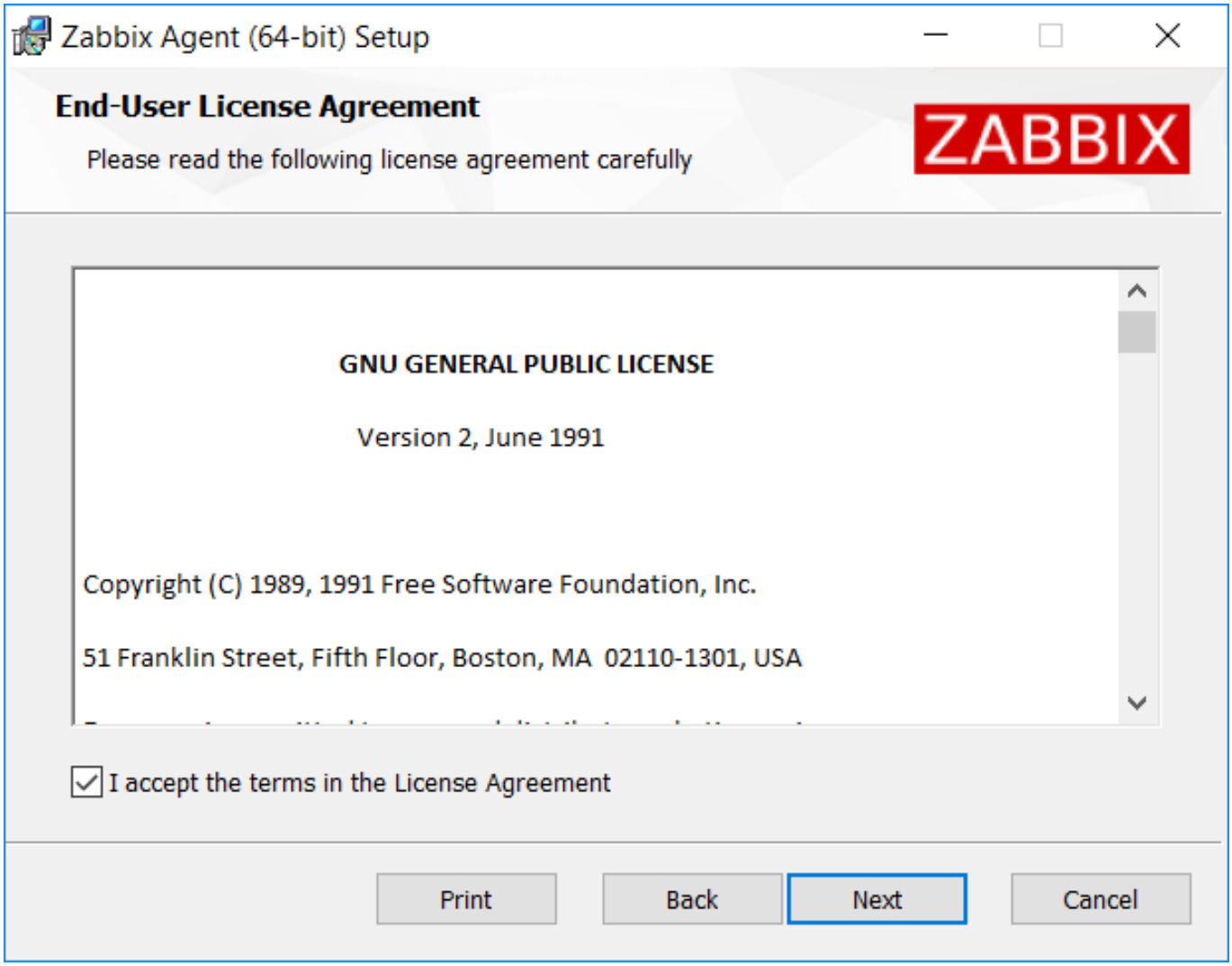
All packages come with TLS support, however, configuring TLS is optional.

Both UI and command-line based installation is supported.

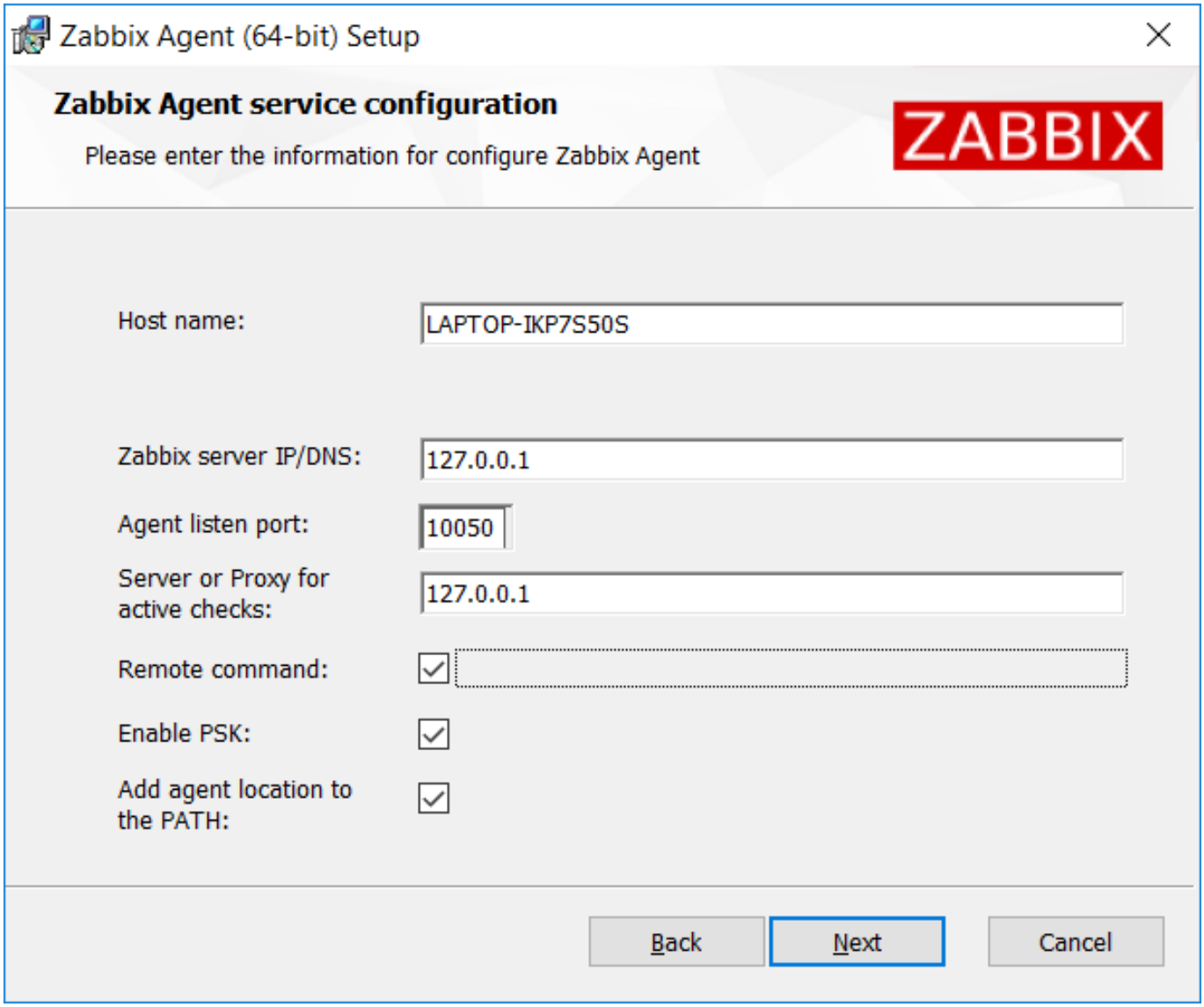
Installation steps

To install, double-click the downloaded MSI file.


Zabbix Agent (64-bit) Setup
ZABBIX
The Enterprise-class Monitoring Solution for Everyone
www.zabbix.com
Welcome to the Zabbix Agent (64-bit) Setup Wizard
The Setup Wizard will install Zabbix Agent (64-bit) on your computer. Click Next to continue or Cancel to exit the Setup Wizard.
Back
Next
Cancel

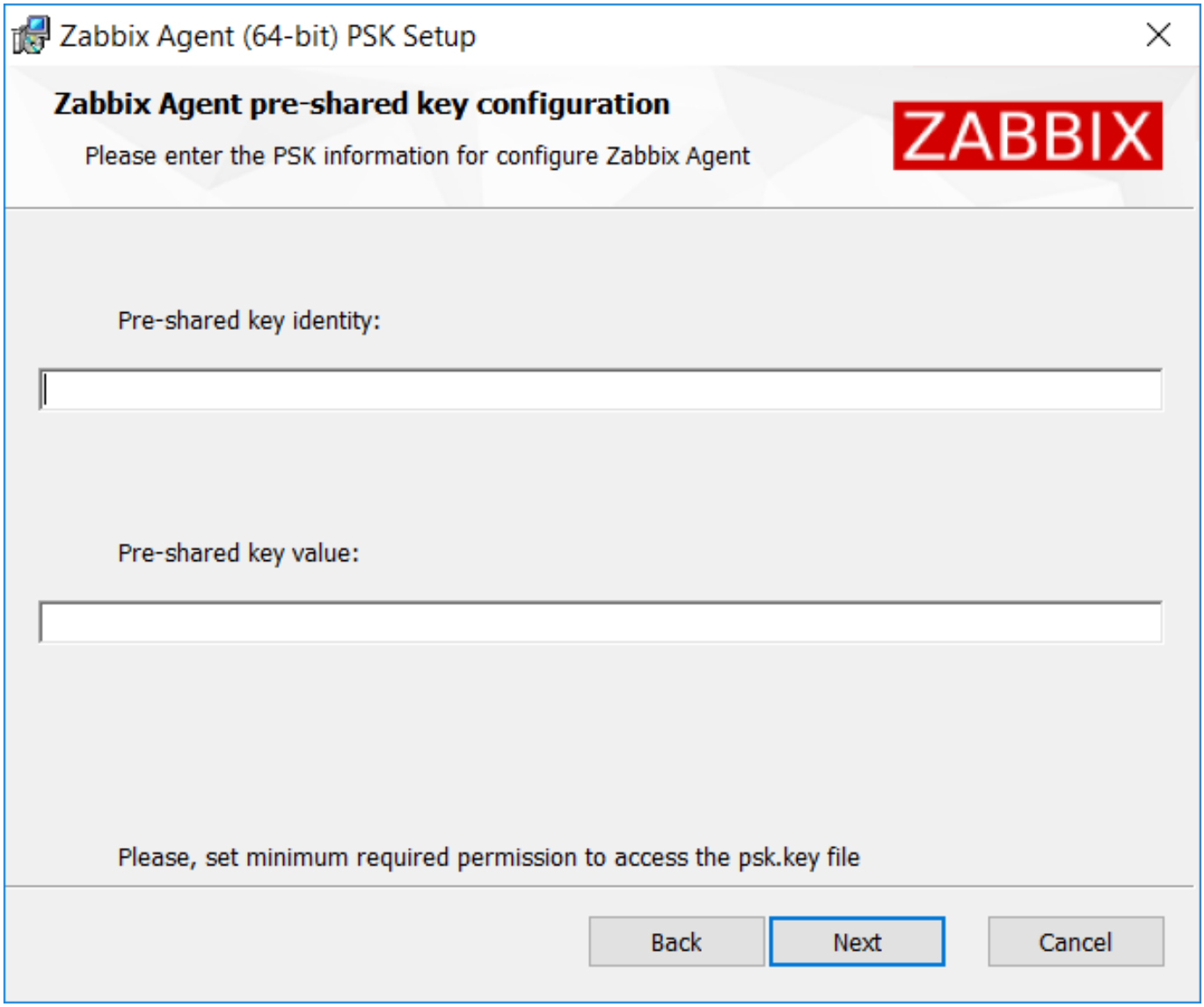


Accept the licence to proceed to the next step.

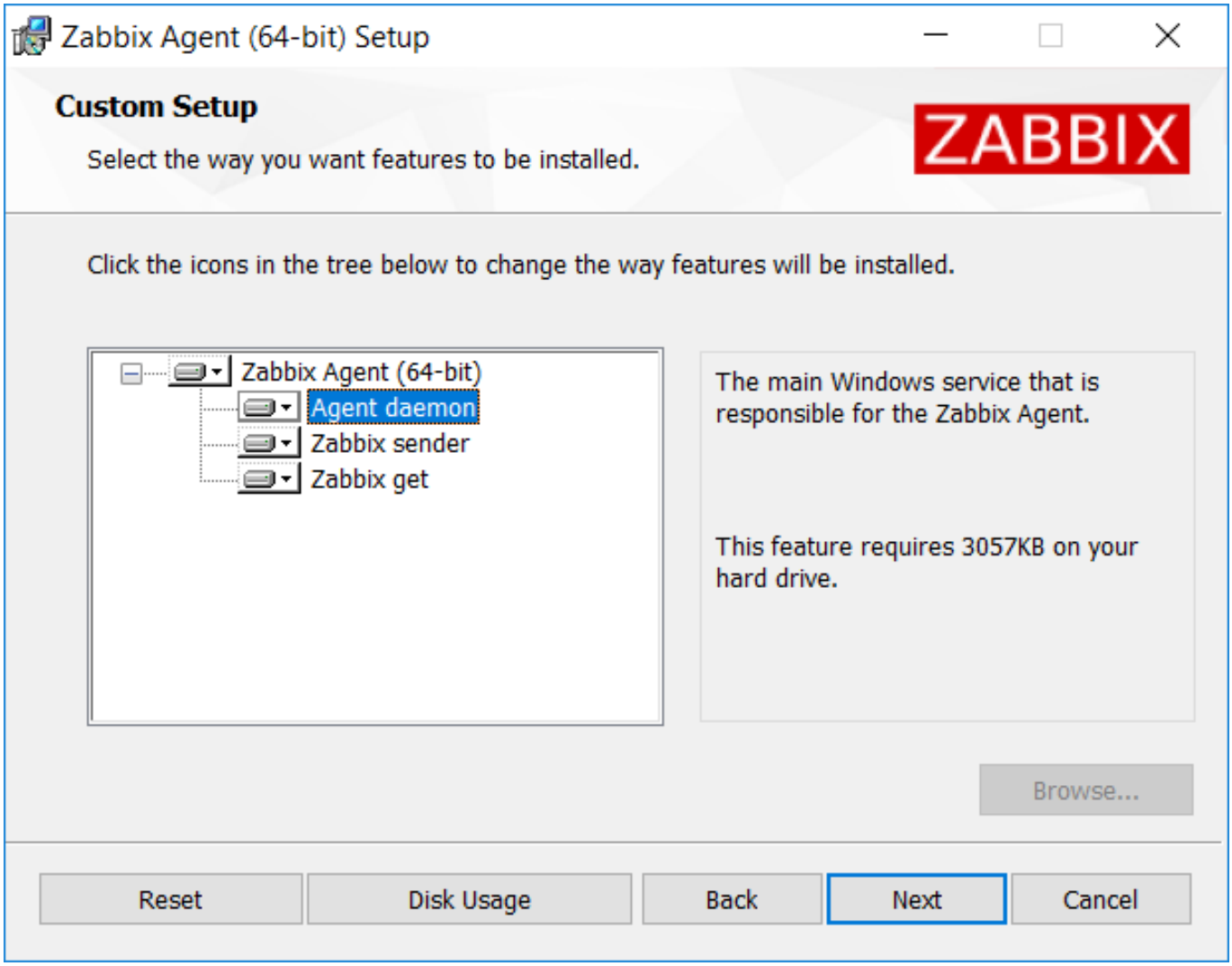


Specify the following parameters.

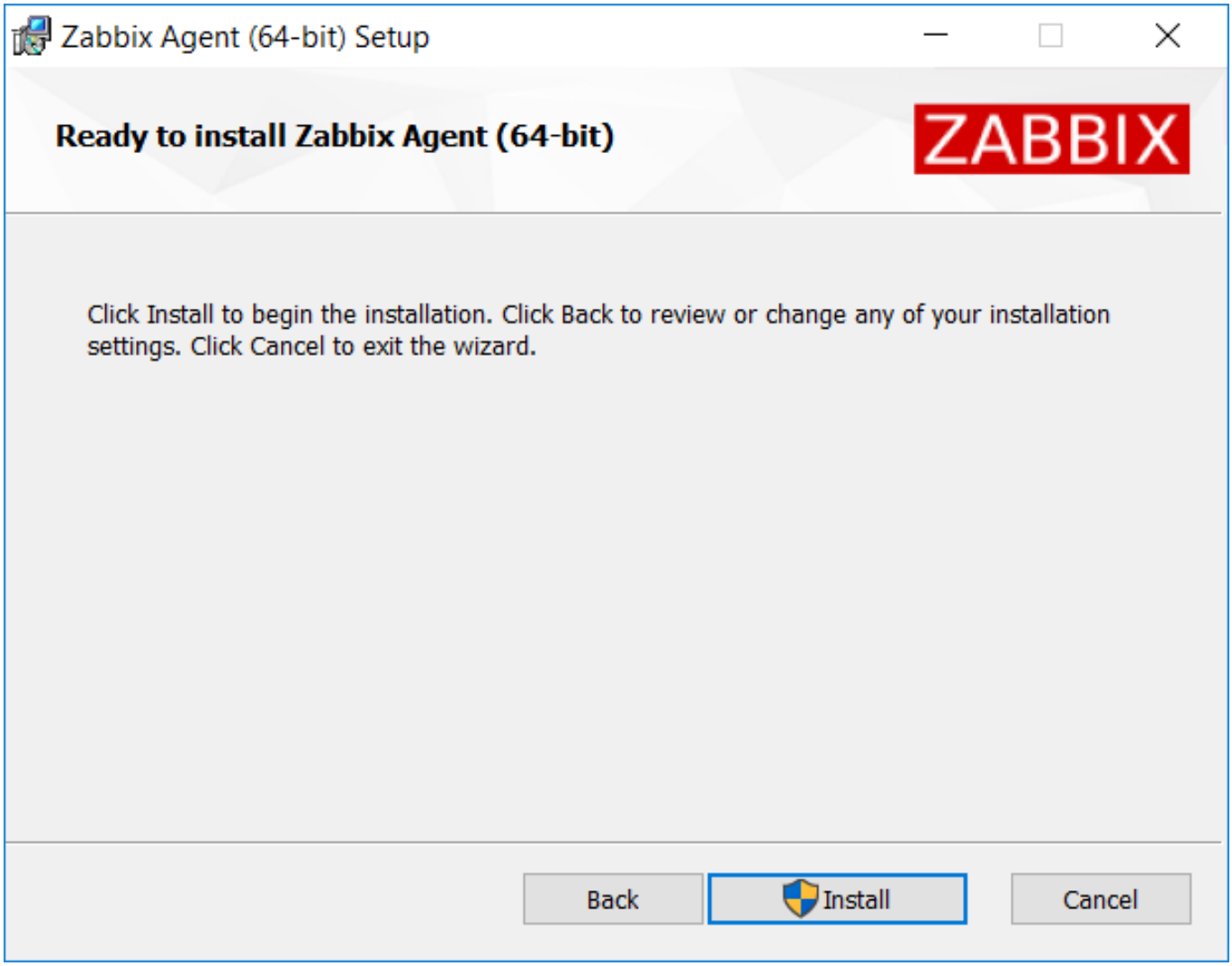
Parameter	Description
Host name	Specify host name.
Zabbix server IP/DNS	Specify IP/DNS of Zabbix server.
Agent listen port	Specify agent listen port (10050 by default).
Server or Proxy for active checks	Specify IP/DNS of Zabbix server/proxy for active agent checks.
Remote commands	Mark the checkbox to enable remote commands.
Enable PSK	Mark the checkbox to enable TLS support via pre-shared keys.
Add agent location to the PATH	Add agent location to the PATH variable.



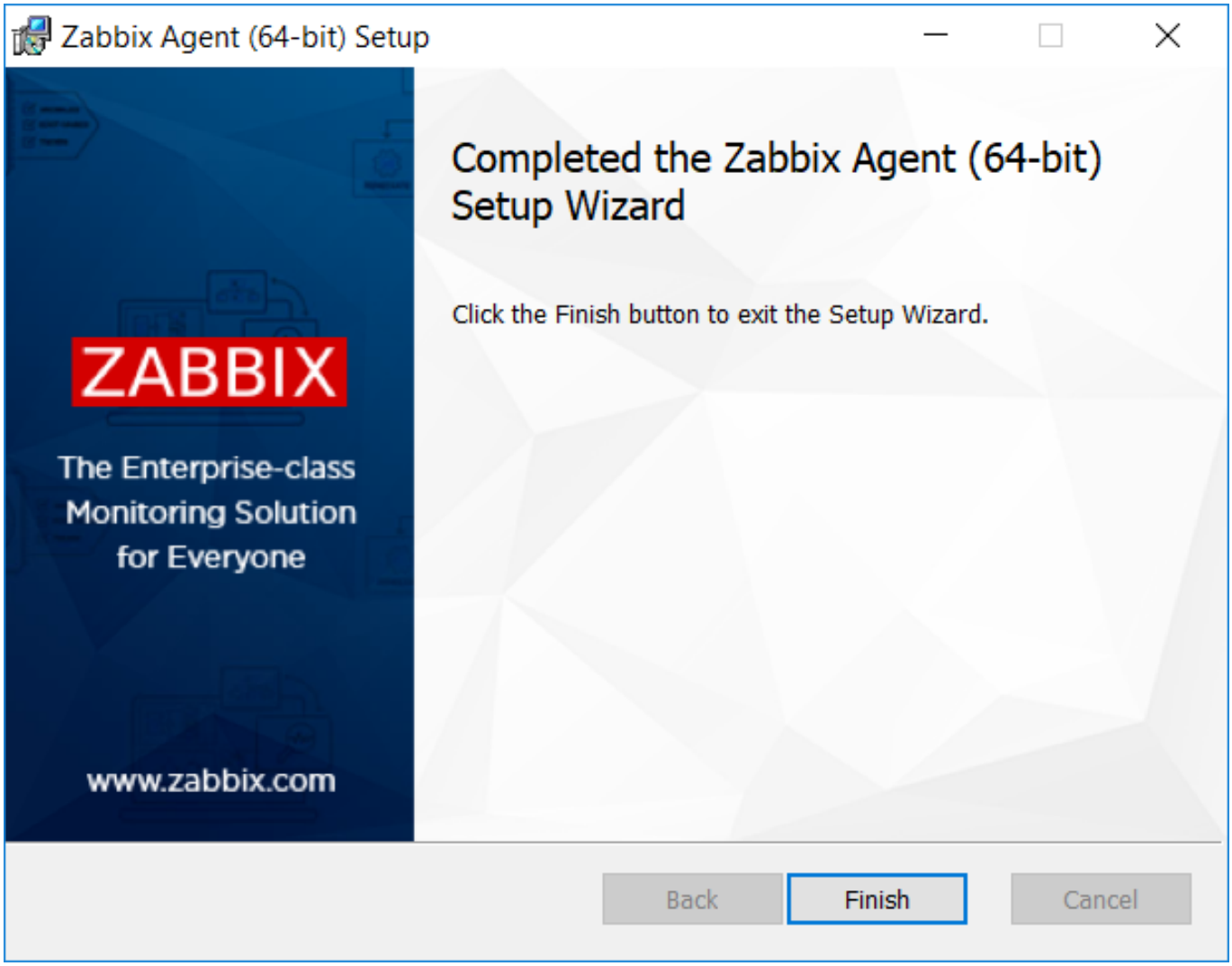
Enter pre-shared key identity and value. This step is only available if you checked *Enable PSK* in the previous step.



Select Zabbix components to install - Zabbix agent daemon, Zabbix sender, Zabbix get.



Zabbix components along with the configuration file will be installed in a *Zabbix Agent* folder in Program Files. zabbix_agentd.exe will be set up as Windows service with automatic startup.



Command-line based installation

Supported parameters

The following set of parameters is supported by created MSIs:

Number	Parameter	Description
1	LOGTYPE	
2	LOGFILE	
3	ENABLEREMOTECOMMANDS	
4	SERVER	
5	LISTENPORT	
6	SERVERACTIVE	
7	HOSTNAME	
8	TIMEOUT	
9	TLSCONNECT	
10	TLSACCEPT	
11	TLSPSKIDENTITY	
12	TLSPSKFILE	
13	TLSPSKVALUE	
14	TLSCAFILE	
15	TLSCRLFILE	
16	TLSSERVERCERTISSUER	
17	TLSSERVERCERTSUBJECT	
18	TLSCERTFILE	
19	TLSKEYFILE	
20	INSTALLFOLDER	
21	ENABLEPATH	
22	SKIP	`SKIP=fw` - do not install firewall exception rule

To install you may run, for example:

```
SET INSTALLFOLDER=C:\Program Files\za

msiexec /l*v log.txt /i zabbix_agent-4.0.6-x86.msi /qn^
 LOGTYPE=file^
 LOGFILE="%INSTALLFOLDER%\za.log"^
 ENABLEREMOTECOMMANDS=1^
 SERVER=192.168.6.76^
 LISTENPORT=12345^
 SERVERACTIVE=::1^
 HOSTNAME=myHost^
 TLSCONNECT=psk^
 TLSACCEPT=psk^
 TLSPSKIDENTITY=MyPSKID^
 TLSPSKFILE="%INSTALLFOLDER%\mykey.psk"^
 TLSCAFILE="c:\temp\f.txt1"^
 TLSCRLFILE="c:\temp\f.txt2"^
 TLSSERVERCERTISSUER="My CA"^
 TLSSERVERCERTSUBJECT="My Cert"^
 TLSCERTFILE="c:\temp\f.txt5"^
 TLSKEYFILE="c:\temp\f.txt6"^
 ENABLEPATH=1^
 INSTALLFOLDER="%INSTALLFOLDER%"
 SKIP=fw
```

or

```
msiexec /l*v log.txt /i zabbix_agent-4.4.0-x86.msi /qn^
 SERVER=192.168.6.76^
 TLSCONNECT=psk^
 TLSACCEPT=psk^
 TLSPSKIDENTITY=MyPSKID^
 TLSPSKVALUE=1f87b595725ac58dd977beef14b97461a7c1045b9a1c963065002c5473194952
```

5 Mac OS agent installation from PKG

Overview

Zabbix Mac OS agent can be installed from PKG installer packages available for download. Versions with or without encryption are available.

Installing agent

The agent can be installed using the graphical user interface or from the command line, for example:

```
sudo installer -pkg zabbix_agent-4.4.1-macos-amd64-openssl.pkg -target /
```

Make sure to use the correct Zabbix package version in the command. It must match the name of the downloaded package.

Running agent

The agent will start automatically after installation or restart.

You may edit the configuration file at `/usr/local/etc/zabbix/zabbix_agentd.conf` if necessary.

To start the agent manually, you may run:

```
sudo launchctl start com.zabbix.zabbix_agentd
```

To stop the agent manually:

```
sudo launchctl stop com.zabbix.zabbix_agentd
```

During upgrade, the existing configuration file is not overwritten. Instead a new `zabbix_agentd.conf.NEW` file is created to be used for reviewing and updating the existing configuration file, if necessary. Remember to restart the agent after manual changes to the configuration file.

Troubleshooting and removing agent

This section lists some useful commands that can be used for troubleshooting and removing Zabbix agent installation.

See if Zabbix agent is running:

```
ps aux | grep zabbix_agentd
```

See if Zabbix agent has been installed from packages:

```
$ pkgutil --pkgs | grep zabbix
com.zabbix.pkg.ZabbixAgent
```

See the files that were installed from the installer package (note that the initial / is not displayed in this view):

```
$ pkgutil --only-files --files com.zabbix.pkg.ZabbixAgent
Library/LaunchDaemons/com.zabbix.zabbix_agentd.plist
usr/local/bin/zabbix_get
usr/local/bin/zabbix_sender
usr/local/etc/zabbix/zabbix_agentd/userparameter_examples.conf.NEW
usr/local/etc/zabbix/zabbix_agentd/userparameter_mysql.conf.NEW
usr/local/etc/zabbix/zabbix_agentd.conf.NEW
usr/local/sbin/zabbix_agentd
```

Stop Zabbix agent if it was launched with `launchctl`:

```
sudo launchctl unload /Library/LaunchDaemons/com.zabbix.zabbix_agentd.plist
```

Remove files (including configuration and logs) that were installed with installer package:

```
sudo rm -f /Library/LaunchDaemons/com.zabbix.zabbix_agentd.plist
sudo rm -f /usr/local/sbin/zabbix_agentd
sudo rm -f /usr/local/bin/zabbix_get
sudo rm -f /usr/local/bin/zabbix_sender
sudo rm -rf /usr/local/etc/zabbix
sudo rm -rf /var/logs/zabbix
```

Forget that Zabbix agent has been installed:

```
sudo pkgutil --forget com.zabbix.pkg.ZabbixAgent
```

5 Installation from containers

Docker Zabbix provides Docker images for each Zabbix component as portable and self-sufficient containers to speed up deployment and update procedure.

Zabbix components come with MySQL and PostgreSQL database support, Apache2 and Nginx web server support. These images are separated into different images.

Docker base images

Zabbix components are provided on Ubuntu, Alpine Linux and CentOS base images:

Image	Version
alpine	3.11
ubuntu	18.04 (bionic)
centos	7 and 8 (Apache and Nginx images)

All images are configured to rebuild latest images if base images are updated.

Attention:
Zabbix Docker Appliance image is decommissioned since 4.4.7 and will not be available for newer releases. Please use a separate Docker image for each component instead of the all-in-one solution.

Docker file sources

Everyone can follow Docker file changes using the Zabbix official repository on github.com. You can fork the project or make your own images based on official Docker files.

Structure

All Zabbix components are available in the following Docker repositories:

- Zabbix agent - zabbix/zabbix-agent
- Zabbix server
  - Zabbix server with MySQL database support - zabbix/zabbix-server-mysql
  - Zabbix server with PostgreSQL database support - zabbix/zabbix-server-pgsql
- Zabbix web-interface
  - Zabbix web-interface based on Apache2 web server with MySQL database support - zabbix/zabbix-web-apache-mysql
  - Zabbix web-interface based on Apache2 web server with PostgreSQL database support - zabbix/zabbix-web-apache-pgsql
  - Zabbix web-interface based on Nginx web server with MySQL database support - zabbix/zabbix-web-nginx-mysql
  - Zabbix web-interface based on Nginx web server with PostgreSQL database support - zabbix/zabbix-web-nginx-pgsql
- Zabbix proxy
  - Zabbix proxy with SQLite3 database support - zabbix/zabbix-proxy-sqlite3
  - Zabbix proxy with MySQL database support - zabbix/zabbix-proxy-mysql
- Zabbix Java Gateway - zabbix/zabbix-java-gateway

Additionally there is SNMP trap support. It is provided as additional repository (zabbix/zabbix-snmptraps) based on Ubuntu Trusty only. It could be linked with Zabbix server and Zabbix proxy.

Versions

Each repository of Zabbix components contains the following tags:

- `latest` - latest stable version of a Zabbix component based on Alpine Linux image
- `alpine-latest` - latest stable version of a Zabbix component based on Alpine Linux image
- `ubuntu-latest` - latest stable version of a Zabbix component based on Ubuntu image
- `alpine-4.4-latest` - latest minor version of a Zabbix 4.4 component based on Alpine Linux image
- `ubuntu-4.4-latest` - latest minor version of a Zabbix 4.4 component based on Ubuntu image
- `alpine-4.4.*` - different minor versions of a Zabbix 4.4 component based on Alpine Linux image, where `*` is the minor version of Zabbix component
- `ubuntu-4.4.*` - different minor versions of a Zabbix 4.4 component based on Ubuntu image, where `*` is the minor version of Zabbix component

Usage

Environment variables

All Zabbix component images provide environment variables to control configuration. These environment variables are listed in each component repository. These environment variables are options from Zabbix configuration files, but with different naming method. For example, `ZBX_LOGSLOWQUERIES` is equal to `LogSlowQueries` from Zabbix server and Zabbix proxy configuration files.

> **Attention:**
> Some of configuration options are not allowed to change. For example, `PIDFile` and `LogType`.

Some of components have specific environment variables, which do not exist in official Zabbix configuration files:

Variable	Components	Description
`DB_SERVER_HOST`	Server Proxy Web interface	This variable is IP or DNS name of MySQL or PostgreSQL server. By default, value is `mysql-server` or `postgres-server` for MySQL or PostgreSQL respectively
`DB_SERVER_PORT`	Server Proxy Web interface	This variable is port of MySQL or PostgreSQL server. By default, value is '3306' or '5432' respectively.
`MYSQL_USER`	Server Proxy Web-interface	MySQL database user. By default, value is 'zabbix'.
`MYSQL_PASSWORD`	Server Proxy Web interface	MySQL database password. By default, value is 'zabbix'.
`MYSQL_DATABASE`	Server Proxy Web interface	Zabbix database name. By default, value is 'zabbix' for Zabbix server and 'zabbix_proxy' for Zabbix proxy.

POSTGRES_USER	Server Web interface	PostgreSQL database user. By default, value is 'zabbix'.
POSTGRES_PASSWORD	Server Web interface	PostgreSQL database password. By default, value is 'zabbix'.
POSTGRES_DB	Server Web interface	Zabbix database name. By default, value is 'zabbix' for Zabbix server and 'zabbix_proxy' for Zabbix proxy.
PHP_TZ	Web-interface	Timezone in PHP format. Full list of supported timezones are available on php.net. By default, value is 'Europe/Riga'.
ZBX_SERVER_NAME	Web interface	Visible Zabbix installation name in right top corner of the web interface. By default, value is 'Zabbix Docker'
ZBX_JAVAGATEWAY_ENABLE	Server Proxy	Enables communication with Zabbix Java gateway to collect Java related checks. By default, value is "false"
ZBX_ENABLE_SNMP_TRAPS	Server Proxy	Enables SNMP trap feature. It requires **zabbix-snmptraps** instance and shared volume */var/lib/zabbix/snmptraps* to Zabbix server or Zabbix proxy.

Volumes

The images allow to use some mount points. These mount points are different and depend on Zabbix component type:

Volume	**Description**
Zabbix agent	
/etc/zabbix/zabbix_agentd.d	The volume allows to include **.conf* files and extend Zabbix agent using the `UserParameter` feature
/var/lib/zabbix/modules	The volume allows to load additional modules and extend Zabbix agent using the LoadModule feature
/var/lib/zabbix/enc	The volume is used to store TLS-related files. These file names are specified using `ZBX_TLSCAFILE`, `ZBX_TLSCRLFILE`, `ZBX_TLSKEY_FILE` and `ZBX_TLSPSKFILE` environment variables
Zabbix server	
/usr/lib/zabbix/alertscripts	The volume is used for custom alert scripts. It is the `AlertScriptsPath` parameter in zabbix_server.conf
/usr/lib/zabbix/externalscripts	The volume is used by external checks. It is the `ExternalScripts` parameter in zabbix_server.conf
/var/lib/zabbix/modules	The volume allows to load additional modules and extend Zabbix server using the LoadModule feature
/var/lib/zabbix/enc	The volume is used to store TLS related files. These file names are specified using `ZBX_TLSCAFILE`, `ZBX_TLSCRLFILE`, `ZBX_TLSKEY_FILE` and `ZBX_TLSPSKFILE` environment variables
/var/lib/zabbix/ssl/certs	The volume is used as location of SSL client certificate files for client authentication. It is the `SSLCertLocation` parameter in zabbix_server.conf
/var/lib/zabbix/ssl/keys	The volume is used as location of SSL private key files for client authentication. It is the `SSLKeyLocation` parameter in zabbix_server.conf
/var/lib/zabbix/ssl/ssl_ca	The volume is used as location of certificate authority (CA) files for SSL server certificate verification. It is the `SSLCALocation` parameter in zabbix_server.conf

/var/lib/zabbix/snmptraps	The volume is used as location of snmptraps.log file. It could be shared by zabbix-snmptraps container and inherited using the volumes_from Docker option while creating a new instance of Zabbix server. SNMP trap processing feature could be enabled by using shared volume and switching the ZBX_ENABLE_SNMP_TRAPS environment variable to 'true'
/var/lib/zabbix/mibs	The volume allows to add new MIB files. It does not support subdirectories, all MIBs must be placed in /var/lib/zabbix/mibs
Zabbix proxy	
/usr/lib/zabbix/externalscripts	The volume is used by external checks. It is the ExternalScripts parameter in zabbix_proxy.conf
/var/lib/zabbix/modules	The volume allows to load additional modules and extend Zabbix server using the LoadModule feature
/var/lib/zabbix/enc	The volume is used to store TLS related files. These file names are specified using ZBX_TLSCAFILE, ZBX_TLSCRLFILE, ZBX_TLSKEY_FILE and ZBX_TLSPSKFILE environment variables
/var/lib/zabbix/ssl/certs	The volume is used as location of SSL client certificate files for client authentication. It is the SSLCertLocation parameter in zabbix_proxy.conf
/var/lib/zabbix/ssl/keys	The volume is used as location of SSL private key files for client authentication. It is the SSLKeyLocation parameter in zabbix_proxy.conf
/var/lib/zabbix/ssl/ssl_ca	The volume is used as location of certificate authority (CA) files for SSL server certificate verification. It is the SSLCALocation parameter in zabbix_proxy.conf
/var/lib/zabbix/snmptraps	The volume is used as location of snmptraps.log file. It could be shared by the zabbix-snmptraps container and inherited using the volumes_from Docker option while creating a new instance of Zabbix server. SNMP trap processing feature could be enabled by using shared volume and switching the ZBX_ENABLE_SNMP_TRAPS environment variable to 'true'
/var/lib/zabbix/mibs	The volume allows to add new MIB files. It does not support subdirectories, all MIBs must be placed in /var/lib/zabbix/mibs
Zabbix web interface based on Apache2 web server	
/etc/ssl/apache2	The volume allows to enable HTTPS for Zabbix web interface. The volume must contain the two ssl.crt and ssl.key files prepared for Apache2 SSL connections
Zabbix web interface based on Nginx web server	
/etc/ssl/nginx	The volume allows to enable HTTPS for Zabbix web interface. The volume must contain the two ssl.crt, ssl.key files and dhparam.pem prepared for Nginx SSL connections
Zabbix snmptraps	
/var/lib/zabbix/snmptraps	The volume contains the snmptraps.log log file named with received SNMP traps
/var/lib/zabbix/mibs	The volume allows to add new MIB files. It does not support subdirectories, all MIBs must be placed in /var/lib/zabbix/mibs

For additional information use Zabbix official repositories in Docker Hub.

Usage examples

** Example 1 **

The example demonstrates how to run Zabbix server with MySQL database support, Zabbix web interface based on the Nginx web server and Zabbix Java gateway.

1. Start empty MySQL server instance

```
# docker run --name mysql-server -t \
      -e MYSQL_DATABASE="zabbix" \
```

```
      -e MYSQL_USER="zabbix" \
      -e MYSQL_PASSWORD="zabbix_pwd" \
      -e MYSQL_ROOT_PASSWORD="root_pwd" \
      -d mysql:8.0 \
      --restart unless-stopped \
      --character-set-server=utf8 --collation-server=utf8_bin \
      --default-authentication-plugin=mysql_native_password
```

2. Start Zabbix Java gateway instance

```
# docker run --name zabbix-java-gateway -t \
      --restart unless-stopped \
      -d zabbix/zabbix-java-gateway:alpine-4.4-latest
```

3. Start Zabbix server instance and link the instance with created MySQL server instance

```
# docker run --name zabbix-server-mysql -t \
      -e DB_SERVER_HOST="mysql-server" \
      -e MYSQL_DATABASE="zabbix" \
      -e MYSQL_USER="zabbix" \
      -e MYSQL_PASSWORD="zabbix_pwd" \
      -e MYSQL_ROOT_PASSWORD="root_pwd" \
      -e ZBX_JAVAGATEWAY="zabbix-java-gateway" \
      --link mysql-server:mysql \
      --link zabbix-java-gateway:zabbix-java-gateway \
      -p 10051:10051 \
      --restart unless-stopped \
      -d zabbix/zabbix-server-mysql:alpine-4.4-latest
```

> **Note:**
> Zabbix server instance exposes 10051/TCP port (Zabbix trapper) to host machine.

4. Start Zabbix web interface and link the instance with created MySQL server and Zabbix server instances

```
# docker run --name zabbix-web-nginx-mysql -t \
      -e DB_SERVER_HOST="mysql-server" \
      -e MYSQL_DATABASE="zabbix" \
      -e MYSQL_USER="zabbix" \
      -e MYSQL_PASSWORD="zabbix_pwd" \
      -e MYSQL_ROOT_PASSWORD="root_pwd" \
      --link mysql-server:mysql \
      --link zabbix-server-mysql:zabbix-server \
      -p 80:8080 \
      --restart unless-stopped \
      -d zabbix/zabbix-web-nginx-mysql:alpine-4.4-latest
```

> **Note:**
> Zabbix web interface instance exposes 80/TCP port (HTTP) to host machine.

** Example 2 **

The example demonstrates how to run Zabbix server with PostgreSQL database support, Zabbix web interface based on the Nginx web server and SNMP trap feature.

1. Start empty PostgreSQL server instance

```
# docker run --name postgres-server -t \
      -e POSTGRES_USER="zabbix" \
      -e POSTGRES_PASSWORD="zabbix_pwd" \
      -e POSTGRES_DB="zabbix" \
      --restart unless-stopped \
      -d postgres:latest
```

2. Start Zabbix snmptraps instance

```
# docker run --name zabbix-snmptraps -t \
      -v /zbx_instance/snmptraps:/var/lib/zabbix/snmptraps:rw \
```

```
    -v /var/lib/zabbix/mibs:/usr/share/snmp/mibs:ro \
    -p 162:1162/udp \
    --restart unless-stopped \
    -d zabbix/zabbix-snmptraps:alpine-4.4-latest
```

Note:
Zabbix snmptrap instance exposes the 162/UDP port (SNMP traps) to host machine.

3. Start Zabbix server instance and link the instance with created PostgreSQL server instance

```
# docker run --name zabbix-server-pgsql -t \
    -e DB_SERVER_HOST="postgres-server" \
    -e POSTGRES_USER="zabbix" \
    -e POSTGRES_PASSWORD="zabbix_pwd" \
    -e POSTGRES_DB="zabbix" \
    -e ZBX_ENABLE_SNMP_TRAPS="true" \
    --link postgres-server:postgres \
    -p 10051:10051 \
    --volumes-from zabbix-snmptraps \
    --restart unless-stopped \
    -d zabbix/zabbix-server-pgsql:alpine-4.4-latest
```

Note:
Zabbix server instance exposes the 10051/TCP port (Zabbix trapper) to host machine.

4. Start Zabbix web interface and link the instance with created PostgreSQL server and Zabbix server instances

```
# docker run --name zabbix-web-nginx-pgsql -t \
    -e DB_SERVER_HOST="postgres-server" \
    -e POSTGRES_USER="zabbix" \
    -e POSTGRES_PASSWORD="zabbix_pwd" \
    -e POSTGRES_DB="zabbix" \
    --link postgres-server:postgres \
    --link zabbix-server-pgsql:zabbix-server \
    -p 443:8443 \
    -p 80:8080 \
    -v /etc/ssl/nginx:/etc/ssl/nginx:ro \
    --restart unless-stopped \
    -d zabbix/zabbix-web-nginx-pgsql:alpine-4.4-latest
```

Note:
Zabbix web interface instance exposes the 443/TCP port (HTTPS) to host machine.
Directory */etc/ssl/nginx* must contain certificate with required name.

Docker Compose Zabbix provides compose files also for defining and running multi-container Zabbix components in Docker. These compose files are available in Zabbix docker official repository on github.com: https://github.com/zabbix/zabbix-docker. These compose files are added as examples, they are overloaded. For example, they contain proxies with MySQL and SQLite3 support.

There are a few different versions of compose files:

File name	Description
`docker-compose_v3_alpine_mysql_latest.yaml`	The compose file runs the latest version of Zabbix 4.4 components on Alpine Linux with MySQL database support.
`docker-compose_v3_alpine_mysql_local.yaml`	The compose file locally builds the latest version of Zabbix 4.4 and runs Zabbix components on Alpine Linux with MySQL database support.
`docker-compose_v3_alpine_pgsql_latest.yaml`	The compose file runs the latest version of Zabbix 4.4 components on Alpine Linux with PostgreSQL database support.
`docker-compose_v3_alpine_pgsql_local.yaml`	The compose file locally builds the latest version of Zabbix 4.4 and runs Zabbix components on Alpine Linux with PostgreSQL database support.

docker-compose_v3_centos_mysql_latest.yaml	The compose file runs the latest version of Zabbix 4.4 components on CentOS 7 with MySQL database support.
docker-compose_v3_centos_mysql_local.yaml	The compose file locally builds the latest version of Zabbix 4.4 and runs Zabbix components on CentOS 7 with MySQL database support.
docker-compose_v3_centos_pgsql_latest.yaml	The compose file runs the latest version of Zabbix 4.4 components on CentOS 7 with PostgreSQL database support.
docker-compose_v3_centos_pgsql_local.yaml	The compose file locally builds the latest version of Zabbix 4.4 and runs Zabbix components on CentOS 7 with PostgreSQL database support.
docker-compose_v3_ubuntu_mysql_latest.yaml	The compose file runs the latest version of Zabbix 4.4 components on Ubuntu 18.04 with MySQL database support.
docker-compose_v3_ubuntu_mysql_local.yaml	The compose file locally builds the latest version of Zabbix 4.4 and runs Zabbix components on Ubuntu 18.04 with MySQL database support.
docker-compose_v3_ubuntu_pgsql_latest.yaml	The compose file runs the latest version of Zabbix 4.4 components on Ubuntu 18.04 with PostgreSQL database support.
docker-compose_v3_ubuntu_pgsql_local.yaml	The compose file locally builds the latest version of Zabbix 4.4 and runs Zabbix components on Ubuntu 18.04 with PostgreSQL database support.

Attention:
Available Docker compose files support version 3 of Docker Compose.

Storage

Compose files are configured to support local storage on a host machine. Docker Compose will create a `zbx_env` directory in the folder with the compose file when you run Zabbix components using the compose file. The directory will contain the same structure as described above in the Volumes section and directory for database storage.

There are also volumes in read-only mode for `/etc/localtime` and `/etc/timezone` files.

Environment files

In the same directory with compose files on github.com you can find files with default environment variables for each component in compose file. These environment files are named like `.env_<type of component>`.

Examples

** Example 1 **

```
# git checkout 4.4
# docker-compose -f ./docker-compose_v3_alpine_mysql_latest.yaml up -d
```

The command will download latest Zabbix 4.4 images for each Zabbix component and run them in detach mode.

Attention:
Do not forget to download `.env_<type of component>` files from github.com official Zabbix repository with compose files.

** Example 2 **

```
# git checkout 4.4
# docker-compose -f ./docker-compose_v3_ubuntu_mysql_local.yaml up -d
```

The command will download base image Ubuntu 18.04 (bionic), then build Zabbix 4.4 components locally and run them in detach mode.

6 Upgrade procedure

Overview

This section provides upgrade information for Zabbix **4.4**:

- using packages:
  - for Red Hat Enterprise Linux/CentOS
  - for Debian/Ubuntu
- using sources

Direct upgrade to Zabbix 4.4.x is possible from Zabbix **4.2**.x, **4.0**.x, **3.4**.x, **3.2**.x, **3.0**.x, **2.4**.x, **2.2**.x and **2.0**.x. For upgrading from earlier versions consult Zabbix documentation for 2.0 and earlier.

Upgrade from packages

Overview

This section provides the steps required for a successful upgrade using official RPM and DEB packages provided by Zabbix for:

- Red Hat Enterprise Linux/CentOS
- Debian/Ubuntu

1 Red Hat Enterprise Linux/CentOS

Overview

This section provides the steps required for a successful upgrade from Zabbix **4.2**.x to Zabbix **4.4**.x using official Zabbix packages for Red Hat Enterprise Linux/CentOS.

While upgrading Zabbix agents is not mandatory (but recommended), Zabbix server and proxies must be of the same major version. Therefore, in a server-proxy setup, Zabbix server and all proxies have to be stopped and upgraded. Keeping proxies running during server upgrade no longer will bring any benefit as during proxy upgrade their old data will be discarded and no new data will be gathered until proxy configuration is synced with server.

Note that with SQLite database on proxies, history data from proxies before the upgrade will be lost, because SQLite database upgrade is not supported and the SQLite database file has to be manually removed. When proxy is started for the first time and the SQLite database file is missing, proxy creates it automatically.

Depending on database size the database upgrade to version 4.4 may take a long time.

Warning:
Before the upgrade make sure to read the relevant **upgrade notes!**

The following upgrade notes are available:

Upgrade from	Read full upgrade notes	Most important changes between versions
4.2.x	For: Zabbix 4.4	Jabber, Ez Texting media types removed.
4.0.x LTS	For: Zabbix 4.2 Zabbix 4.4	Older proxies no longer can report data to an upgraded server; Newer agents no longer will be able to work with an older Zabbix server.
3.4.x	For: Zabbix 4.0 Zabbix 4.2 Zabbix 4.4	'libpthread' and 'zlib' libraries now mandatory; Support for plain text protocol dropped and header is mandatory; Pre-1.4 version Zabbix agents are no longer supported; The Server parameter in passive proxy configuration now mandatory.
3.2.x	For: Zabbix 3.4 Zabbix 4.0 Zabbix 4.2 Zabbix 4.4	SQLite support as backend database dropped for Zabbix server/frontend; Perl Compatible Regular Expressions (PCRE) supported instead of POSIX extended; 'libpcre' and 'libevent' libraries mandatory for Zabbix server; Exit code checks added for user parameters, remote commands and system.run[] items without the 'nowait' flag as well as Zabbix server executed scripts; Zabbix Java gateway has to be upgraded to support new functionality.

Upgrade from	Read full upgrade notes	Most important changes between versions
3.0.x LTS	For: Zabbix 3.2 Zabbix 3.4 Zabbix 4.0 Zabbix 4.2 Zabbix 4.4	Database upgrade may be slow, depending on the history table size.

You may also want to check the requirements for 4.4.

Note:
It may be handy to run two parallel SSH sessions during the upgrade, executing the upgrade steps in one and monitoring the server/proxy logs in another. For example, run `tail -f zabbix_server.log` or `tail -f zabbix_proxy.log` in the second SSH session showing you the latest log file entries and possible errors in real time. This can be critical for production instances.

Upgrade procedure

1 Stop Zabbix processes

Stop Zabbix server to make sure that no new data is inserted into database.

```
# systemctl stop zabbix-server
```

If upgrading the proxy, stop proxy too.

```
# systemctl stop zabbix-proxy
```

Attention:
It is no longer possible to start the upgraded server and have older, yet unupgraded proxies report data to a newer server. This approach, which was never recommended nor supported by Zabbix, now is officially disabled when upgrading to 4.4 (or later) from any version before 4.4, as the server will ignore data from unupgraded proxies.

2 Back up the existing Zabbix database

This is a very important step. Make sure that you have a backup of your database. It will help if the upgrade procedure fails (lack of disk space, power off, any unexpected problem).

3 Back up configuration files, PHP files and Zabbix binaries

Make a backup copy of Zabbix binaries, configuration files and the PHP file directory.

Configuration files:

```
# mkdir /opt/zabbix-backup/
# cp /etc/zabbix/zabbix_server.conf /opt/zabbix-backup/
# cp /etc/httpd/conf.d/zabbix.conf  /opt/zabbix-backup/
```

PHP files and Zabbix binaries:

```
# cp -R /usr/share/zabbix/ /opt/zabbix-backup/
# cp -R /usr/share/doc/zabbix-* /opt/zabbix-backup/
```

4 Update repository configuration package

To proceed with the upgrade your current repository package has to be updated.

```
# rpm -Uvh https://repo.zabbix.com/zabbix/4.4/rhel/7/x86_64/zabbix-release-4.4-1.el7.noarch.rpm
```

5 Upgrade Zabbix components

To upgrade Zabbix components you may run something like:

```
# yum upgrade zabbix-server-mysql zabbix-web-mysql zabbix-agent
```

If using PostgreSQL, substitute `mysql` with `pgsql` in the command. If upgrading the proxy, substitute `server` with `proxy` in the command.

To upgrade the web frontend with Apache **on RHEL 8** correctly, also run:

```
# yum install zabbix-apache-conf
```

and make the necessary changes to this file.

6 Review component configuration parameters

See the upgrade notes for details on mandatory changes.

7 Start Zabbix processes

Start the updated Zabbix components.

```
# systemctl start zabbix-server
# systemctl start zabbix-proxy
# systemctl start zabbix-agent
```

8 Clear web browser cookies and cache

After the upgrade you may need to clear web browser cookies and web browser cache for the Zabbix web interface to work properly.

Upgrade between minor versions

It is possible to upgrade between minor versions of 4.4.x (for example, from 4.4.1 to 4.4.3). Upgrading between minor versions is easy.

To execute Zabbix minor version upgrade it is required to run:

```
$ sudo yum upgrade 'zabbix-*'
```

To execute Zabbix server minor version upgrade run:

```
$ sudo yum upgrade 'zabbix-server-*'
```

To execute Zabbix agent minor version upgrade run:

```
$ sudo yum upgrade 'zabbix-agent-*'
```

Note that you may also use 'update' instead of 'upgrade' in these commands. While 'upgrade' will delete obsolete packages, 'update' will preserve them.

2 Debian/Ubuntu

Overview

This section provides the steps required for a successful upgrade from Zabbix **4.2**.x to Zabbix **4.4**.x using official Zabbix packages for Debian/Ubuntu.

While upgrading Zabbix agents is not mandatory (but recommended), Zabbix server and proxies must be of the same major version. Therefore, in a server-proxy setup, Zabbix server and all proxies have to be stopped and upgraded. Keeping proxies running during server upgrade no longer will bring any benefit as during proxy upgrade their old data will be discarded and no new data will be gathered until proxy configuration is synced with server.

> **Attention:**
> It is no longer possible to start the upgraded server and have older, yet unupgraded proxies report data to a newer server. This approach, which was never recommended nor supported by Zabbix, now is officially disabled when upgrading to 4.4 (or later) from any version before 4.4, as the server will ignore data from unupgraded proxies.

Note that with SQLite database on proxies, history data from proxies before the upgrade will be lost, because SQLite database upgrade is not supported and the SQLite database file has to be manually removed. When proxy is started for the first time and the SQLite database file is missing, proxy creates it automatically.

Depending on database size the database upgrade to version 4.4 may take a long time.

> **Warning:**
> Before the upgrade make sure to read the relevant **upgrade notes!**

The following upgrade notes are available:

Upgrade from	Read full upgrade notes	Important notes/changes between versions
4.2.x	For: Zabbix 4.4	Jabber, Ez Texting media types removed.

Upgrade from	Read full upgrade notes	Important notes/changes between versions
4.0.x LTS	For: Zabbix 4.2 Zabbix 4.4	Older proxies no longer can report data to an upgraded server; Newer agents no longer will be able to work with an older Zabbix server.
3.4.x	For: Zabbix 4.0 Zabbix 4.2 Zabbix 4.4	'libpthread' and 'zlib' libraries now mandatory; Support for plain text protocol dropped and header is mandatory; Pre-1.4 version Zabbix agents are no longer supported; The Server parameter in passive proxy configuration now mandatory.
3.2.x	For: Zabbix 3.4 Zabbix 4.0 Zabbix 4.2 Zabbix 4.4	SQLite support as backend database dropped for Zabbix server/frontend; Perl Compatible Regular Expressions (PCRE) supported instead of POSIX extended; 'libpcre' and 'libevent' libraries mandatory for Zabbix server; Exit code checks added for user parameters, remote commands and system.run[] items without the 'nowait' flag as well as Zabbix server executed scripts; Zabbix Java gateway has to be upgraded to support new functionality.
3.0.x LTS	For: Zabbix 3.2 Zabbix 3.4 Zabbix 4.0 Zabbix 4.2 Zabbix 4.4	Database upgrade may be slow, depending on the history table size.

You may also want to check the requirements for 4.4.

Note:
It may be handy to run two parallel SSH sessions during the upgrade, executing the upgrade steps in one and monitoring the server/proxy logs in another. For example, run `tail -f zabbix_server.log` or `tail -f zabbix_proxy.log` in the second SSH session showing you the latest log file entries and possible errors in real time. This can be critical for production instances.

Upgrade procedure

1 Stop Zabbix processes

Stop Zabbix server to make sure that no new data is inserted into database.

```
# service zabbix-server stop
```

If upgrading Zabbix proxy, stop proxy too.

```
# service zabbix-proxy stop
```

Attention:
It is no longer possible to start the upgraded server and have older, yet unupgraded proxies report data to a newer server. This approach, which was never recommended nor supported by Zabbix, now is officially disabled when upgrading to 4.4 (or later) from any version before 4.4, as the server will ignore data from unupgraded proxies.

2 Back up the existing Zabbix database

This is a very important step. Make sure that you have a backup of your database. It will help if the upgrade procedure fails (lack of disk space, power off, any unexpected problem).

3 Back up configuration files, PHP files and Zabbix binaries

Make a backup copy of Zabbix binaries, configuration files and the PHP file directory.

Configuration files:

```
# mkdir /opt/zabbix-backup/
# cp /etc/zabbix/zabbix_server.conf /opt/zabbix-backup/
# cp /etc/apache2/conf-enabled/zabbix.conf /opt/zabbix-backup/
```

PHP files and Zabbix binaries:

```
# cp -R /usr/share/zabbix/ /opt/zabbix-backup/
# cp -R /usr/share/doc/zabbix-* /opt/zabbix-backup/
```

4 Update repository configuration package

To proceed with the update your current repository package has to be uninstalled.

```
# rm -Rf /etc/apt/sources.list.d/zabbix.list
```

Then install the new repository configuration package.

On **Debian 9** run:

```
# wget https://repo.zabbix.com/zabbix/4.4/debian/pool/main/z/zabbix-release/zabbix-release_4.4-1+stretch_a
# dpkg -i zabbix-release_4.4-1+stretch_all.deb
```

On **Debian 8** run:

```
# wget https://repo.zabbix.com/zabbix/4.4/debian/pool/main/z/zabbix-release/zabbix-release_4.4-1+jessie_al
# dpkg -i zabbix-release_4.4-1+jessie_all.deb
```

On **Ubuntu 18.04** run:

```
# wget https://repo.zabbix.com/zabbix/4.4/ubuntu/pool/main/z/zabbix-release/zabbix-release_4.4-1+bionic_al
# dpkg -i zabbix-release_4.4-1+bionic_all.deb
```

On **Ubuntu 16.04** run:

```
# wget https://repo.zabbix.com/zabbix/4.4/ubuntu/pool/main/z/zabbix-release/zabbix-release_4.4-1+xenial_al
# dpkg -i zabbix-release_4.4-1+xenial_all.deb
```

On **Ubuntu 14.04** run:

```
# wget https://repo.zabbix.com/zabbix/4.4/ubuntu/pool/main/z/zabbix-release/zabbix-release_4.4-1+trusty_al
# dpkg -i zabbix-release_4.4-1+trusty_all.deb
```

Update the repository information.

```
# apt-get update
```

5 Upgrade Zabbix components

To upgrade Zabbix components you may run something like:

```
# apt-get install --only-upgrade zabbix-server-mysql zabbix-frontend-php zabbix-agent
```

If using PostgreSQL, substitute `mysql` with `pgsql` in the command. If upgrading the proxy, substitute `server` with `proxy` in the command.

Then, to upgrade the web frontend with Apache correctly, also run:

```
# apt-get install zabbix-apache-conf
```

6 Review component configuration parameters

See the upgrade notes for details on mandatory changes.

For new optional parameters, see the What's new section.

7 Start Zabbix processes

Start the updated Zabbix components.

```
# service zabbix-server start
# service zabbix-proxy start
# service zabbix-agent start
```

8 Clear web browser cookies and cache

After the upgrade you may need to clear web browser cookies and web browser cache for the Zabbix web interface to work properly.

Upgrade between minor versions

It is possible to upgrade minor versions of 4.4.x (for example, from 4.4.1 to 4.4.3). It is easy.

To upgrade Zabbix minor version please run:

```
$ sudo apt install --only-upgrade 'zabbix.*'
```

To upgrade Zabbix server minor version please run:

```
$ sudo apt install --only-upgrade 'zabbix-server.*'
```

To upgrade Zabbix agent minor version please run:

```
$ sudo apt install --only-upgrade 'zabbix-agent.*'
```

Upgrade from sources

Overview

This section provides the steps required for a successful upgrade from Zabbix **4.2**.x to Zabbix **4.4**.x using official Zabbix sources.

While upgrading Zabbix agents is not mandatory (but recommended), Zabbix server and proxies must be of the same major version. Therefore, in a server-proxy setup, Zabbix server and all proxies have to be stopped and upgraded. Keeping proxies running no longer will bring any benefit as during proxy upgrade their old data will be discarded and no new data will be gathered until proxy configuration is synced with server.

Attention:
It is no longer possible to start the upgraded server and have older, yet unupgraded proxies report data to a newer server. This approach, which was never recommended nor supported by Zabbix, now is officially disabled when upgrading to 4.4 (or later) from any version before 4.4, as the server will ignore data from unupgraded proxies.

Note that with SQLite database on proxies, history data from proxies before the upgrade will be lost, because SQLite database upgrade is not supported and the SQLite database file has to be manually removed. When proxy is started for the first time and the SQLite database file is missing, proxy creates it automatically.

Depending on database size the database upgrade to version 4.4 may take a long time.

Warning:
Before the upgrade make sure to read the relevant **upgrade notes!**

The following upgrade notes are available:

Upgrade from	Read full upgrade notes	Important notes/changes between versions
4.2.x	For: Zabbix 4.4	Jabber, Ez Texting media types removed
4.0.x LTS	For: Zabbix 4.2 Zabbix 4.4	Older proxies no longer can report data to an upgraded server; Newer agents no longer will be able to work with an older Zabbix server
3.4.x	For: Zabbix 4.0 Zabbix 4.2 Zabbix 4.4	'libpthread' and 'zlib' libraries now mandatory; Support for plain text protocol dropped and header is mandatory; Pre-1.4 version Zabbix agents are no longer supported; The Server parameter in passive proxy configuration now mandatory
3.2.x	For: Zabbix 3.4 Zabbix 4.0 Zabbix 4.2 Zabbix 4.4	SQLite support as backend database dropped for Zabbix server/frontend; Perl Compatible Regular Expressions (PCRE) supported instead of POSIX extended; 'libpcre' and 'libevent' libraries mandatory for Zabbix server; Exit code checks added for user parameters, remote commands and system.run[] items without the 'nowait' flag as well as Zabbix server executed scripts; Zabbix Java gateway has to be upgraded to support new functionality
3.0.x LTS	For: Zabbix 3.2 Zabbix 3.4 Zabbix 4.0 Zabbix 4.2 Zabbix 4.4	Database upgrade may be slow, depending on the history table size

Upgrade from	Read full upgrade notes	Important notes/changes between versions
2.4.x	For: Zabbix 3.0 Zabbix 3.2 Zabbix 3.4 Zabbix 4.0 Zabbix 4.2 Zabbix 4.4	Minimum required PHP version upped from 5.3.0 to 5.4.0 LogFile agent parameter must be specified
2.2.x LTS	For: Zabbix 2.4 Zabbix 3.0 Zabbix 3.2 Zabbix 3.4 Zabbix 4.0 Zabbix 4.2 Zabbix 4.4	Node-based distributed monitoring removed
2.0.x	For: Zabbix 2.2 Zabbix 2.4 Zabbix 3.0 Zabbix 3.2 Zabbix 3.4 Zabbix 4.0 Zabbix 4.2 Zabbix 4.4	Minimum required PHP version upped from 5.1.6 to 5.3.0; Case-sensitive MySQL database required for proper server work; character set utf8 and utf8_bin collation is required for Zabbix server to work properly with MySQL database. See database creation scripts. 'mysqli' PHP extension required instead of 'mysql'

You may also want to check the requirements for 4.4.

Note:
It may be handy to run two parallel SSH sessions during the upgrade, executing the upgrade steps in one and monitoring the server/proxy logs in another. For example, run `tail -f zabbix_server.log` or `tail -f zabbix_proxy.log` in the second SSH session showing you the latest log file entries and possible errors in real time. This can be critical for production instances.

Server upgrade process

1 Stop server

Stop Zabbix server to make sure that no new data is inserted into database.

2 Back up the existing Zabbix database

This is a very important step. Make sure that you have a backup of your database. It will help if the upgrade procedure fails (lack of disk space, power off, any unexpected problem).

3 Back up configuration files, PHP files and Zabbix binaries

Make a backup copy of Zabbix binaries, configuration files and the PHP file directory.

4 Install new server binaries

Use these instructions to compile Zabbix server from sources.

5 Review server configuration parameters

See the upgrade notes for details on mandatory changes.

For new optional parameters, see the What's new section.

6 Start new Zabbix binaries

Start new binaries. Check log files to see if the binaries have started successfully.

Zabbix server will automatically upgrade the database. When starting up, Zabbix server reports the current (mandatory and optional) and required database versions. If the current mandatory version is older than the required version, Zabbix server automatically executes the required database upgrade patches. The start and progress level (percentage) of the database upgrade is written to the Zabbix server log file. When the upgrade is completed, a "database upgrade fully completed" message is written to the log file. If any of the upgrade patches fail, Zabbix server will not start. Zabbix server will also not start if the current

mandatory database version is newer than the required one. Zabbix server will only start if the current mandatory database version corresponds to the required mandatory version.

```
8673:20161117:104750.259 current database version (mandatory/optional): 03040000/03040000
8673:20161117:104750.259 required mandatory version: 03040000
```

Before you start the server:

- Make sure the database user has enough permissions (create table, drop table, create index, drop index)
- Make sure you have enough free disk space.

7 Install new Zabbix web interface

The minimum required PHP version is 5.4.0. Update if needed and follow installation instructions.

8 Clear web browser cookies and cache

After the upgrade you may need to clear web browser cookies and web browser cache for the Zabbix web interface to work properly.

Proxy upgrade process

1 Stop proxy

Stop Zabbix proxy.

2 Back up configuration files and Zabbix proxy binaries

Make a backup copy of the Zabbix proxy binary and configuration file.

3 Install new proxy binaries

Use these instructions to compile Zabbix proxy from sources.

4 Review proxy configuration parameters

There are no mandatory changes in this version to proxy parameters. For new optional parameters, see the What's new section.

5 Start new Zabbix proxy

Start the new Zabbix proxy. Check log files to see if the proxy has started successfully.

Zabbix proxy will automatically upgrade the database. Database upgrade takes place similarly as when starting Zabbix server.

Agent upgrade process

> **Attention:**
> Upgrading agents is not mandatory. You only need to upgrade agents if it is required to access the new functionality.

1 Stop agent

Stop Zabbix agent.

2 Back up configuration files and Zabbix agent binaries

Make a backup copy of the Zabbix agent binary and configuration file.

3 Install new agent binaries

Use these instructions to compile Zabbix agent from sources.

Alternatively, you may download pre-compiled Zabbix agents from the Zabbix download page.

4 Review agent configuration parameters

There are no mandatory changes in this version to agent parameters.

5 Start new Zabbix agent

Start the new Zabbix agent. Check log files to see if the agent has started successfully.

Upgrade between minor versions

When upgrading between minor versions of 4.4.x (for example from 4.4.1 to 4.4.3) it is required to execute the same actions for server/proxy/agent as during the upgrade between major versions. The only difference is that when upgrading between minor versions no changes to the database are made.

7 Known issues

Proxy startup with MySQL 8.0.0-8.0.17

zabbix_proxy on MySQL versions 8.0.0-8.0.17 fails with the following "access denied" error:

```
[Z3001] connection to database 'zabbix' failed: [1227] Access denied; you need (at least one of) the SUPER
```

That is due to MySQL 8.0.0 starting to enforce special permissions for setting session variables. However, in 8.0.18 this behaviour was removed: As of MySQL 8.0.18, setting the session value of this system variable is no longer a restricted operation.

The workaround is based on granting additional privileges to the `zabbix` user:

For MySQL versions 8.0.14 - 8.0.17:

```
grant SESSION_VARIABLES_ADMIN on *.* to 'zabbix'@'localhost';
```

For MySQL versions 8.0.0 - 8.0.13:

```
grant SYSTEM_VARIABLES_ADMIN on *.* to 'zabbix'@'localhost';
```

Timescale DB

PostgreSQL versions 9.6-12 use too much memory when updating tables with a large number of partitions (see problem report). This issue manifests itself when Zabbix updates trends on systems with TimescaleDB if trends are split into relatively small (e.g. 1 day - default in Zabbix 4.4) chunks. This leads to hundreds of chunks present in the trends tables with default housekeeping settings - the condition where PostgreSQL is likely to run out of memory.

The issue has been resolved since Zabbix 4.4.9 for new installations with TimescaleDB, but if TimescaleDB was set up with Zabbix before that, please see ZBX-16347 for the migration notes.

Upgrade with MariaDB 10.2.1 and before

Upgrading Zabbix may fail if database tables were created with MariaDB 10.2.1 and before, because in those versions the default row format is compact. This can be fixed by changing the row format to dynamic (see also ZBX-17690).

Global event correlation

Events may not get correlated correctly if the time interval between the first and second event is very small, i.e. half a second and less.

IPMI checks

IPMI checks will not work with the standard OpenIPMI library package on Debian prior to 9 (stretch) and Ubuntu prior to 16.04 (xenial). To fix that, recompile OpenIPMI library with OpenSSL enabled as discussed in ZBX-6139.

SSH checks

Some Linux distributions like Debian, Ubuntu do not support encrypted private keys (with passphrase) if the libssh2 library is installed from packages. Please see ZBX-4850 for more details.

When using libssh 0.9.x on CentOS 8 with OpenSSH 8 SSH checks may occasionally report "Cannot read data from SSH server". This is caused by a libssh issue (more detailed report). The error is expected to have been fixed by a stable libssh 0.9.5 release. See also ZBX-17756 for details.

ODBC checks

Zabbix server or proxy that uses MySQL as its database may or may not work correctly with MySQL ODBC library due to an upstream bug. Please see ZBX-7665 for more information and available workarounds.

XML data queried from Microsoft SQL Server may get truncated in various ways on Linux and UNIX systems.

Incorrect request method parameter in items

The request method parameter, used only in HTTP checks, may be incorrectly set to '1', a non-default value for all items as a result of upgrade from a pre-4.0 Zabbix version. For details on how to fix this situation, see ZBX-19308.

HTTPS checks

Web scenarios and HTTP agent items using the https protocol, Zabbix agent checks `net.tcp.service[https...]` and `net.tcp.service.perf[https...]` may fail if the target server is configured to disallow TLS v1.0 protocol or below. Please see ZBX-9879 for more information and available workarounds.

Web monitoring and HTTP agent

Zabbix server leaks memory on CentOS 6, CentOS 7 and possibly other related Linux distributions due to an upstream bug when "SSL verify peer" is enabled in web scenarios or HTTP agent. Please see ZBX-10486 for more information and available workarounds.

Simple checks

There is a bug in **fping** versions earlier than v3.10 that mishandles duplicate echo replay packets. This may cause unexpected results for `icmpping`, `icmppingloss`, `icmppingsec` items. It is recommended to use the latest version of **fping**. Please see ZBX-11726 for more details.

SNMP checks

If the OpenBSD operating system is used, a use-after-free bug in the Net-SNMP library up to the 5.7.3 version can cause a crash of Zabbix server if the SourceIP parameter is set in the Zabbix server configuration file. As a workaround, please do not set the SourceIP parameter. The same problem applies also for Linux, but it does not cause Zabbix server to stop working. A local patch for the net-snmp package on OpenBSD was applied and will be released with OpenBSD 6.3.

SNMP data spikes

Spikes in SNMP data have been observed that may be related to certain physical factors like voltage spikes in the mains. See ZBX-14318 more details.

Alerter process crash in Centos/RHEL 7

Instances of a Zabbix server alerter process crash have been encountered in Centos/RHEL 7. Please see ZBX-10461 for details.

Compiling Zabbix agent on HP-UX

If you install the PCRE library from a popular HP-UX package site http://hpux.connect.org.uk, for example from file `pcre-8.42-ia64_64-11.3` you get only the 64-bit version of the library installed in the /usr/local/lib/hpux64 directory.

In this case, for successful agent compilation customized options need to be used for the "configure" script, e.g.:

```
CFLAGS="+DD64" ./configure --enable-agent --with-libpcre-include=/usr/local/include --with-libpcre-lib=/us
```

Flipping frontend locales

It has been observed that frontend locales may flip without apparent logic, i. e. some pages (or parts of pages) are displayed in one language while other pages (or parts of pages) in a different language. Typically the problem may appear when there are several users, some of whom use one locale, while others use another.

A known workaround to this is to disable multithreading in PHP and Apache.

The problem is related to how setting the locale works in PHP: locale information is maintained per process, not per thread. So in a multi-thread environment, when there are several projects run by same Apache process, it is possible that the locale gets changed in another thread and that changes how data can be processed in the Zabbix thread.

For more information, please see related problem reports:

- ZBX-10911 (Problem with flipping frontend locales)
- ZBX-16297 (Problem with number processing in graphs using the `bcdiv` function of BC Math functions)

Compatibility issue with PHP 7.0

It has been observed that with PHP 7.0 importing a template with web monitoring triggers may fail due to incorrectly added double quotes to the web monitoring items in the trigger expressions. The issue goes away when upgrading PHP to 7.1.

PHP 7.3 opcache configuration

If "opcache" is enabled in the PHP 7.3 configuration, Zabbix frontend may show a blank screen when loaded for the first time. This is a registered PHP bug. To work around this, please set the "opcache.optimization_level" parameter to `0x7FFFBFDF` in the PHP configuration (php.ini file).

Graphs

Changes to Daylight Saving Time (DST) result in irregularities when displaying X axis labels (date duplication, date missing, etc).

Log file monitoring

`log[]` and `logrt[]` items repeatedly reread log file from the beginning if file system is 100% full and the log file is being appended (see ZBX-10884 for more information).

Slow MySQL queries

Zabbix server generates slow select queries in case of non-existing values for items. This is caused by a known issue in MySQL 5.6/5.7 versions. A workaround to this is disabling the index_condition_pushdown optimizer in MySQL. For an extended discussion, see ZBX-10652.

API login

A large number of open user sessions can be created when using custom scripts with the `user.login` method without a following `user.logout`.

IPv6 address issue in SNMPv3 traps

Due to a net-snmp bug, IPv6 address may not be correctly displayed when using SNMPv3 in SNMP traps. For more details and a possible workaround, see ZBX-14541.

Trimmed long IPv6 IP address in failed login information

Failed login attempt message will display only the first 39 characters of a stored IP address as that's the character limit in the database field. That means that IPv6 IP addresses longer than 39 characters will be shown incompletely.

IE11 issue with map resizing in dashboard widgets

Maps, in Internet Explorer 11, are cut off on the right side if the map content is larger than the dashboard widget area (instead of being resized proportionately). This is intentional because of an IE11-related issue with proper resizing of SVG images.

Zabbix agent checks on Windows

Non-existing DNS entries in a `Server` parameter of Zabbix agent configuration file (zabbix_agentd.conf) may increase Zabbix agent response time on Windows. This happens because Windows DNS caching daemon doesn't cache negative responses for IPv4 addresses. However, for IPv6 addresses negative responses are cached, so a possible workaround to this is disabling IPv4 on the host.

Known issues in 4.4.0 - 4.4.3

- High memory usage has been observed during process startup with SQLite 3.7.17 on Centos/RHEL 7. The startup process has been improved in 4.4.4 to avoid similar issues with other databases as well. See ZBX-9084 for more details.

8 Template changes

This page lists all changes to the stock templates that are shipped with Zabbix.

Note that upgrading to the latest Zabbix version will not automatically upgrade the templates used. It is suggested to modify the templates in existing installations by:

- Downloading the latest templates from the Zabbix Git repository;
- Then, while in *Configuration* → *Templates* you can import them manually into Zabbix. If templates with the same names already exist, the *Delete missing* options should be checked when importing to achieve a clean import. This way the old items that are no longer in the updated template will be removed (note that it will mean losing history of these old items).

New templates

See the list of new templates in Zabbix 4.4.0.

Changes in 4.4.1

- The *Template Net HP Comware HH3C SNMPv2* now contains the correct value mapping.
- In the *Template Module Zabbix agent* agent.ping type has been changed from ZABBIX_ACTIVE to ZABBIX_PASSIVE

Changes in 4.4.2

Low-level **discovery rules** have been split from the parent template *Template Module HOST-RESOURCES-MIB SNMPv2* into separate linked templates:

- Template Module HOST-RESOURCES-MIB storage SNMPv2
- Template Module HOST-RESOURCES-MIB memory SNMPv2
- Template Module HOST-RESOURCES-MIB CPU SNMPv2

Other changes:

- A CPU utilization item has been added to *Template Module HOST-RESOURCES-MIB CPU SNMPv2*;
- The filesystem discovery filter has been improved to exclude some unnecessary values in *Template Module HOST-RESOURCES-MIB storage SNMPv2* (linked to *Template OS Windows SNMPv2*), *Template Net Arista SNMPv2*);
- The network interface discovery filter has been improved to exclude some unnecessary values in *Template Module Interfaces Windows SNMPv2* (linked to *Template OS Windows SNMPv2*);
- Discovery filters in several templates are now defined by template-level user macros (for example {$VFS.FS.FSNAME.MATCHES} and {$VFS.FS.FSNAME.NOT_MATCHES}) that can be overridden on host or linked-template level for flexibility:
  - *Template Module HOST-RESOURCES-MIB storage SNMPv2*

- *Template Module HOST-RESOURCES-MIB memory SNMPv2*
- *Template Module HOST-RESOURCES-MIB CPU SNMPv2*
- *Template Module Interfaces Windows SNMPv2*

Changes in 4.4.4

- Windows service discovery has been added to *Template OS Windows by Zabbix agent*.
- Low-level discovery rules have been split from *Template Module HOST-RESOURCES-MIB SNMPv1* into separate linked templates (see Changes in 4.4.2 for details)
- Each xml of template has been moved into its own sub directory. In Bitbucket, this allows each template to have its own README.md rendered, when viewed in web.
- Value mapping 'Ethernet 10Mbs' has been renamed to 'Ethernet' in linux,linux_prom
- Ploop md hcp zram has been added to LLD filter for vfs.dev(block devices) in linux,linux_prom,linux_snmp
- Not used macros in hp_hpn template have been removed
- Value mapping for HH3C template has been fixed
- Poll time of CPU metrics has been changed to 5m by default in cisco template
- Missing user macros in windows_agent template has been added
- Remove mode=none from trigger prototypes, version triggers now close after some timeout
- Width has been set to 750px for all screen graphs

Changes in 4.4.5

New HAProxy and Redis templates are available:

- *Template App HAProxy by HTTP* - collects metrics by polling HAProxy Stats Page with HTTP agent remotely (see description);
- *Template App HAProxy by Zabbix agent* - collects metrics by polling HAProxy Stats Page locally with Zabbix agent (see description).
- *Template DB Redis* - collects metrics from Redis by polling the new Zabbix agent 2 (see description).

Changes in 4.4.6

New MySQL template is available:

- *Template DB MySQL by ODBC* - collects metrics from DBMS MySQL and its forks by ODBC (see description).

9 Upgrade notes for 4.4.0

These notes are for upgrading from Zabbix 4.2.x to Zabbix 4.4.0. All notes are grouped into:

- `Critical` - the most critical information related to the upgrade process and the changes in Zabbix functionality
- `Informational` - all remaining information describing the changes in Zabbix functionality

It is possible to upgrade to Zabbix 4.4.0 from versions before Zabbix 4.2.0. See the upgrade procedure section for all relevant information about upgrading from previous Zabbix versions.

Critical Jabber, Ez Texting media types removed

Jabber and Ez Texting media types for delivering notifications have been removed.

During the upgrade these media types, if present in your installation, will be transformed to a script media type with all relevant parameters preserved. However, notifications via Jabber and Ez Texting will not work any more.

Real-time export protocol changed

Real-time export now also includes host names, not only the visible host names. Note that the real-time export protocol has been changed with host name information now an object, rather than a string/array.

Upgrade with MariaDB 10.2.1 and before

Upgrading Zabbix may fail if database tables were created with MariaDB 10.2.1 and before, because in those versions the default row format is compact. This can be fixed by changing the row format to dynamic (see also ZBX-17690).

Informational Screen element removed from screens

Zabbix screens no longer support the possibility to display another screen as a screen element. After the upgrade, all screen cells containing another screen will be empty.

Linked template selection

The auto-select field for selecting linked templates has been removed from host/template configuration forms. To link templates, click on *Add* and then select templates in the popup window.

Changed host export format

The format of host/template export in XML/JSON has been changed. For more details, see What's new in 4.4.0.

Items table split

Realtime fields have been split from the `items` table into a new table called `item_rtdata`. See also What's new in 4.4.0.

Zabbix frontend sets own cookie path

If Zabbix frontend runs behind proxy, cookie path set by Zabbix now needs to be specified in the proxy configuration. See using Zabbix frontend behind proxy for details.

Item update interval for unreachable hosts

A bug related to item check time on unreachable hosts has been fixed. This bug was introduced in Zabbix version 3.4.9 or 4.0.0. Now the item check period is recalculated based on the UnavailableDelay value, not on the item update period. This can potentially change unreachable poller performance. For example, if item previously had a delay of 1h then now it will be checked based on the UnavailableDelay value, not every 1h as it was (due to bug). Therefore it is recommended to increase UnavailableDelay value to avoid possible unreachable poller overload.

Minimum screen width for frontend

The dashboard grid in Zabbix frontend has been increased from 12 to 24 columns, therefore the minimum supported screen width has been set to 1200px.

10 Upgrade notes for 4.4.1

This minor version does not have any upgrade notes.

11 Upgrade notes for 4.4.2

Agent 2 configuration parameters

The following general configuration parameters have been moved to plugin configuration parameters:

- EnableRemoteCommands → Plugins.SystemRun.EnableRemoteCommands
- LogRemoteCommands → Plugins.SystemRun.LogRemoteCommands
- MaxLinesPerSecond → Plugins.Log.MaxLinesPerSecond

The internal plugin Configurator API also has been changed: another parameter has been added to the Configure() function, the format of passed plugin parameters to the Configure() function has been changed and the Validate() function has been added to validate plugin specific configuration.

12 Upgrade notes for 4.4.3

This minor version does not have any upgrade notes.

13 Upgrade notes for 4.4.4

Real-time export of events, items, trends

In case of a write error during the export (data cannot be written to the export file or the export file cannot be renamed or a new one cannot be created after renaming it), the data item is now dropped and never written to the export file. It is written only in the Zabbix database. Writing data to the export file is resumed when the writing problem is resolved.

Previously, in case of a write error, Zabbix would retry with a 10 second interval until success. The previous behaviour, while ensuring history data equivalence between database and the export files resulted in actually stopping monitoring until the problem

with the export file was fixed. Now the priority is given to continued monitoring rather than keeping the export file in sync with database at all cost.

See also: Real-time export of events, items, trends

Sound in browsers

Sounds are now supported in MP3 format only.

14 Upgrade notes for 4.4.5

Timeout value in web scenario steps

The timeout value in a web scenario step can no longer be '0'. Similarly, any user macros used in this field must not resolve to '0'.

15 Upgrade notes for 4.4.6

Building with libxml2

When building with libxml2, pkg-config is now used instead of xml2-config to detect and use libxml2, as xml2-config is to be removed from libxml2 in the future.

DB character set and collation check

A check for the correct character set and collation is now performed on the database, database tables and table fields during the initial frontend installation. If the check fails a warning message is displayed.

A warning message is also displayed in *Reports* → *System information*.

16 Upgrade notes for 4.4.7

This minor version does not have any upgrade notes.

17 Upgrade notes for 4.4.8

Item changes

The Timeout configuration parameter is now used for web.page.get, web.page.regexp and web.page.perf items.

Redis plugin update

Configuration parameter `Plugins.Redis.Password` was removed and an opportunity to pass a password as a key parameter has now been added. See Redis plugin metrics for details.

Maintenance and Daylight Saving Time

In previous Zabbix versions, maintenance period calculation was unaware of the possible effects caused by Daylight Saving Time change resulting in unpredictable behaviours. In the new version Daylight Saving Time (DST) change is cared for and should not unpredictably affect how long the maintenance will be. Let's say we have a two-hour maintenance that usually starts at 1am and finishes at 3am. If after one hour of maintenance (at 2am) a DST change happens and current time changes from 2:00 to 3:00, the maintenance will continue for one more hour till 4:00.

Non-root permissions implemented for Docker images

Zabbix Docker images have been updated to implement non-root container best practices. Due to the change:

- All directories have been restricted for the container user, except directories which are required for the container. For example, /etc/zabbix/ with Zabbix component configuration files.
- Ports 80 and 443 have been changed to 8080 and 8443, because usage of all ports <1024 is restricted for non-privileged users. Zabbix web interface images have been updated to use non-privileged ports 8080, 8443; Zabbix snmptrap images port 1162.
- All Zabbix images are updated to use a non-privileged user. By default, 'zabbix' with UID 1997.

A known issue: Nginx based images do not run under root. Will be fixed soon.

18 Upgrade notes for 4.4.9

This minor version has no upgrade notes.

19 Upgrade notes for 4.4.10

This minor version does not have any upgrade notes.

5. Quickstart

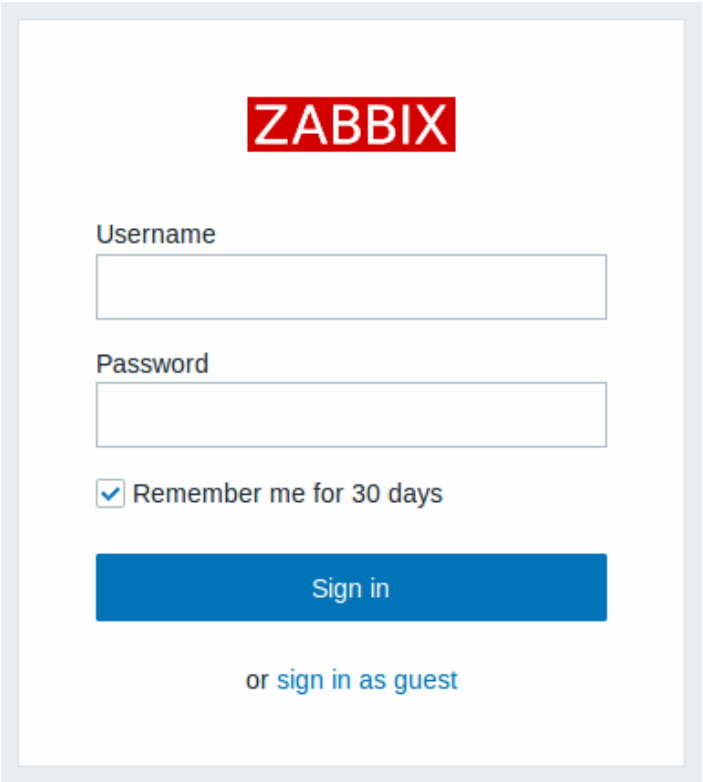
Please use the sidebar to access content in the Quickstart section.

1 Login and configuring user

Overview

In this section you will learn how to log in and set up a system user in Zabbix.

Login



This is the Zabbix "Welcome" screen. Enter the user name **Admin** with password **zabbix** to log in as a Zabbix superuser.

When logged in, you will see 'Connected as Admin' in the lower right corner of the page. Access to *Configuration* and *Administration* menus will be granted.

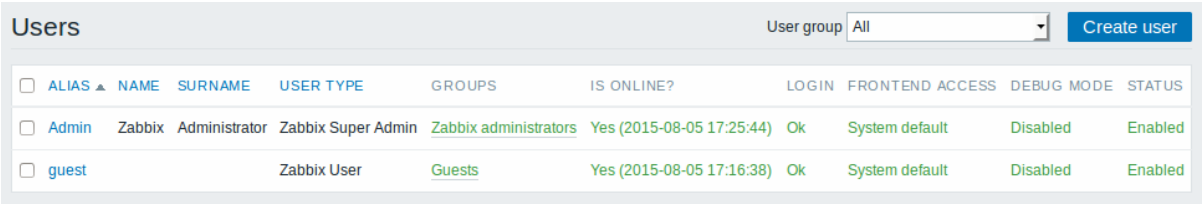
Protection against brute force attacks

In case of five consecutive failed login attempts, Zabbix interface will pause for 30 seconds in order to prevent brute force and dictionary attacks.

The IP address of a failed login attempt will be displayed after a successful login.

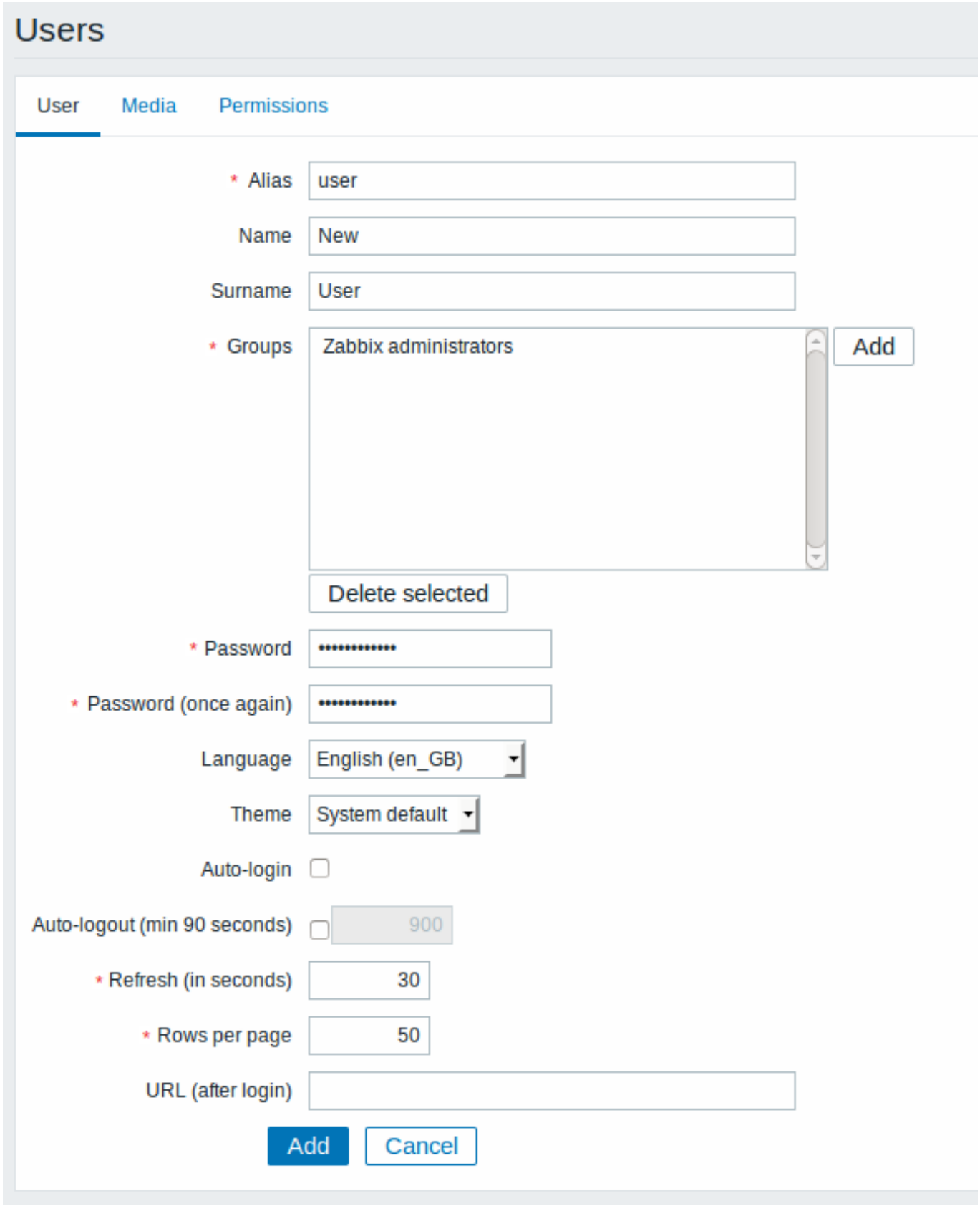
Adding user

To view information about users, go to *Administration* → *Users*.



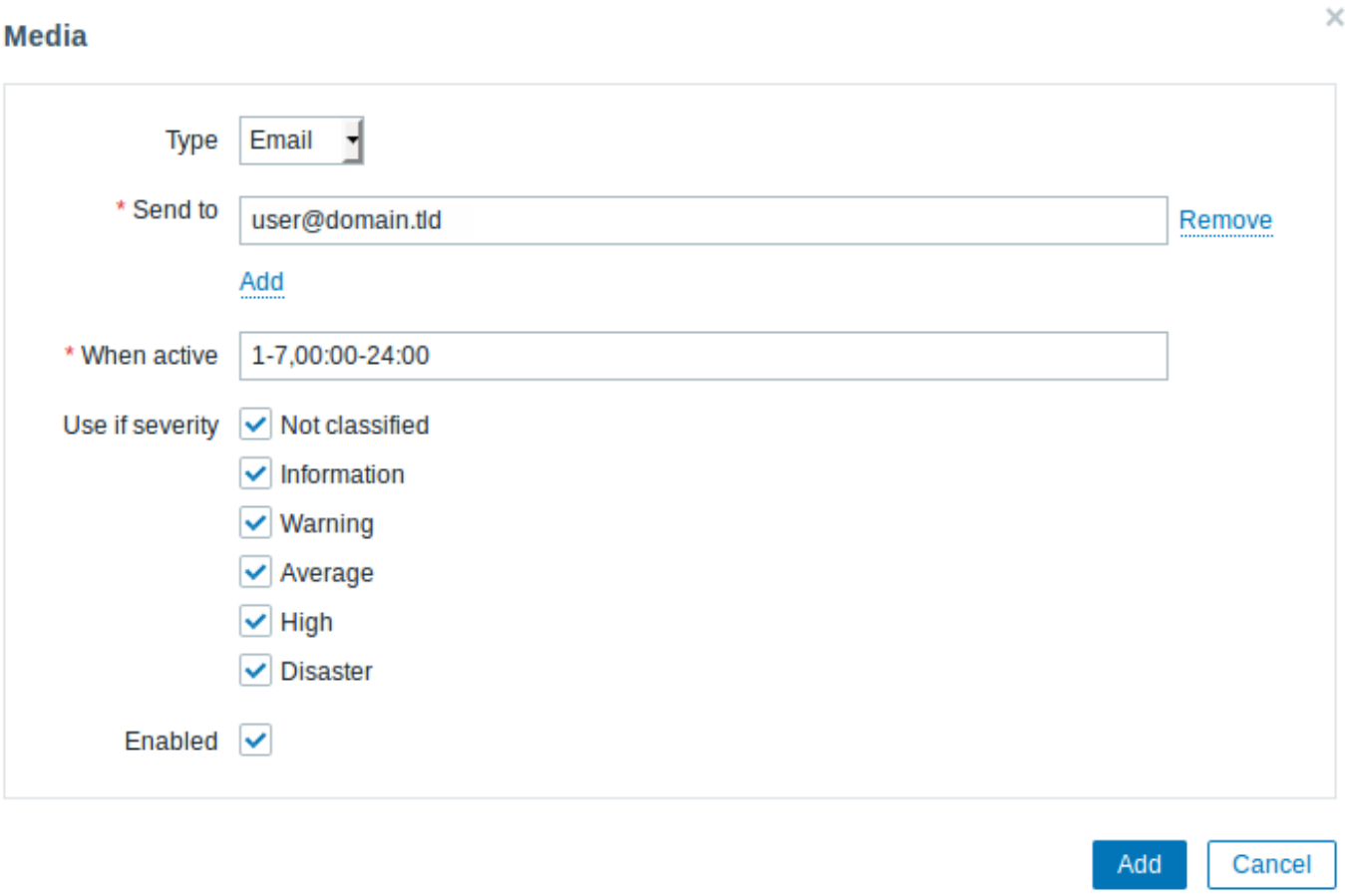
To add a new user, click on *Create user*.

In the new user form, make sure to add your user to one of the existing user groups, for example 'Zabbix administrators'.



All mandatory input fields are marked with a red asterisk.

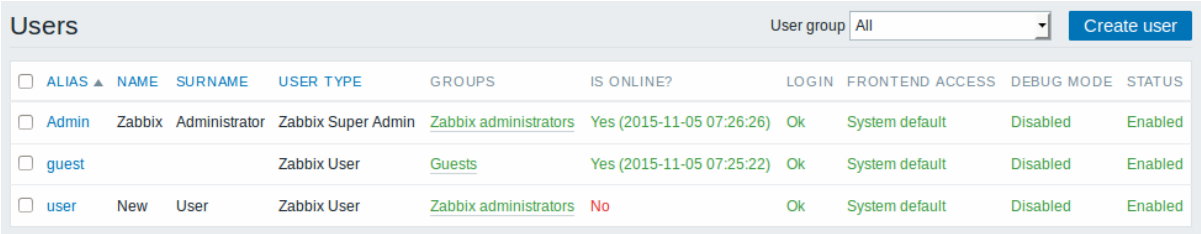
By default, new users have no media (notification delivery methods) defined for them. To create one, go to the 'Media' tab and click on *Add*.



In this pop-up, enter an e-mail address for the user.

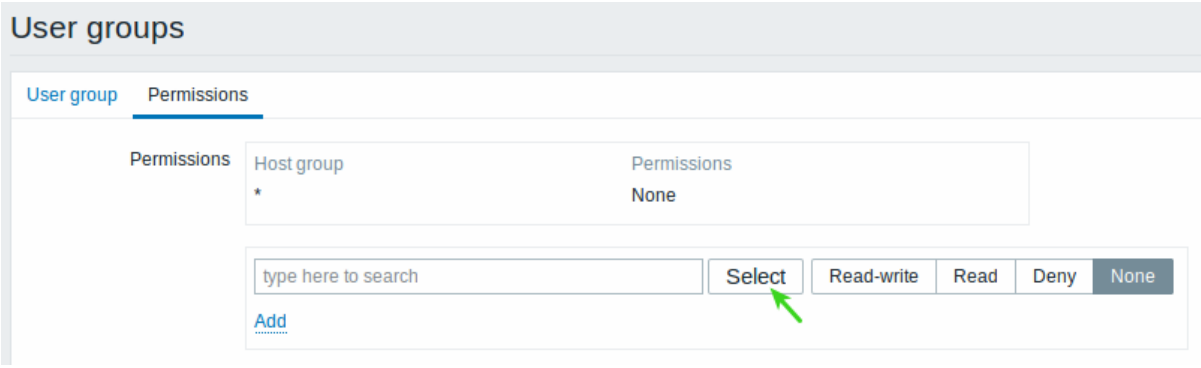
You can specify a time period when the medium will be active (see Time period specification page for description of the format), by default a medium is always active. You can also customise trigger severity levels for which the medium will be active, but leave all of them enabled for now.

Click on *Add*, then click *Add* in the user properties form. The new user appears in the userlist.

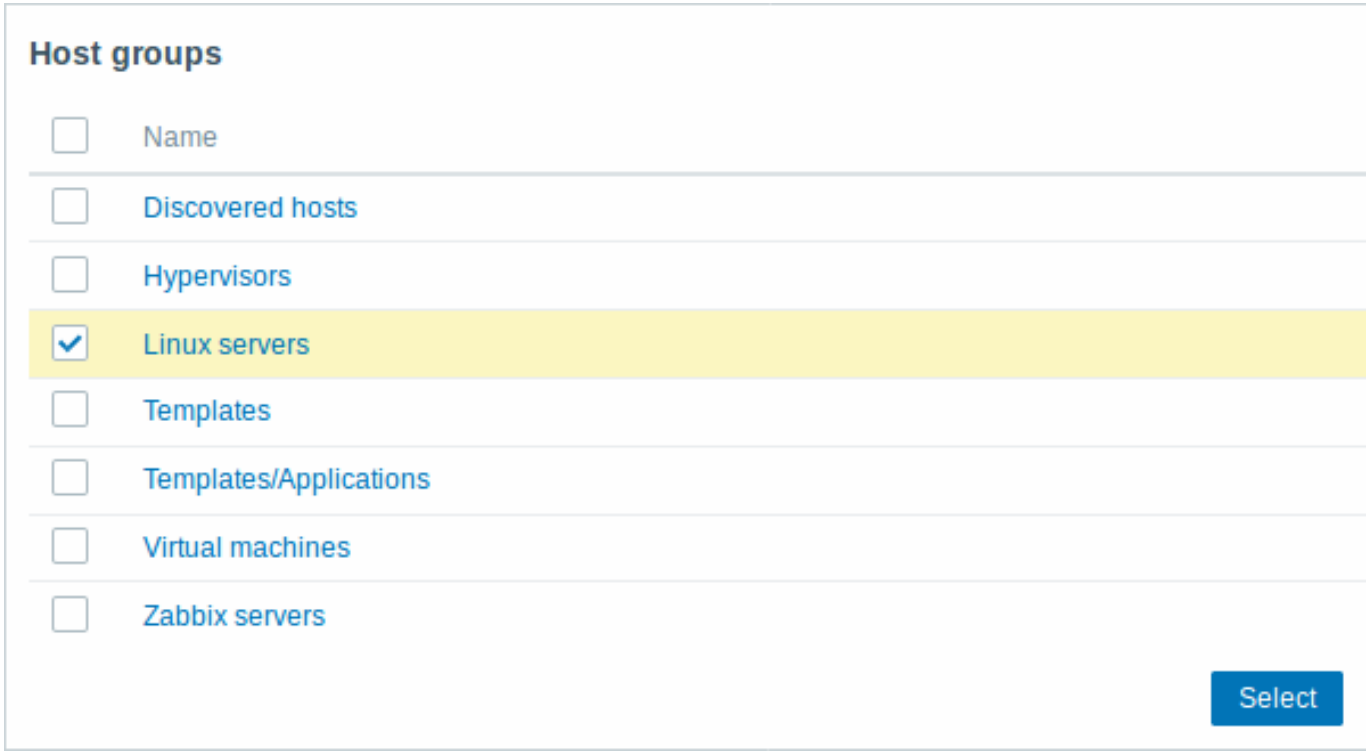


Adding permissions

By default, a new user has no permissions to access hosts. To grant the user rights, click on the group of the user in the *Groups* column (in this case - 'Zabbix administrators'). In the group properties form, go to the *Permissions* tab.



This user is to have read-only access to *Linux servers* group, so click on *Select* next to the user group selection field.



In this pop-up, mark the checkbox next to 'Linux servers', then click *Select*. *Linux servers* should be displayed in the selection field. Click the 'Read' button to set permission level and then *Add* to add the group to the list of permissions. In the user group properties form, click *Update*.

Attention:
In Zabbix, access rights to hosts are assigned to user groups, not individual users.

Done! You may try to log in using the credentials of the new user.

2 New host

Overview

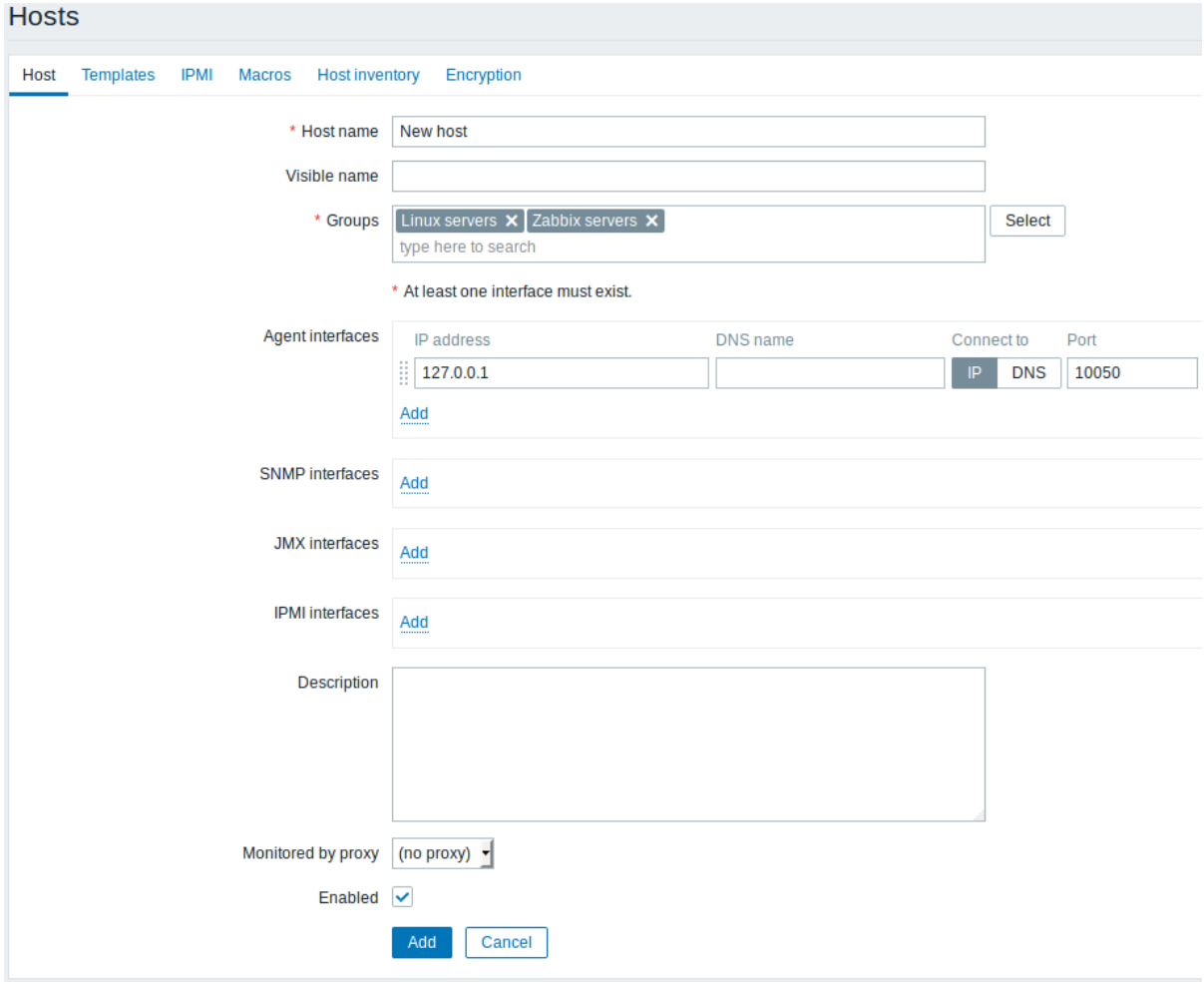
In this section you will learn how to set up a new host.

A host in Zabbix is a networked entity (physical, virtual) that you wish to monitor. The definition of what can be a "host" in Zabbix is quite flexible. It can be a physical server, a network switch, a virtual machine or some application.

Adding host

Information about configured hosts in Zabbix is available in *Configuration* → *Hosts*. There is already one pre-defined host, called 'Zabbix server', but we want to learn adding another.

To add a new host, click on *Create host*. This will present us with a host configuration form.



All mandatory input fields are marked with a red asterisk.

The bare minimum to enter here is:

Host name

- Enter a host name. Alphanumerics, spaces, dots, dashes and underscores are allowed.

Groups

- Select one or several existing groups by clicking *Select* button or enter a non-existing group name to create a new group.

Note:
All access permissions are assigned to host groups, not individual hosts. That is why a host must belong to at least one group.

IP address

- Enter the IP address of the host. Note that if this is the Zabbix server IP address, it must be specified in the Zabbix agent configuration file 'Server' directive.

Other options will suit us with their defaults for now.

When done, click *Add*. Your new host should be visible in the hostlist.

Note:
If the *ZBX* icon in the *Availability* column is red, there is some error with communication - move your mouse cursor over it to see the error message. If that icon is gray, no status update has happened so far. Check that Zabbix server is running, and try refreshing the page later as well.

3 New item

Overview

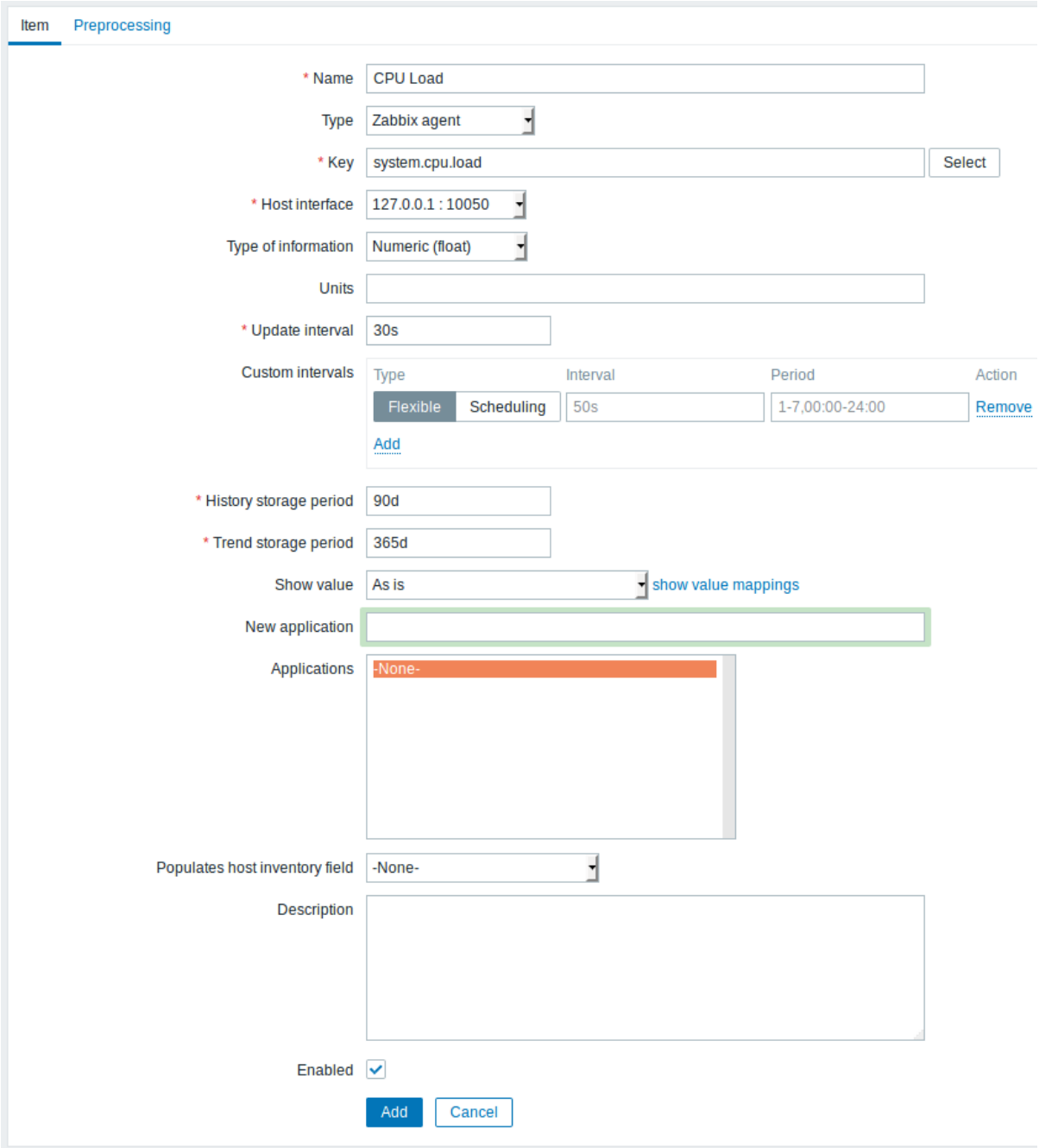
In this section you will learn how to set up an item.

Items are the basis of gathering data in Zabbix. Without items, there is no data - because only an item defines a single metric or what data to get off of a host.

Adding item

All items are grouped around hosts. That is why to configure a sample item we go to *Configuration → Hosts* and find the 'New host' we have created.

The *Items* link in the row of 'New host' should display a count of '0'. Click on the link, and then click on *Create item*. This will present us with an item definition form.



All mandatory input fields are marked with a red asterisk.

For our sample item, the essential information to enter is:

Name

- Enter *CPU Load* as the value. This will be the item name displayed in lists and elsewhere.

Key

- Manually enter *system.cpu.load* as the value. This is a technical name of an item that identifies the type of information that will be gathered. The particular key is just one of pre-defined keys that come with Zabbix agent.

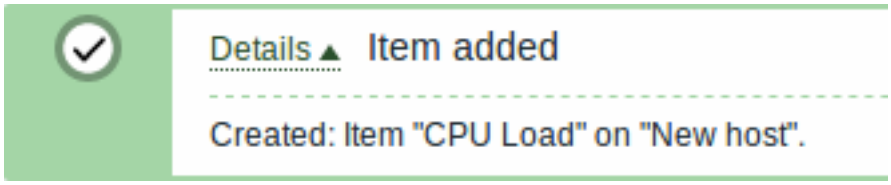
Type of information

- Select *Numeric (float)* here. This attribute defines the format of expected data.

Note:
You may also want to reduce the amount of days item history will be kept, to 7 or 14. This is good practice to relieve the database from keeping lots of historical values.

Other options will suit us with their defaults for now.

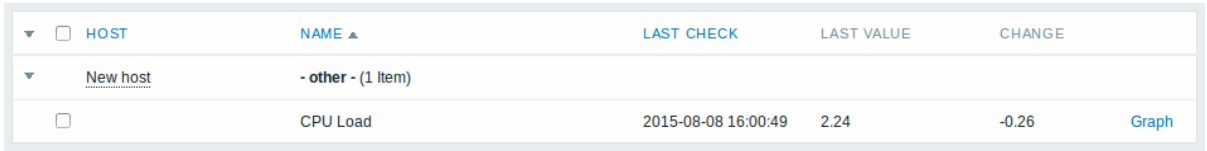
When done, click *Add*. The new item should appear in the itemlist. Click on *Details* above the list to view what exactly was done.



Seeing data

With an item defined, you might be curious if it is actually gathering data. For that, go to *Monitoring* → *Latest data*, select 'New host' in the filter and click on *Apply*.

Then click on the **+** before **- other -** and expect your item to be there and displaying data.



With that said, first data may take up to 60 seconds to arrive. That, by default, is how often the server reads configuration changes and picks up new items to execute.

If you see no value in the 'Change' column, maybe only one value has been received so far. Wait 30 seconds for another value to arrive.

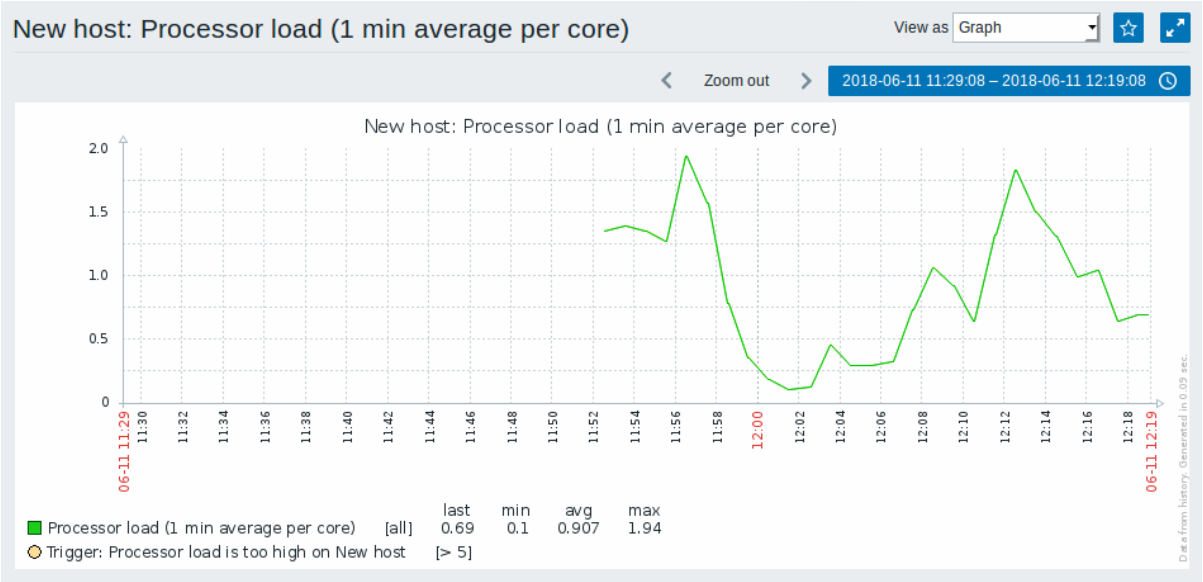
If you do not see information about the item as in the screenshot, make sure that:

- you entered item 'Key' and 'Type of information' fields exactly as in the screenshot
- both agent and server are running
- host status is 'Monitored' and its availability icon is green
- host is selected in the host dropdown, item is active

Graphs

With the item working for a while, it might be time to see something visual. Simple graphs are available for any monitored numeric item without any additional configuration. These graphs are generated on runtime.

To view the graph, go to *Monitoring* → *Latest data* and click on the 'Graph' link next to the item.



4 New trigger

Overview

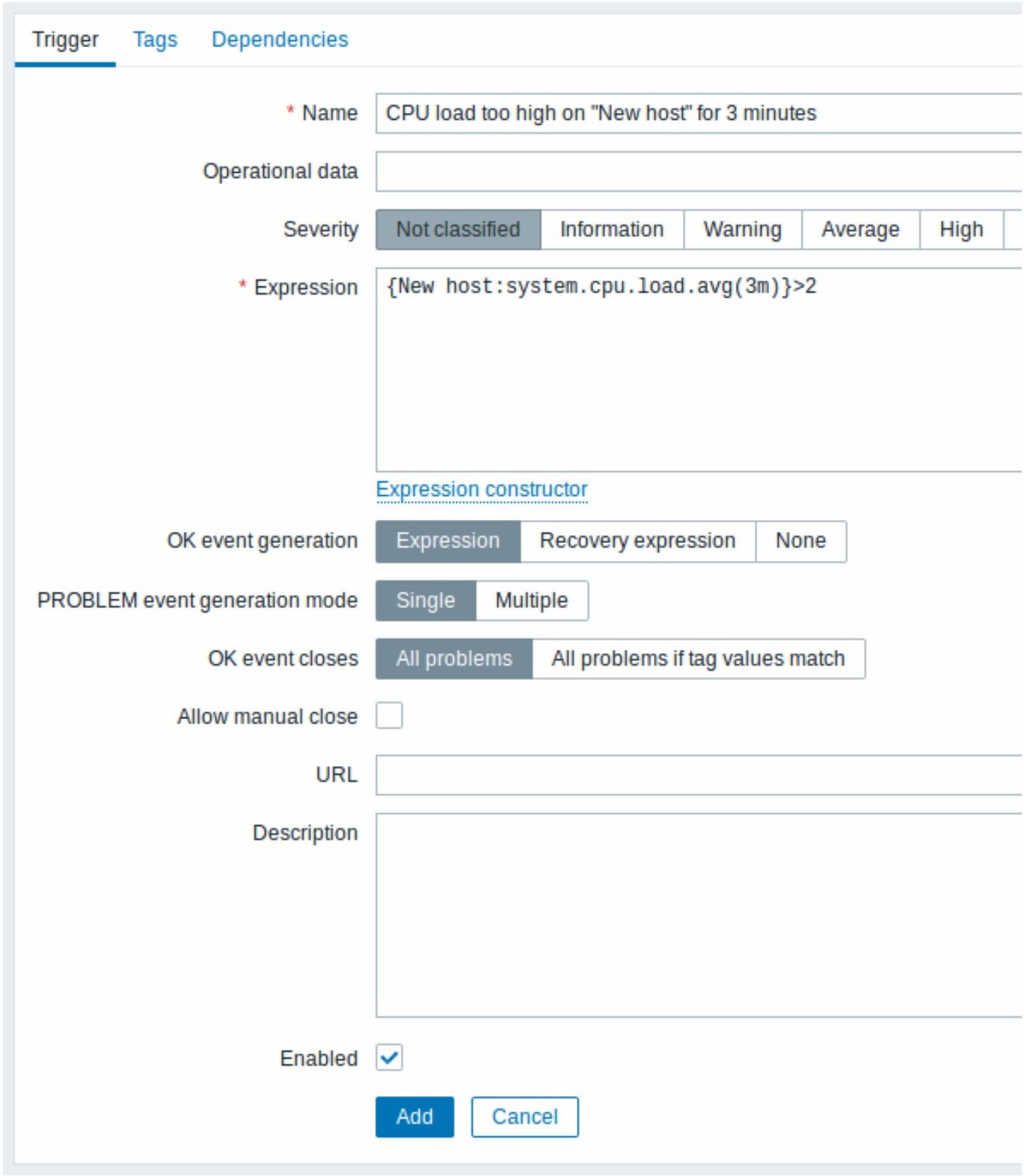
In this section you will learn how to set up a trigger.

Items only collect data. To automatically evaluate incoming data we need to define triggers. A trigger contains an expression that defines a threshold of what is an acceptable level for the data.

If that level is surpassed by the incoming data, a trigger will ”fire” or go into a ’Problem’ state - letting us know that something has happened that may require attention. If the level is acceptable again, trigger returns to an ’Ok’ state.

Adding trigger

To configure a trigger for our item, go to *Configuration* → *Hosts*, find ’New host’ and click on *Triggers* next to it and then on *Create trigger*. This presents us with a trigger definition form.



For our trigger, the essential information to enter here is:

Name

- Enter *CPU load too high on 'New host' for 3 minutes* as the value. This will be the trigger name displayed in lists and elsewhere.

Expression

- Enter: {New host:system.cpu.load.avg(3m)}>2

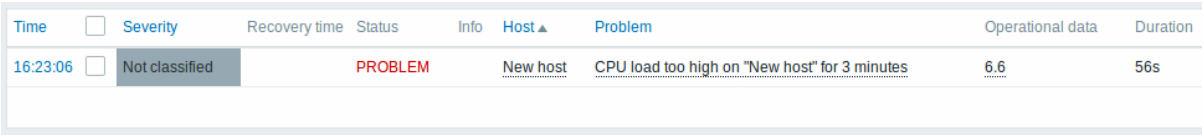
This is the trigger expression. Make sure that the expression is entered right, down to the last symbol. The item key here (system.cpu.load) is used to refer to the item. This particular expression basically says that the problem threshold is exceeded when the CPU load average value for 3 minutes is over 2. You can learn more about the syntax of trigger expressions.

When done, click *Add*. The new trigger should appear in the trigger list.

Displaying trigger status

With a trigger defined, you might be interested to see its status.

If the CPU load has exceeded the threshold level you defined in the trigger, the problem will be displayed in *Monitoring* → *Problems*.



Time		Severity	Recovery time	Status	Info	Host ▲	Problem	Operational data	Duration
16:23:06		Not classified		PROBLEM		New host	CPU load too high on "New host" for 3 minutes	6.6	56s

The flashing in the status column indicates a recent change of trigger status, one that has taken place in the last 30 minutes.

5 Receiving problem notification

Overview

In this section you will learn how to set up alerting in the form of notifications in Zabbix.

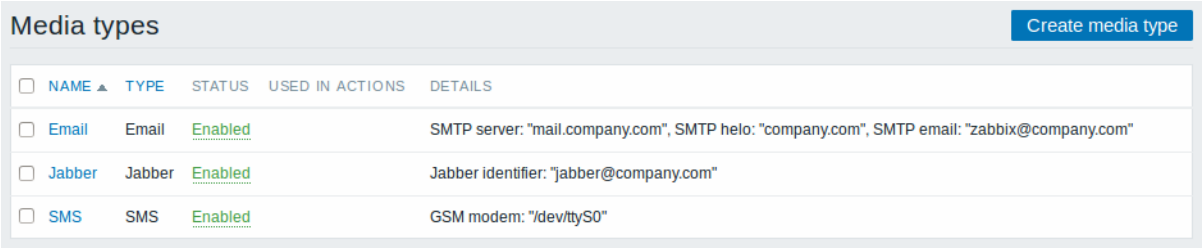
With items collecting data and triggers designed to ”fire” upon problem situations, it would also be useful to have some alerting mechanism in place that would notify us about important events even when we are not directly looking at Zabbix frontend.

This is what notifications do. E-mail being the most popular delivery method for problem notifications, we will learn how to set up an e-mail notification.

E-mail settings

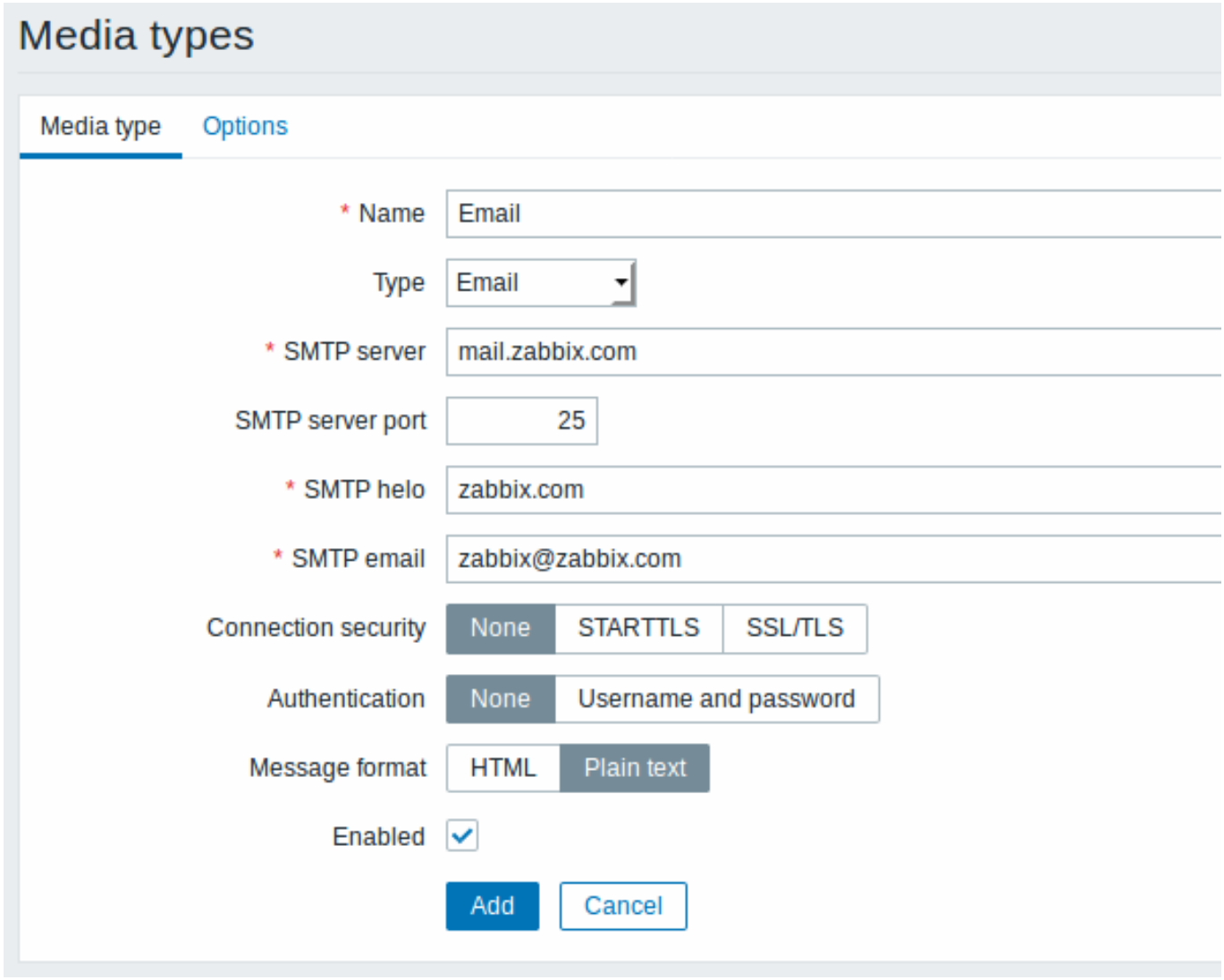
Initially there are several predefined notification delivery methods in Zabbix. E-mail is one of those.

To configure e-mail settings, go to *Administration* → *Media types* and click on *Email* in the list of pre-defined media types.



NAME ▲	TYPE	STATUS	USED IN ACTIONS	DETAILS
Email	Email	Enabled		SMTP server: "mail.company.com", SMTP helo: "company.com", SMTP email: "zabbix@company.com"
Jabber	Jabber	Enabled		Jabber identifier: "jabber@company.com"
SMS	SMS	Enabled		GSM modem: "/dev/ttyS0"

This will present us with the e-mail settings definition form.



All mandatory input fields are marked with a red asterisk.

Set the values of SMTP server, SMTP helo and SMTP e-mail to the appropriate for your environment.

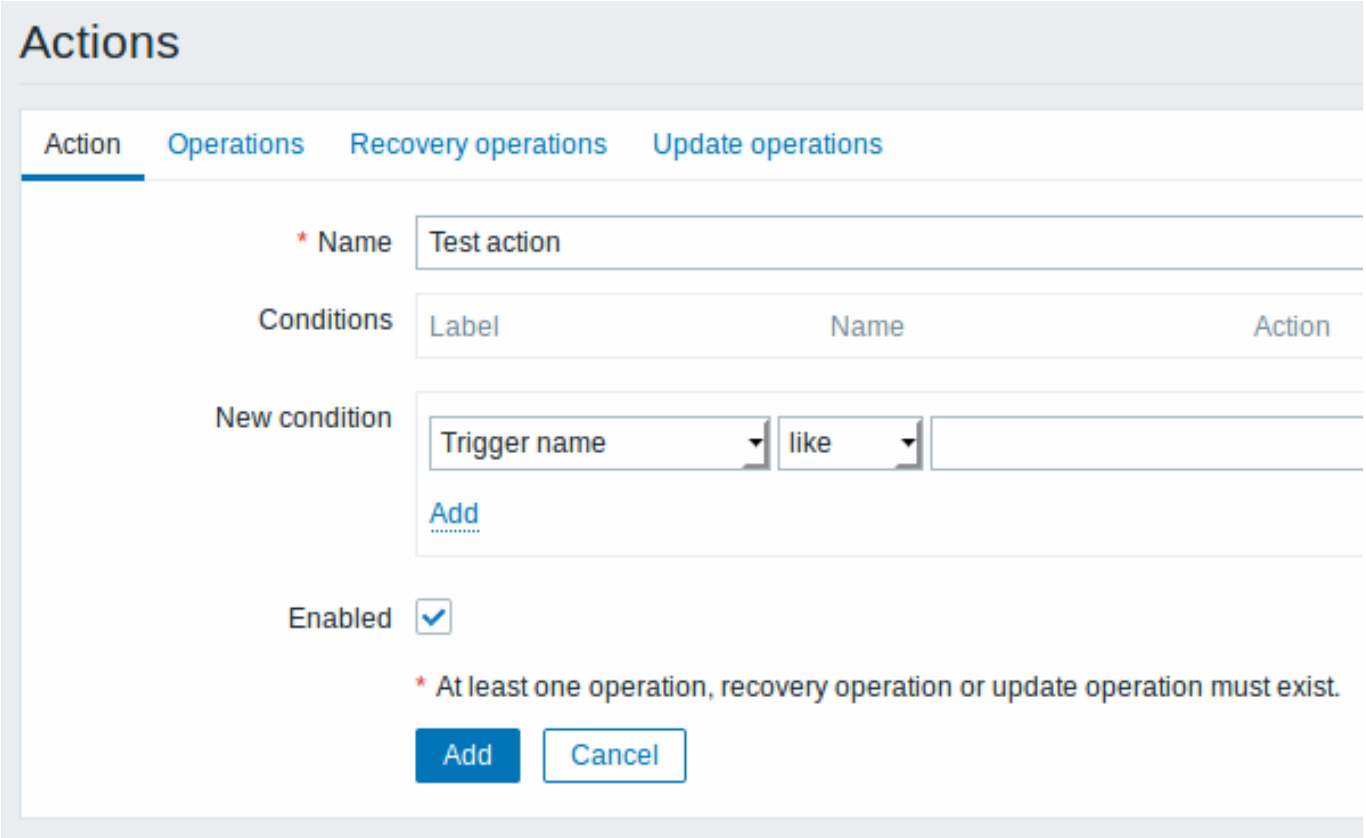
Note:
'SMTP email' will be used as the 'From' address for the notifications sent from Zabbix.

Press *Update* when ready.

Now you have configured 'Email' as a working media type. A media type must be linked to users by defining specific delivery addresses (like we did when configuring a new user), otherwise it will not be used.

New action

Delivering notifications is one of the things actions do in Zabbix. Therefore, to set up a notification, go to *Configuration* → *Actions* and click on *Create action*.

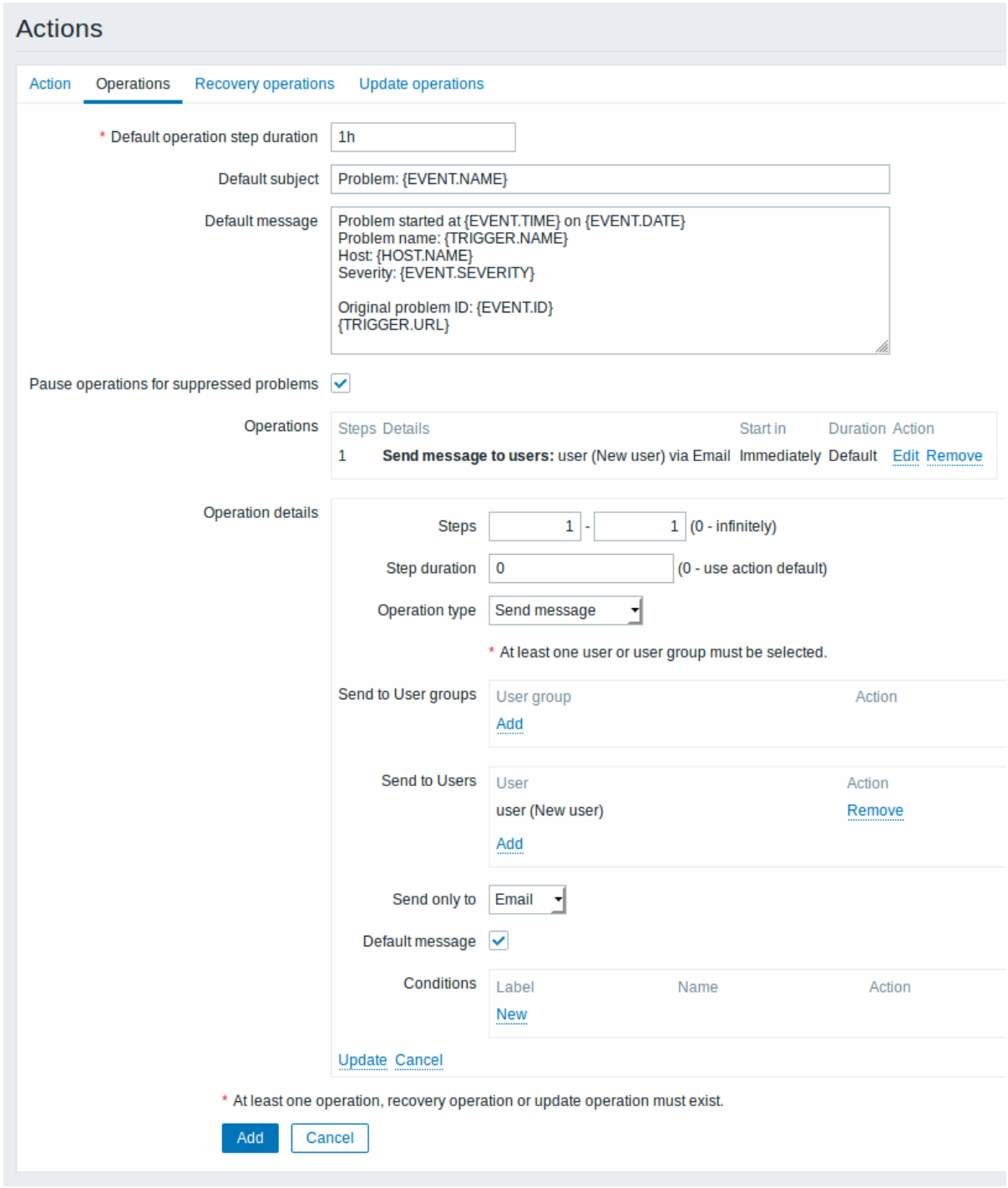


All mandatory input fields are marked with a red asterisk.

In this form, enter a name for the action.

In the most simple case, if we do not add any more specific conditions, the action will be taken upon any trigger change from 'Ok' to 'Problem'.

We still should define what the action should do - and that is done in the *Operations* tab. Click on *New* in the Operations block, which opens a new operation form.



All mandatory input fields are marked with a red asterisk.

Here, click on *Add* in the *Send to Users* block and select the user ('user') we have defined. Select 'Email' as the value of *Send only to*. When done with this, click on *Add* in the operation detail block.

{TRIGGER.STATUS} and {TRIGGER.NAME} macros (or variables), visible in the *Default subject* and *Default message* fields, will be replaced with the actual trigger status and trigger name values.

That is all for a simple action configuration, so click *Add* in the action form.

Receiving notification

Now, with delivering notifications configured it would be fun to actually receive one. To help with that, we might on purpose increase the load on our host - so that our trigger "fires" and we receive a problem notification.

Open the console on your host and run:

```
cat /dev/urandom | md5sum
```

You may run one or several of these processes.

Now go to *Monitoring* → *Latest data* and see how the values of 'CPU Load' have increased. Remember, for our trigger to *fire*, the

'CPU Load' value has to go over '2' for 3 minutes running. Once it does:

- in *Monitoring* → *Problems* you should see the trigger with a flashing 'Problem' status
- you should receive a problem notification in your e-mail

Attention:
If notifications do not work:

- verify once again that both the e-mail settings and the action have been configured properly
- make sure the user you created has at least read permissions on the host which generated the event, as noted in the *Adding user* step. The user, being part of the 'Zabbix administrators' user group must have at least read access to 'Linux servers' host group that our host belongs to.
- Additionally, you can check out the action log by going to *Reports* → *Action log*.

6 New template

Overview

In this section you will learn how to set up a template.

Previously we learned how to set up an item, a trigger and how to get a problem notification for the host.

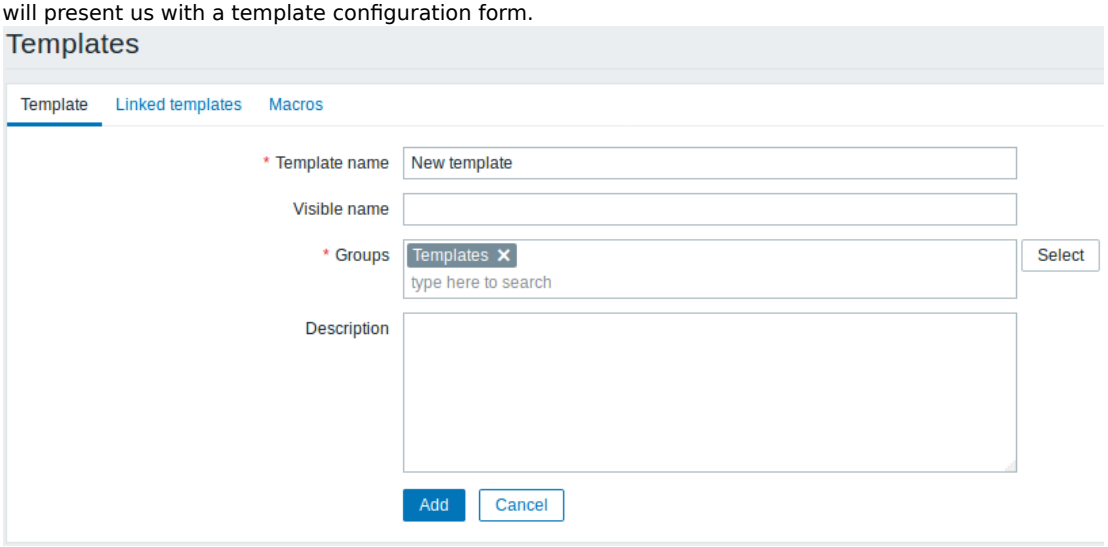
While all of these steps offer a great deal of flexibility in themselves, it may appear like a lot of steps to take if needed for, say, a thousand hosts. Some automation would be handy.

This is where templates come to help. Templates allow to group useful items, triggers and other entities so that those can be reused again and again by applying to hosts in a single step.

When a template is linked to a host, the host inherits all entities of the template. So, basically a pre-prepared bunch of checks can be applied very quickly.

Adding template

To start working with templates, we must first create one. To do that, in *Configuration* → *Templates* click on *Create template*. This will present us with a template configuration form.



All mandatory input fields are marked with a red asterisk.

The required parameters to enter here are:

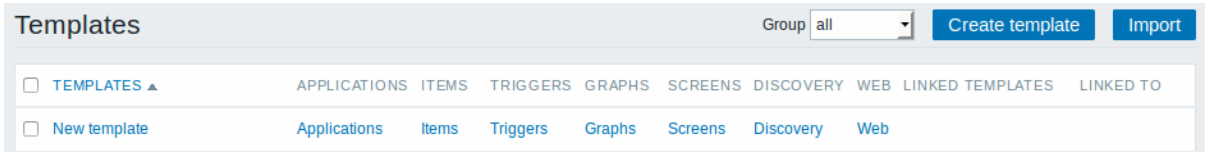
Template name

- Enter a template name. Alpha-numericals, spaces and underscores are allowed.

Groups

- Select one or several groups by clicking *Select* button. The template must belong to a group.

When done, click *Add*. Your new template should be visible in the list of templates.



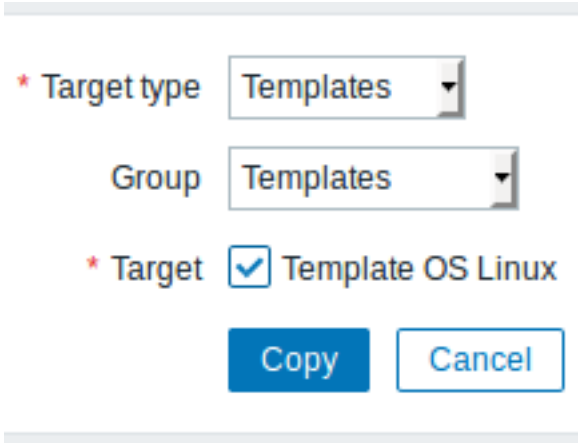
As you may see, the template is there, but it holds nothing in it - no items, triggers or other entities.

Adding item to template

To add an item to the template, go to the item list for 'New host'. In *Configuration* → *Hosts* click on *Items* next to 'New host'.

Then:

- mark the checkbox of the 'CPU Load' item in the list
- click on *Copy* below the list
- select the template to copy item to



All mandatory input fields are marked with a red asterisk.

- click on *Copy*

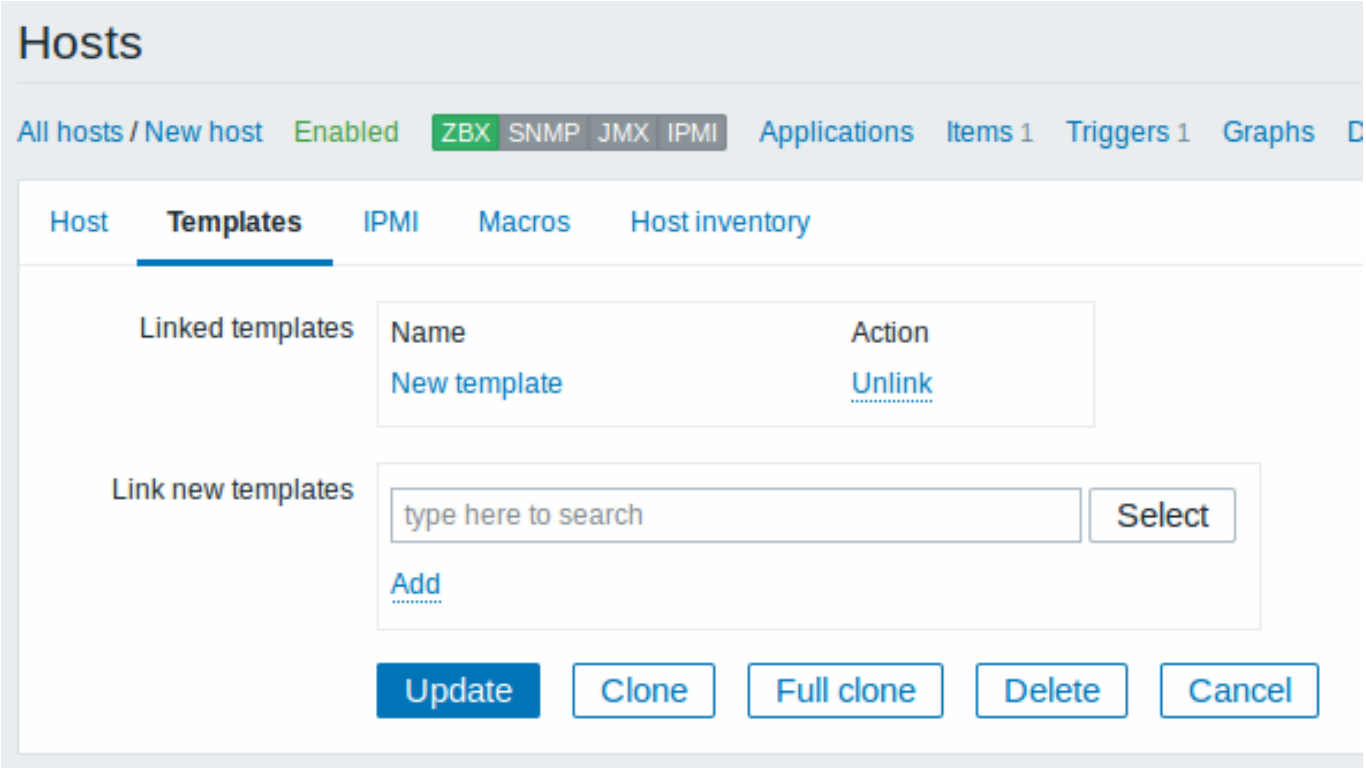
If you now go to *Configuration* → *Templates*, 'New template' should have one new item in it.

We will stop at one item only for now, but similarly you can add any other items, triggers or other entities to the template until it's a fairly complete set of entities for given purpose (monitoring OS, monitoring single application).

Linking template to host

With a template ready, it only remains to add it to a host. For that, go to *Configuration* → *Hosts*, click on 'New host' to open its property form and go to the **Templates** tab.

There, click on *Select* next to *Link new templates*. In the pop-up window click on the name of template we have created ('New template'). As it appears in the *Link new templates* field, click on *Add*. The template should appear in the *Linked templates* list.



Click *Update* in the form to save the changes. The template is now added to the host, with all entities that it holds.

As you may have guessed, this way it can be applied to any other host as well. Any changes to the items, triggers and other entities at the template level will propagate to the hosts the template is linked to.

Linking pre-defined templates to hosts

As you may have noticed, Zabbix comes with a set of predefined templates for various OS, devices and applications. To get started with monitoring very quickly, you may link the appropriate one of them to a host, but beware that these templates need to be fine-tuned for your environment. Some checks may not be needed, and polling intervals may be way too frequent.

More information about templates is available.

6. Zabbix appliance

Overview As an alternative to setting up manually or reusing an existing server for Zabbix, users may download a Zabbix appliance or a Zabbix appliance installation CD image.

Zabbix appliance and installation CD versions are based upon the following OS:

Zabbix appliance version	OS
4.4	CentOS 8 (x86_64)

Zabbix appliance installation CD can be used for instant deployment of Zabbix server (MySQL).

System requirements:

- *RAM*: 1.5 GB
- *Disk space*: at least 8 GB should be allocated for the virtual machine.

|<| |<| |-|

Zabbix appliance contains a Zabbix server (configured and running on MySQL) and a frontend.

Zabbix virtual appliance is available in the following formats:

- VMWare (.vmx)
- Open virtualization format (.ovf)
- Microsoft Hyper-V 2012 (.vhdx)

- Microsoft Hyper-V 2008 (.vhd)
- KVM, Parallels, QEMU, USB stick, VirtualBox, Xen (.raw)
- KVM, QEMU (.qcow2)

To get started, boot the appliance and point a browser at the IP the appliance has received over DHCP.

> **Attention:**
> DHCP must be enabled on the host.

To get the IP address from inside the virtual machine run:

```
ip addr show
```

To access Zabbix frontend, go to **http://<host_ip>** (for access from the host's browser bridged mode should be enabled in the VM network settings).

> **Note:**
> If the appliance fails to start up in Hyper-V, you may want to press `Ctrl+Alt+F2` to switch tty sessions.

1 Changes to CentOS 8 configuration The appliance is based on CentOS 8. There are some changes applied to the base CentOS configuration.

1.1 Repositories

Official Zabbix repository has been added to */etc/yum.repos.d*:

```
[zabbix]
name=Zabbix Official Repository - $basearch
baseurl=http://repo.zabbix.com/zabbix/4.5/rhel/8/$basearch/
enabled=1
gpgcheck=1
gpgkey=file:///etc/pki/rpm-gpg/RPM-GPG-KEY-ZABBIX-A14FE591
```

1.2 Firewall configuration

The appliance uses iptables firewall with predefined rules:

- Opened SSH port (22 TCP);
- Opened Zabbix agent (10050 TCP) and Zabbix trapper (10051 TCP) ports;
- Opened HTTP (80 TCP) and HTTPS (443 TCP) ports;
- Opened SNMP trap port (162 UDP);
- Opened outgoing connections to NTP port (53 UDP);
- ICMP packets limited to 5 packets per second;
- All other incoming connections are dropped.

1.3 Using a static IP address

By default the appliance uses DHCP to obtain the IP address. To specify a static IP address:

- Log in as root user;
- Open */etc/sysconfig/network-scripts/ifcfg-eth0* file;
- Replace *BOOTPROTO=dhcp* with *BOOTPROTO=none*
- Add the following lines:
  - *IPADDR=<IP address of the appliance>*
  - *PREFIX=<CIDR prefix>*
  - *GATEWAY=<gateway IP address>*
  - *DNS1=<DNS server IP address>*
- Run **systemctl restart network** command.

Consult the official Red Hat documentation if needed.

1.4 Changing time zone

By default the appliance uses UTC for the system clock. To change the time zone, copy the appropriate file from */usr/share/zoneinfo* to */etc/localtime*, for example:

```
cp /usr/share/zoneinfo/Europe/Riga /etc/localtime
```

2 Zabbix configuration Zabbix appliance setup has the following passwords and configuration changes:

2.1 Credentials (login:password)

System:

- root:zabbix

Zabbix frontend:

- Admin:zabbix

Database:

- root:<random>
- zabbix:<random>

> **Note:**
> Database passwords are randomly generated during the installation process.
> Root password is stored inside the /root/.my.cnf file. It is not required to input a password under the ”root” account.

To change the database user password, changes have to be made in the following locations:

- MySQL;
- /etc/zabbix/zabbix_server.conf;
- /etc/zabbix/web/zabbix.conf.php.

> **Note:**
> Separate users `zabbix_srv` and `zabbix_web` are defined for the server and the frontend respectively.

2.2 File locations

- Configuration files are located in **/etc/zabbix**.
- Zabbix server, proxy and agent logfiles are located in **/var/log/zabbix**.
- Zabbix frontend is located in **/usr/share/zabbix**.
- Home directory for the user **zabbix** is **/var/lib/zabbix**.

2.3 Changes to Zabbix configuration

- Frontend timezone is set to Europe/Riga (this can be modified in **/etc/php-fpm.d/zabbix.conf**);

3 Frontend access By default, access to the frontend is allowed from anywhere.

The frontend can be accessed at *http://<host>*.

This can be customised in **/etc/nginx/conf.d/zabbix.conf**. Nginx has to be restarted after modifying this file. To do so, log in using SSH as **root** user and execute:

```
systemctl restart nginx
```

4 Firewall By default, only the ports listed in the configuration changes above are open. To open additional ports, modify *”/etc/sysconfig/iptables”* file and reload firewall rules:

```
systemctl reload iptables
```

5 Upgrading The Zabbix appliance packages may be upgraded. To do so, run:

```
dnf update zabbix*
```

6 System Services Systemd services are available:

```
systemctl list-units zabbix*
```

7 Format-specific notes 7.1 VMware

The images in *vmdk* format are usable directly in VMware Player, Server and Workstation products. For use in ESX, ESXi and vSphere they must be converted using VMware converter.

7.2 HDD/flash image (raw)

```
dd if=./zabbix_appliance_4.4.0.raw of=/dev/sdc bs=4k conv=fdatasync
```

Replace */dev/sdc* with your Flash/HDD disk device.

7. Configuration

Please use the sidebar to access content in the Configuration section.

1 Configuring a template

Overview

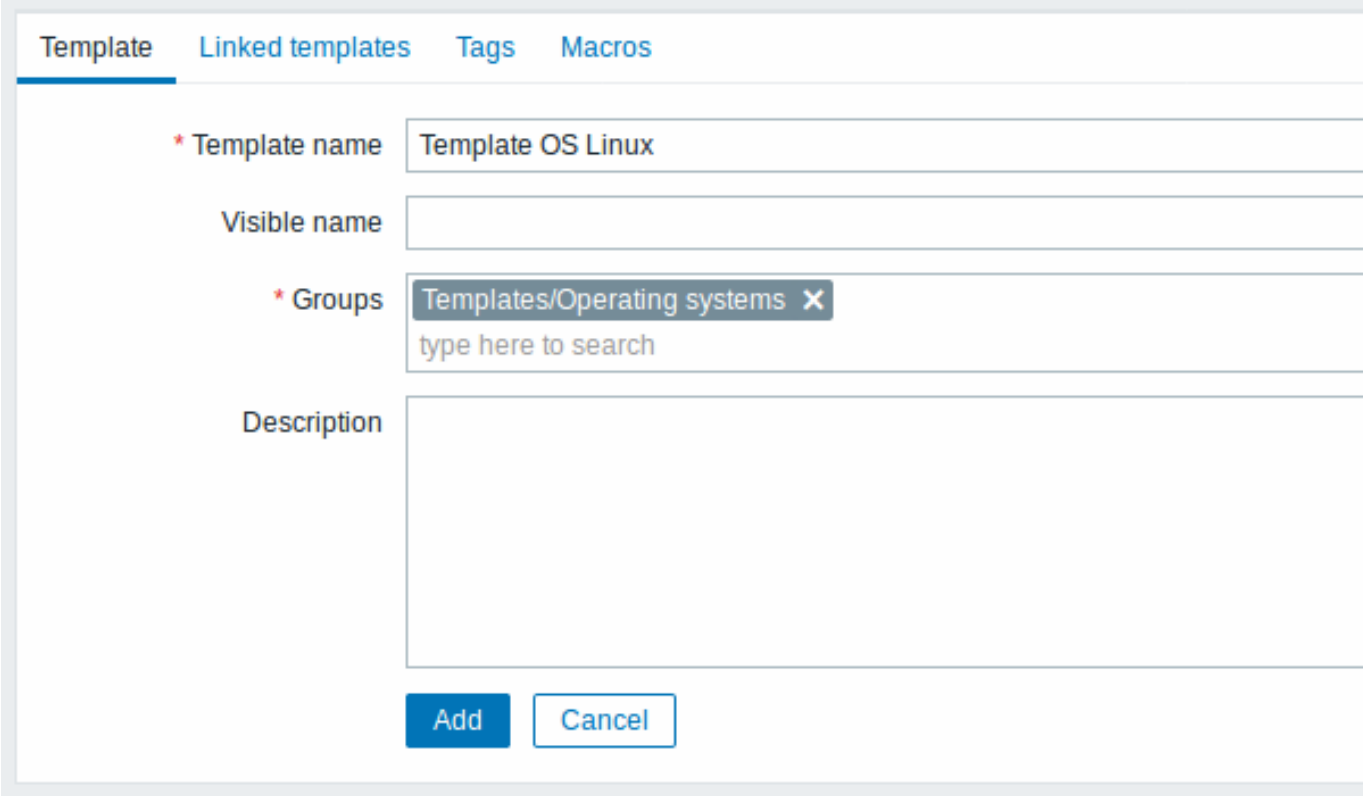
Configuring a template requires that you first create a template by defining its general parameters and then you add entities (items, triggers, graphs etc.) to it.

Creating a template

To create a template, do the following:

- Go to *Configuration* → *Templates*
- Click on *Create template*
- Edit template attributes

The **Template** tab contains general template attributes.



All mandatory input fields are marked with a red asterisk.

Template attributes:

Parameter	Description
Template name	Unique template name. Alphanumerics, spaces, dots, dashes and underscores are allowed. However, leading and trailing spaces are disallowed.
Visible name	If you set this name, it will be the one visible in lists, maps, etc.
Groups	Host/template groups the template belongs to.
Description	Enter the template description.

The **Linked templates** tab allows you to link one or more ”nested” templates to this template. All entities (items, triggers, graphs etc.) will be inherited from the linked templates.

To link a new template, start typing the template name in the *Link new templates* field. A list of matching templates will appear; scroll down to select. Alternatively, you may click on *Select* next to the field and select templates from the list in a popup window.

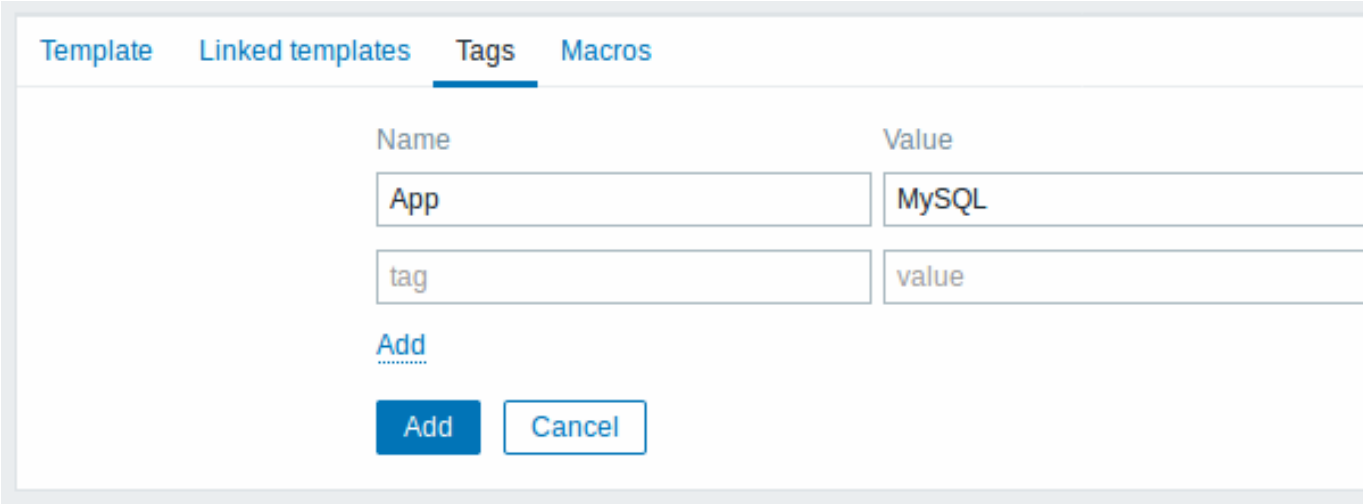
The templates that are selected in the *Link new templates* field will be linked to the template when the template configuration form is saved or updated.

Note that before Zabbix 4.4.5, to link a new template, you have to click on *Add* and then select templates in the popup window.

To unlink a template, use one of the two options in the *Linked templates* block:

- *Unlink* - unlink the template, but preserve its items, triggers and graphs
- *Unlink and clear* - unlink the template and remove all its items, triggers and graphs

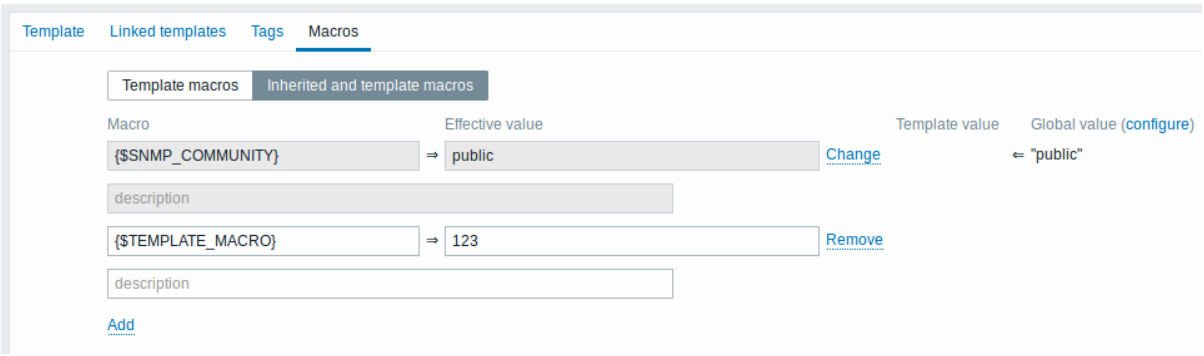
The **Tags** tab allows you to define template-level tags. All problems of hosts linked to this template will be tagged with the values entered here.



User macros, {INVENTORY.*} macros, {HOST.HOST}, {HOST.NAME}, {HOST.CONN}, {HOST.DNS}, {HOST.IP}, {HOST.PORT} and {HOST.ID} macros are supported in tags.

The **Macros** tab allows you to define template-level user macros as a macro-value pairs. Adding a description is also supported.

You may also view here macros from linked templates and global macros if you select the *Inherited and template macros* option. That is where all defined user macros for the template are displayed with the value they resolve to as well as their origin.



For convenience, links to respective templates and global macro configuration are provided. It is also possible to edit a nested template/global macro on the template level, effectively creating a copy of the macro on the template.

Buttons:

Add	Add the template. The added template should appear in the list.
Update	Update the properties of an existing template.
Clone	Create another template based on the properties of the current template, including the entities (items, triggers, etc) inherited from linked templates.

Full clone	Create another template based on the properties of the current template, including the entities (items, triggers, etc) both inherited from linked templates and directly attached to the current template.
Delete	Delete the template; entities of the template (items, triggers, etc) remain with the linked hosts.
Delete and clear	Delete the template and all its entities from linked hosts.
Cancel	Cancel the editing of template properties.

With a template created, it is time to add some entities to it.

Attention:
Items have to be added to a template first. Triggers and graphs cannot be added without the corresponding item.

Adding items, triggers, graphs

To add items to the template, do the following:

- Go to *Configuration* → *Hosts* (or *Templates*)
- Click on *Items* in the row of the required host/template
- Mark the checkboxes of items you want add to the template
- Click on *Copy* below the item list
- Select the template (or group of templates) the items should be copied to and click on *Copy*

All the selected items should be copied to the template.

Adding triggers and graphs is done in similar fashion (from the list of triggers and graphs respectively), again, keeping in mind that they can only be added if the required items are added first.

Adding screens

To add screens to a template in *Configuration* → *Templates*, do the following:

- Click on *Screens* in the row of the template
- Configure a screen following the usual method of configuring screens

Attention:
The elements that can be included in a template screen are: simple graph, custom graph, clock, plain text, URL.

Note:
For details on accessing host screens that are created from template screens, see the host screen section.

Configuring low-level discovery rules

See the low-level discovery section of the manual.

Adding web scenarios

To add web scenarios to a template in *Configuration* → *Templates*, do the following:

- Click on *Web* in the row of the template
- Configure a web scenario following the usual method of configuring web scenarios

2 Linking/unlinking

Overview

Linking is a process whereby templates are applied to hosts, whereas unlinking removes the association with the template from a host.

Attention:
Templates are linked directly to individual hosts and not to host groups. Simply adding a template to a host group will not link it. Host groups are used only for logical grouping of hosts and templates.

Linking a template

To link a template to the host, do the following:

- Go to *Configuration* → *Hosts*
- Click on the required host and switch to the *Templates* tab
- Start typing the template name in the *Link new templates* field. A list of matching templates will appear; scroll down to select.
- Alternatively, you may click on *Select* next to the field and select one or several templates from the list in a popup window
- Click on *Add/Update* in the host attributes form

The host will now have all the entities (items, triggers, graphs, etc) of the template.

Attention:
Linking multiple templates to the same host will fail if in those templates there are items with the same item key. And, as triggers and graphs use items, they cannot be linked to a single host from multiple templates either, if using identical item keys.

When entities (items, triggers, graphs etc.) are added from the template:

- previously existing identical entities on the host are updated as entities of the template
- entities from the template are added
- any directly linked entities that, prior to template linkage, existed only on the host remain untouched

In the lists, all entities from the template now are prefixed by the template name, indicating that these belong to the particular template. The template name itself (in grey text) is a link allowing to access the list of those entities on the template level.

If some entity (item, trigger, graph etc.) is not prefixed by the template name, it means that it existed on the host before and was not added by the template.

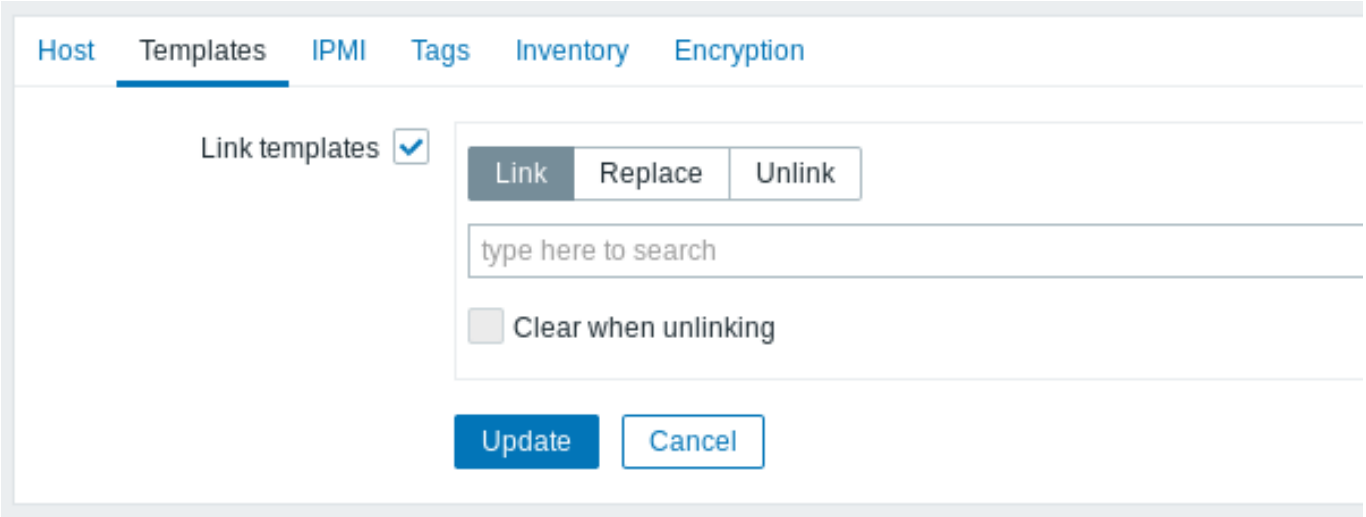
Entity uniqueness criteria

When adding entities (items, triggers, graphs etc.) from a template it is important to know what of those entities already exist on the host and need to be updated and what entities differ. The uniqueness criteria for deciding upon the sameness/difference are:

- for items - the item key
- for triggers - trigger name and expression
- for custom graphs - graph name and its items
- for applications - application name

Linking templates to several hosts

To update template linkage of many hosts, in *Configuration* → *Hosts* select some hosts by marking their checkboxes, then click on **Mass update** below the list and then in the *Templates* tab select to link additional templates:



Select *Link templates* and start typing the template name in the auto-complete field until a dropdown appears offering the matching templates. Just scroll down to select the template to link.

The *Replace* option will allow to link a new template while unlinking any template that was linked to the hosts before. The *Unlink* option will allow to specify which templates to unlink. The *Clear when unlinking* option will allow to not only unlink any previously linked templates, but also remove all elements inherited from them (items, triggers, etc.).

Note:
Zabbix offers a sizable set of predefined templates. You can use these for reference, but beware of using them unchanged in production as they may contain too many items and poll for data too often. If you feel like using them, finetune them to fit you real needs.

Editing linked entities

If you try to edit an item or trigger that was linked from the template, you may realize that many key options are disabled for editing. This makes sense as the idea of templates is that things are edited in one-touch manner on the template level. However, you still can, for example, enable/disable an item on the individual host and set the update interval, history length and some other parameters.

If you want to edit the entity fully, you have to edit it on the template level (template level shortcut is displayed in the form name), keeping in mind that these changes will affect all hosts that have this template linked to them.

Unlinking a template

To unlink a template from a host, do the following:

- Go to *Configuration* → *Hosts*
- Click on the required host and switch to the *Templates* tab
- Click on *Unlink* or *Unlink and clear* next to the template to unlink
- Click on *Update* in the host attributes form

Choosing the *Unlink* option will simply remove association with the template, while leaving all its entities (items, triggers, graphs etc.) with the host.

Choosing the *Unlink and clear* option will remove both the association with the template and all its entities (items, triggers, graphs etc.).

3 Nesting

Overview

Nesting is a way of one template encompassing one or more other templates.

As it makes sense to separate out on individual templates entities for various services, applications etc. you may end up with quite a few templates all of which may need to be linked to quite a few hosts. To simplify the picture, it is possible to link some templates together, in one ”nested” template.

The benefit of nesting is that then you have to link only the one template to the host and the host will inherit all entities of the linked templates automatically.

Configuring a nested template

If you want to link some templates, to begin with you can take an existing template or a new one, then:

- Open the template properties form
- Look for the *Linked templates* tab
- Click on *Select* to select templates in the popup window
- Click on *Add* to list selected templates
- Click on *Add/Update* in the template properties form

Now the template should have all the entities (items, triggers, custom graphs etc.) of the linked templates.

To unlink any of the linked templates, in the same form use the *Unlink* or *Unlink and clear* buttons and click on *Update*.

Choosing the *Unlink* option will simply remove the association with the other template, while not removing all its entities (items, triggers, graphs etc).

Choosing the *Unlink and clear* option will remove both the association with the other template and all its entities (items, triggers, graphs etc).

4 Mass update

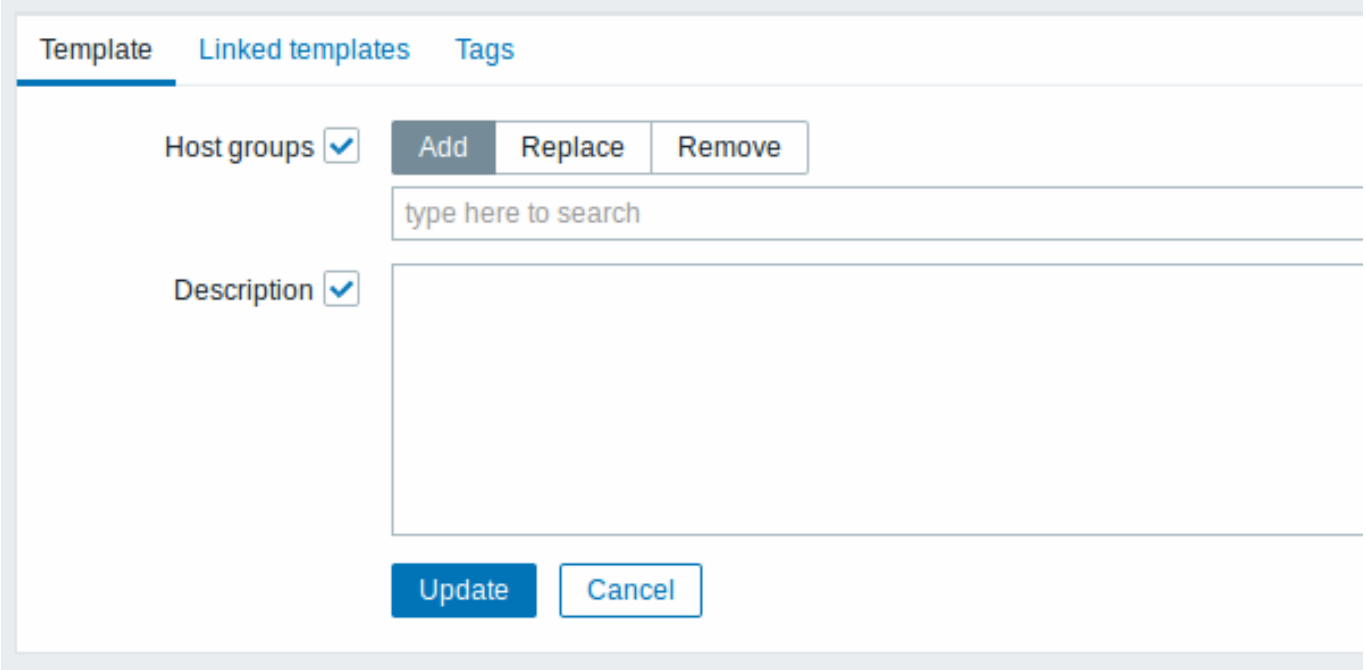
Overview

Sometimes you may want to change some attribute for a number of templates at once. Instead of opening each individual template for editing, you may use the mass update function for that.

Using mass update

To mass-update some templates, do the following:

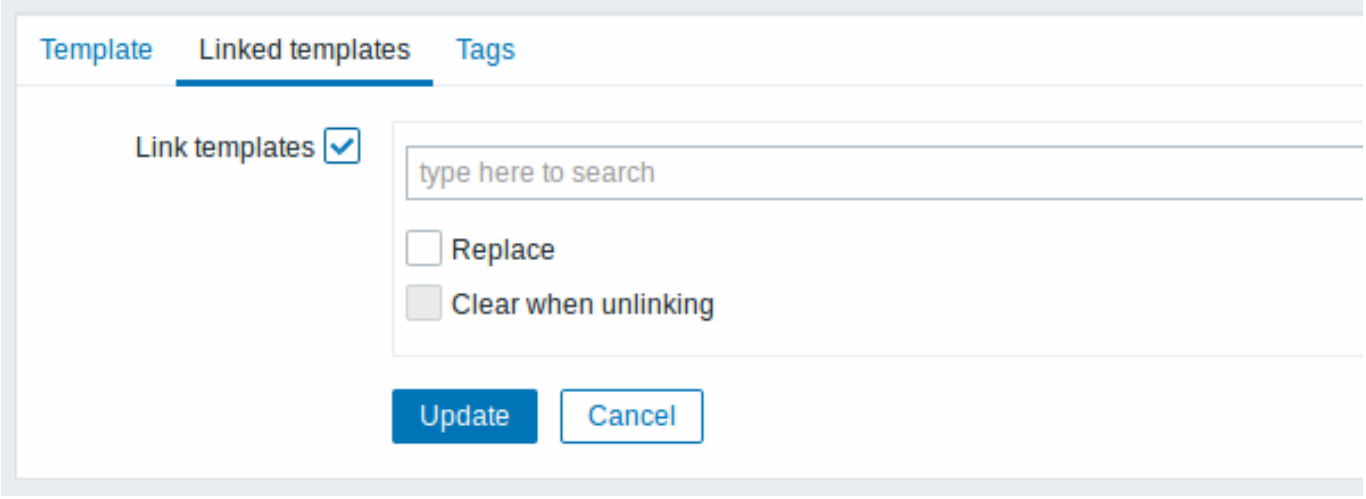
- Mark the checkboxes before the templates you want to update in the template list
- Click on *Mass update* below the list
- Navigate to the tab with required attributes (*Template*, *Linked templates* or *Tags*)
- Mark the checkboxes of any attribute to update and enter a new value for them



The following options are available when selecting the respective button for host group update:

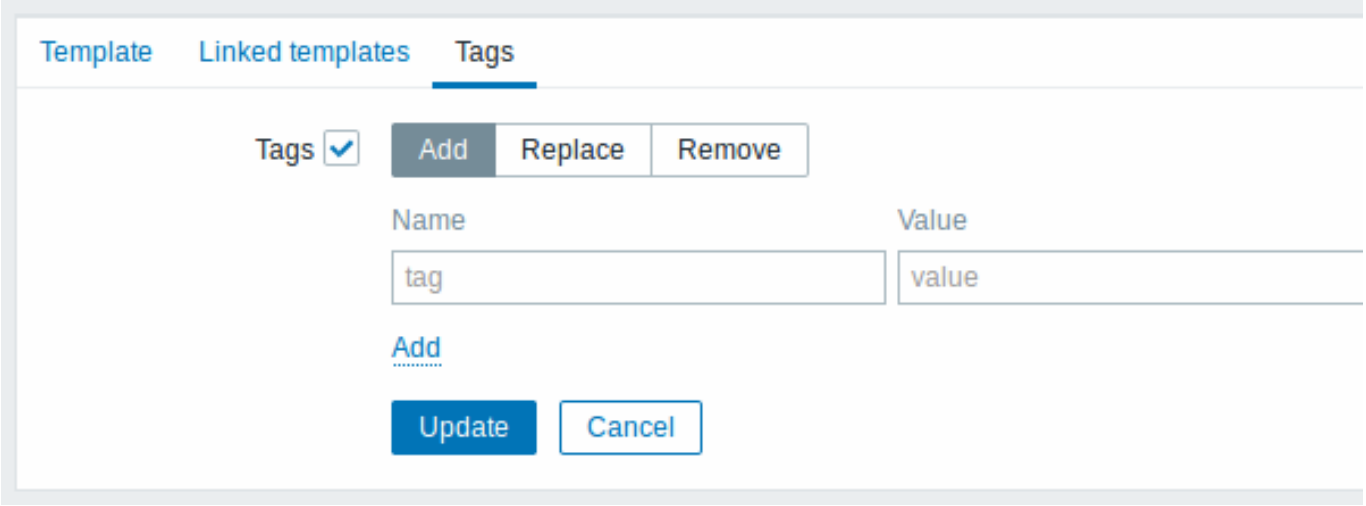
- *Add* - allows to specify additional host groups from the existing ones or enter completely new host groups for the templates.
- *Replace* - will remove the template from any existing host groups and replace them with the one(s) specified in this field (existing or new host groups).
- *Remove* - will remove specific host groups from templates.

These fields are auto-complete - starting to type in them offers a dropdown of matching host groups. If the host group is new, it also appears in the dropdown and it is indicated by *(new)* after the string. Just scroll down to select.



To update template linkage in the **Linked templates** tab, select *Link templates* and start typing the template name in the auto-complete field until a dropdown appears offering the matching templates. Just scroll down to select the template to link.

The *Replace* option will allow to link a new template while unlinking any template that was linked to the templates before. The *Clear when unlinking* option will allow to not only unlink any previously linked templates, but also remove all elements inherited from them (items, triggers, etc.).



User macros, {INVENTORY.*} macros, {HOST.HOST}, {HOST.NAME}, {HOST.CONN}, {HOST.DNS}, {HOST.IP}, {HOST.PORT} and {HOST.ID} macros are supported in tags. Note, that tags with the same name, but different values are not considered 'duplicates' and can be added to the same template.

When done with all required changes, click on *Update*. The attributes will be updated accordingly for all the selected templates.

1 Hosts and host groups

What is a "host"?

Typical Zabbix hosts are the devices you wish to monitor (servers, workstations, switches, etc).

Creating hosts is one of the first monitoring tasks in Zabbix. For example, if you want to monitor some parameters on a server "x", you must first create a host called, say, "Server X" and then you can look to add monitoring items to it.

Hosts are organized into host groups.

Proceed to creating and configuring a host.

1 Configuring a host

Overview

To configure a host in Zabbix frontend, do the following:

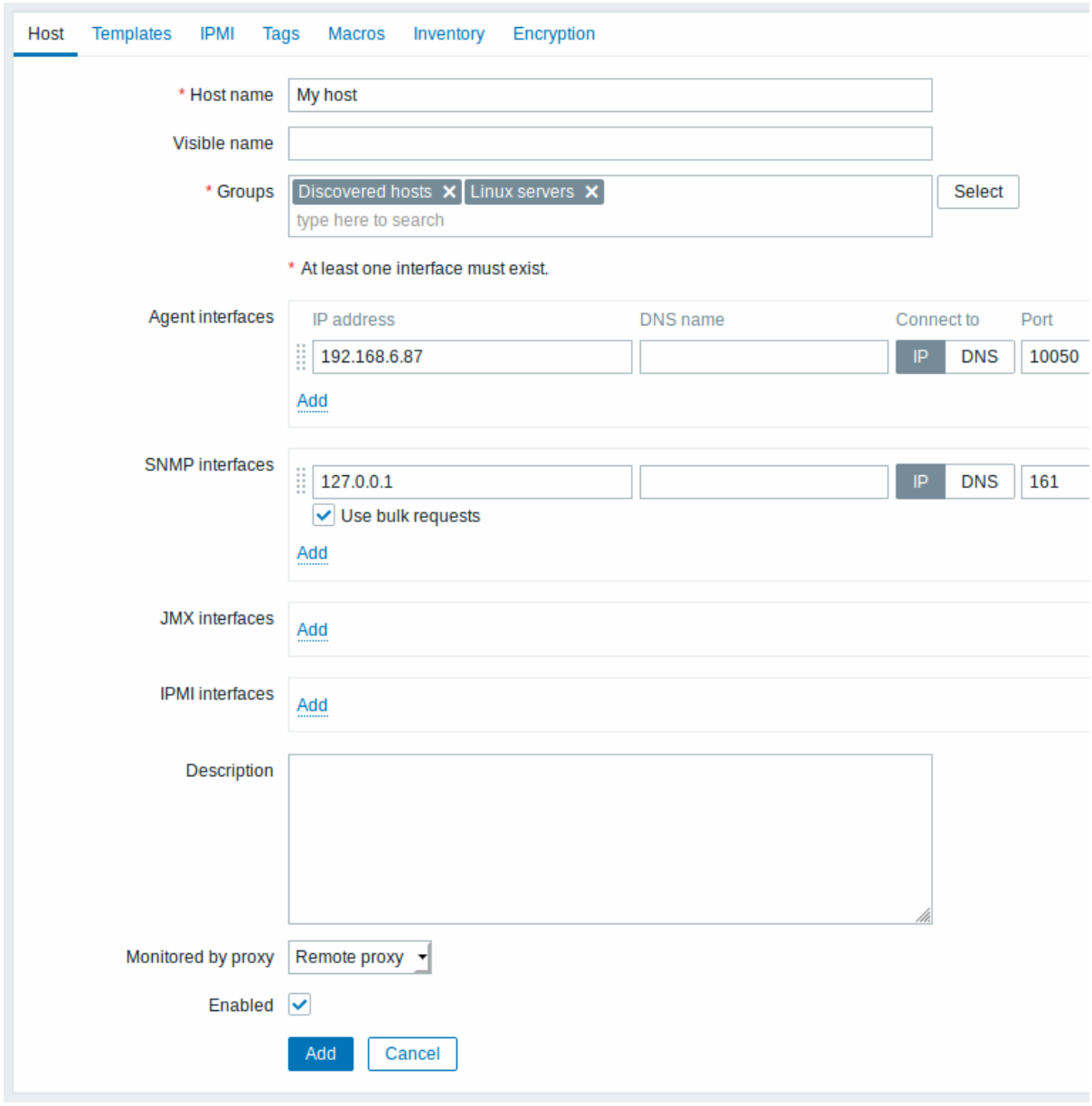
- Go to: *Configuration* → *Hosts*
- Click on *Create host* to the right (or on the host name to edit an existing host)
- Enter parameters of the host in the form

You can also use the *Clone* and *Full clone* buttons in the form of an existing host to create a new host. Clicking on *Clone* will retain all host parameters and template linkage (keeping all entities from those templates). *Full clone* will additionally retain directly attached entities (applications, items, triggers, graphs, low-level discovery rules and web scenarios).

Note: When a host is cloned, it will retain all template entities as they are originally on the template. Any changes to those entities made on the existing host level (such as changed item interval, modified regular expression or added prototypes to the low-level discovery rule) will not be cloned to the new host; instead they will be as on the template.

Configuration

The **Host** tab contains general host attributes:



All mandatory input fields are marked with a red asterisk.

Parameter	Description
Host name	Enter a unique host name. Alphanumerics, spaces, dots, dashes and underscores are allowed. However, leading and trailing spaces are disallowed. *Note:* With Zabbix agent running on the host you are configuring, the agent configuration file parameter *Hostname* must have the same value as the host name entered here. The name in the parameter is needed in the processing of active checks.
Visible name	If you set this name, it will be the one visible in lists, maps, etc. This attribute has UTF-8 support.
Groups	Select host groups the host belongs to. A host must belong to at least one host group. A new group can be created and linked to the host group by adding a non-existing group name.
Interfaces	Several host interface types are supported for a host: *Agent*, *SNMP*, *JMX* and *IPMI*. To add a new interface, click on *Add* in the *Interfaces* block and enter *IP/DNS*, *Connect to* and *Port* info. *Note:* Interfaces that are used in any items cannot be removed and link *Remove* is greyed out for them. *Use bulk requests* option for SNMP interfaces allows to enable/disable bulk processing of SNMP requests per interface.
IP address	Host IP address (optional).

Parameter	Description
DNS name	Host DNS name (optional).
Connect to	Clicking the respective button will tell Zabbix server what to use to retrieve data from agents: **IP** - Connect to the host IP address (recommended) **DNS** - Connect to the host DNS name
Port	TCP/UDP port number. Default values are: 10050 for Zabbix agent, 161 for SNMP agent, 12345 for JMX and 623 for IPMI.
Default	Check the radio button to set the default interface.
Description	Enter the host description.
Monitored by proxy	The host can be monitored either by Zabbix server or one of Zabbix proxies: **(no proxy)** - host is monitored by Zabbix server **Proxy name** - host is monitored by Zabbix proxy "Proxy name"
Enabled	Mark the checkbox to make the host active, ready to be monitored. If unchecked, the host is not active, thus not monitored.

The **Templates** tab allows you to link templates to the host. All entities (items, triggers, graphs and applications) will be inherited from the template.

To link a new template, start typing the template name in the *Link new templates* field. A list of matching templates will appear; scroll down to select. Alternatively, you may click on *Select* next to the field and select templates from the list in a popup window. The templates that are selected in the *Link new templates* field will be linked to the host when the host configuration form is saved or updated.

Note that before Zabbix 4.4.5, to link a new template you have to click on *Add* and then select templates in the popup window.

To unlink a template, use one of the two options in the *Linked templates* block:

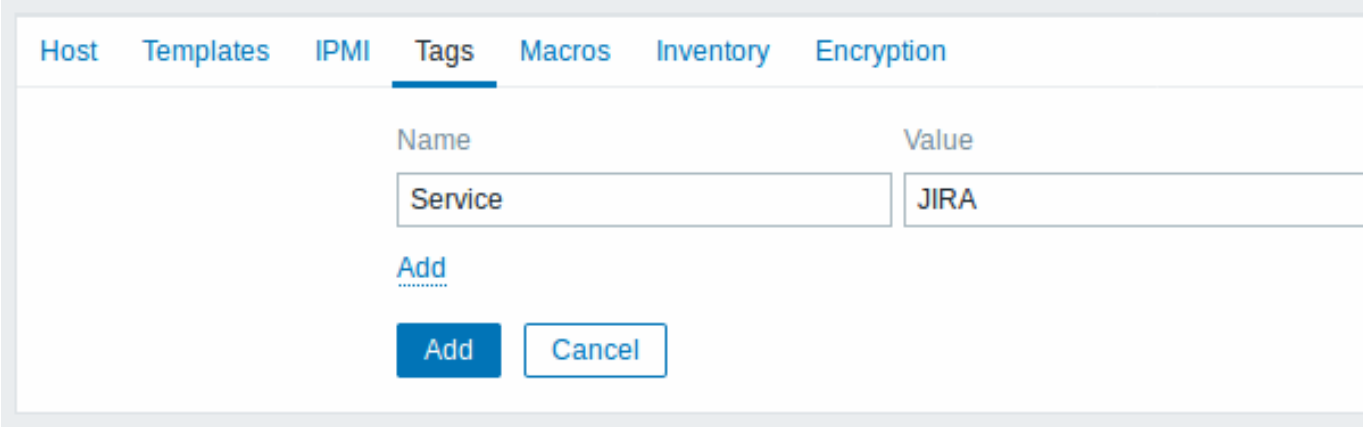
- *Unlink* - unlink the template, but preserve its items, triggers and graphs
- *Unlink and clear* - unlink the template and remove all its items, triggers and graphs

Listed template names are clickable links leading to the template configuration form.

The **IPMI** tab contains IPMI management attributes.

Parameter	Description
Authentication algorithm	Select the authentication algorithm.
Privilege level	Select the privilege level.
Username	User name for authentication.
Password	Password for authentication.

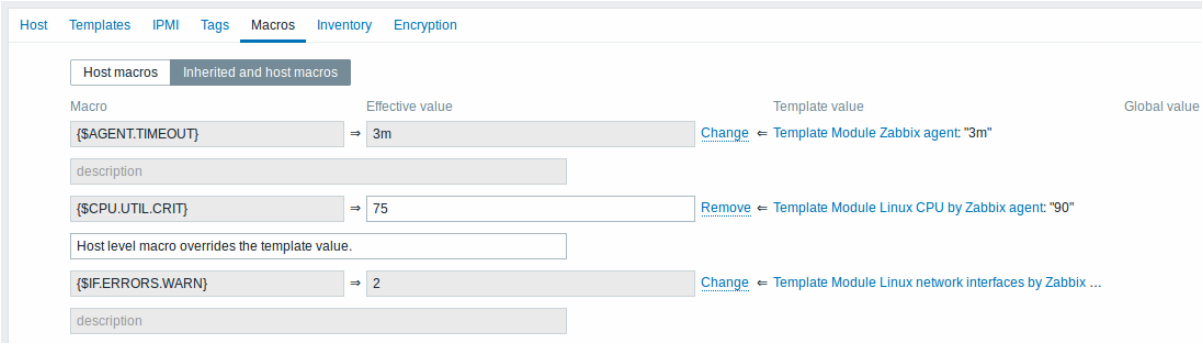
The **Tags** tab allows you to define host-level tags. All problems of this host will be tagged with the values entered here.



User macros, {INVENTORY.*} macros, {HOST.HOST}, {HOST.NAME}, {HOST.CONN}, {HOST.DNS}, {HOST.IP}, {HOST.PORT} and {HOST.ID} macros are supported in tags.

The **Macros** tab allows you to define host-level user macros as a macro-value pairs. Adding a description is also supported.

You may also view here template-level and global macros if you select the *Inherited and host macros* option. That is where all defined user macros for the host are displayed with the value they resolve to as well as their origin.



For convenience, links to respective templates and global macro configuration are provided. It is also possible to edit a template/global macro on the host level, effectively creating a copy of the macro on the host.

The **Host inventory** tab allows you to manually enter inventory information for the host. You can also select to enable *Automatic* inventory population, or disable inventory population for this host.

Encryption

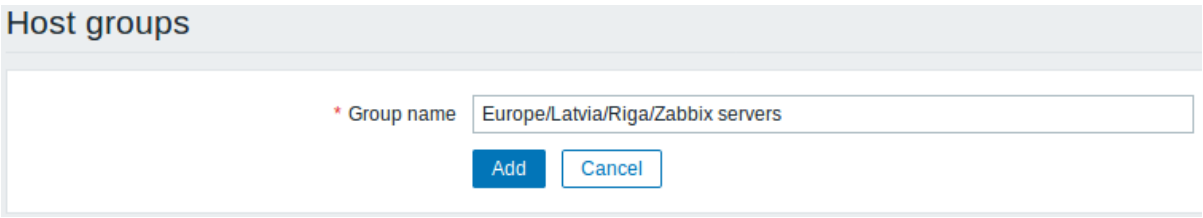
The **Encryption** tab allows you to require encrypted connections with the host.

Parameter	Description
Connections to host	How Zabbix server or proxy connects to Zabbix agent on a host: no encryption (default), using PSK (pre-shared key) or certificate.
Connections from host	Select what type of connections are allowed from the host (i.e. from Zabbix agent and Zabbix sender). Several connection types can be selected at the same time (useful for testing and switching to other connection type). Default is "No encryption".
Issuer	Allowed issuer of certificate. Certificate is first validated with CA (certificate authority). If it is valid, signed by the CA, then the *Issuer* field can be used to further restrict allowed CA. This field is intended to be used if your Zabbix installation uses certificates from multiple CAs. If this field is empty then any CA is accepted.
Subject	Allowed subject of certificate. Certificate is first validated with CA. If it is valid, signed by the CA, then the *Subject* field can be used to allow only one value of *Subject* string. If this field is empty then any valid certificate signed by the configured CA is accepted.
PSK identity	Pre-shared key identity string. Do not put sensitive information in the PSK identity, it is transmitted unencrypted over the network to inform a receiver which PSK to use.
PSK	Pre-shared key (hex-string). Maximum length: 512 hex-digits (256-byte PSK) if Zabbix uses GnuTLS or OpenSSL library, 64 hex-digits (32-byte PSK) if Zabbix uses mbed TLS (PolarSSL) library. Example: 1f87b595725ac58dd977beef14b97461a7c1045b9a1c963065002c5473194952

Creating a host group

To create a host group in Zabbix frontend, do the following:

- Go to: *Configuration* → *Host groups*
- Click on *Create Group* in the upper right corner of the screen
- Enter parameters of the group in the form



All mandatory input fields are marked with a red asterisk.

Parameter	Description
Group name	Enter a unique host group name. To create a nested host group, use the '/' forward slash separator, for example `Europe/Latvia/Riga/Zabbix servers`. You can create this group even if none of the three parent host groups (`Europe/Latvia/Riga`) exist. In this case creating these parent host groups is up to the user; they will not be created automatically. Leading and trailing slashes, several slashes in a row are not allowed. Escaping of '/' is not supported. Nested representation of host groups is supported since Zabbix 3.2.0.
Apply permissions to all subgroups	Checkbox is available to Zabbix Super Admin users only and only when editing an existing host group. Mark this checkbox and click on *Update* to apply the same level of permissions to all nested host groups. For user groups that may have had differing permissions assigned to nested host groups, the permission level of the parent host group will be enforced on the nested groups. This is a one-time option that is not saved in the database. This option is supported since Zabbix 3.4.0.

Permissions to nested host groups

- When creating a child host group to an existing parent host group, user group permissions to the child are inherited from the parent (for example, when creating `Riga/Zabbix servers` if `Riga` already exists)
- When creating a parent host group to an existing child host group, no permissions to the parent are set (for example, when creating `Riga` if `Riga/Zabbix servers` already exists)

2 Inventory

Overview

You can keep the inventory of networked devices in Zabbix.

There is a special *Inventory* menu in the Zabbix frontend. However, you will not see any data there initially and it is not where you enter data. Building inventory data is done manually when configuring a host or automatically by using some automatic population options.

Building inventory

Manual mode

When configuring a host, in the *Host inventory* tab you can enter such details as the type of device, serial number, location, responsible person, etc - data that will populate inventory information.

If a URL is included in host inventory information and it starts with 'http' or 'https', it will result in a clickable link in the *Inventory* section.

Automatic mode

Host inventory can also be populated automatically. For that to work, when configuring a host the inventory mode in the *Host inventory* tab must be set to *Automatic*.

Then you can configure host items to populate any host inventory field with their value, indicating the destination field with the respective attribute (called *Item will populate host inventory field*) in item configuration.

Items that are especially useful for automated inventory data collection:

- system.hw.chassis[full|type|vendor|model|serial] - default is [full], root permissions needed
- system.hw.cpu[all|cpunum,full|maxfreq|vendor|model|curfreq] - default is [all,full]
- system.hw.devices[pci|usb] - default is [pci]
- system.hw.macaddr[interface,short|full] - default is [all,full], interface is regexp
- system.sw.arch
- system.sw.os[name|short|full] - default is [name]
- system.sw.packages[package,manager,short|full] - default is [all,all,full], package is regexp

Inventory mode selection

Inventory mode can be selected in the host configuration form.

Inventory mode by default for new hosts is selected based on the *Default host inventory mode* setting in *Administration* → *General* → *Other*.

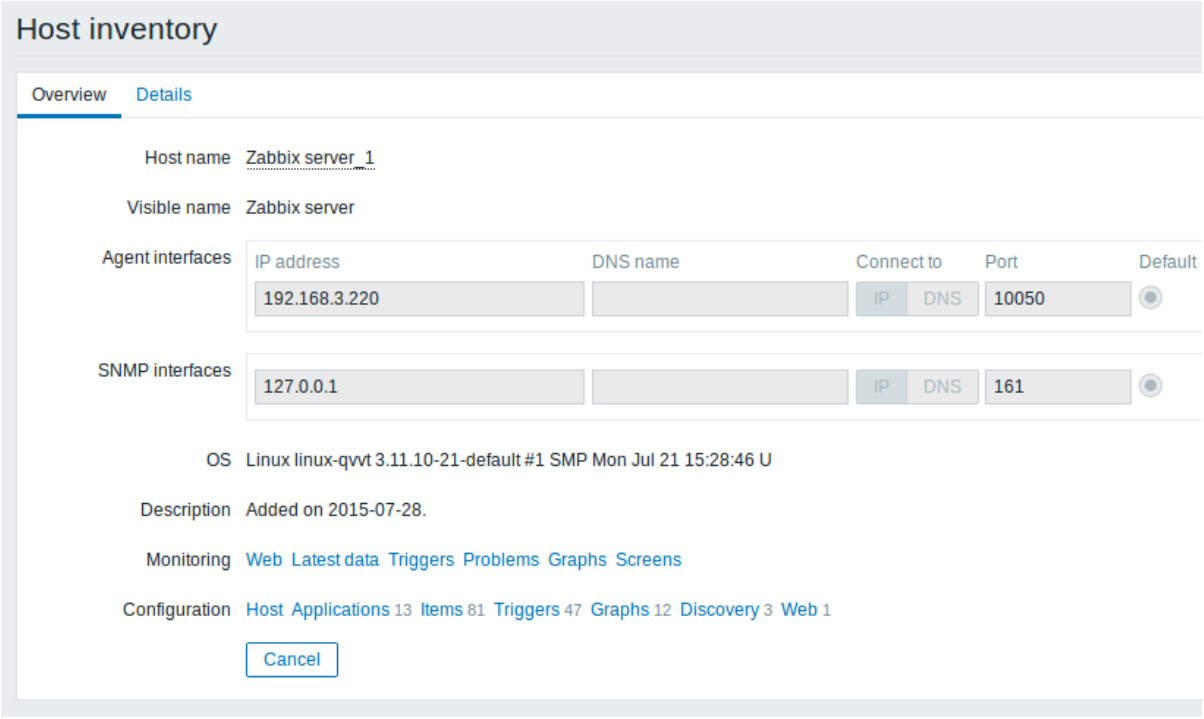
For hosts added by network discovery or auto registration actions, it is possible to define a *Set host inventory mode* operation selecting manual or automatic mode. This operation overrides the *Default host inventory mode* setting.

Inventory overview

The details of all existing inventory data are available in the *Inventory* menu.

In *Inventory* → *Overview* you can get a host count by various fields of the inventory.

In *Inventory* → *Hosts* you can see all hosts that have inventory information. Clicking on the host name will reveal the inventory details in a form.



The **Overview** tab shows:

Parameter	Description
Host name	Name of the host. Clicking on the name opens a menu with the scripts defined for the host. Host name is displayed with an orange icon, if the host is in maintenance.
Visible name	Visible name of the host (if defined).
Host (Agent, SNMP, JMX, IPMI) interfaces	This block provides details of the interfaces configured for the host.
OS	Operating system inventory field of the host (if defined).
Hardware	Host hardware inventory field (if defined).
Software	Host software inventory field (if defined).
Description	Host description.
Monitoring	Links to monitoring sections with data for this host: *Web*, *Latest data*, *Triggers*, *Problems*, *Graphs*, *Screens*.
Configuration	Links to configuration sections for this host: *Host*, *Applications*, *Items*, *Triggers*, *Graphs*, *Discovery*, *Web*. The amount of configured entities is listed in parenthesis after each link.

The **Details** tab shows all inventory fields that are populated (are not empty).

Inventory macros

There are host inventory macros {INVENTORY.*} available for use in notifications, for example:

"Server in {INVENTORY.LOCATION1} has a problem, responsible person is {INVENTORY.CONTACT1}, phone number {INVENTORY.POC.PRIMARY.PHONE.A1}."

For more details, see the supported macro page.

3 Mass update

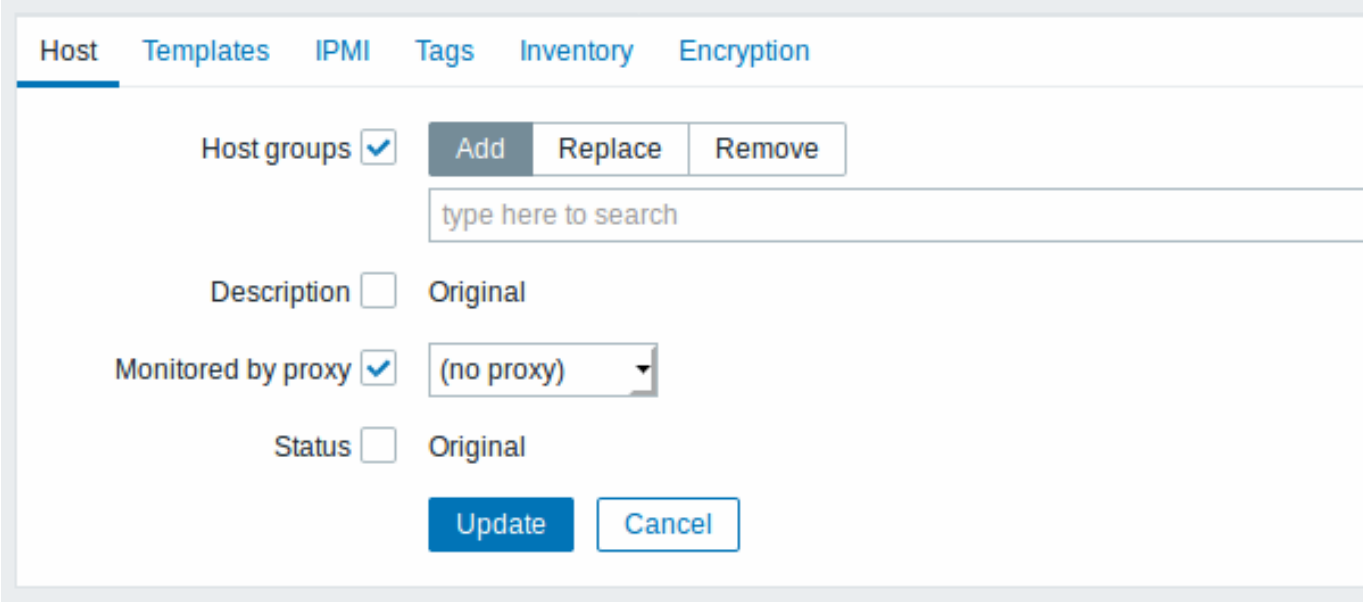
Overview

Sometimes you may want to change some attribute for a number of hosts at once. Instead of opening each individual host for editing, you may use the mass update function for that.

Using mass update

To mass-update some hosts, do the following:

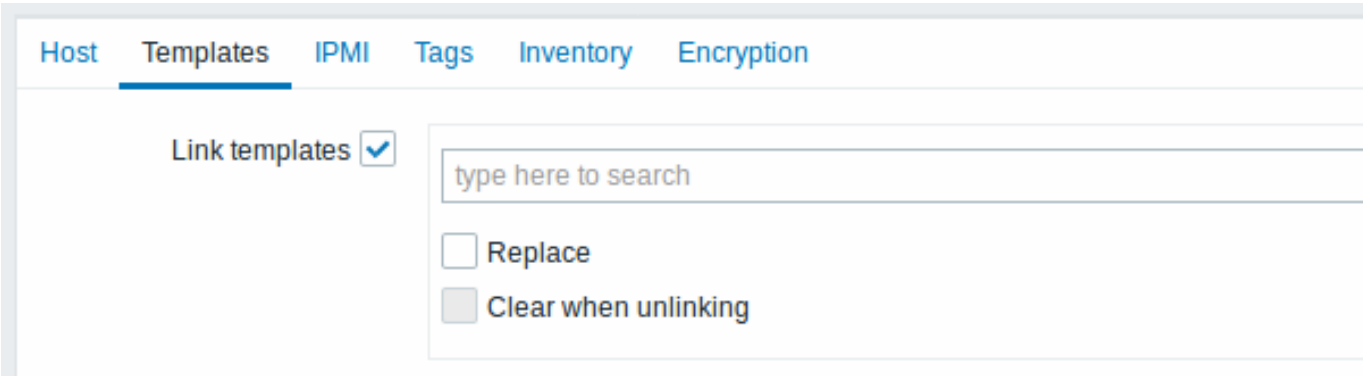
- Mark the checkboxes before the hosts you want to update in the host list
- Click on *Mass update* below the list
- Navigate to the tab with required attributes (*Host*, *Templates*, *IPMI*, *Inventory* or *Encryption*)
- Mark the checkboxes of any attribute to update and enter a new value for them



The following options are available when selecting the respective button for host group update:

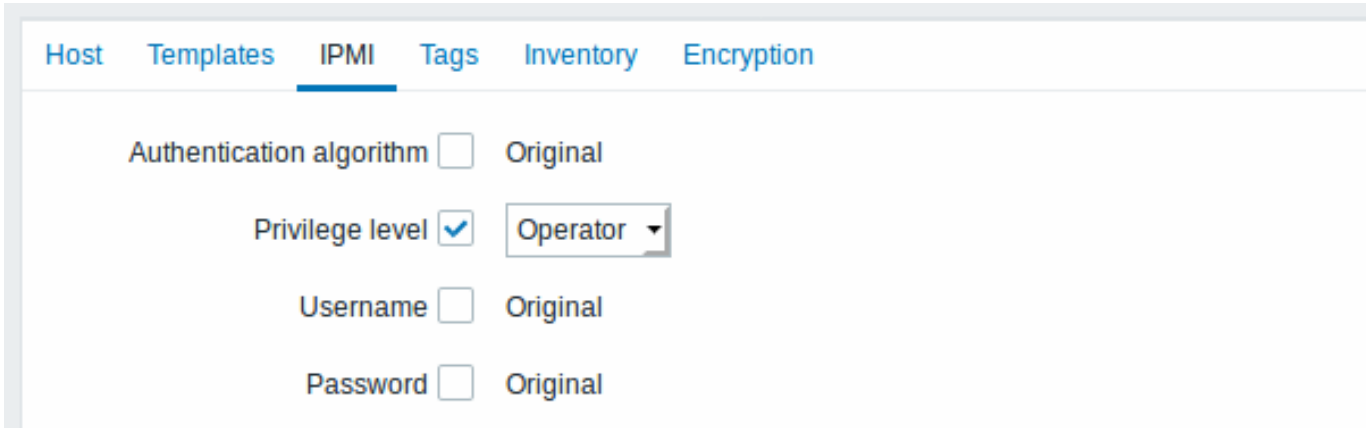
- *Add* - allows to specify additional host groups from the existing ones or enter completely new host groups for the hosts.
- *Replace* - will remove the host from any existing host groups and replace them with the one(s) specified in this field (existing or new host groups).
- *Remove* - will remove specific host groups from hosts.

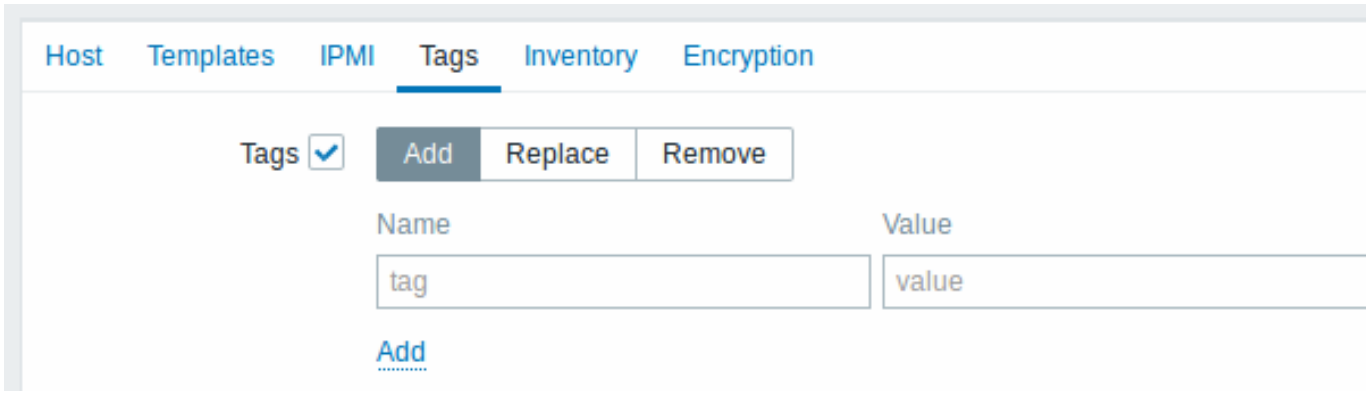
These fields are auto-complete - starting to type in them offers a dropdown of matching host groups. If the host group is new, it also appears in the dropdown and it is indicated by *(new)* after the string. Just scroll down to select.



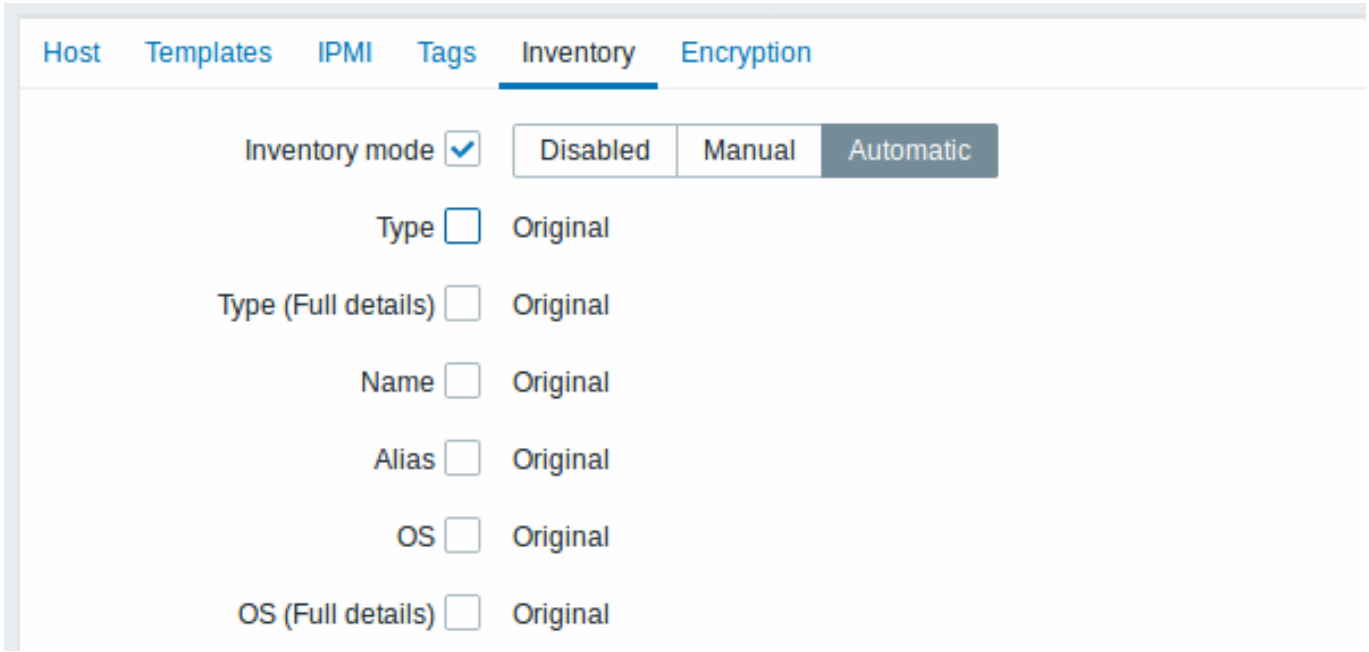
To update template linkage in the **Templates** tab, select *Link templates* and start typing the template name in the auto-complete field until a dropdown appears offering the matching templates. Just scroll down to select the template to link.

The *Replace* option will allow to link a new template while unlinking any template that was linked to the hosts before. The *Clear when unlinking* option will allow to not only unlink any previously linked templates, but also remove all elements inherited from them (items, triggers, etc.).

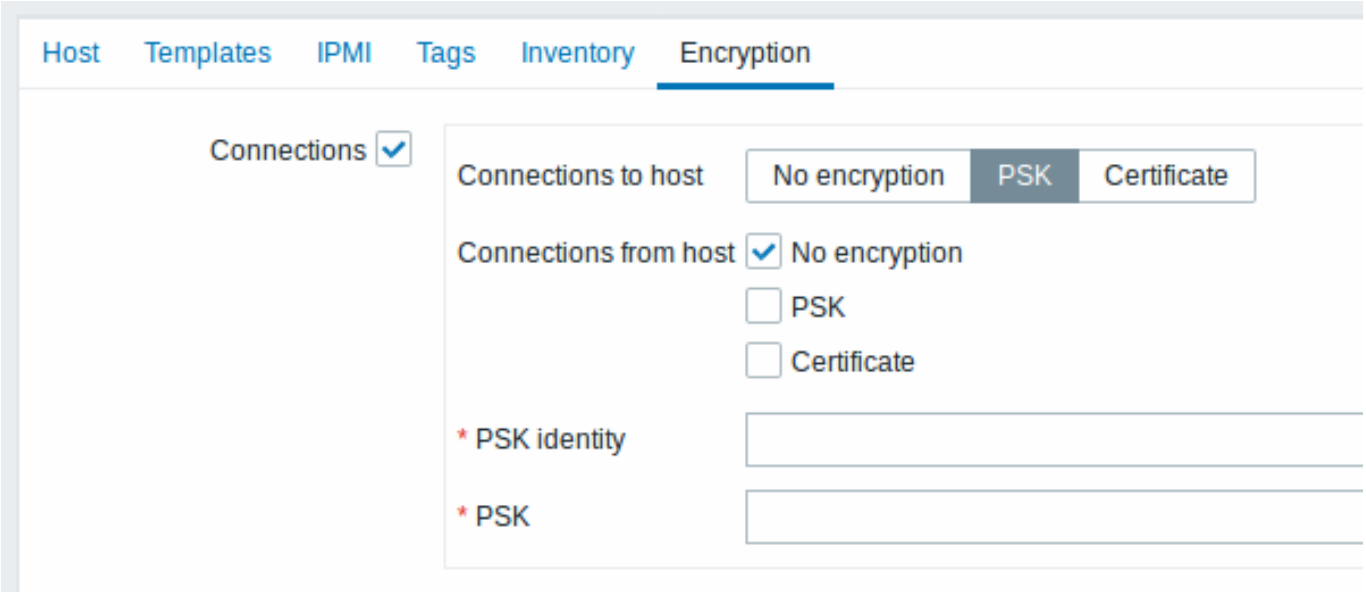




User macros, {INVENTORY.*} macros, {HOST.HOST}, {HOST.NAME}, {HOST.CONN}, {HOST.DNS}, {HOST.IP}, {HOST.PORT} and {HOST.ID} macros are supported in tags. Note, that tags with the same name, but different values are not considered 'duplicates' and can be added to the same host.



To be able to mass update inventory fields, the *Inventory mode* should be set to 'Manual' or 'Automatic'.



When done with all required changes, click on *Update*. The attributes will be updated accordingly for all the selected hosts.

2 Items

Overview

Items are the ones that gather data from a host.

Once you have configured a host, you need to add some monitoring items to start getting actual data.

An item is an individual metric. One way of quickly adding many items is to attach one of the predefined templates to a host. For optimized system performance though, you may need to fine-tune the templates to have only as many items and as frequent monitoring as is really necessary.

In an individual item you specify what sort of data will be gathered from the host.

For that purpose you use the item key. Thus an item with the key name **system.cpu.load** will gather data of the processor load, while an item with the key name **net.if.in** will gather incoming traffic information.

To specify further parameters with the key, you include those in square brackets after the key name. Thus, system.cpu.load**[avg5]** will return processor load average for the last 5 minutes, while net.if.in**[eth0]** will show incoming traffic in the interface eth0.

Note:
For all supported item types and item keys, see individual sections of item types.

Proceed to creating and configuring an item.

1 Creating an item

Overview

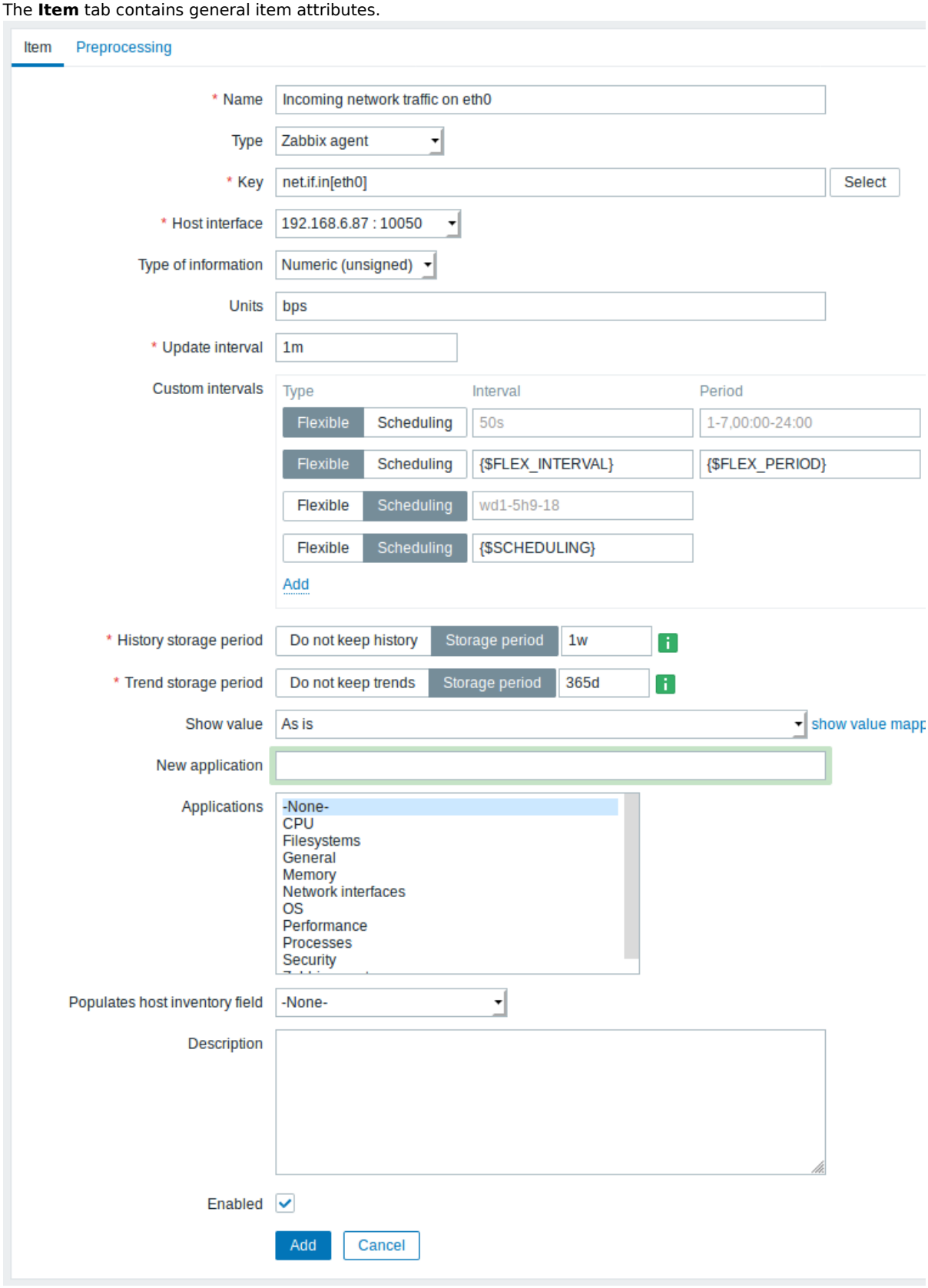
To create an item in Zabbix frontend, do the following:

- Go to: *Configuration* → *Hosts*
- Click on *Items* in the row of the host
- Click on *Create item* in the upper right corner of the screen
- Enter parameters of the item in the form

You can also create an item by opening an existing one, pressing the *Clone* button and then saving under a different name.

Configuration

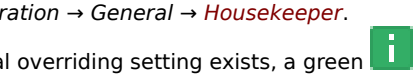
The **Item** tab contains general item attributes.



All mandatory input fields are marked with a red asterisk.

Parameter	Description
Name	Item name. *Note* that the use of positional macros ($1,$2... $9 - referring to the first, second... ninth parameter of the item key) is now deprecated. For example: Free disk space on $1. If the item key is "vfs.fs.size[/,free]", the description will automatically change to "Free disk space on /"
Type	Item type. See individual item type sections.
Key	Item key (up to 256 characters). The supported item keys can be found in individual item type sections. The key must be unique within a single host. If key type is 'Zabbix agent', 'Zabbix agent (active)', 'Simple check' or 'Zabbix aggregate', the key value must be supported by Zabbix agent or Zabbix server. See also: the correct key format.
Host interface	Select the host interface. This field is available when editing an item on the host level.
Type of information	Type of data as stored in the database after performing conversions, if any. **Numeric (unsigned)** - 64bit unsigned integer **Numeric (float)** - floating point number Negative values can be stored. Allowed range: -999999999999.9999 to 999999999999.9999. Starting with Zabbix 2.2, receiving values in scientific notation is also supported. E.g. 1e+7, 1e-4. **Character** - short text data **Log** - long text data with optional log related properties (timestamp, source, severity, logeventid) **Text** - long text data. See also text data limits.
Units	If a unit symbol is set, Zabbix will add post processing to the received value and display it with the set unit postfix. By default, if the raw value exceeds 1000, it is divided by 1000 and displayed accordingly. For example, if you set *bps* and receive a value of 881764, it will be displayed as 881.76 Kbps. Special processing is used for **B** (byte), **Bps** (bytes per second) units, which are divided by 1024. Thus, if units are set to **B** or **Bps** Zabbix will display: 1 as 1B/1Bps 1024 as 1KB/1KBps 1536 as 1.5KB/1.5KBps Special processing is used if the following time-related units are used: **unixtime** - translated to "yyyy.mm.dd hh:mm:ss". To translate correctly, the received value must be a *Numeric (unsigned)* type of information. **uptime** - translated to "hh:mm:ss" or "N days, hh:mm:ss" For example, if you receive the value as 881764 (seconds), it will be displayed as "10 days, 04:56:04" **s** - translated to "yyy mmm ddd hhh mmm sss ms"; parameter is treated as number of seconds. For example, if you receive the value as 881764 (seconds), it will be displayed as "10d 4h 56m" Only 3 upper major units are shown, like "1m 15d 5h" or "2h 4m 46s". If there are no days to display, only two levels are displayed - "1m 5h" (no minutes, seconds or milliseconds are shown). Will be translated to "< 1 ms" if the value is less than 0.001. *Note* that if a unit is prefixed with !, then no unit prefixes/processing is applied to item values. See unit blacklisting.

Parameter	Description
Update interval	Retrieve a new value for this item every N seconds. Maximum allowed update interval is 86400 seconds (1 day). Time suffixes are supported, e.g. 30s, 1m, 2h, 1d. User macros are supported. A single macro has to fill the whole field. Multiple macros in a field or macros mixed with text are not supported. *Note*: The update interval can only be set to '0' if custom intervals exist with a non-zero value. If set to '0', and a custom interval (flexible or scheduled) exists with a non-zero value, the item will be polled during the custom interval duration. *Note* that the first item poll after the item became active or after update interval change might occur earlier than the configured value. An existing passive item can be polled for value immediately by pushing the *Check now* button.
Custom intervals	You can create custom rules for checking the item: **Flexible** - create an exception to the *Update interval* (interval with different frequency) **Scheduling** - create a custom polling schedule. For detailed information see Custom intervals. Time suffixes are supported in the *Interval* field, e.g. 30s, 1m, 2h, 1d. User macros are supported. A single macro has to fill the whole field. Multiple macros in a field or macros mixed with text are not supported. Scheduling is supported since Zabbix 3.0.0. *Note*: Not available for Zabbix agent active items.
History storage period	Select either: **Do not keep history** - item history is not stored. Useful for master items if only dependent items need to keep history. This setting cannot be overridden by global housekeeper settings. **Storage period** - specify the duration of keeping detailed history in the database (1 hour to 25 years). Older data will be removed by the housekeeper. Stored in seconds. Time suffixes are supported, e.g. 2h, 1d. User macros are supported. The *Storage period* value can be overridden globally in *Administration* → *General* → *Housekeeper*. If a global overriding setting exists, a green  info icon is displayed. If you position your mouse on it, a warning message is displayed, e. g. *Overridden by global housekeeper settings (1d)*. It is recommended to keep the recorded values for the smallest possible time to reduce the size of value history in the database. Instead of keeping a long history of values, you can keep longer data of trends. See also History and trends.

Parameter	Description
Trend storage period	Select either: **Do not keep trends** - trends are not stored. This setting cannot be overridden by global housekeeper settings. **Storage period** - specify the duration of keeping aggregated (hourly min, max, avg, count) history in the database (1 day to 25 years). Older data will be removed by the housekeeper. Stored in seconds. Time suffixes are supported, e.g. 24h, 1d. User macros are supported. The *Storage period* value can be overridden globally in *Administration → General → Housekeeper*. If a global overriding setting exists, a green  info icon is displayed. If you position your mouse on it, a warning message is displayed, e. g. *Overridden by global housekeeper settings (7d)*. *Note:* Keeping trends is not available for non-numeric data - character, log and text. See also History and trends.
Show value	Apply value mapping to this item. Value mapping does not change received values, it is for displaying data only. It works with *Numeric(unsigned)*, *Numeric(float)* and *Character* items. For example, ”Windows service states”.
Log time format	Available for items of type **Log** only. Supported placeholders: * **y**: *Year (1970-2038)* * **M**: *Month (01-12)* * **d**: *Day (01-31)* * **h**: *Hour (00-23)* * **m**: *Minute (00-59)* * **s**: *Second (00-59)* If left blank the timestamp will not be parsed. For example, consider the following line from the Zabbix agent log file: ” 23480:20100328:154718.045 Zabbix agent started. Zabbix 1.8.2 (revision 11211).” It begins with six character positions for PID, followed by date, time, and the rest of the line. Log time format for this line would be ”ppppp:yyyyMMdd:hhmmss”. Note that ”p” and ”:” chars are just placeholders and can be anything but ”yMdhms”.
New application	Enter the name of a new application for the item.
Applications	Link item to one or more existing applications.
Populates host inventory field	You can select a host inventory field that the value of item will populate. This will work if automatic inventory population is enabled for the host. This field is not available if *Type of information* is set to ’Log’.
Description	Enter an item description.
Enabled	Mark the checkbox to enable the item so it will be processed.

Note:
Item type specific fields are described on corresponding pages.

Note:
When editing an existing template level item on a host level, a number of fields are read-only. You can use the link in the form header and go to the template level and edit them there, keeping in mind that the changes on a template level will change the item for all hosts that the template is linked to.

Text data limits

Text data limits depend on the database backend. Before storing text values in the database they get truncated to match the database value type limit:

Database	Type of information		
	Character	Log	Text
MySQL	255 characters	65536 bytes	65536 bytes
PostgreSQL	255 characters	65536 characters	65536 characters
Oracle	255 characters	65536 characters	65536 characters
IBM DB2	255 bytes	2048 bytes	2048 bytes

Unit blacklisting

By default, specifying a unit for an item results in a multiplier prefix being added - for example, an incoming value '2048' with unit 'B' would be displayed as '2KB'.

Any unit, however, can be prevented from being converted by using a `!` prefix, for example `!B`. To better illustrate how the conversion works with and without the blacklisting, see the following examples of values and units:

```
1024 !B → 1024 B
1024 B → 1 KB
61 !s → 61 s
61 s → 1m 1s
0 !uptime → 0 uptime
0 uptime → 00:00:00
0 !! → 0 !
0 ! → 0
```

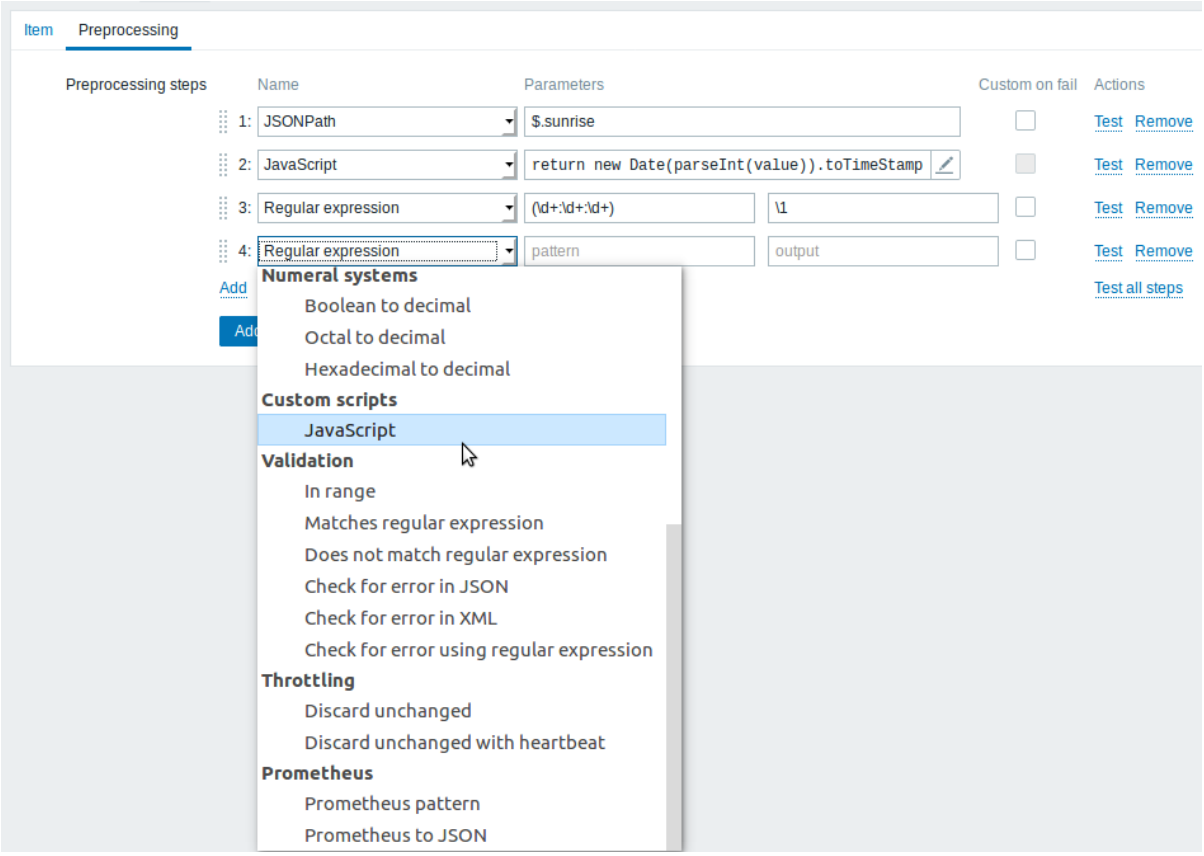
Note:
Before Zabbix 4.0, there was a hardcoded unit blacklist consisting of `ms`, `rpm`, `RPM`, `%`. This blacklist has been deprecated, thus the correct way of blacklisting such units is `!ms`, `!rpm`, `!RPM`, `!%`.

Item value preprocessing

The **Preprocessing** tab allows to define transformation rules for the received values. One or several transformations are possible before saving values to the database. Transformations are executed in the order in which they are defined. Preprocessing is done either by Zabbix server or by Zabbix proxy (for items monitored by proxy).

See also:

- Preprocessing details
- Preprocessing usage examples



Attention:
An item will become unsupported if any of the preprocessing steps fails except if custom error handling is specified using the *Custom on fail* option for supported transformations.

For log items, log metadata (without value) will always reset item unsupported state and make item supported again, even if the initial error occurred after receiving a log value from agent.

User macros and user macros with context are supported in item value preprocessing parameters, including JavaScript code.

Note:
Context is ignored when a macro is replaced with its value. Macro value is inserted in the code as is, it is not possible to add additional escaping before placing the value in the JavaScript code. Please be advised, that this can cause JavaScript errors in some cases.

Type	Transformation	Description
Text		

Type	Transformation	Description
	Regular expression	Match the value to the <pattern> regular expression and replace value with <output>. The regular expression supports extraction of maximum 10 captured groups with the \N sequence. Failure to match the input value will make the item unsupported. Parameters: **pattern** - regular expression **output** - output formatting template. An \N (where N=1…9) escape sequence is replaced with the Nth matched group. A \0 escape sequence is replaced with the matched text. Supported since 3.4.0. Please refer to regular expressions section for some existing examples. If you mark the *Custom on fail* checkbox, the item will not become unsupported in case of failed preprocessing step and it is possible to specify custom error handling options: either to discard the value, set a specified value or set a specified error message.
	Trim	Remove specified characters from the beginning and end of the value.
	Right trim	Remove specified characters from the end of the value.
	Left trim	Remove specified characters from the beginning of the value.
Structured data		

	XML XPath	Extract value or fragment from XML data using XPath functionality.
		For this option to work, Zabbix server must be compiled with libxml support.
		Examples:
		`number(/document/item/value)` will extract 10 from `<document><item><value>10</value></item></do`
		`number(/document/item/@attribute)` will extract 10 from `<document><item attribute="10"></item></document>`
		`/document/item` will extract `<item><value>10</value></item>` from `<document><item><value>10</value></item></do`
		Note that namespaces are not supported.
		Supported since 3.4.0.
		If you mark the *Custom on fail* checkbox, the item will not become unsupported in case of failed preprocessing step and it is possible to specify custom error handling options: either to discard the value, set a specified value or set a specified error message.

	JSON Path	Extract value or fragment from JSON data using JSONPath functionality. If you mark the *Custom on fail* checkbox, the item will not become unsupported in case of failed preprocessing step and it is possible to specify custom error handling options: either to discard the value, set a specified value or set a specified error message.
	CSV to JSON	Convert CSV file data into JSON format. For more information, see: CSV to JSON preprocessing. Supported since 4.4.0.

Type	Transformation	Description
Arithmetic		
	Custom multiplier	Multiply the value by the specified integer or floating-point value. Use this option to convert values received in KB, MBps, etc into B, Bps. Otherwise Zabbix cannot correctly set prefixes (K, M, G etc). *Note* that if the item type of information is *Numeric (unsigned)*, incoming values with a fractional part will be trimmed (i.e. '0.9' will become '0') before the custom multiplier is applied. Starting with Zabbix 2.2, using scientific notation is also supported. E.g. 1e+70. If you mark the *Custom on fail* checkbox, the item will not become unsupported in case of failed preprocessing step and it is possible to specify custom error handling options: either to discard the value, set a specified value or set a specified error message.
Change		
	Simple change	Calculate difference between the current and previous value. Evaluated as **value**-**prev_value**, where *value* - current value; *prev_value* - previously received value This setting can be useful to measure a constantly growing value. If the current value is smaller than the previous value, Zabbix discards that difference (stores nothing) and waits for another value. Only one change operation per item is allowed. If you mark the *Custom on fail* checkbox, the item will not become unsupported in case of failed preprocessing step and it is possible to specify custom error handling options: either to discard the value, set a specified value or set a specified error message.

Type	Transformation	Description
	Change per second	Calculate the value change (difference between the current and previous value) speed per second. Evaluated as (**value**-**prev_value**)/(**time**-**prev_time**), where *value* - current value; *prev_value* - previously received value; *time* - current timestamp; *prev_time* - timestamp of previous value. This setting is extremely useful to get speed per second for a constantly growing value. If the current value is smaller than the previous value, Zabbix discards that difference (stores nothing) and waits for another value. This helps to work correctly with, for instance, a wrapping (overflow) of 32-bit SNMP counters. *Note*: As this calculation may produce floating point numbers, it is recommended to set the 'Type of information' to *Numeric (float)*, even if the incoming raw values are integers. This is especially relevant for small numbers where the decimal part matters. If the floating point values are large and may exceed the 'float' field length in which case the entire value may be lost, it is actually suggested to use *Numeric (unsigned)* and thus trim only the decimal part. Only one change operation per item is allowed. If you mark the *Custom on fail* checkbox, the item will not become unsupported in case of failed preprocessing step and it is possible to specify custom error handling options: either to discard the value, set a specified value or set a specified error message.
Numeral systems	*Boolean to decimal*	Convert the value from boolean format to decimal. Textual representation is translated into either 0 or 1. Thus, 'TRUE' is stored as 1 and 'FALSE' is stored as 0. All values are matched in a case-insensitive way. Currently recognized values are, for: *TRUE* - true, t, yes, y, on, up, running, enabled, available, ok, master *FALSE* - false, f, no, n, off, down, unused, disabled, unavailable, err, slave Additionally, any non-zero numeric value is considered to be TRUE and zero is considered to be FALSE. Following values are supported since 4.0.0: ok, master, err, slave. If you mark the *Custom on fail* checkbox, the item will not become unsupported in case of failed preprocessing step and it is possible to specify custom error handling options: either to discard the value, set a specified value or set a specified error message.

Type	Transformation	Description
	Octal to decimal	Convert the value from octal format to decimal. If you mark the *Custom on fail* checkbox, the item will not become unsupported in case of failed preprocessing step and it is possible to specify custom error handling options: either to discard the value, set a specified value or set a specified error message.
	Hexadecimal to decimal	Convert the value from hexadecimal format to decimal. If you mark the *Custom on fail* checkbox, the item will not become unsupported in case of failed preprocessing step and it is possible to specify custom error handling options: either to discard the value, set a specified value or set a specified error message.
Custom scripts		
	Javascript	Enter JavaScript code in the block that appears when clicking in the parameter field or on a pencil icon. Note that available JavaScript length depends on the database used. For more information, see: Javascript preprocessing.
Validation		
	In range	Define a range that a value should be in by specifying minimum/maximum values (inclusive). Numeric values are accepted (including any number of digits, optional decimal part and optional exponential part, negative values). User macros and low-level discovery macros can be used. Minimum value should be less than the maximum. At least one value must exist. If you mark the *Custom on fail* checkbox, the item will not become unsupported in case of failed preprocessing step and it is possible to specify custom error handling options: either to discard the value, set a specified value or set a specified error message.
	Matches regular expression	Specify a regular expression that a value must match. If you mark the *Custom on fail* checkbox, the item will not become unsupported in case of failed preprocessing step and it is possible to specify custom error handling options: either to discard the value, set a specified value or set a specified error message.
	Does not match regular expression	Specify a regular expression that a value must not match. If you mark the *Custom on fail* checkbox, the item will not become unsupported in case of failed preprocessing step and it is possible to specify custom error handling options: either to discard the value, set a specified value or set a specified error message.

Type	Transformation	Description
	Check for error in JSON	Check for an application-level error message located at JSONpath. Stop processing if succeeded and message is not empty; otherwise continue processing with the value that was before this preprocessing step. Note that these external service errors are reported to user as is, without adding preprocessing step information. No error will be reported in case of failing to parse invalid JSON. If you mark the *Custom on fail* checkbox, the item will not become unsupported in case of failed preprocessing step and it is possible to specify custom error handling options: either to discard the value, set a specified value or set a specified error message.
	Check for error in XML	Check for an application-level error message located at xpath. Stop processing if succeeded and message is not empty; otherwise continue processing with the value that was before this preprocessing step. Note that these external service errors are reported to user as is, without adding preprocessing step information. No error will be reported in case of failing to parse invalid XML. If you mark the *Custom on fail* checkbox, the item will not become unsupported in case of failed preprocessing step and it is possible to specify custom error handling options: either to discard the value, set a specified value or set a specified error message.
	Check for error using a regular expression	Check for an application-level error message using a regular expression. Stop processing if succeeded and message is not empty; otherwise continue processing with the value that was before this preprocessing step. Note that these external service errors are reported to user as is, without adding preprocessing step information. Parameters: **pattern** - regular expression **output** - output formatting template. An \N (where N=1…9) escape sequence is replaced with the Nth matched group. A \0 escape sequence is replaced with the matched text. If you mark the *Custom on fail* checkbox, the item will not become unsupported in case of failed preprocessing step and it is possible to specify custom error handling options: either to discard the value, set a specified value or set a specified error message.
Throttling		

Type	Transformation	Description
	Discard unchanged	Discard a value if it has not changed. If a value is discarded, it is not saved in the database and Zabbix server has no knowledge that this value was received. No trigger expressions will be evaluated, as a result, no problems for related triggers will be created/resolved. Trigger functions will work only based on data that is actually saved in database. As trends are built based on data in the database, if there is no value saved for an hour then there will also be no trends data for that hour. Only one throttling option can be specified for an item.
	Discard unchanged with heartbeat	Discard a value if it has not changed within the defined time period (in seconds). Positive integer values are supported to specify the seconds (minimum - 1 second). Time suffixes can be used in this field (e.g. 30s, 1m, 2h, 1d). User macros and low-level discovery macros can be used in this field. If a value is discarded, it is not saved in the database and Zabbix server has no knowledge that this value was received. No trigger expressions will be evaluated, as a result, no problems for related triggers will be created/resolved. Trigger functions will work only based on data that is actually saved in database. As trends are built based on data in the database, if there is no value saved for an hour then there will also be no trends data for that hour. Only one throttling option can be specified for an item.
Prometheus		
	Prometheus pattern	Use the following query to extract required data from Prometheus metrics. See Prometheus checks for more details.
	Prometheus to JSON	Convert required Prometheus metrics to JSON. See Prometheus checks for more details.

For change and throttling preprocessing steps Zabbix has to remember the last value to calculate/compare the new value as required. If Zabbix server is restarted or there is any change to preprocessing steps the last value of the corresponding item is reset, resulting in:

- for *Simple change*, *Change per second* steps - the next value will be ignored, because there is no previous value to calculated change from;
- for *Discard unchanged*. *Discard unchanged with heartbeat* steps - the next value will never be discarded, even if it should have been because of discarding rules.

Note:
If you use a custom multiplier or store value as *Change per second* for items with the type of information set to *Numeric (unsigned)* and the resulting calculated value is actually a float number, the calculated value is still accepted as a correct one by trimming the decimal part and storing the value as integer.

Custom script limit

Available custom script length depends on the database used:

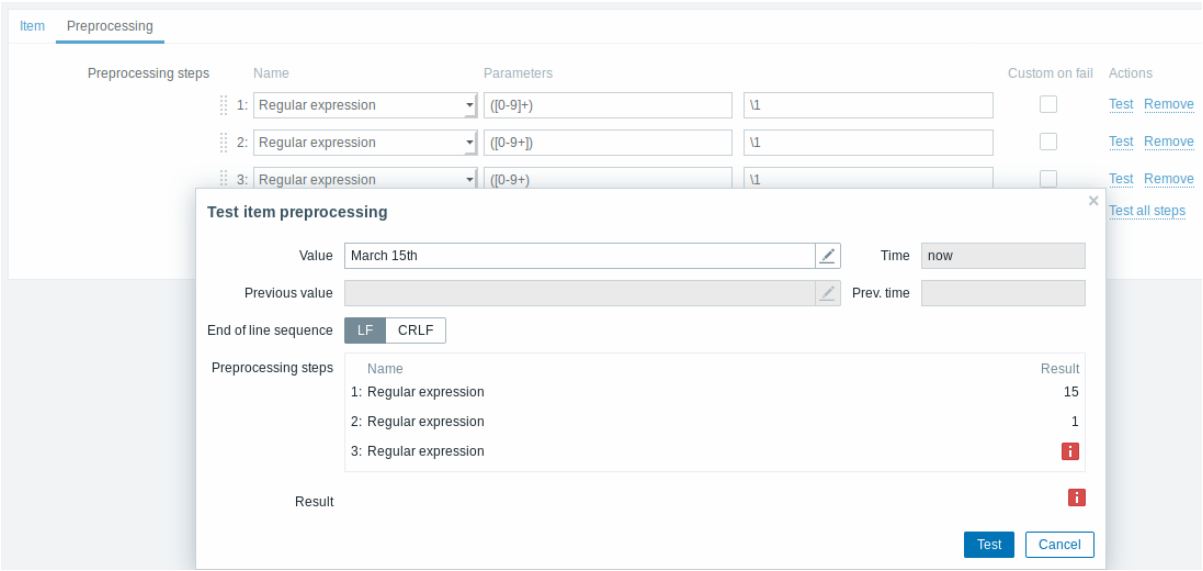
Database	//Limit in characters //	//Limit in bytes //

MySQL	65535	65535
Oracle Database	2048	4000
PostgreSQL	65535	not limited
IBM DB2	2048	2048
SQLite (only Zabbix proxy)	65535	not limited

Testing preprocessing steps

Testing preprocessing steps is useful to make sure that complex preprocessing pipelines yield the results that are expected from them, without waiting for the item value to be received and preprocessed.

Each preprocessing step can be tested individually as well as all steps can be tested together. When you click on *Test* or *Test all steps* button respectively in the Actions block, a testing window is opened.



Parameter	Description
Value	Enter the input value to test. Clicking in the parameter field or on the view/edit button will open a text area window for entering the value or code block.
Time	Time of the input value is displayed: `now` (read-only).
Previous value	Enter a previous input value to compare to. Only for *Change* and *Throttling* preprocessing steps.
Previous time	Enter the previous input value time to compare to. Only for *Change* and *Throttling* preprocessing steps. The default value is based on the 'Update interval' field value of the item (if '1m', then this field is filled with `now-1m`). If nothing is specified or user has no access to host, the default is `now-30s`.
Macros	If any macros are used, they are listed along with their values. The values are editable for testing purposes, but the changes will only be saved within the testing context. If non-existing or non-accessible (because of permissions) macro names are used, the macro values are editable within the testing context as well.
End of line sequence	Select the end of line sequence for multiline input values: **LF** - LF (line feed) sequence **CRLF** - CRLF (carriage-return line-feed) sequence.
Preprocessing steps	Preprocessing steps are listed; the testing result is displayed for each step after the *Test* button is clicked. If the step failed in testing, an error icon is displayed. The error description is displayed on mouseover. In case "Custom on fail" is specified for the step and that action is performed, a new line appears right after the preprocessing test step row, showing what action was done and what outcome it produced (error or value).

Parameter	Description
Result	The final result of testing preprocessing steps is displayed in all cases when all steps are tested together (when you click on the *Test all steps* button). The type of conversion to the value type of the item is also displayed, for example `Result converted to Numeric (unsigned)`. An error icon is displayed in case of errors. The error description is displayed on mouseover.

Click on *Test* to see the result after each preprocessing step.

Test values are stored between test sessions for either individual steps or all steps, allowing user to change preprocessing steps or item configuration and then return to the testing window without having to re-enter information. Values are lost on a page refresh though.

The testing is done by Zabbix server. The frontend sends a corresponding request to the server and waits for the result. The request contains the input value and preprocessing steps (with expanded user macros). For *Change* and *Throttling* steps, an optional previous value and time can be specified. The server responds with results for each preprocessing step.

Technical connection errors are displayed as error box at the top of the testing window.

Form buttons

Buttons at the bottom of the form allow to perform several operations.

Add	Add an item. This button is only available for new items.
Update	Update the properties of an item.
Clone	Create another item based on the properties of the current item.
Check now	Execute a check for a new item value immediately. Supported for **passive** checks only (see more details). *Note* that when checking for a value immediately, configuration cache is not updated, thus the value will not reflect very recent changes to item configuration.
Clear history and trends	Delete the item history and trends.
Delete	Delete the item.
Cancel	Cancel the editing of item properties.

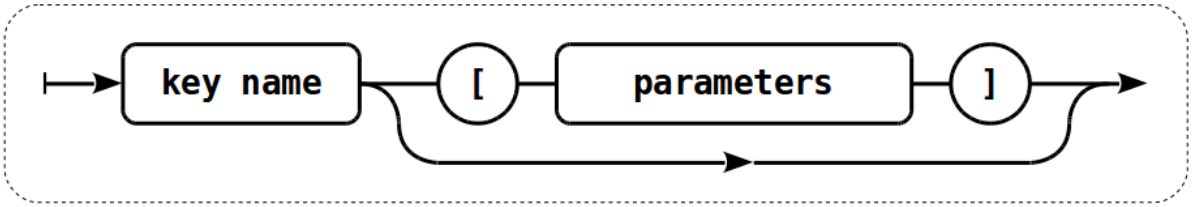
Unsupported items

An item can become unsupported if its value cannot be retrieved for some reason. Such items are still rechecked at a fixed interval, configurable in Administration section.

Unsupported items are reported as having a NOT SUPPORTED state.

1 Item key format

Item key format, including key parameters, must follow syntax rules. The following illustrations depict the supported syntax. Allowed elements and characters at each point can be determined by following the arrows - if some block can be reached through the line, it is allowed, if not - it is not allowed.



To construct a valid item key, one starts with specifying the key name, then there's a choice to either have parameters or not - as depicted by the two lines that could be followed.

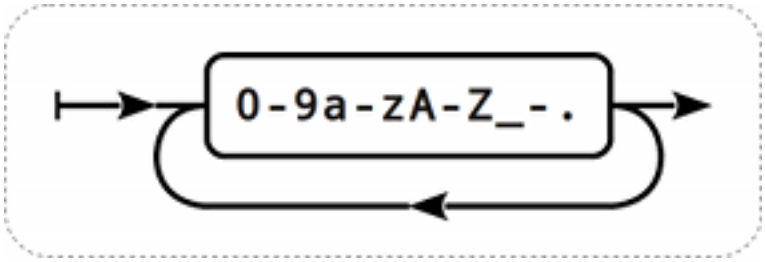
Key name

The key name itself has a limited range of allowed characters, which just follow each other. Allowed characters are:

`0-9a-zA-Z_-.`

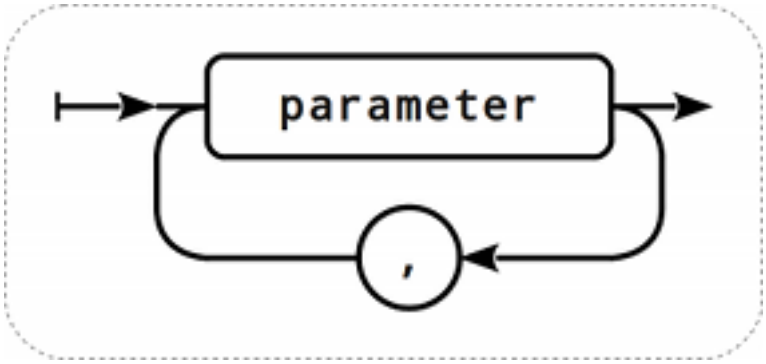
Which means:

- all numbers;
- all lowercase letters;
- all uppercase letters;
- underscore;
- dash;
- dot.

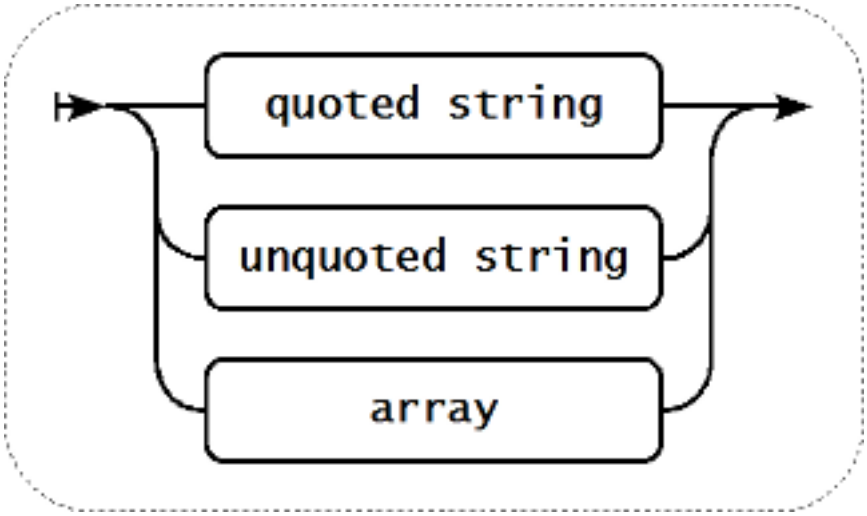


Key parameters

An item key can have multiple parameters that are comma separated.



Each key parameter can be either a quoted string, an unquoted string or an array.



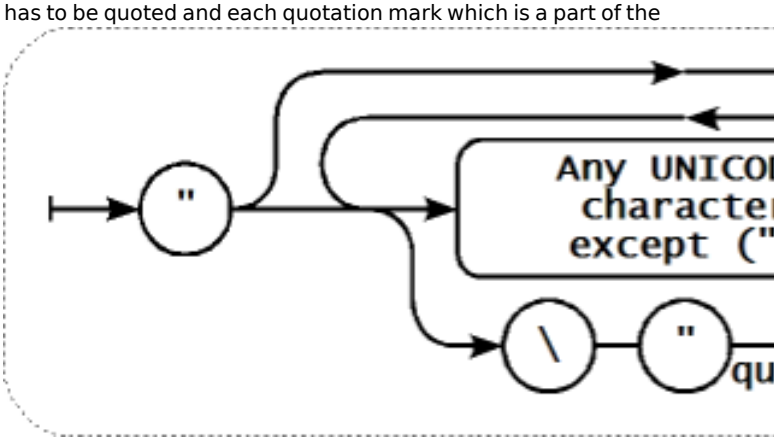
The parameter can also be left empty, thus using the default value. In that case, the appropriate number of commas must be added if any further parameters are specified. For example, item key **icmpping[„200„500]** would specify that the interval between individual pings is 200 milliseconds, timeout - 500 milliseconds, and all other parameters are left at their defaults.

Parameter - quoted string

If the key parameter is a quoted string, any Unicode character is allowed.

If the key parameter string contains comma, this parameter has to be quoted.

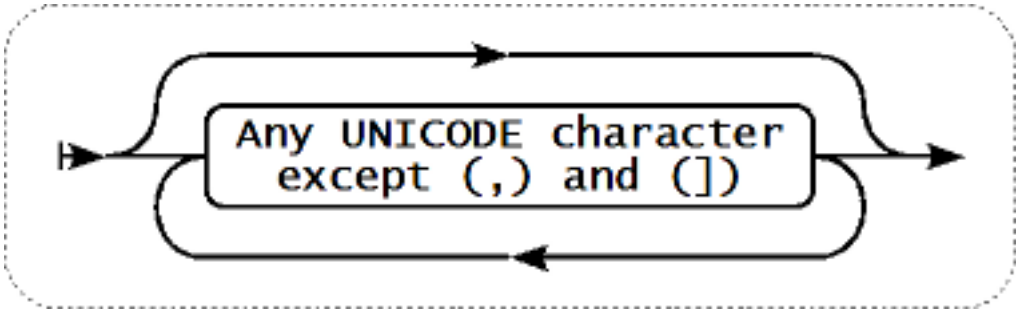
If the key parameter string contains quotation mark, this parameter has to be quoted and each quotation mark which is a part of the parameter string has to be escaped with a backsplash (\) character.



Warning:
To quote item key parameters, use double quotes only. Single quotes are not supported.

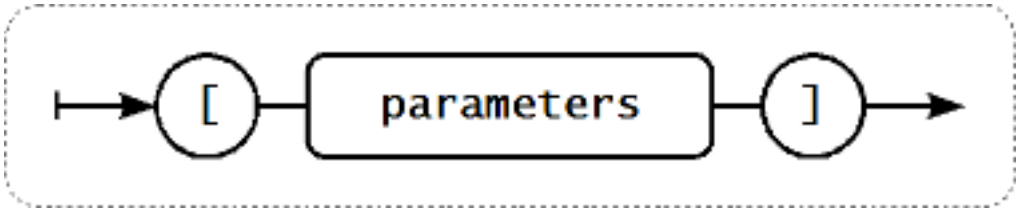
Parameter - unquoted string

If the key parameter is an unquoted string, any Unicode character is allowed except comma and right square bracket (]). Unquoted parameter cannot start with left square bracket ([).



Parameter - array

If the key parameter is an array, it is again enclosed in square brackets, where individual parameters come in line with the rules and syntax of specifying multiple parameters.



Attention:
Multi-level parameter arrays, e.g. `[a,[b,[c,d]],e]`, are not allowed.

2 Custom intervals

Overview

It is possible to create custom rules regarding the times when an item is checked. The two methods for that are *Flexible intervals*, which allow to redefine the default update interval, and *Scheduling*, whereby an item check can be executed at a specific time or sequence of times.

Flexible intervals

Flexible intervals allow to redefine the default update interval for specific time periods. A flexible interval is defined with *Interval* and *Period* where:

- *Interval* – the update interval for the specified time period
- *Period* – the time period when the flexible interval is active (see the time periods for detailed description of the *Period* format)

Up to seven flexible intervals can be defined. If multiple flexible intervals overlap, the smallest *Interval* value is used for the overlapping period. Note that if the smallest value of overlapping flexible intervals is '0', no polling will take place. Outside the flexible intervals the default update interval is used.

Note that if the flexible interval equals the length of the period, the item will be checked exactly once. If the flexible interval is greater than the period, the item might be checked once or it might not be checked at all (thus such configuration is not advisable). If the flexible interval is less than the period, the item will be checked at least once.

If the flexible interval is set to '0', the item is not polled during the flexible interval period and resumes polling according to the default *Update interval* once the period is over. Examples:

Interval	Period	Description
10	1-5,09:00-18:00	Item will be checked every 10 seconds during working hours.
0	1-7,00:00-7:00	Item will not be checked during the night.
0	7-7,00:00-24:00	Item will not be checked on Sundays.
60	1-7,12:00-12:01	Item will be checked at 12:00 every day. Note that this was used as a workaround for scheduled checks and starting with Zabbix 3.0 it is recommended to use scheduling intervals for such checks.

Scheduling intervals

Scheduling intervals are used to check items at specific times. While flexible intervals are designed to redefine the default item update interval, the scheduling intervals are used to specify an independent checking schedule, which is executed in parallel.

A scheduling interval is defined as: `md<filter>wd<filter>h<filter>m<filter>s<filter>` where:

- **md** - month days
- **wd** - week days
- **h** - hours
- **m** - minutes
- **s** – seconds

`<filter>` is used to specify values for its prefix (days, hours, minutes, seconds) and is defined as: `[<from>[-<to>]][/<step>][,<filter` where:

- `<from>` and `<to>` define the range of matching values (included). If `<to>` is omitted then the filter matches a `<from> - <from>` range. If `<from>` is also omitted then the filter matches all possible values.
- `<step>` defines the skips of the number value through the range. By default `<step>` has the value of 1, which means that all values of the defined range are matched.

While the filter definitions are optional, at least one filter must be used. A filter must either have a range or the *<step>* value defined.

An empty filter matches either '0' if no lower-level filter is defined or all possible values otherwise. For example, if the hour filter is omitted then only '0' hour will match, provided minute and seconds filters are omitted too, otherwise an empty hour filter will match all hour values.

Valid `<from>` and `<to>` values for their respective filter prefix are:

Prefix	Description	*<from>*	*<to>*
md	Month days	1-31	1-31
wd	Week days	1-7	1-7
h	Hours	0-23	0-23
m	Minutes	0-59	0-59
s	Seconds	0-59	0-59

The <from> value must be less or equal to <to> value. The <step> value must be greater or equal to 1 and less or equal to <to> - <from>.

Single digit month days, hours, minutes and seconds values can be prefixed with 0. For example md01-31 and h/02 are valid intervals, but md01-031 and wd01-07 are not.

In Zabbix frontend, multiple scheduling intervals are entered in separate rows. In Zabbix API, they are concatenated into a single string with a semicolon ; as a separator.

If a time is matched by several intervals it is executed only once. For example, wd1h9;h9 will be executed only once on Monday at 9am.

Examples:

Interval	Will be executed
m0-59	every minute
h9-17/2	every 2 hours starting with 9:00 (9:00, 11:00 ...)
m0,30 or m/30	hourly at hh:00 and hh:30
m0,5,10,15,20,25,30,35,40,45,50,55 or m/5	every five minutes
wd1-5h9	every Monday till Friday at 9:00
wd1-5h9-18	every Monday till Friday at 9:00,10:00,...,18:00
h9,10,11 or h9-11	every day at 9:00, 10:00 and 11:00
md1h9m30	every 1st day of each month at 9:30
md1wd1h9m30	every 1st day of each month at 9:30 if it is Monday
h9m/30	every day at 9:00, 9:30
h9m0-59/30	every day at 9:00, 9:30
h9,10m/30	every day at 9:00, 9:30, 10:00, 10:30
h9-10m30	every day at 9:30, 10:30
h9m10-40/30	every day at 9:10, 9:40
h9,10m10-40/30	every day at 9:10, 9:40, 10:10, 10:40
h9-10m10-40/30	every day at 9:10, 9:40, 10:10, 10:40
h9m10-40	every day at 9:10, 9:11, 9:12, ... 9:40
h9m10-40/1	every day at 9:10, 9:11, 9:12, ... 9:40
h9-12,15	every day at 9:00, 10:00, 11:00, 12:00, 15:00
h9-12,15m0	every day at 9:00, 10:00, 11:00, 12:00, 15:00
h9-12,15m0s30	every day at 9:00:30, 10:00:30, 11:00:30, 12:00:30, 15:00:30
h9-12s30	every day at 9:00:30, 9:01:30, 9:02:30 ... 12:58:30, 12:59:30
h9m/30;h10 (*API-specific syntax*)	every day at 9:00, 9:30, 10:00
h9m/30 h10 (*add this as another row in frontend*)	every day at 9:00, 9:30, 10:00

3 Preprocessing usage examples

Overview

This section presents examples of using preprocessing steps to accomplish some practical tasks.

Filtering VMware event log records

Using a regular expression preprocessing to filter unnecessary events of the VMWare event log.

1. On a working VMWare Hypervisor host check that the event log item vmware.eventlog[<url>,<mode>] is present and working properly. Note that the event log item could already be present on the hypervisor if the *Template VM VMWare* template has been linked during the host creation.

2. On the VMWare Hypervisor host create a dependent item of 'Log' type and set the event log item as its master.

In the "Preprocessing" tab of the dependent item select the "Matches regular expression" validation option and fill pattern, for example:

```
".* logged in .*" - filters all logging events in the event log
"\bUser\s+\K\S+" -  filter only lines with usernames from the event log
```

Attention:
If the regular expression is not matched then the dependent item becomes unsupported with a corresponding error message. To avoid this mark the "Custom on fail" checkbox and select to discard unmatched value, for example.

Another approach that allows using matching groups and output control is to select "Regular expression" option in the "Preprocessing" tab and fill parameters, for example:

```
pattern: ".*logged in.*", output: "\0" - filters all logging events in the event log
pattern "User (.*?)(?=\ )", output: "\1" - filter only usernames from the event log
```

2 Item types

Overview

Item types cover various methods of acquiring data from your system. Each item type comes with its own set of supported item keys and required parameters.

The following items types are currently offered by Zabbix:

- Zabbix agent checks
- SNMP agent checks
- SNMP traps
- IPMI checks
- Simple checks
  - VMware monitoring
- Log file monitoring
- Calculated items
- Zabbix internal checks
- SSH checks
- Telnet checks
- External checks
- Aggregate checks
- Trapper items
- JMX monitoring
- ODBC checks
- Dependent items
- HTTP checks

Details for all item types are included in the subpages of this section. Even though item types offer a lot of options for data gathering, there are further options through user parameters or loadable modules.

Some checks are performed by Zabbix server alone (as agent-less monitoring) while others require Zabbix agent or even Zabbix Java gateway (with JMX monitoring).

Attention:
If a particular item type requires a particular interface (like an IPMI check needs an IPMI interface on the host) that interface must exist in the host definition.

Multiple interfaces can be set in the host definition: Zabbix agent, SNMP agent, JMX and IPMI. If an item can use more than one interface, it will search the available host interfaces (in the order: Agent→SNMP→JMX→IPMI) for the first appropriate one to be linked with.

All items that return text (character, log, text types of information) can return whitespace only as well (where applicable) setting the return value to an empty string (supported since 2.0).

1 Zabbix agent

Overview

These checks use the communication with Zabbix agent for data gathering.

There are passive and active agent checks. When configuring an item, you can select the required type:

- *Zabbix agent* - for passive checks
- *Zabbix agent (active)* - for active checks

Supported item keys

The table provides details on the item keys that you can use with Zabbix agent items.

See also:

- Items supported by platform
- Item keys supported by Zabbix agent 2
- Item keys specific for Windows agent
- Minimum permission level for Windows agent items

** Mandatory and optional parameters **

Parameters without angle brackets are mandatory. Parameters marked with angle brackets **< >** are optional.

Key	Description	Return value	Parameters	Comments
agent.hostname	Agent host name.	String		Returns the actual value of the agent hostname from a configuration file.
agent.ping	Agent availability check.	Nothing - unavailable 1 - available		Use the **nodata()** trigger function to check for host unavailability.
agent.version	Version of Zabbix agent.	String		Example of returned value: 1.8.2
kernel.maxfiles	Maximum number of opened files supported by OS.	Integer		
kernel.maxproc	Maximum number of processes supported by OS.	Integer		
log[file,<regexp>,<encoding>,<maxlines>,<mode>,<output>,<maxdelay>,<options>]				

Key					
	Log file monitoring.	Log	**file** - full path and name of log file **regexp** - regular expression[4] describing the required pattern **encoding** - code page identifier **maxlines** - maximum number of new lines per second the agent will send to Zabbix server or proxy. This parameter overrides the value of 'MaxLinesPer-Second' in zab-bix_agentd.conf **mode** - possible values: *all* (default), *skip* - skip processing of older data (affects only newly created items). **output** - an optional output formatting template. The **\0** escape sequence is replaced with the matched part of text (from the first character where match begins until the character where match ends) while an **\N** (where N=1...9) escape sequence is replaced with Nth matched group (or an empty string if the N exceeds the number of captured	The item must be configured as an active check. If file is missing or permissions do not allow access, item turns unsupported. If `output` is left empty - the whole line containing the matched text is returned. Note that all global regular expression types except 'Result is TRUE' always return the whole matched line and the `output` parameter is ignored. Content extraction using the `output` parameter takes place on the agent. Examples: => log[/var/log/syslog] => log[/var/log/syslog,error] => log[/home/zabbix/logs/logfile„ *Using `output` parameter for extracting a number from log record:* => log[/app1/app.log,"task run [0-9.]+ sec, processed ([0-9]+) records, [0-9]+ errors"„„\1] → will match a log record "2015-11-13 10:08:26 task run 6.08 sec, processed 6080 records,

Key
log.count[file,<regexp>,<encoding>,<maxproclines>,<mode>,<maxdelay>,<options>]

Key				
	Count of matched lines in log file monitoring.	Integer	**file** - full path and name of log file **regexp** - regular expression[4] describing the required pattern **encoding** - code page identifier **maxproclines** - maximum number of new lines per second the agent will analyze. Default value is 10*'MaxLines-PerSecond' in zabbix_agentd.conf. **mode** - possible values: *all* (default), *skip* - skip processing of older data (affects only newly created items). **maxdelay** - maximum delay in seconds. Type: float. Values: 0 - (default) never ignore log file lines; > 0.0 - ignore older lines in order to get the most recent lines analyzed within "maxdelay" seconds. Read the maxdelay notes before using it! **options** - additional options: *mtime-noreread* - non-unique records, reread only if the file size changes (ignore modification time change).	The item must be configured as an active check. If file is missing or permissions do not allow access, item turns unsupported. See also additional information on log monitoring. This item is not supported for Windows Event Log. The `options` parameter is supported since Zabbix 4.4.7. Supported since Zabbix 3.2.0.

Key
logrt[file_regexp,<regexp>,<encoding>,<maxlines>,<mode>,<output>,<maxdelay>,<options>]

Key					
	Log file monitoring with log rotation support.	Log	**file_regexp** - absolute path to file and regular expression[4] describing the file name pattern **regexp** - regular expression[4] describing the required content pattern **encoding** - code page identifier **maxlines** - maximum number of new lines per second the agent will send to Zabbix server or proxy. This parameter overrides the value of 'MaxLinesPer-Second' in zab-bix_agentd.conf **mode** - possible values: *all* (default), *skip* - skip processing of older data (affects only newly created items). **output** - an optional output formatting template. The **\0** escape sequence is replaced with the matched part of text (from the first character where match begins until the character where match ends) while an **\N** (where N=1...9) escape sequence is replaced with Nth matched	The item must be configured as an active check. Log rotation is based on the last modification time of files. Note that logrt is designed to work with one currently active log file, with several other matching inactive files rotated. If, for example, a directory has many active log files, a separate logrt item should be created for each one. Otherwise if one logrt item picks up too many files it may lead to exhausted memory and a crash of monitoring. If `output` is left empty - the whole line containing the matched text is returned. Note that all global regular expression types except 'Result is TRUE' always return the whole matched line and the `output` parameter is ignored. Content extraction using the `output` parameter takes place on the agent. Examples:

Key
logrt.count[file_regexp,<regexp>,<encoding>,<maxproclines>,<mode>,<maxdelay>,<options>]

Key				
	Count of matched lines in log file monitoring with log rotation support.	Integer	**file_regexp** - absolute path to file and regular expression[4] describing the file name pattern **regexp** - regular expression[4] describing the required content pattern **encoding** - code page identifier **maxproclines** - maximum number of new lines per second the agent will analyze. Default value is 10*'MaxLinesPerSecond' in zabbix_agentd.conf. **mode** - possible values: *all* (default), *skip* - skip processing of older data (affects only newly created items). **maxdelay** - maximum delay in seconds. Type: float. Values: 0 - (default) never ignore log file lines; > 0.0 - ignore older lines in order to get the most recent lines analyzed within "maxdelay" seconds. Read the maxdelay notes before using it! **options** - type of log file rotation and other options. Possible values: *rotate*	The item must be configured as an active check. Log rotation is based on the last modification time of files. See also additional information on log monitoring. The `options` parameter is supported since Zabbix 4.0 (*mtime-reread*, *mtime-noreread* options since 4.4.7). This item is not supported for Windows Event Log. Supported since Zabbix 3.2.0.

Key				
net.dns[<ip>,name,<type>,<timeout>,<count>,<protocol>]	Checks if DNS service is up.	0 - DNS is down (server did not respond or DNS resolution failed) 1 - DNS is up	**ip** - IP address of DNS server (leave empty for the default DNS server, ignored on Windows) **name** - DNS name to query **type** - record type to be queried (default is *SOA*) **timeout** (ignored on Windows) - timeout for the request in seconds (default is 1 second) **count** (ignored on Windows) - number of tries for the request (default is 2) **protocol** - the protocol used to perform DNS queries: *udp* (default) or *tcp*	Example: => net.dns[8.8.8.8,zabbix.com,MX The possible values for `type` are: *ANY*, *A*, *NS*, *CNAME*, *MB*, *MG*, *MR*, *PTR*, *MD*, *MF*, *MX*, *SOA*, *NULL*, *WKS* (except for Windows), *HINFO*, *MINFO*, *TXT*, *SRV* Internationalized domain names are not supported, please use IDNA encoded names instead. The `protocol` parameter is supported since Zabbix 3.0. SRV record type is supported since Zabbix agent versions 1.8.6 (Unix) and 2.0.0 (Windows). Naming before Zabbix 2.0 (still supported): *net.tcp.dns*
net.dns.record[<ip>,name,<type>,<timeout>,<count>,<protocol>]				

Key				
	Performs a DNS query.	Character string with the required type of information	**ip** - IP address of DNS server (leave empty for the default DNS server, ignored on Windows) **name** - DNS name to query **type** - record type to be queried (default is *SOA*) **timeout** (ignored on Windows) - timeout for the request in seconds (default is 1 second) **count** (ignored on Windows) - number of tries for the request (default is 2) **protocol** - the protocol used to perform DNS queries: *udp* (default) or *tcp*	Example: => net.dns.record[8.8.8.8,zabbix. The possible values for `type` are: *ANY*, *A*, *NS*, *CNAME*, *MB*, *MG*, *MR*, *PTR*, *MD*, *MF*, *MX*, *SOA*, *NULL*, *WKS* (except for Windows), *HINFO*, *MINFO*, *TXT*, *SRV* Internationalized domain names are not supported, please use IDNA encoded names instead. The `protocol` parameter is supported since Zabbix 3.0. SRV record type is supported since Zabbix agent versions 1.8.6 (Unix) and 2.0.0 (Windows). Naming before Zabbix 2.0 (still supported): *net.tcp.dns.query*
net.if.collisions[if]	Number of out-of-window collisions.	Integer	**if** - network interface name	
net.if.discovery				

Key			
	List of network interfaces. Used for low-level discovery.	JSON object	Supported since Zabbix agent version 2.0. On FreeBSD, OpenBSD and NetBSD supported since Zabbix agent version 2.2. Some Windows versions (for example, Server 2008) might require the latest updates installed to support non-ASCII characters in interface names.
net.if.in[if,<mode>]			

Key					
	Incoming traffic statistics on network interface.	Integer	**if** - network interface name (Unix); network interface full description or IPv4 address (Windows) **mode** - possible values: *bytes* - number of bytes (default) *packets* - number of packets *errors* - number of errors *dropped* - number of dropped packets *overruns (fifo)* - the number of FIFO buffer errors *frame* - the number of packet framing errors *compressed* - the number of compressed packets transmitted or received by the device driver *multicast* - the number of multicast frames received by the device driver	On Windows, the item gets values from 64-bit counters if available. 64-bit interface statistic counters were introduced in Windows Vista and Windows Server 2008. If 64-bit counters are not available, the agent uses 32-bit counters. Multi-byte interface names on Windows are supported since Zabbix agent version 1.8.6. Examples: => net.if.in[eth0,errors] => net.if.in[eth0] You may obtain network interface descriptions on Windows with net.if.discovery or net.if.list items. You may use this key with the *Change per second* preprocessing step in order to get bytes per second statistics.
net.if.out[if,<mode>]					

Key				
	Outgoing traffic statistics on network interface.	Integer	**if** - network interface name (Unix); network interface full description or IPv4 address (Windows) **mode** - possible values: *bytes* - number of bytes (default) *packets* - number of packets *errors* - number of errors *dropped* - number of dropped packets *overruns (fifo)* - the number of FIFO buffer errors *collisions (colls)* - the number of collisions detected on the interface *carrier* - the number of carrier losses detected by the device driver *compressed* - the number of compressed packets transmitted by the device driver	On Windows, the item gets values from 64-bit counters if available. 64-bit interface statistic counters were introduced in Windows Vista and Windows Server 2008. If 64-bit counters are not available, the agent uses 32-bit counters. Multi-byte interface names on Windows are supported since Zabbix agent 1.8.6 version. Examples: => net.if.out[eth0,errors] => net.if.out[eth0] You may obtain network interface descriptions on Windows with net.if.discovery or net.if.list items. You may use this key with the *Change per second* preprocessing step in order to get bytes per second statistics.
net.if.total[if,<mode>]				

Key					
	Sum of incoming and outgoing traffic statistics on network interface.	Integer	**if** - network interface name (Unix); network interface full description or IPv4 address (Windows) **mode** - possible values: *bytes* - number of bytes (default) *packets* - number of packets *errors* - number of errors *dropped* - number of dropped packets *overruns (fifo)* - the number of FIFO buffer errors *compressed* - the number of compressed packets transmitted or received by the device driver	On Windows, the item gets values from 64-bit counters if available. 64-bit interface statistic counters were introduced in Windows Vista and Windows Server 2008. If 64-bit counters are not available, the agent uses 32-bit counters. Examples: => net.if.total[eth0,errors] => net.if.total[eth0] You may obtain network interface descriptions on Windows with net.if.discovery or net.if.list items. You may use this key with the *Change per second* preprocessing step in order to get bytes per second statistics. Note that dropped packets are supported only if both net.if.in and net.if.out work for dropped packets on your platform.
net.tcp.listen[port]					

Key				
	Checks if this TCP port is in LISTEN state.	0 - it is not in LISTEN state 1 - it is in LISTEN state	**port** - TCP port number	Example: => net.tcp.listen[80] On Linux supported since Zabbix agent version 1.8.4 Since Zabbix 3.0.0, on Linux kernels 2.6.14 and above, information about listening TCP sockets is obtained from the kernel's NETLINK interface, if possible. Otherwise, the information is retrieved from /proc/net/tcp and /proc/net/tcp6 files.
net.tcp.port[<ip>,port]	Checks if it is possible to make TCP connection to specified port.	0 - cannot connect 1 - can connect	**ip** - IP address (default is 127.0.0.1) **port** - port number	Example: => net.tcp.port[,80] → can be used to test availability of web server running on port 80. For simple TCP performance testing use net.tcp.service.perf[tcp,<ip>, Note that these checks may result in additional messages in system daemon logfiles (SMTP and SSH sessions being logged usually). Old naming: *check_port[*]*
net.tcp.service[service,<ip>,<port>]				

Key				
	Checks if service is running and accepting TCP connections.	0 - service is down 1 - service is running	**service** - either of: *ssh*, *ldap*, *smtp*, *ftp*, *http*, *pop*, *nntp*, *imap*, *tcp*, *https*, *telnet* (see details) **ip** - IP address (default is 127.0.0.1) **port** - port number (by default standard service port number is used)	Example: => net.tcp.service[ftp„45] → can be used to test the availability of FTP server on TCP port 45. Note that these checks may result in additional messages in system daemon logfiles (SMTP and SSH sessions being logged usually). Checking of encrypted protocols (like IMAP on port 993 or POP on port 995) is currently not supported. As a workaround, please use net.tcp.port for checks like these. Checking of LDAP and HTTPS by Windows agent is currently not supported. Note that the telnet check looks for a login prompt (':' at the end). See also known issues of checking HTTPS service. *https* and *telnet* services are supported since Zabbix 2.0. Old naming: *check_service[*]*

Key				
net.tcp.service.perf[service,<ip>,<port>]	Checks performance of TCP service.	0 - service is down seconds - the number of seconds spent while connecting to the service	**service** - either of: *ssh*, *ldap*, *smtp*, *ftp*, *http*, *pop*, *nntp*, *imap*, *tcp*, *https*, *telnet* (see details) **ip** - IP address (default is 127.0.0.1) **port** - port number (by default standard service port number is used)	Example: => net.tcp.service.perf[ssh] → can be used to test the speed of initial response from SSH server. Checking of encrypted protocols (like IMAP on port 993 or POP on port 995) is currently not supported. As a workaround, please use net.tcp.service.perf[tcp,<ip>, for checks like these. Checking of LDAP and HTTPS by Windows agent is currently not supported. Note that the telnet check looks for a login prompt (':' at the end). See also known issues of checking HTTPS service. *https* and *telnet* services are supported since Zabbix 2.0. Old naming: *check_service_perf[*]*
net.udp.listen[port]	Checks if this UDP port is in LISTEN state.	0 - it is not in LISTEN state 1 - it is in LISTEN state	**port** - UDP port number	Example: => net.udp.listen[68] On Linux supported since Zabbix agent version 1.8.4
net.udp.service[service,<ip>,<port>]				

Key				
	Checks if service is running and responding to UDP requests.	0 - service is down 1 - service is running	**service** - *ntp* (see details) **ip** - IP address (default is 127.0.0.1) **port** - port number (by default standard service port number is used)	Example: => net.udp.service[ntp,,45] → can be used to test the availability of NTP service on UDP port 45. This item is supported since Zabbix 3.0.0, but *ntp* service was available for net.tcp.service[] item in prior versions.
net.udp.service.perf[service,<ip>,<port>]				
	Checks performance of UDP service.	0 - service is down seconds - the number of seconds spent waiting for response from the service	**service** - *ntp* (see details) **ip** - IP address (default is 127.0.0.1) **port** - port number (by default standard service port number is used)	Example: => net.udp.service.perf[ntp] → can be used to test response time from NTP service. This item is supported since Zabbix 3.0.0, but *ntp* service was available for net.tcp.service[] item in prior versions.
proc.cpu.util[<name>,<user>,<type>,<cmdline>,<mode>,<zone>]				

Key				
	Process CPU utilisation percentage.	Float	**name** - process name (default is *all processes*) **user** - user name (default is *all users*) **type** - CPU utilisation type: *total* (default), *user*, *system* **cmdline** - filter by command line (it is a regular expression[4]) **mode** - data gathering mode: *avg1* (default), *avg5*, *avg15* **zone** - target zone: *current* (default), *all*. This parameter is supported on Solaris only.	Examples: => proc.cpu.util[,root] → CPU utilisation of all processes running under the ”root” user => proc.cpu.util[zabbix_server,za → CPU utilisation of all zabbix_server processes running under the zabbix user The returned value is based on single CPU core utilisation percentage. For example CPU utilisation of a process fully using two cores is 200%. The process CPU utilisation data is gathered by a collector which supports the maximum of 1024 unique (by name, user and command line) queries. Queries not accessed during the last 24 hours are removed from the collector. *Note* that when setting the `zone` parameter to *current* (or default) in case the agent has been compiled on a Solaris without zone support, but running on a newer Solaris where zones are supported, then the agent will return NOT-SUPPORTED (the agent

Key
proc.mem[<name>,<user>,<mode>,<cmdline>,<memtype>]

Key					
	Memory used by process in bytes.	Integer - with `mode` as *max*, *min*, *sum* Float - with `mode` as *avg*	**name** - process name (default is *all processes*) **user** - user name (default is *all users*) **mode** - possible values: *avg*, *max*, *min*, *sum* (default) **cmdline** - filter by command line (it is a regular expression[4]) **memtype** - type of memory used by process	Examples: => proc.mem[,root] → memory used by all processes running under the ”root” user => proc.mem[zabbix_server,zabb → memory used by all zabbix_server processes running under the zabbix user => proc.mem[,oracle,max,oracleZ → memory used by the most memory-hungry process running under oracle having oracleZABBIX in its command line *Note*: When several processes use shared memory, the sum of memory used by processes may result in large, unrealistic values. See notes on selecting processes with `name` and `cmdline` parameters (Linux-specific). When this item is invoked from the command line and contains a command line parameter (e.g. using the agent test mode: `zabbix_agentd -t proc.mem[,,,apache2]`), one extra process will be

Key
proc.num[<name>,<user>,<state>,<cmdline>,<zone>]

Key					
	The number of processes.	Integer	**name** - process name (default is *all processes*) **user** - user name (default is *all users*) **state** - possible values: *all* (default), *disk* - uninterruptible sleep, *run* - running, *sleep* - interruptible sleep, *trace* - stopped, *zomb* - zombie **cmdline** - filter by command line (it is a regular expression[4]) **zone** - target zone: *current* (default), *all*. This parameter is supported on Solaris only.	Examples: => proc.num[,mysql] → number of processes running under the mysql user => proc.num[apache2,www-data] → number of apache2 processes running under the www-data user => proc.num[,oracle,sleep,oracle → number of processes in sleep state running under oracle having oracleZABBIX in its command line See notes on selecting processes with `name` and `cmdline` parameters (Linux-specific). On Windows, only the `name` and `user` parameters are supported. When this item is invoked from the command line and contains a command line parameter (e.g. using the agent test mode: `zabbix_agentd -t proc.num[,,,apache2]`), one extra process will be counted, as the agent will count itself. *Note* that when setting the `zone` parameter to

Key				
sensor[device,sensor,<mode>]	Hardware sensor reading.	Float	**device** - device name **sensor** - sensor name **mode** - possible values: *avg*, *max*, *min* (if this parameter is omitted, device and sensor are treated verbatim).	Reads /proc/sys/dev/sensors on Linux 2.4. Example: => sensor[w83781d-i2c-0-2d,temp1] Prior to Zabbix 1.8.4, the *sensor[temp1]* format was used. Reads /sys/class/hwmon on Linux 2.6+. See a more detailed description of sensor item on Linux. Reads the *hw.sensors* MIB on OpenBSD. Examples: => sensor[cpu0,temp0] → temperature of one CPU => sensor[”cpu[0-2]$”,temp,avg] → average temperature of the first three CPU’s Supported on OpenBSD since Zabbix 1.8.4.
system.boottime	System boot time.	Integer (Unix timestamp)		
system.cpu.discovery	List of detected CPUs/CPU cores. Used for low-level discovery.	JSON object		Supported on all platforms since 2.4.0.
system.cpu.intr	Device interrupts.	Integer		
system.cpu.load[<cpu>,<mode>]				

Key				
	CPU load.	Float	**cpu** - possible values: *all* (default), *percpu* (total load divided by online CPU count) **mode** - possible values: *avg1* (one-minute average, default), *avg5*, *avg15*	Example: => system.cpu.load[,avg5] *percpu* is supported since Zabbix 2.0.0. Old naming: *system.cpu.loadX*
system.cpu.num[<type>]				
	Number of CPUs.	Integer	**type** - possible values: *online* (default), *max*	Example: => system.cpu.num
system.cpu.switches				
	Count of context switches.	Integer		Old naming: *system.cpu[switches]*
system.cpu.util[<cpu>,<type>,<mode>]				
	CPU utilisation percentage.	Float	**cpu** - *<CPU number>* or *all* (default) **type** - possible values: *user* (default), *idle*, *nice*, *system* (default for Windows), *iowait*, *interrupt*, *softirq*, *steal*, *guest* (on Linux kernels 2.6.24 and above), *guest_nice* (on Linux kernels 2.6.33 and above). See also platform-specific details for this parameter. **mode** - possible values: *avg1* (one-minute average, default), *avg5*, *avg15*	Example: => system.cpu.util[0,user,avg5] Old naming: *system.cpu.idleX*, *system.cpu.niceX*, *system.cpu.systemX*, *system.cpu.userX*
system.hostname[<type>]				

Key				
	System host name.	String	**type** (Windows only, must not be used on other systems) - possible values: *netbios* (default) or *host*	The value is acquired by either GetComputerName() (for **netbios**) or gethostname() (for **host**) functions on Windows and by "hostname" command on other systems. Examples of returned values: *on Linux*: => system.hostname → linux-w7x1 => system.hostname → www.zabbix.com *on Windows*: => system.hostname → WIN-SERV2008-I6 => system.hostname[host] → Win-Serv2008-I6LonG The `type` parameter for this item is supported since Zabbix **1.8.6**. See also a more detailed description.
system.hw.chassis[<info>]				

Key				
	Chassis information.	String	**info** - one of full (default), model, serial, type or vendor	Example: system.hw.chassis[full] Hewlett-Packard HP Pro 3010 Small Form Factor PC CZXXXXXXXX Desktop] This key depends on the availability of the SMBIOS table. Will try to read the DMI table from sysfs, if sysfs access fails then try reading directly from memory. **Root permissions** are required because the value is acquired by reading from sysfs or memory. Supported since Zabbix agent version 2.0.
system.hw.cpu[<cpu>,<info>]				

Key				
	CPU information.	String or integer	**cpu** - *<CPU number>* or *all* (default) **info** - possible values: *full* (default), *curfreq*, *maxfreq*, *model* or *vendor*	Example: => system.hw.cpu[0,vendor] → AuthenticAMD Gathers info from /proc/cpuinfo and /sys/devices/system/cpu/[cpur If a CPU number and *curfreq* or *maxfreq* is specified, a numeric value is returned (Hz). Supported since Zabbix agent version 2.0.
system.hw.devices[<type>]				
	Listing of PCI or USB devices.	Text	**type** - *pci* (default) or *usb*	Example: => system.hw.devices[pci] → 00:00.0 Host bridge: Advanced Micro Devices [AMD] RS780 Host Bridge [..] Returns the output of either lspci or lsusb utility (executed without any parameters) Supported since Zabbix agent version 2.0.
system.hw.macaddr[<interface>,<format>]				

Key				
	Listing of MAC addresses.	String	**interface** - *all* (default) or a regular expression[4] **format** - *full* (default) or *short*	Lists MAC adresses of the interfaces whose name matches the given `interface` regular expression[4] (*all* lists for all interfaces). Example: => system.hw.macaddr[”eth0$”,full] → [eth0] 00:11:22:33:44:55 If `format` is specified as *short*, interface names and identical MAC addresses are not listed. Supported since Zabbix agent version 2.0.
system.localtime[<type>]	System time.	Integer - with `type` as *utc* String - with `type` as *local*	**type** - possible values: *utc* - (default) the time since the Epoch (00:00:00 UTC, January 1, 1970), measured in seconds. *local* - the time in the ’yyyy-mm-dd,hh:mm:ss.nnn,+hh:mm’ format	Must be used as a passive check only. Parameters for this item are supported since Zabbix agent version 2.0. Example: => system.localtime[local] → create an item using this key and then use it to display host time in the *Clock* screen element.
system.run[command,<mode>]				

Key				
	Run specified command on the host.	Text result of the command 1 - with `mode` as *nowait* (regardless of command result)	**command** - command for execution **mode** - possible values: *wait* - wait end of execution (default), *nowait* - do not wait	Up to 512KB of data can be returned, including trailing whitespace that is truncated. To be processed correctly, the output of the command must be text. Example: => system.run[ls -l /] → detailed file list of root directory. *Note*: To enable this functionality, agent configuration file must contain EnableRemoteCommands=1 option. The return value of the item is standard output together with standard error produced by command. The exit code is not checked. Empty result is allowed starting with Zabbix 2.4.0. See also: Command execution.
system.stat[resource,<type>]				

Key			
	System statistics.	Integer or float	**ent** - number of processor units this partition is entitled to receive (float) **kthr,<type>** - information about kernel thread states: *r* - average number of runnable kernel threads (float) *b* - average number of kernel threads placed in the Virtual Memory Manager wait queue (float) **memory,<type>** - information about the usage of virtual and real memory: *avm* - active virtual pages (integer) *fre* - size of the free list (integer) **page,<type>** - information about page faults and paging activity: *fi* - file page-ins per second (float) *fo* - file page-outs per second (float) *pi* - pages paged in from paging space (float) *po* - pages paged out to paging space (float) *fr* - pages freed (page replacement) (float) *sr* - pages scanned by page-replacement algorithm (float) **faults,<type>** - trap and

Key				
				Comments This item is supported on AIX only, since Zabbix 1.8.1. Take note of the following limitations in these items: => system.stat[cpu,app] - supported only on AIX LPAR of type ”Shared” => system.stat[cpu,ec] - supported on AIX LPAR of type ”Shared” and ”Dedicated” (”Dedicated” always returns 100 (percent)) => system.stat[cpu,lbusy] - supported only on AIX LPAR of type ”Shared” => system.stat[cpu,pc] - supported on AIX LPAR of type ”Shared” and ”Dedicated” => system.stat[ent] - supported on AIX LPAR of type ”Shared” and ”Dedicated”
system.sw.arch	Software architecture information.	String		Example: => system.sw.arch → i686 Info is acquired from uname() function. Supported since Zabbix agent version 2.0.
system.sw.os[<info>]				

Key				
	Operating system information.	String	**info** - possible values: *full* (default), *short* or *name*	Example: => system.sw.os[short]→ Ubuntu 2.6.35-28.50-generic 2.6.35.11 Info is acquired from (note that not all files and options are present in all distributions): /proc/version (*full*) /proc/version_signature (*short*) PRETTY_NAME parameter from /etc/os-release on systems supporting it, or /etc/issue.net (*name*) Supported since Zabbix agent version 2.0.
system.sw.packages[<package>,<manager>,<format>]				

Key				
	Listing of installed packages.	Text	**package** - *all* (default) or a regular expression[4] **manager** - *all* (default) or a package manager **format** - *full* (default) or *short*	Lists (alphabetically) installed packages whose name matches the given `package` regular expression[4] (*all* lists them all). Example: => system.sw.packages[mini,dpkg,sh → python-minimal, python2.6-minimal, ubuntu-minimal Supported package managers (executed command): dpkg (dpkg --get-selections) pkgtool (ls /var/log/packages) rpm (rpm -qa) pacman (pacman -Q) If `format` is specified as *full*, packages are grouped by package managers (each manager on a separate line beginning with its name in square brackets). If `format` is specified as *short*, packages are not grouped and are listed on a single line. Supported since Zabbix agent version 2.0.
system.swap.in[<device>,<type>]				

Key				
	Swap in (from device into memory) statistics.	Integer	**device** - device used for swapping (default is *all*) **type** - possible values: *count* (number of swapins), *sectors* (sectors swapped in), *pages* (pages swapped in). See also platform-specific details for this parameter.	Example: => system.swap.in[,pages] The source of this information is: /proc/swaps, /proc/partitions, /proc/stat (Linux 2.4) /proc/swaps, /proc/diskstats, /proc/vmstat (Linux 2.6)
system.swap.out[<device>,<type>]				
	Swap out (from memory onto device) statistics.	Integer	**device** - device used for swapping (default is *all*) **type** - possible values: *count* (number of swapouts), *sectors* (sectors swapped out), *pages* (pages swapped out). See also platform-specific details for this parameter.	Example: => system.swap.out[,pages] The source of this information is: /proc/swaps, /proc/partitions, /proc/stat (Linux 2.4) /proc/swaps, /proc/diskstats, /proc/vmstat (Linux 2.6)
system.swap.size[<device>,<type>]				

Key				
	Swap space size in bytes or in percentage from total.	Integer - for bytes Float - for percentage	**device** - device used for swapping (default is *all*) **type** - possible values: *free* (free swap space, default), *pfree* (free swap space, in percent), *pused* (used swap space, in percent), *total* (total swap space), *used* (used swap space) See also platform-specific details for this parameter.	Example: => system.swap.size[,pfree] → free swap space percentage If *device* is not specified Zabbix agent will only take into account swap devices (files), physical memory will be ignored. For example, on Solaris systems *swap -s* command includes a portion of physical memory and swap devices (unlike *swap -l*). Note that this key might report incorrect swap space size/percentage on virtualized (VMware ESXi, VirtualBox) Windows platforms. In this case you may use the `perf_counter[\700(_Tota` key to obtain correct swap space percentage. Old naming: *system.swap.free*, *system.swap.total*
system.uname				

Key			
	Identification of the system.	String	Example of returned value (Unix): FreeBSD localhost 4.2-RELEASE FreeBSD 4.2-RELEASE #0: Mon Nov i386 Example of returned value (Windows): Windows ZABBIX-WIN 6.0.6001 Microsoft® Windows Server® 2008 Standard Service Pack 1 x86 On Unix since Zabbix 2.2.0 the value for this item is obtained with uname() system call. Previously it was obtained by invoking ”uname -a”. The value of this item might differ from the output of ”uname -a” and does not include additional information that ”uname -a” prints based on other sources. On Windows since Zabbix 3.0 the value for this item is obtained from Win32_OperatingSystem and Win32_Processor WMI classes. Previously it was obtained from volatile Windows APIs and undocumented registry keys.

Key			
system.uptime			
	System uptime in seconds.	Integer	In item configuration, use **s** or **uptime** units to get readable values.
system.users.num			
	Number of users logged in.	Integer	**who** command is used on the agent side to obtain the value.
vfs.dev.discovery			
	List of block devices and their type. Used for low-level discovery.	JSON object	This item is supported on Linux platform only. Supported since Zabbix 4.4.0.
vfs.dev.read[<device>,<type>,<mode>]			

Key					
		Disk read statistics.	Integer - with `type` in *sectors*, *operations*, *bytes* Float - with `type` in *sps*, *ops*, *bps* *Note*: if using an update interval of three hours or more[2], will always return '0'	**device** - disk device (default is *all* [3]) **type** - possible values: *sectors*, *operations*, *bytes*, *sps*, *ops*, *bps* Note that 'type' parameter support and defaults depend on the platform. See platform-specific details. *sps*, *ops*, *bps* stand for: sectors, operations, bytes per second, respectively. **mode** - possible values: *avg1* (one-minute average, default), *avg5*, *avg15*. This parameter is supported only with `type` in: sps, ops, bps.	You may use relative device names (for example, `sda`) as well as an optional /dev/ prefix (for example, `/dev/sda`). LVM logical volumes are supported. Default values of 'type' parameter for different OSes: AIX - operations FreeBSD - bps Linux - sps OpenBSD - operations Solaris - bytes Example: => vfs.dev.read[,operations] *sps*, *ops* and *bps* on supported platforms used to be limited to 8 devices (7 individual and one *all*). Since Zabbix 2.0.1 this limit is 1024 devices (1023 individual and one for *all*). Old naming: *io[*]*
vfs.dev.write[<device>,<type>,<mode>]					

Key					
		Disk write statistics.	Integer - with `type` in *sectors*, *operations*, *bytes* Float - with `type` in *sps*, *ops*, *bps* *Note*: if using an update interval of three hours or more[2], will always return '0'	**device** - disk device (default is *all* [3]) **type** - possible values: *sectors*, *operations*, *bytes*, *sps*, *ops*, *bps* Note that 'type' parameter support and defaults depend on the platform. See platform-specific details. *sps*, *ops*, *bps* stand for: sectors, operations, bytes per second, respectively. **mode** - possible values: *avg1* (one-minute average, default), *avg5*, *avg15*. This parameter is supported only with `type` in: sps, ops, bps.	You may use relative device names (for example, `sda`) as well as an optional /dev/ prefix (for example, `/dev/sda`). LVM logical volumes are supported. Default values of 'type' parameter for different OSes: AIX - operations FreeBSD - bps Linux - sps OpenBSD - operations Solaris - bytes Example: => vfs.dev.write[,operations] *sps*, *ops* and *bps* on supported platforms used to be limited to 8 devices (7 individual and one *all*). Since Zabbix 2.0.1 this limit is 1024 (1023 individual and one for *all*). Old naming: *io[*]*
vfs.dir.count[dir,<regex_incl>,<regex_excl>,<types_incl>,<types_excl>,<max_depth>,<min_size>,<max_size>,<min_age>,<max_age					

Key					
	Directory entry count.	Integer	**dir** - absolute path to directory **regex_incl** - regular expression describing the name pattern of the entity (file, directory, symbolic link) to include; include all if empty (default value) **regex_excl** - regular expression describing the name pattern of the entity (file, directory, symbolic link) to exclude; don't exclude any if empty (default value) **types_incl** - directory entry types to count, possible values: *file* - regular file, *dir* - subdirectory, *sym* - symbolic link, *sock* - socket, *bdev* - block device, *cdev* - character device, *fifo* - FIFO, *dev* - synonymous with "bdev,cdev", *all* - all types (default), i.e. "file,dir,sym,sock,bdev,cdev,fifo". Multiple types must be separated with comma and quoted. **types_excl** - directory entry types (see <types_incl>) to NOT count. If some entry type is in both <types_incl> and <types_excl>, directory	Environment variables, e.g. %APP_HOME%, $HOME and %TEMP% are not supported. Pseudo-directories "." and ".." are never counted. Symbolic links are never followed for directory traversal. On Windows, directory symlinks are skipped and hard links are counted only once. Both `regex_incl` and `regex_excl` are being applied to files and directories when calculating entry size, but are ignored when picking subdirectories to traverse (if regex_incl is "(?i)^.+\.zip$" and max_depth is not set, then all subdirectories will be traversed, but only files of type zip will be counted). Execution time is limited by the default timeout value in agent configuration (3 sec). Since large directory traversal may take longer than that, no data will be returned and

Key
vfs.dir.size[dir,<regex_incl>,<regex_excl>,<mode>,<max_depth>,<regex_excl_dir>]

Key				
	Directory size (in bytes).	Integer	**dir** - absolute path to directory **regex_incl** - regular expression describing the name pattern of the entity (file, directory, symbolic link) to include; include all if empty (default value) **regex_excl** - regular expression describing the name pattern of the entity (file, directory, symbolic link) to exclude; don't exclude any if empty (default value) **mode** - possible values: *apparent* (default) - gets apparent file sizes rather than disk usage (acts as `du -sb dir`), *disk* - gets disk usage (acts as `du -s -B1 dir`). Unlike du command, vfs.dir.size item takes hidden files in account when calculating directory size (acts as `du -sb .[^.]* * ` within dir). **max_depth** - maximum depth of subdirectories to traverse. **-1** (default) - unlimited, **0** - no descending into subdirectories. **regex_excl_dir** - regular expression describing the	Only directories with at least read permission for *zabbix* user are calculated. On Windows any symlink is skipped and hard links are taken into account only once. With large directories or slow drives this item may time out due to the Timeout setting in agent and server/proxy configuration files. Increase the timeout values as necessary. Examples: ⇒ vfs.dir.size[/tmp,log] - calculates size of all files in /tmp which contain 'log' ⇒ vfs.dir.size[/tmp,log,^.+\.old$] - calculates size of all files in /tmp which contain 'log', excluding files containing '.old' The file size limit depends on large file support. Supported since Zabbix 3.4.0.

Key				
vfs.file.cksum[file]	File checksum, calculated by the UNIX cksum algorithm.	Integer	**file** - full path to file	Example: => vfs.file.cksum[/etc/passwd] Example of returned value: 1938292000 Old naming: *cksum* The file size limit depends on large file support.
vfs.file.contents[file,<encoding>]	Retrieving contents of a file.	Text	**file** - full path to file **encoding** - code page identifier	Returns an empty string if the file is empty or contains LF/CR characters only. Byte order mark (BOM) is excluded from the output since Zabbix 4.4.2. Example: => vfs.file.contents[/etc/passwd] This item is limited to files no larger than 64 Kbytes. Supported since Zabbix agent version 2.0.
vfs.file.exists[file]	Checks if file exists.	0 - not found 1 - regular file or a link (symbolic or hard) to regular file exists	**file** - full path to file	Example: => vfs.file.exists[/tmp/application The return value depends on what S_ISREG POSIX macro returns. The file size limit depends on large file support.
vfs.file.md5sum[file]				

Key				
	MD5 checksum of file.	Character string (MD5 hash of the file)	**file** - full path to file	Example: => vfs.file.md5sum[/usr/local/etc/ Example of returned value: b5052decb577e0fffd622d6dd The file size limit (64 MB) for this item was removed in version 1.8.6. The file size limit depends on large file support.
vfs.file.regexp[file,regexp,<encoding>,<start line>,<end line>,<output>]				

Key					
vfs.file.regmatch[file,regexp,<encoding>,<start line>,<end line>]	Find string in a file.	The line containing the matched string, or as specified by the optional `output` parameter	**file** - full path to file **regexp** - regular expression[4] describing the required pattern **encoding** - code page identifier **start line** - the number of first line to search (first line of file by default). **end line** - the number of last line to search (last line of file by default). **output** - an optional output formatting template. The **\0** escape sequence is replaced with the matched part of text (from the first character where match begins until the character where match ends) while an **\N** (where N=1...9) escape sequence is replaced with Nth matched group (or an empty string if the N exceeds the number of captured groups).	Only the first matching line is returned. An empty string is returned if no line matched the expression. Byte order mark (BOM) is excluded from the output since Zabbix 4.4.2. Content extraction using the `output` parameter takes place on the agent. The `start line`, `end line` and `output` parameters are supported from version 2.2. Examples: => vfs.file.regexp[/etc/passwd,zal => vfs.file.regexp[/path/to/some/f 9]+)$"„3,5,\1] => vfs.file.regexp[/etc/passwd,"^ 9]+)"„„\1] → getting the ID of user *zabbix*

Key				
	Find string in a file.	0 - match not found 1 - found	**file** - full path to file **regexp** - regular expression[4] describing the required pattern **encoding** - code page identifier **start line** - the number of first line to search (first line of file by default). **end line** - the number of last line to search (last line of file by default).	Byte order mark (BOM) is ignored since Zabbix 4.4.2. The `start line` and `end line` parameters are supported from version 2.2. Example: => vfs.file.regmatch[/var/log/app.
vfs.file.size[file]	File size (in bytes).	Integer	**file** - full path to file	The file must have read permissions for user *zabbix*. Example: => vfs.file.size[/var/log/syslog] The file size limit depends on large file support.
vfs.file.time[file,<mode>]	File time information.	Integer (Unix timestamp)	**file** - full path to the file **mode** - possible values: *modify* (default) - last time of modifying file content, *access* - last time of reading file, *change* - last time of changing file properties	Example: => vfs.file.time[/etc/passwd,modi The file size limit depends on large file support.
vfs.fs.discovery				

Key				
	List of mounted filesystems. Used for low-level discovery.	JSON object		Supported since Zabbix agent version 2.0. {#FSDRIVETYPE} macro is supported on Windows since Zabbix agent version 3.0.
vfs.fs.get				
	List of mounted filesystems, their types, disk space and inode statistics. Can be used for low-level discovery.	JSON object		Supported since Zabbix agent version 4.4.5.
vfs.fs.inode[fs,<mode>]				
	Number or percentage of inodes.	Integer - for number Float - for percentage	**fs** - filesystem **mode** - possible values: *total* (default), *free*, *used*, //pfree // (free, percentage), *pused* (used, percentage)	Example: => vfs.fs.inode[/,pfree] Old naming: *vfs.fs.inode.free[*]*, *vfs.fs.inode.pfree[*]*, *vfs.fs.inode.total[*]*
vfs.fs.size[fs,<mode>]				
	Disk space in bytes or in percentage from total.	Integer - for bytes Float - for percentage	**fs** - filesystem **mode** - possible values: *total* (default), *free*, *used*, *pfree* (free, percentage), *pused* (used, percentage)	In case of a mounted volume, disk space for local file system is returned. Example: => vfs.fs.size[/tmp,free] Reserved space of a file system is taken into account and not included when using the *free* mode. Old naming: *vfs.fs.free[*]*, *vfs.fs.total[*]*, *vfs.fs.used[*]*, *vfs.fs.pfree[*]*, *vfs.fs.pused[*]*
vm.memory.size[<mode>]				

Key				
	Memory size in bytes or in percentage from total.	Integer - for bytes Float - for percentage	**mode** - possible values: *total* (default), *active*, *anon*, *buffers*, *cached*, *exec*, *file*, *free*, *inactive*, *pinned*, *shared*, *slab*, *wired*, *used*, *pused* (used, percentage), *available*, *pavailable* (available, percentage) See also platform-specific support and additional details for this parameter.	This item accepts three categories of parameters: 1) *total* - total amount of memory; 2) platform-specific memory types: *active*, *anon*, *buffers*, *cached*, *exec*, *file*, *free*, *inactive*, *pinned*, *shared*, *slab*, *wired*; 3) user-level estimates on how much memory is used and available: *used*, *pused*, *available*, *pavailable*.
web.page.get[host,<path>,<port>]				

Key				
	Get content of web page.	Web page source as text (including headers)	**host** - hostname or URL (as `scheme://host:port/path`, where only *host* is mandatory). Allowed URL schemes: *http*, *https*[5]. Missing scheme will be treated as *http*. If URL is specified `path` and `port` must be empty. Specifying user name/password when connecting to servers that require authentication, for example: `http://user:password@www.zabbix.com` is only possible with cURL support [5]. Punycode is suported in hostnames. **path** - path to HTML document (default is /) **port** - port number (default is 80 for HTTP)	This item turns unsupported if the resource specified in `host` does not exist or is unavailable. `host` can be hostname, domain name, IPv4 or IPv6 address. But for IPv6 address Zabbix agent must be compiled with IPv6 support enabled. Example: => web.page.get[www.zabbix.com] => web.page.get[https://www.zabbix.com/documentation/3.0] => web.page.get[https://blog.zabbix.com] => web.page.get[localhost:80] => web.page.get[”[::1]/server-status”]
web.page.perf[host,<path>,<port>]				

Key				
	Loading time of full web page (in seconds).	Float	**host** - hostname or URL (as `scheme://host:port/path`, where only *host* is mandatory). Allowed URL schemes: *http*, *https*[5]. Missing scheme will be treated as *http*. If URL is specified `path` and `port` must be empty. Specifying user name/password when connecting to servers that require authentication, for example: `http://user:password@www.example.com` is only possible with cURL support [5]. Punycode is suported in hostnames. **path** - path to HTML document (default is /) **port** - port number (default is 80 for HTTP)	This item turns unsupported if the resource specified in `host` does not exist or is unavailable. `host` can be hostname, domain name, IPv4 or IPv6 address. But for IPv6 address Zabbix agent must be compiled with IPv6 support enabled. Example: => web.page.perf[www.zabbix.co => web.page.perf[https://www.za
web.page.regexp[host,<path>,<port>,regexp,<length>,<output>]				

Key					
		Find string on a web page.	The matched string, or as specified by the optional `output` parameter	**host** - hostname or URL (as `scheme://host:port/path`, where only *host* is mandatory). Allowed URL schemes: *http*, *https*[5]. Missing scheme will be treated as *http*. If URL is specified `path` and `port` must be empty. Specifying user name/password when connecting to servers that require authentication, for example: `http://user:password@www.example.com` is only possible with cURL support [5]. Punycode is suported in hostnames. **path** - path to HTML document (default is /) **port** - port number (default is 80 for HTTP) **regexp** - regular expression[4] describing the required pattern **length** - maximum number of characters to return **output** - an optional output formatting template. The **\0** escape sequence is replaced with the matched part of text (from the first character where match begins until the character where match	This item turns unsupported if the resource specified in `host` does not exist or is unavailable. `host` can be hostname, domain name, IPv4 or IPv6 address. But for IPv6 address Zabbix agent must be compiled with IPv6 support enabled. Content extraction using the `output` parameter takes place on the agent. The `output` parameter is supported from version 2.2. Example: => web.page.regexp[www.zabbix => web.page.regexp[https://www

Key				
zabbix.stats[<ip>,<port>]	Return a set of Zabbix server or proxy internal metrics remotely.	JSON object	**ip** - IP/DNS/network mask list of servers/proxies to be remotely queried (default is 127.0.0.1) **port** - port of server/proxy to be remotely queried (default is 10051)	Note that the stats request will only be accepted from the addresses listed in the 'StatsAllowedIP' server/proxy parameter on the target instance. A selected set of internal metrics is returned by this item. For details, see Remote monitoring of Zabbix stats.
zabbix.stats[<ip>,<port>,queue,<from>,<to>]	Return number of monitored items in the queue which are delayed on Zabbix server or proxy remotely.	JSON object	**ip** - IP/DNS/network mask list of servers/proxies to be remotely queried (default is 127.0.0.1) **port** - port of server/proxy to be remotely queried (default is 10051) **queue** - constant (to be used as is) **from** - delayed by at least (default is 6 seconds) **to** - delayed by at most (default is infinity)	Note that the stats request will only be accepted from the addresses listed in the 'StatsAllowedIP' server/proxy parameter on the target instance.

Footnotes

[1] A Linux-specific note. Zabbix agent must have read-only access to filesystem */proc*. Kernel patches from www.grsecurity.org limit access rights of non-privileged users.

[2] `vfs.dev.read[]`, `vfs.dev.write[]`: Zabbix agent will terminate "stale" device connections if the item values are not accessed for more than 3 hours. This may happen if a system has devices with dynamically changing paths or if a device gets manually removed. Note also that these items, if using an update interval of 3 hours or more, will always return '0'.

[3] `vfs.dev.read[]`, `vfs.dev.write[]`: If default *all* is used for the first parameter then the key will return summary statistics, including all block devices like sda, sbd and their partitions (sda1, sda2, sdb3...) and multiple devices (MD raid) based on those block devices/partitions and logical volumes (LVM) based on those block devices/partitions. In such cases returned values should

be considered only as relative value (dynamic in time) but not as absolute values.

[4] Perl Compatible Regular Expression (PCRE) since Zabbix 3.4; POSIX-extended regular expression before that. See also: Regular expressions supported by location.

[5] SSL (HTTPS) is supported only if agent is compiled with cURL support. Otherwise the item will turn unsupported.

Encoding settings

To make sure that the acquired data are not corrupted you may specify the correct encoding for processing the check (e.g. 'vfs.file.contents') in the `encoding` parameter. The list of supported encodings (code page identifiers) may be found in documentation for libiconv (GNU Project) or in Microsoft Windows SDK documentation for "Code Page Identifiers".

If no encoding is specified in the `encoding` parameter the following resolution strategies are applied:

- Standard resolution - UTF-8 is used in Unix/Linux (default in newer distributions); ANSI with a system-specific extension is used in Windows;
- BOM analysis - applicable for items 'vfs.file.contents', 'vfs.file.regexp', 'vfs.file.regmatch' since Zabbix 4.4.2. An attempt is made to determine the correct encoding by using the byte order mark (BOM) at the beginning of the file. If BOM is not present - standard resolution (see above) is applied instead.

Troubleshooting agent items

- If used with the passive agent, *Timeout* value in server configuration may need to be higher than *Timeout* in the agent configuration file. Otherwise the item may not get any value because the server request to agent timed out first.

Zabbix agent 2

Item keys

The table provides details on the item keys that you can only use with Zabbix agent 2.

Key	Description	Return value	Parameters	Comments
redis.config[<connString>,<password>,<pattern>]	Gets the configuration parameters of a Redis instance that match the pattern.	JSON - if a glob-style pattern was used single value - if a pattern did not contain any wildcard character	**connString** - URI or session name. **password** - Redis password. **pattern** - glob-style pattern (* by default).	This item is supported since Zabbix 4.4.5 for the Redis plugin.
redis.info[<connString>,<password>,<section>]	Gets the output of the INFO command.	JSON - output is serialized as JSON	**connString** - URI or session name. **password** - Redis password. **section** - section of information (*default* by default).	This item is supported since Zabbix 4.4.5 for the Redis plugin.
redis.ping[<connString>,<password>]				

Key				
	Test if a connection is alive or not.	1 - connection is alive 0 - connection is broken (if there is any error presented including AUTH and configuration issues)	**connString** - URI or session name. **password** - Redis password.	This item is supported since Zabbix 4.4.5 for the Redis plugin.
redis.slowlog.count[<connString>,<password>]	The number of slow log entries since Redis was started.	Integer	**connString** - URI or session name. **password** - Redis password.	This item is supported since Zabbix 4.4.5 for the Redis plugin.
systemd.unit.info[<unit name>,<property>,<interface>]				

Key					
	Systemd unit information.	String	**unit name** - unit name (you may want to use the {#UNIT.NAME} macro in item prototype to discover the name) **property** - unit property (e.g. ActiveState (default), LoadState, Description) **interface** - unit interface type (e.g. Unit (default), Socket, Service)	This item allows to retrieve a specific property from specific type of interface as described in dbus API. This item is only supported in Zabbix agent 2. This item is supported on Linux platform only. Examples: => sys-temd.unit.info[”{#UNIT.NAME - collect active state (active, reloading, inactive, failed, activating, deactivating) info on discovered systemd units => sys-temd.unit.info[”{#UNIT.NAME - collect load state info on discovered systemd units => sys-temd.unit.info[mysqld.service - retrieve service technical name (mysqld.service) => sys-temd.unit.info[mysqld.service - retrieve service desciption (MySQL Server) => sys-temd.unit.info[mysqld.service - retrieve the last time the service entered the active state (1562565036283903) => sys-temd.unit.info[dbus.socket,NO - collect the number of connections from this socket unit

Key				
systemd.unit.discovery[<type>]	List of systemd units and their details. Used for low-level discovery.	JSON object	**type** - possible values: *all*, *automount*, *device*, *mount*, *path*, *service* (default), *socket*, *swap*, *target*	This item is supported on Linux platform only.

Redis plugin metrics

Overview

The Redis plugin in Zabbix agent 2 provides a native Zabbix solution for monitoring Redis servers (the in-memory data structure store).

Attention:
The Redis plugin is available since Zabbix agent 2 version 4.4.5.
An updated plugin version, described on this page, is available since Zabbix 4.4.8

The plugin uses the RESP protocol (over TCP and Unix-sockets) implementation in order to gather all necessary metrics.

An official Redis template is available, which you may extend as needed or create your own template.

Installation

The plugin is supplied as part of Zabbix agent 2, and it does not require any special installation steps. Once Zabbix agent 2 installed, the plugin is ready to work. The only thing you need to do is to make sure that a Redis instance is available for connection.

Configuration

The plugin uses the configuration file of Zabbix agent 2 for its parameters.

Connections

The plugin supports gathering metrics from multiple Redis instances simultaneously. Both local and remote instances can be monitored. TCP and Unix-socket connections are supported.

The plugin keeps connections to Redis instances in the opened state. The benefits are reduced network congestion, latency and CPU and memory usage due to the lower number of connections. The client library takes care of this.

Underlying every connection is a pool of connections. A connection is initialized at the same time when the first metric request (that needs a connection) is performed (lazy connection):

- Requests are limited in time of execution by the timeout option (see `Plugin.Redis.Timeout` configuration parameter);
- A special timer closes connections that have not been accessed too long (see `Plugin.Redis.KeepAlive` configuration parameter).

Authentication

The plugin can authenticate using the password specified as a key parameter or within named sessions. Embedded URI credentials (userinfo) will be ignored.

Named sessions

Named sessions allow you to define specific parameters for each Redis instance. Currently, only two parameters are supported: `Uri` and `Password`. Those can be useful if you have multiple instances with different credentials. E.g: if you have two instances: "Redis1" and "Redis2", you need to add these options to your agent 2 configuration:

```
Plugins.Redis.Sessions.Redis1.Uri=tcp://127.0.0.1:6379
Plugins.Redis.Sessions.Redis1.Password=<PasswordForRedis1>
Plugins.Redis.Sessions.Redis2.Uri=tcp://127.0.0.1:6380
Plugins.Redis.Sessions.Redis2.Password=<PasswordForRedis2>
```

Then you can use these names as `connString` in the item keys instead of URIs, e.g:

```
redis.info[Redis1]
redis.info[Redis2]
```

> **Note:**
> Named sessions provide a more secure way to store credentials compared to item key parameters or user macros.

Metrics

The following items are supported:

- redis.config[<connString>,<password>, <pattern>]
- redis.info[<connString>,<password>, <section>]
- redis.ping[<connString>, <password>]
- redis.slowlog.count[<connString>, <password>]

See also: Agent 2 item keys

Parameter priority

There are four levels of parameter overwriting:

1. hardcoded default values →
2. 1st level configuration parameters (Plugins.Redis.*) →
3. named sessions (Plugins.Redis.Sessions.<sessionName>.*) →
4. item key parameters

Troubleshooting

The plugin uses Zabbix agent logs. Increase the debug level on the Zabbix agent to view more information in the logs.

Windows-specific item keys

Item keys

The table provides details on the item keys that you can use with Zabbix Windows agent only.

See also: Minimum permission level for Windows agent items

Key	Description	Return value	Parameters	Comments
eventlog[name,<regexp>,<severity>,<source>,<eventid>,<maxlines>,<mode>]				

Key					
	Event log monitoring.	Log	**name** - name of event log **regexp** - regular expression describing the required pattern **severity** - regular expression describing severity This parameter accepts the following values: *"Information"*, *"Warning"*, *"Error"*, *"Critical"*, *"Verbose"* (since Zabbix 2.2.0 running on Windows Vista or newer) **source** - regular expression describing source identifier (regular expression is supported since Zabbix 2.2.0) **eventid** - regular expression describing the event identifier(s) **maxlines** - maximum number of new lines per second the agent will send to Zabbix server or proxy. This parameter overrides the value of 'MaxLinesPerSecond' in zabbix_agentd.win.conf. **mode** - possible values: *all* (default), *skip* - skip processing of	The item must be configured as an active check. Examples: => eventlog[Application] => eventlog[Security,"Failure Audit",^(529|680)$] => eventlog[System,"Warning\|Error"] => eventlog[System,,^1$] => eventlog[System,,@TWOSHORT] - here a custom regular expression named `TWOSHORT` is referenced (defined as a *Result is TRUE* type, the expression itself being `^1$\|^70$`). *Note* that the agent is unable to send in events from the "Forwarded events" log. The `mode` parameter is supported since Zabbix 2.0.0. "Windows Eventing 6.0" is supported since Zabbix 2.2.0. Note that selecting a non-Log type of information for this item will lead to the loss of local timestamp, as well as log severity and source information. See also additional information on

Key			
net.if.list	Network interface list (includes interface type, status, IPv4 address, description).	Text	Supported since Zabbix agent version 1.8.1. Multi-byte interface names supported since Zabbix agent version 1.8.6. Disabled interfaces are not listed. Note that enabling/disabling some components may change their ordering in the Windows interface name. Some Windows versions (for example, Server 2008) might require the latest updates installed to support non-ASCII characters in interface names.
perf_counter[counter,<interval>]			

Key				
	Value of any Windows performance counter.	Integer, float, string or text (depending on the request)	**counter** - path to the counter **interval** - last N seconds for storing the average value. The `interval` must be between 1 and 900 seconds (included) and the default value is 1.	Performance Monitor can be used to obtain list of available counters. Until version 1.6 this parameter will return correct value only for counters that require just one sample (like \System\Threads). It will not work as expected for counters that require more that one sample - like CPU utilisation. Since 1.6, `interval` is used, so the check returns an average value for last "interval" seconds every time. See also: Windows performance counters.
perf_counter_en[counter,<interval>]	Value of any Windows performance counter in English.	Integer, float, string or text (depending on the request)	**counter** - path to the counter in English **interval** - last N seconds for storing the average value. The `interval` must be between 1 and 900 seconds (included) and the default value is 1.	This item is only supported on **Windows Server 2008/Vista** and above. You can find the list of English strings by viewing the following registry key: `HKEY_LOCAL_MACHINE\SOFT NT\CurrentVersion\Perfl` Supported since Zabbix agent versions 4.0.13 and 4.2.7.
proc_info[process,<attribute>,<type>]				

Key					
	Various information about specific process(es).	Float	**process** - process name **attribute** - requested process attribute **type** - representation type (meaningful when more than one process with the same name exists)	The following `attributes` are supported: *vmsize* (default) - size of process virtual memory in Kbytes *wkset* - size of process working set (amount of physical memory used by process) in Kbytes *pf* - number of page faults *ktime* - process kernel time in milliseconds *utime* - process user time in milliseconds *io_read_b* - number of bytes read by process during I/O operations *io_read_op* - number of read operation performed by process *io_write_b* - number of bytes written by process during I/O operations *io_write_op* - number of write operation performed by process *io_other_b* - number of bytes transferred by process during operations other than read and write operations *io_other_op* - number of I/O operations performed by process, other than read and write operations *gdiobj* - number of GDI objects used

Key				
service.discovery	List of Windows services. Used for low-level discovery.	JSON object		Supported since Zabbix agent version 3.0.
service.info[service,<param>]	Information about a service.	Integer - with `param` as *state*, *startup* String - with `param` as *displayname*, *path*, *user* Text - with `param` as *description* Specifically for *state*: 0 - running, 1 - paused, 2 - start pending, 3 - pause pending, 4 - continue pending, 5 - stop pending, 6 - stopped, 7 - unknown, 255 - no such service Specifically for *startup*: 0 - automatic, 1 - automatic delayed, 2 - manual, 3 - disabled, 4 - unknown, 5 - automatic trigger start, 6 - automatic delayed trigger start, 7 - manual trigger start	**service** - a real service name or its display name as seen in MMC Services snap-in **param** - *state* (default), *displayname*, *path*, *user*, *startup* or *description*	Examples: => service.info[SNMPTRAP] - state of the SNMPTRAP service => service.info[SNMP Trap] - state of the same service, but with display name specified => service.info[EventLog,startup] - startup type of the EventLog service Items service.info[service,state] and service.info[service] will return the same information. Note that only with `param` as *state* this item returns a value for non-existing services (255). This item is supported since Zabbix 3.0.0. It should be used instead of the deprecated service_state[service] item.
services[<type>,<state>,<exclude>]				

Key					
		Listing of services.	0 - if empty Text - list of services separated by a newline	**type** - *all* (default), *automatic*, *manual* or *disabled* **state** - *all* (default), *stopped*, *started*, *start_pending*, *stop_pending*, *running*, *continue_pending*, *pause_pending* or *paused* **exclude** - services to exclude from the result. Excluded services should be listed in double quotes, separated by comma, without spaces.	Examples: => services[,started] - list of started services => services[automatic, stopped] - list of stopped services, that should be run => services[automatic, stopped, "service1,service2,service3"] - list of stopped services, that should be run, excluding services with names service1, service2 and service3 The `exclude` parameter is supported since Zabbix 1.8.1.
wmi.get[<namespace>,<query>]		Execute WMI query and return the first selected object.	Integer, float, string or text (depending on the request)	**namespace** - WMI namespace **query** - WMI query returning a single object	WMI queries are performed with WQL. Example: => wmi.get[root\cimv2,select status from Win32_DiskDrive where Name like '%PHYSICALDRIVE0%'] - returns the status of the first physical disk This key is supported since Zabbix 2.2.0.
wmi.getall[<namespace>,<query>]					

Key				
	Execute WMI query and return the whole response. Can be used for low-level discovery.	JSON object	**namespace** - WMI namespace **query** - WMI query	WMI queries are performed with WQL. Example: => wmi.getall[root\cimv2,select * from Win32_DiskDrive where Name like '%PHYSICALDRIVE%'] - returns status information of physical disks JSONPath preprocessing can be used to point to more specific values in the returned JSON. This key is supported since Zabbix 4.4.0.
vm.vmemory.size[<type>]				

Key				
	Virtual memory size in bytes or in percentage from total.	Integer - for bytes Float - for percentage	**type** - possible values: *available* (available virtual memory), *pavailable* (available virtual memory, in percent), *pused* (used virtual memory, in percent), *total* (total virtual memory, default), *used* (used virtual memory)	Example: => vm.vmemory.size[pavailable] → available virtual memory, in percentage Monitoring of virtual memory statistics is based on: * Total virtual memory on Windows (total physical + page file size); * The maximum amount of memory Zabbix agent can commit; * The current committed memory limit for the system or Zabbix agent, whichever is smaller. This key is supported since Zabbix 3.0.7 and 3.2.3.

Monitoring Windows services

This tutorial provides step-by-step instructions for setting up the monitoring of Windows services. It is assumed that Zabbix server and agent are configured and operational.

Step 1

Get the service name.

You can get that name by going to MMC Services snap-in and bringing up the properties of the service. In the General tab you should see a field called 'Service name'. The value that follows is the name you will use when setting up an item for monitoring.

For example, if you wanted to monitor the "workstation" service then your service might be: **lanmanworkstation**.

Step 2

Configure an item for monitoring the service.

The item service.info[service,<param>] retrieves the information about a particular service. Depending on the information you need, specify the *param* option which accepts the following values: *displayname*, *state*, *path*, *user*, *startup* or *description*. The default value is *state* if *param* is not specified (service.info[service]).

The type of return value depends on chosen *param*: integer for *state* and *startup*; character string for *displayname*, *path* and *user*; text for *description*.

Example:

- *Key*: service.info[lanmanworkstation]

- *Type of information*: Numeric (unsigned)
- *Show value*: select the *Windows service state* value mapping

Two value maps are available *Windows service state* and *Windows service startup type* to map a numerical value to a text representation in the Frontend.

Discovery of Windows services

Low-level discovery provides a way to automatically create items, triggers, and graphs for different entities on a computer. Zabbix can automatically start monitoring Windows services on your machine, without the need to know the exact name of a service or create items for each service manually. A filter can be used to generate real items, triggers, and graphs only for services of interest.

2 SNMP agent

Overview

You may want to use SNMP monitoring on devices such as printers, network switches, routers or UPS that usually are SNMP-enabled and on which it would be impractical to attempt setting up complete operating systems and Zabbix agents.

To be able to retrieve data provided by SNMP agents on these devices, Zabbix server must be initially configured with SNMP support.

SNMP checks are performed over the UDP protocol only.

Zabbix server and proxy daemons query SNMP devices for multiple values in a single request. This affects all kinds of SNMP items (regular SNMP items, SNMP items with dynamic indexes, and SNMP low-level discovery) and should make SNMP processing much more efficient. See the bulk processing section for technical details on how it works internally. Bulk requests can also be disabled for devices that cannot handle them properly using the "Use bulk requests" setting for each interface.

Zabbix server and proxy daemons log lines similar to the following if they receive an incorrect SNMP response:

```
SNMP response from host "gateway" does not contain all of the requested variable bindings
```

While they do not cover all the problematic cases, they are useful for identifying individual SNMP devices for which bulk requests should be disabled.

Zabbix server/proxy will always retry at least one time after an unsuccessful query attempt: either through the SNMP library's retrying mechanism or through the internal bulk processing mechanism.

Warning:
If monitoring SNMPv3 devices, make sure that msgAuthoritativeEngineID (also known as snmpEngineID or "Engine ID") is never shared by two devices. According to RFC 2571 (section 3.1.1.1) it must be unique for each device.

Configuring SNMP monitoring

To start monitoring a device through SNMP, the following steps have to be performed:

Step 1

Create a host for the device with an SNMP interface.

Enter the IP address/DNS name and port number. You can use one of the provided SNMP templates (*Template SNMP Device* and others) that will automatically add a set of items. However, the template may not be compatible with the host. Click on *Add* to save the host.

Step 2

Find out the SNMP string (or OID) of the item you want to monitor.

To get a list of SNMP strings, use the **snmpwalk** command (part of net-snmp software which you should have installed as part of the Zabbix installation) or equivalent tool:

```
shell> snmpwalk -v 2c -c public <host IP> .
```

As '2c' here stands for SNMP version, you may also substitute it with '1', to indicate SNMP Version 1 on the device.

This should give you a list of SNMP strings and their last value. If it doesn't then it is possible that the SNMP 'community' is different from the standard 'public' in which case you will need to find out what it is.

You can then go through the list until you find the string you want to monitor, e.g. if you wanted to monitor the bytes coming in to your switch on port 3 you would use the `IF-MIB::ifInOctets.3` string from this line:

```
IF-MIB::ifInOctets.3 = Counter32: 3409739121
```

You may now use the **snmpget** command to find out the numeric OID for 'IF-MIB::ifInOctets.3':

```
shell> snmpget -v 2c -c public -On 10.62.1.22 IF-MIB::ifInOctets.3
```

Note that the last number in the string is the port number you are looking to monitor. See also: Dynamic indexes.

This should give you something like the following:

```
.1.3.6.1.2.1.2.2.1.10.3 = Counter32: 3472126941
```

Again, the last number in the OID is the port number.

Note:
3COM seem to use port numbers in the hundreds, e.g. port 1 = port 101, port 3 = port 103, but Cisco use regular numbers, e.g. port 3 = 3.

Note:
Some of the most used SNMP OIDs are translated automatically to a numeric representation by Zabbix.

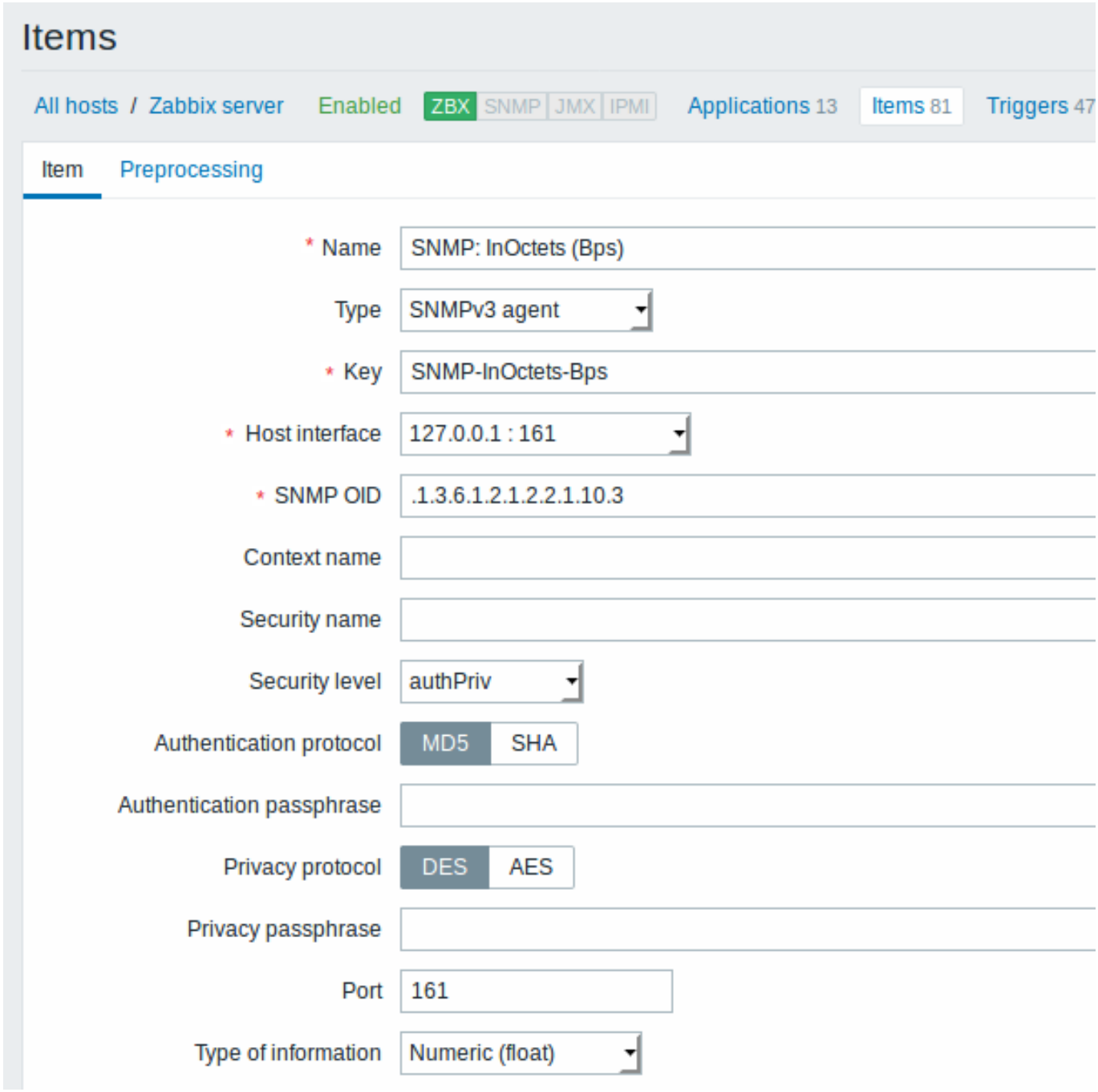
In the last example above value type is "Counter32", which internally corresponds to ASN_COUNTER type. The full list of supported types is ASN_COUNTER, ASN_COUNTER64, ASN_UINTEGER, ASN_UNSIGNED64, ASN_INTEGER, ASN_INTEGER64, ASN_FLOAT, ASN_DOUBLE, ASN_TIMETICKS, ASN_GAUGE, ASN_IPADDRESS, ASN_OCTET_STR and ASN_OBJECT_ID (since 2.2.8, 2.4.3). These types roughly correspond to "Counter32", "Counter64", "UInteger32", "INTEGER", "Float", "Double", "Timeticks", "Gauge32", "IpAddress", "OCTET STRING", "OBJECT IDENTIFIER" in **snmpget** output, but might also be shown as "STRING", "Hex-STRING", "OID" and other, depending on the presence of a display hint.

Step 3

Create an item for monitoring.

So, now go back to Zabbix and click on *Items* for the SNMP host you created earlier. Depending on whether you used a template or not when creating your host, you will have either a list of SNMP items associated with your host or just an empty list. We will work on the assumption that you are going to create the item yourself using the information you have just gathered using snmpwalk and snmpget, so click on *Create item*. In the new item form, enter the item 'Name'. Make sure the 'Host interface' field has your switch/router in it and change the 'Type' field to "SNMPv* agent". Enter the community (usually public) and enter the textual or numeric OID that you retrieved earlier into the 'SNMP OID' field, for example: .1.3.6.1.2.1.2.2.1.10.3

Enter the SNMP 'Port' as 161 and the 'Key' as something meaningful, e.g. SNMP-InOctets-Bps. Set the 'Type of information' to *Numeric (float)* and the preprocessing step as *Change per second* (important, otherwise you will get cumulative values from the SNMP device instead of the latest change). Choose a custom multiplier if you want one and enter an 'Update interval' and 'History storage period' if you want them to be different from the default.



All mandatory input fields are marked with a red asterisk.

Now save the item and go to *Monitoring* → *Latest data* for your SNMP data!

Take note of specific options available for SNMPv3 items:

Parameter	Description
Context name	Enter context name to identify item on SNMP subnet. *Context name* is supported for SNMPv3 items since Zabbix 2.2. User macros are resolved in this field.
Security name	Enter security name. User macros are resolved in this field.
Security level	Select security level: **noAuthNoPriv** - no authentication nor privacy protocols are used **AuthNoPriv** - authentication protocol is used, privacy protocol is not **AuthPriv** - both authentication and privacy protocols are used
Authentication protocol	Select authentication protocol - *MD5* or *SHA*.
Authentication passphrase	Enter authentication passphrase. User macros are resolved in this field.

Parameter	Description
Privacy protocol	Select privacy protocol - *DES* or *AES*.
Privacy passphrase	Enter privacy passphrase. User macros are resolved in this field.

In case of wrong SNMPv3 credentials (security name, authentication protocol/passphrase, privacy protocol) Zabbix receives an ERROR from net-snmp, except for wrong *Privacy passphrase* in which case Zabbix receives a TIMEOUT error from net-snmp.

Warning:
Server/proxy restart is required for changes in *Authentication protocol*, *Authentication passphrase*, *Privacy protocol* or *Privacy passphrase* to take effect, if the *Security name* is not changed at the same time. In cases, where *Security name* is also changed, all parameters will be updated immediately.

Example 1

General example:

Parameter	Description
Community	public
OID	1.2.3.45.6.7.8.0 (or .1.2.3.45.6.7.8.0)
Key	<Unique string to be used as reference to triggers> For example, ”my_param”.

Note that OID can be given in either numeric or string form. However, in some cases, string OID must be converted to numeric representation. Utility snmpget may be used for this purpose:

```
shell> snmpget -On localhost public enterprises.ucdavis.memory.memTotalSwap.0
```

Monitoring of SNMP parameters is possible if --with-net-snmp flag was specified while configuring Zabbix sources.

Example 2

Monitoring of uptime:

Parameter	Description
Community	public
Oid	MIB::sysUpTime.0
Key	router.uptime
Value type	Float
Units	uptime
Multiplier	0.01

Internal workings of bulk processing

Starting from 2.2.3 Zabbix server and proxy query SNMP devices for multiple values in a single request. This affects several types of SNMP items:

- regular SNMP items;
- SNMP items with dynamic indexes;
- SNMP low-level discovery rules.

All SNMP items on a single interface with identical parameters are scheduled to be queried at the same time. The first two types of items are taken by pollers in batches of at most 128 items, whereas low-level discovery rules are processed individually, as before.

On the lower level, there are two kinds of operations performed for querying values: getting multiple specified objects and walking an OID tree.

For ”getting”, a GetRequest-PDU is used with at most 128 variable bindings. For ”walking”, a GetNextRequest-PDU is used for SNMPv1 and GetBulkRequest with ”max-repetitions” field of at most 128 is used for SNMPv2 and SNMPv3.

Thus, the benefits of bulk processing for each SNMP item type are outlined below:

- regular SNMP items benefit from ”getting” improvements;
- SNMP items with dynamic indexes benefit from both ”getting” and ”walking” improvements: ”getting” is used for index verification and ”walking” for building the cache;

- SNMP low-level discovery rules benefit from ”walking” improvements.

However, there is a technical issue that not all devices are capable of returning 128 values per request. Some always return a proper response, but others either respond with a ”tooBig(1)” error or do not respond at all once the potential response is over a certain limit.

In order to find an optimal number of objects to query for a given device, Zabbix uses the following strategy. It starts cautiously with querying 1 value in a request. If that is successful, it queries 2 values in a request. If that is successful again, it queries 3 values in a request and continues similarly by multiplying the number of queried objects by 1.5, resulting in the following sequence of request sizes: 1, 2, 3, 4, 6, 9, 13, 19, 28, 42, 63, 94, 128.

However, once a device refuses to give a proper response (for example, for 42 variables), Zabbix does two things.

First, for the current item batch it halves the number of objects in a single request and queries 21 variables. If the device is alive, then the query should work in the vast majority of cases, because 28 variables were known to work and 21 is significantly less than that. However, if that still fails, then Zabbix falls back to querying values one by one. If it still fails at this point, then the device is definitely not responding and request size is not an issue.

The second thing Zabbix does for subsequent item batches is it starts with the last successful number of variables (28 in our example) and continues incrementing request sizes by 1 until the limit is hit. For example, assuming the largest response size is 32 variables, the subsequent requests will be of sizes 29, 30, 31, 32, and 33. The last request will fail and Zabbix will never issue a request of size 33 again. From that point on, Zabbix will query at most 32 variables for this device.

If large queries fail with this number of variables, it can mean one of two things. The exact criteria that a device uses for limiting response size cannot be known, but we try to approximate that using the number of variables. So the first possibility is that this number of variables is around the device’s actual response size limit in the general case: sometimes response is less than the limit, sometimes it is greater than that. The second possibility is that a UDP packet in either direction simply got lost. For these reasons, if Zabbix gets a failed query, it reduces the maximum number of variables to try to get deeper into the device’s comfortable range, but (starting from 2.2.8) only up to two times.

In the example above, if a query with 32 variables happens to fail, Zabbix will reduce the count to 31. If that happens to fail, too, Zabbix will reduce the count to 30. However, Zabbix will not reduce the count below 30, because it will assume that further failures are due to UDP packets getting lost, rather than the device’s limit.

If, however, a device cannot handle bulk requests properly for other reasons and the heuristic described above does not work, since Zabbix 2.4 there is a ”Use bulk requests” setting for each interface that allows to disable bulk requests for that device.

1 Dynamic indexes

Overview

While you may find the required index number (for example, of a network interface) among the SNMP OIDs, sometimes you may not completely rely on the index number always staying the same.

Index numbers may be dynamic - they may change over time and your item may stop working as a consequence.

To avoid this scenario, it is possible to define an OID which takes into account the possibility of an index number changing.

For example, if you need to retrieve the index value to append to **ifInOctets** that corresponds to the **GigabitEthernet0/1** interface on a Cisco device, use the following OID:

```
ifInOctets["index","ifDescr","GigabitEthernet0/1"]
```

The syntax

A special syntax for OID is used:

<OID of data>[”index”,”<base OID of index>”,”<string to search for>”]

Parameter	Description
OID of data	Main OID to use for data retrieval on the item.
index	Method of processing. Currently one method is supported: **index** – search for index and append it to the data OID
base OID of index	This OID will be looked up to get the index value corresponding to the string.
string to search for	The string to use for an exact match with a value when doing lookup. Case sensitive.

Example

Getting memory usage of *apache* process.

If using this OID syntax:

```
HOST-RESOURCES-MIB::hrSWRunPerfMem["index","HOST-RESOURCES-MIB::hrSWRunPath", "/usr/sbin/apache2"]
```

the index number will be looked up here:

```
...
HOST-RESOURCES-MIB::hrSWRunPath.5376 = STRING: "/sbin/getty"
HOST-RESOURCES-MIB::hrSWRunPath.5377 = STRING: "/sbin/getty"
HOST-RESOURCES-MIB::hrSWRunPath.5388 = STRING: "/usr/sbin/apache2"
HOST-RESOURCES-MIB::hrSWRunPath.5389 = STRING: "/sbin/sshd"
...
```

Now we have the index, 5388. The index will be appended to the data OID in order to receive the value we are interested in:

```
HOST-RESOURCES-MIB::hrSWRunPerfMem.5388 = INTEGER: 31468 KBytes
```

Index lookup caching

When a dynamic index item is requested, Zabbix retrieves and caches whole SNMP table under base OID for index, even if a match would be found sooner. This is done in case another item would refer to the same base OID later - Zabbix would look up index in the cache, instead of querying the monitored host again. Note that each poller process uses separate cache.

In all subsequent value retrieval operations only the found index is verified. If it has not changed, value is requested. If it has changed, cache is rebuilt - each poller that encounters a changed index walks the index SNMP table again.

2 Special OIDs

Some of the most used SNMP OIDs are translated automatically to a numeric representation by Zabbix. For example, **ifIndex** is translated to **1.3.6.1.2.1.2.2.1.1**, **ifIndex.0** is translated to **1.3.6.1.2.1.2.2.1.1.0**.

The table contains list of the special OIDs.

Special OID	Identifier	Description
ifIndex	1.3.6.1.2.1.2.2.1.1	A unique value for each interface.
ifDescr	1.3.6.1.2.1.2.2.1.2	A textual string containing information about the interface.This string should include the name of the manufacturer, the product name and the version of the hardware interface.
ifType	1.3.6.1.2.1.2.2.1.3	The type of interface, distinguished according to the physical/link protocol(s) immediately ’below’ the network layer in the protocol stack.
ifMtu	1.3.6.1.2.1.2.2.1.4	The size of the largest datagram which can be sent / received on the interface, specified in octets.
ifSpeed	1.3.6.1.2.1.2.2.1.5	An estimate of the interface’s current bandwidth in bits per second.
ifPhysAddress	1.3.6.1.2.1.2.2.1.6	The interface’s address at the protocol layer immediately ‘below’ the network layer in the protocol stack.
ifAdminStatus	1.3.6.1.2.1.2.2.1.7	The current administrative state of the interface.
ifOperStatus	1.3.6.1.2.1.2.2.1.8	The current operational state of the interface.
ifInOctets	1.3.6.1.2.1.2.2.1.10	The total number of octets received on the interface, including framing characters.
ifInUcastPkts	1.3.6.1.2.1.2.2.1.11	The number of subnetwork-unicast packets delivered to a higher-layer protocol.

Special OID	Identifier	Description
ifInNUcastPkts	1.3.6.1.2.1.2.2.1.12	The number of non-unicast (i.e., subnetwork- broadcast or subnetwork-multicast) packets delivered to a higher-layer protocol.
ifInDiscards	1.3.6.1.2.1.2.2.1.13	The number of inbound packets which were chosen to be discarded even though no errors had been detected to prevent their being deliverable to a higher-layer protocol. One possible reason for discarding such a packet could be to free up buffer space.
ifInErrors	1.3.6.1.2.1.2.2.1.14	The number of inbound packets that contained errors preventing them from being deliverable to a higher-layer protocol.
ifInUnknownProtos	1.3.6.1.2.1.2.2.1.15	The number of packets received via the interface which were discarded because of an unknown or unsupported protocol.
ifOutOctets	1.3.6.1.2.1.2.2.1.16	The total number of octets transmitted out of the interface, including framing characters.
ifOutUcastPkts	1.3.6.1.2.1.2.2.1.17	The total number of packets that higher-level protocols requested be transmitted, and which were not addressed to a multicast or broadcast address at this sub-layer, including those that were discarded or not sent.
ifOutNUcastPkts	1.3.6.1.2.1.2.2.1.18	The total number of packets that higher-level protocols requested be transmitted, and which were addressed to a multicast or broadcast address at this sub-layer, including those that were discarded or not sent.
ifOutDiscards	1.3.6.1.2.1.2.2.1.19	The number of outbound packets which were chosen to be discarded even though no errors had been detected to prevent their being transmitted. One possible reason for discarding such a packet could be to free up buffer space.
ifOutErrors	1.3.6.1.2.1.2.2.1.20	The number of outbound packets that could not be transmitted because of errors.
ifOutQLen	1.3.6.1.2.1.2.2.1.21	The length of the output packet queue (in packets).

3 MIB files

Introduction

MIB stands for a Management Information Base. MIB files allow you to use textual representation of the OID (Object Identifier).

For example,

`ifHCOutOctets`

is textual representation of OID

`1.3.6.1.2.1.31.1.1.1.10`

You can use either, when monitoring SNMP devices with Zabbix, but if you feel more comfortable when using textual representation you have to install MIB files.

Installing MIB files

On Debian-based systems:

```
# apt install snmp-mibs-downloader
# download-mibs
```

On RedHat-based systems:

```
# yum install net-snmp-libs
```

Enabling MIB files

On RedHat-based systems the mib files should be enabled by default. On Debian-based systems you have to edit file `/etc/snmp/snmp.conf` and comment out the line that says `mibs :`

```
# As the snmp packages come without MIB files due to license reasons, loading
# of MIBs is disabled by default. If you added the MIBs you can reenable
# loading them by commenting out the following line.
#mibs :
```

Testing MIB files

Testing snmp MIBs can be done using `snmpwalk` utility. If you don't have it installed, use the following instructions.

On Debian-based systems:

```
# apt install snmp
```

On RedHat-based systems:

```
# yum install net-snmp-utils
```

After that, the following command must not give error when you query a network device:

```
$ snmpwalk -v 2c -c public <NETWORK DEVICE IP> ifInOctets
IF-MIB::ifInOctets.1 = Counter32: 176137634
IF-MIB::ifInOctets.2 = Counter32: 0
IF-MIB::ifInOctets.3 = Counter32: 240375057
IF-MIB::ifInOctets.4 = Counter32: 220893420
[...]
```

Using MIBs in Zabbix

The most important is to keep in mind that Zabbix processes do not get aware of the changes made to MIB files. So after every change you must restart Zabbix server or proxy, e. g.:

```
# service zabbix-server restart
```

After that, the changes made to MIB files are in effect.

Using custom MIB files

There are standard MIB files coming with every GNU/Linux distribution. But some device vendors provide their own.

Let's say, you would like to use CISCO-SMI MIB file. The following instructions will download and install it:

```
# wget ftp://ftp.cisco.com/pub/mibs/v2/CISCO-SMI.my -P /tmp
# mkdir -p /usr/local/share/snmp/mibs
# grep -q '^mibdirs +/usr/local/share/snmp/mibs' /etc/snmp/snmp.conf 2>/dev/null || echo "mibdirs +/usr/lo
# cp /tmp/CISCO-SMI.my /usr/local/share/snmp/mibs
```

Now you should be able to use it. Try to translate the name of the object *ciscoProducts* from the MIB file to OID:

```
# snmptranslate -IR -On CISCO-SMI::ciscoProducts
.1.3.6.1.4.1.9.1
```

If you receive errors instead of the OID, ensure all the previous commands did not return any errors.

The object name translation worked, you are ready to use custom MIB file. Note the MIB name prefix (*CISCO-SMI::*) used in the query. You will need this when using command-line tools as well as Zabbix.

Don't forget to restart Zabbix server/proxy before using this MIB file in Zabbix.

Attention:
Keep in mind that MIB files can have dependencies. That is, one MIB may require another. In order to satisfy these dependencies you have to install all the affected MIB files.

3 SNMP traps

Overview

Receiving SNMP traps is the opposite to querying SNMP-enabled devices.

In this case the information is sent from a SNMP-enabled device and is collected or "trapped" by Zabbix.

Usually traps are sent upon some condition change and the agent connects to the server on port 162 (as opposed to port 161 on the agent side that is used for queries). Using traps may detect some short problems that occur amidst the query interval and may be missed by the query data.

Receiving SNMP traps in Zabbix is designed to work with **snmptrapd** and one of the built-in mechanisms for passing the traps to Zabbix - either a perl script or SNMPTT.

The workflow of receiving a trap:

1. **snmptrapd** receives a trap
2. snmptrapd passes the trap to SNMPTT or calls Perl trap receiver
3. SNMPTT or Perl trap receiver parses, formats and writes the trap to a file
4. Zabbix SNMP trapper reads and parses the trap file
5. For each trap Zabbix finds all "SNMP trapper" items with host interfaces matching the received trap address. Note that only the selected "IP" or "DNS" in host interface is used during the matching.
6. For each found item, the trap is compared to regexp in "snmptrap[regexp]". The trap is set as the value of **all** matched items. If no matching item is found and there is an "snmptrap.fallback" item, the trap is set as the value of that.
7. If the trap was not set as the value of any item, Zabbix by default logs the unmatched trap. (This is configured by "Log unmatched SNMP traps" in Administration → General → Other.)

1 Configuring SNMP traps

Configuring the following fields in the frontend is specific for this item type:

- Your host must have an SNMP interface

In *Configuration* → *Hosts*, in the **Host interface** field set an SNMP interface with the correct IP or DNS address. The address from each received trap is compared to the IP and DNS addresses of all SNMP interfaces to find the corresponding hosts.

- Configure the item

In the **Key** field use one of the SNMP trap keys:

Key		
Description	Return value	Comments
snmptrap[regexp] Catches all SNMP traps that match the regular expression specified in **regexp**. If regexp is unspecified, catches any trap.	SNMP trap	This item can be set only for SNMP interfaces. This item is supported since Zabbix **2.0.0.** *Note*: Starting with Zabbix 2.0.5, user macros and global regular expressions are supported in the parameter of this item key.
snmptrap.fallback Catches all SNMP traps that were not caught by any of the snmptrap[] items for that interface.	SNMP trap	This item can be set only for SNMP interfaces. This item is supported since Zabbix **2.0.0.**

Note:
Multi-line regexp matching is not supported at this time.

Set the **Type of information** to be 'Log' for the timestamps to be parsed. Note that other formats such as 'Numeric' are also acceptable but might require a custom trap handler.

Note:
For SNMP trap monitoring to work, it must first be correctly set up.

2 Setting up SNMP trap monitoring

Configuring Zabbix server/proxy

To read the traps, Zabbix server or proxy must be configured to start the SNMP trapper process and point to the trap file that is being written by SNMPTT or a perl trap receiver. To do that, edit the configuration file (zabbix_server.conf or zabbix_proxy.conf):

1. StartSNMPTrapper=1
2. SNMPTrapperFile=[TRAP FILE]

Warning:
If systemd parameter **PrivateTmp** is used, this file is unlikely to work in */tmp*.

Configuring SNMPTT

At first, snmptrapd should be configured to use SNMPTT.

Note:
For the best performance, SNMPTT should be configured as a daemon using **snmptthandler-embedded** to pass the traps to it. See instructions for configuring SNMPTT in its homepage:
http://snmptt.sourceforge.net/docs/snmptt.shtml

When SNMPTT is configured to receive the traps, configure `snmptt.ini`:

1. enable the use of the Perl module from the NET-SNMP package:
   net_snmp_perl_enable = 1
2. log traps to the trap file which will be read by Zabbix:
   log_enable = 1
   log_file = [TRAP FILE]
3. set the date-time format:
   date_time_format = %H:%M:%S %Y/%m/%d = [DATE TIME FORMAT]

Warning:
The net-snmp-perl package has been removed in RHEL/CentOS 8.

Now format the traps for Zabbix to recognise them (edit snmptt.conf):

1. Each FORMAT statement should start with "ZBXTRAP [address]", where [address] will be compared to IP and DNS addresses of SNMP interfaces on Zabbix. E.g.:
   EVENT coldStart .1.3.6.1.6.3.1.1.5.1 "Status Events" Normal
   FORMAT ZBXTRAP $aA Device reinitialized (coldStart)
2. See more about SNMP trap format below.

Attention:
Do not use unknown traps - Zabbix will not be able to recognise them. Unknown traps can be handled by defining a general event in snmptt.conf:
EVENT general .* "General event" Normal

Configuring Perl trap receiver

Requirements: Perl, Net-SNMP compiled with --enable-embedded-perl (done by default since Net-SNMP 5.4)

Perl trap receiver (look for misc/snmptrap/zabbix_trap_receiver.pl) can be used to pass traps to Zabbix server directly from snmptrapd. To configure it:

- add the perl script to snmptrapd configuration file (snmptrapd.conf), e.g.:
  perl do ”[FULL PATH TO PERL RECEIVER SCRIPT]”;
- configure the receiver, e.g:
  $SNMPTrapperFile = ’[TRAP FILE]’;
  $DateTimeFormat = ’[DATE TIME FORMAT]’;

Note:
If script name is not quoted, snmptrapd will refuse to start up with messages, similar to these:
```
Regexp modifiers "/l" and "/a" are mutually exclusive at (eval 2) line 1, at end of line
Regexp modifier "/l" may not appear twice at (eval 2) line 1, at end of line
```

Warning:
net-snmp agent does not support AES256 with SNMPv3/USM.

SNMP trap format

All customised perl trap receivers and SNMPTT trap configuration must format the trap in the following way: **[timestamp] [the trap, part 1] ZBXTRAP [address] [the trap, part 2]**, where

- [timestamp] - timestamp used for log items
- ZBXTRAP - header that indicates that a new trap starts in this line
- [address] - IP address used to find the host for this trap

Note that ”ZBXTRAP” and ”[address]” will be cut out from the message during processing. If the trap is formatted otherwise, Zabbix might parse the traps unexpectedly.

Example trap:
11:30:15 2011/07/27 .1.3.6.1.6.3.1.1.5.3 Normal ”Status Events” localhost - ZBXTRAP 192.168.1.1 Link down on interface 2. Admin state: 1. Operational state: 2
This will result in the following trap for SNMP interface with IP=192.168.1.1:
11:30:15 2011/07/27 .1.3.6.1.6.3.1.1.5.3 Normal ”Status Events” localhost - Link down on interface 2. Admin state: 1.

3 System requirements

Large file support

Zabbix has ”Large file support” for SNMP trapper files. The maximum file size that Zabbix can read is 2^63 (8 EiB). Note that the filesystem may impose a lower limit on the file size.

Log rotation

Zabbix does not provide any log rotation system - that should be handled by the user. The log rotation should first rename the old file and only later delete it so that no traps are lost:

1. Zabbix opens the trap file at the last known location and goes to step 3
2. Zabbix checks if the currently opened file has been rotated by comparing the inode number to the define trap file’s inode number. If there is no opened file, Zabbix resets the last location and goes to step 1.
3. Zabbix reads the data from the currently opened file and sets the new location.
4. The new data are parsed. If this was the rotated file, the file is closed and goes back to step 2.
5. If there was no new data, Zabbix sleeps for 1 second and goes back to step 2.

File system

Because of the trap file implementation, Zabbix needs the file system to support inodes to differentiate files (the information is acquired by a stat() call).

4 Setup example

This example uses snmptrapd + SNMPTT to pass traps to Zabbix server. Setup:

1. **zabbix_server.conf** - configure Zabbix to start SNMP trapper and set the trap file:
   StartSNMPTrapper=1
   SNMPTrapperFile=/tmp/my_zabbix_traps.tmp
2. **snmptrapd.conf** - add SNMPTT as the trap handler:
   traphandle default snmptt
3. **snmptt.ini** -
   enable the use of the Perl module from the NET-SNMP package:
   net_snmp_perl_enable = 1

configure output file and time format:
log_file = /tmp/my_zabbix_traps.tmp
date_time_format = %H:%M:%S %Y/%m/%d

4. **snmptt.conf** - define a default trap format:
   EVENT general .* "General event" Normal
   FORMAT ZBXTRAP $aA $ar
5. Create an SNMP item TEST:
   Host's SNMP interface IP: 127.0.0.1
   Key: snmptrap["General"]
   Log time format: hh:mm:ss yyyy/MM/dd

This results in:

1. Command used to send a trap:
   snmptrap -v 1 -c public 127.0.0.1 '.1.3.6.1.6.3.1.1.5.3' '0.0.0.0' 6 33 '55' .1.3.6.1.6.3.1.1.5.3 s "teststring000"
2. The received trap:
   15:48:18 2011/07/26 .1.3.6.1.6.3.1.1.5.3.0.33 Normal "General event" localhost - ZBXTRAP 127.0.0.1 127.0.0.1
3. Value for item TEST:
   15:48:18 2011/07/26 .1.3.6.1.6.3.1.1.5.3.0.33 Normal "General event" localhost - 127.0.0.1

Note:
This simple example uses SNMPTT as **traphandle**. For better performance on production systems, use embedded Perl to pass traps from snmptrapd to SNMPTT or directly to Zabbix.

5 See also

- Zabbix blog article on SNMP traps
- CentOS based SNMP trap tutorial on zabbix.org

4 IPMI checks

Overview

You can monitor the health and availability of Intelligent Platform Management Interface (IPMI) devices in Zabbix. To perform IPMI checks Zabbix server must be initially configured with IPMI support.

IPMI is a standardized interface for remote "lights-out" or "out-of-band" management of computer systems. It allows to monitor hardware status directly from the so-called "out-of-band" management cards, independently from the operating system or whether the machine is powered on at all.

Zabbix IPMI monitoring works only for devices having IPMI support (HP iLO, DELL DRAC, IBM RSA, Sun SSP, etc).

Since Zabbix 3.4, a new IPMI manager process has been added to schedule IPMI checks by IPMI pollers. Now a host is always polled by only one IPMI poller at a time, reducing the number of open connections to BMC controllers. With those changes it's safe to increase the number of IPMI pollers without worrying about BMC controller overloading. The IPMI manager process is automatically started when at least one IPMI poller is started.

See also known issues for IPMI checks.

Configuration

Host configuration

A host must be configured to process IPMI checks. An IPMI interface must be added, with the respective IP and port numbers, and IPMI authentication parameters must be defined.

See the configuration of hosts for more details.

Server configuration

By default, the Zabbix server is not configured to start any IPMI pollers, thus any added IPMI items won't work. To change this, open the Zabbix server configuration file (zabbix_server.conf) as root and look for the following line:

```
# StartIPMIPollers=0
```

Uncomment it and set poller count to, say, 3, so that it reads:

```
StartIPMIPollers=3
```

Save the file and restart zabbix_server afterwards.

Item configuration

When configuring an item on a host level:

- For *Host interface* select the IPMI IP and port
- Select 'IPMI agent' as the *Type*
- Specify the *IPMI sensor* (for example 'FAN MOD 1A RPM' on Dell Poweredge). By default, sensor ID should be specified. It is also possible to use prefixes before the value:
  - `id:` - to specify sensor ID;
  - `name:` - to specify sensor full name. This can be useful in situations when sensors can only be distinguished by specifying the full name.
- Enter an item key that is unique within the host (say, ipmi.fan.rpm)
- Select the respective type of information ('Numeric (float)' in this case, for discrete sensors - 'Numeric (unsigned)'), units (most likely 'rpm') and any other required item attributes

Timeout and session termination

IPMI message timeouts and retry counts are defined in OpenIPMI library. Due to the current design of OpenIPMI, it is not possible to make these values configurable in Zabbix, neither on interface nor item level.

IPMI session inactivity timeout for LAN is 60 +/-3 seconds. Currently it is not possible to implement periodic sending of Activate Session command with OpenIPMI. If there are no IPMI item checks from Zabbix to a particular BMC for more than the session timeout configured in BMC then the next IPMI check after the timeout expires will time out due to individual message timeouts, retries or receive error. After that a new session is opened and a full rescan of the BMC is initiated. If you want to avoid unnecessary rescans of the BMC it is advised to set the IPMI item polling interval below the IPMI session inactivity timeout configured in BMC.

Notes on IPMI discrete sensors

To find sensors on a host start Zabbix server with **DebugLevel=4** enabled. Wait a few minutes and find sensor discovery records in Zabbix server logfile:

```
$ grep 'Added sensor' zabbix_server.log
8358:20130318:111122.170 Added sensor: host:'192.168.1.12:623' id_type:0 id_sz:7 id:'CATERR' reading_type:
8358:20130318:111122.170 Added sensor: host:'192.168.1.12:623' id_type:0 id_sz:15 id:'CPU Therm Trip' read
8358:20130318:111122.171 Added sensor: host:'192.168.1.12:623' id_type:0 id_sz:17 id:'System Event Log' re
8358:20130318:111122.171 Added sensor: host:'192.168.1.12:623' id_type:0 id_sz:17 id:'PhysicalSecurity' re
8358:20130318:111122.171 Added sensor: host:'192.168.1.12:623' id_type:0 id_sz:14 id:'IPMI Watchdog' readi
8358:20130318:111122.171 Added sensor: host:'192.168.1.12:623' id_type:0 id_sz:16 id:'Power Unit Stat' rea
8358:20130318:111122.171 Added sensor: host:'192.168.1.12:623' id_type:0 id_sz:16 id:'P1 Therm Ctrl %' rea
8358:20130318:111122.172 Added sensor: host:'192.168.1.12:623' id_type:0 id_sz:16 id:'P1 Therm Margin' rea
8358:20130318:111122.172 Added sensor: host:'192.168.1.12:623' id_type:0 id_sz:13 id:'System Fan 2' readin
8358:20130318:111122.172 Added sensor: host:'192.168.1.12:623' id_type:0 id_sz:13 id:'System Fan 3' readin
8358:20130318:111122.172 Added sensor: host:'192.168.1.12:623' id_type:0 id_sz:14 id:'P1 Mem Margin' readi
8358:20130318:111122.172 Added sensor: host:'192.168.1.12:623' id_type:0 id_sz:17 id:'Front Panel Temp' re
8358:20130318:111122.173 Added sensor: host:'192.168.1.12:623' id_type:0 id_sz:15 id:'Baseboard Temp' read
8358:20130318:111122.173 Added sensor: host:'192.168.1.12:623' id_type:0 id_sz:9 id:'BB +5.0V' reading_typ
8358:20130318:111122.173 Added sensor: host:'192.168.1.12:623' id_type:0 id_sz:14 id:'BB +3.3V STBY' readi
8358:20130318:111122.173 Added sensor: host:'192.168.1.12:623' id_type:0 id_sz:9 id:'BB +3.3V' reading_typ
8358:20130318:111122.173 Added sensor: host:'192.168.1.12:623' id_type:0 id_sz:17 id:'BB +1.5V P1 DDR3' re
8358:20130318:111122.173 Added sensor: host:'192.168.1.12:623' id_type:0 id_sz:17 id:'BB +1.1V P1 Vccp' re
8358:20130318:111122.174 Added sensor: host:'192.168.1.12:623' id_type:0 id_sz:14 id:'BB +1.05V PCH' readi
```

To decode IPMI sensor types and states, get a copy of IPMI 2.0 specifications at http://www.intel.com/content/www/us/en/servers/ipmi/ipmi-specifications.html (At the time of writing the newest document was http://www.intel.com/content/dam/www/public/us/en/documents/product-briefs/second-gen-interface-spec-v2.pdf)

The first parameter to start with is "reading_type". Use "Table 42-1, Event/Reading Type Code Ranges" from the specifications to decode "reading_type" code. Most of the sensors in our example have "reading_type:0x1" which means "threshold" sensor. "Table 42-3, Sensor Type Codes" shows that "type:0x1" means temperature sensor, "type:0x2" - voltage sensor, "type:0x4" - Fan etc. Threshold sensors sometimes are called "analog" sensors as they measure continuous parameters like temperature, voltage, revolutions per minute.

Another example - a sensor with "reading_type:0x3". "Table 42-1, Event/Reading Type Code Ranges" says that reading type codes 02h-0Ch mean "Generic Discrete" sensor. Discrete sensors have up to 15 possible states (in other words - up to 15 meaningful bits). For example, for sensor 'CATERR' with "type:0x7" the "Table 42-3, Sensor Type Codes" shows that this type means "Processor" and the meaning of individual bits is: 00h (the least significant bit) - IERR, 01h - Thermal Trip etc.

There are few sensors with "reading_type:0x6f" in our example. For these sensors the "Table 42-1, Event/Reading Type Code Ranges" advises to use "Table 42-3, Sensor Type Codes" for decoding meanings of bits. For example, sensor 'Power Unit Stat' has

type ”type:0x9” which means ”Power Unit”. Offset 00h means ”PowerOff/Power Down”. In other words if the least significant bit is 1, then server is powered off. To test this bit a function **band** with mask 1 can be used. The trigger expression could be like

```
{www.zabbix.com:Power Unit Stat.band(#1,1)}=1
```

to warn about a server power off.

Notes on discrete sensor names in OpenIPMI-2.0.16, 2.0.17, 2.0.18 and 2.0.19

Names of discrete sensors in OpenIPMI-2.0.16, 2.0.17 and 2.0.18 often have an additional ”0” (or some other digit or letter) appended at the end. For example, while `ipmitool` and OpenIPMI-2.0.19 display sensor names as ”`PhysicalSecurity`” or ”`CATERR`”, in OpenIPMI-2.0.16, 2.0.17 and 2.0.18 the names are ”`PhysicalSecurity0`” or ”`CATERR0`”, respectively.

When configuring an IPMI item with Zabbix server using OpenIPMI-2.0.16, 2.0.17 and 2.0.18, use these names ending with ”0” in the *IPMI sensor* field of IPMI agent items. When your Zabbix server is upgraded to a new Linux distribution, which uses OpenIPMI-2.0.19 (or later), items with these IPMI discrete sensors will become ”NOT SUPPORTED”. You have to change their *IPMI sensor* names (remove the ’0’ in the end) and wait for some time before they turn ”Enabled” again.

Notes on threshold and discrete sensor simultaneous availability

Some IPMI agents provide both a threshold sensor and a discrete sensor under the same name. In Zabbix versions prior to 2.2.8 and 2.4.3, the first provided sensor was chosen. Since versions 2.2.8 and 2.4.3, preference is always given to the threshold sensor.

Notes on connection termination

If IPMI checks are not performed (by any reason: all host IPMI items disabled/notsupported, host disabled/deleted, host in maintenance etc.) the IPMI connection will be terminated from Zabbix server or proxy in 3 to 4 hours depending on the time when Zabbix server/proxy was started.

5 Simple checks

Overview

Simple checks are normally used for remote agent-less checks of services.

Note that Zabbix agent is not needed for simple checks. Zabbix server/proxy is responsible for the processing of simple checks (making external connections, etc).

Examples of using simple checks:

```
net.tcp.service[ftp,,155]
net.tcp.service[http]
net.tcp.service.perf[http,,8080]
net.udp.service.perf[ntp]
```

Note:
User name and *Password* fields in simple check item configuration are used for VMware monitoring items; ignored otherwise.

Supported simple checks

List of supported simple checks:

See also:

- VMware monitoring item keys

Key	Description	Return value	Parameters	Comments
icmpping[<target>,<packets>,<interval>,<size>,<timeout>]				

Key				
	Host accessibility by ICMP ping.	0 - ICMP ping fails 1 - ICMP ping successful	**target** - host IP or DNS name **packets** - number of packets **interval** - time between successive packets in milliseconds **size** - packet size in bytes **timeout** - timeout in milliseconds	Example: => icmpping[,4] → if at least one packet of the four is returned, the item will return 1. See also: table of default values.
icmppingloss[<target>,<packets>,<interval>,<size>,<timeout>]				
	Percentage of lost packets.	Float.	**target** - host IP or DNS name **packets** - number of packets **interval** - time between successive packets in milliseconds **size** - packet size in bytes **timeout** - timeout in milliseconds	See also: table of default values.
icmppingsec[<target>,<packets>,<interval>,<size>,<timeout>,<mode>]				
	ICMP ping response time (in seconds).	Float.	**target** - host IP or DNS name **packets** - number of packets **interval** - time between successive packets in milliseconds **size** - packet size in bytes **timeout** - timeout in milliseconds **mode** - possible values: *min*, *max*, *avg* (default)	If host is not available (timeout reached), the item will return 0. If the return value is less than 0.0001 seconds, the value will be set to 0.0001 seconds. See also: table of default values.
net.tcp.service[service,<ip>,<port>]				

Key				
	Checks if service is running and accepting TCP connections.	0 - service is down 1 - service is running	**service** - possible values: *ssh*, *ldap*, *smtp*, *ftp*, *http*, *pop*, *nntp*, *imap*, *tcp*, *https*, *telnet* (see details) **ip** - IP address or DNS name (by default host IP/DNS is used) **port** - port number (by default standard service port number is used).	Example: => net.tcp.service[ftp,,45] → can be used to test the availability of FTP server on TCP port 45. Note that with *tcp* service indicating the port is mandatory. These checks may result in additional messages in system daemon logfiles (SMTP and SSH sessions being logged usually). Checking of encrypted protocols (like IMAP on port 993 or POP on port 995) is currently not supported. As a workaround, please use net.tcp.service[tcp,<ip>,port] for checks like these. *https* and *telnet* services are supported since Zabbix 2.0.
net.tcp.service.perf[service,<ip>,<port>]				

Key				
	Checks performance of TCP service.	Float. 0.000000 - service is down seconds - the number of seconds spent while connecting to the service	**service** - possible values: *ssh*, *ldap*, *smtp*, *ftp*, *http*, *pop*, *nntp*, *imap*, *tcp*, *https*, *telnet* (see details) **ip** - IP address or DNS name (by default, host IP/DNS is used) **port** - port number (by default standard service port number is used).	Example: => net.tcp.service.perf[ssh] → can be used to test the speed of initial response from SSH server. Note that with *tcp* service indicating the port is mandatory. Checking of encrypted protocols (like IMAP on port 993 or POP on port 995) is currently not supported. As a workaround, please use net.tcp.service.perf[tcp,<ip>, for checks like these. *https* and *telnet* services are supported since Zabbix 2.0. Called tcp_perf before Zabbix 2.0.
net.udp.service[service,<ip>,<port>]				
	Checks if service is running and responding to UDP requests.	0 - service is down 1 - service is running	**service** - possible values: *ntp* (see details) **ip** - IP address or DNS name (by default host IP/DNS is used) **port** - port number (by default standard service port number is used).	Example: => net.udp.service[ntp,,45] → can be used to test the availability of NTP service on UDP port 45. This item is supported since Zabbix 3.0, but *ntp* service was available for net.tcp.service[] item in prior versions.
net.udp.service.perf[service,<ip>,<port>]				

Key				
	Checks performance of UDP service.	Float. 0.000000 - service is down seconds - the number of seconds spent waiting for response from the service	**service** - possible values: *ntp* (see details) **ip** - IP address or DNS name (by default, host IP/DNS is used) **port** - port number (by default standard service port number is used).	Example: => net.udp.service.perf[ntp] → can be used to test response time from NTP service. This item is supported since Zabbix 3.0, but *ntp* service was available for net.tcp.service[] item in prior versions.

Timeout processing

Zabbix will not process a simple check longer than the Timeout seconds defined in the Zabbix server/proxy configuration file.

ICMP pings

Zabbix uses external utility **fping** for processing of ICMP pings.

The utility is not part of Zabbix distribution and has to be additionally installed. If the utility is missing, has wrong permissions or its location does not match the location set in the Zabbix server/proxy configuration file ('FpingLocation' parameter), ICMP pings (**icmpping**, **icmppingloss**, **icmppingsec**) will not be processed.

See also: known issues

fping must be executable by the user Zabbix daemons run as and setuid root. Run these commands as user **root** in order to set up correct permissions:

```
shell> chown root:zabbix /usr/sbin/fping
shell> chmod 4710 /usr/sbin/fping
```

After performing the two commands above check ownership of the **fping** executable. In some cases the ownership can be reset by executing the chmod command.

Also check, if user zabbix belongs to group zabbix by running:

```
shell> groups zabbix
```

and if it's not add by issuing:

```
shell> usermod -a -G zabbix zabbix
```

Defaults, limits and description of values for ICMP check parameters:

Parameter	Unit	Description	Fping's flag	Defaults set by	Allowed limits by Zabbix

Warning:
Warning: fping defaults can differ depending on platform and version - if in doubt, check fping documentation.

Zabbix writes IP addresses to be checked by any of three *icmpping** keys to a temporary file, which is then passed to **fping**. If items have different key parameters, only ones with identical key parameters are written to a single file.
All IP addresses written to the single file will be checked by fping in parallel, so Zabbix icmp pinger process will spend fixed amount of time disregarding the number of IP addresses in the file.

1 VMware monitoring item keys

Item keys

The table provides details on the simple checks that can be used to monitor VMware environments.

Key	Description	Return value	Parameters	Comments
vmware.cluster.discovery[<url>]	Discovery of VMware clusters.	JSON object	**url** - VMware service URL	
vmware.cluster.status[<url>, <name>]	VMware cluster status.	Integer: 0 - gray; 1 - green; 2 - yellow; 3 - red	**url** - VMware service URL **name** - VMware cluster name	
vmware.datastore.discovery[<url>]	Discovery of VMware datastores.	JSON object	**url** - VMware service URL	
vmware.datastore.hv.list[<url>,<datastore>]	List of datastore hypervisors.	JSON object	**url** - VMware service URL **datastore** - datastore name	
vmware.datastore.read[<url>,<datastore>,<mode>]	Amount of time for a read operation from the datastore (milliseconds).	Integer [2]	**url** - VMware service URL **datastore** - datastore name **mode** - latency (average value, default), maxlatency (maximum value)	
vmware.datastore.size[<url>,<datastore>,<mode>]	VMware datastore space in bytes or in percentage from total.	Integer - for bytes Float - for percentage	**url** - VMware service URL **datastore** - datastore name **mode** - possible values: total (default), free, pfree (free, percentage), uncommitted	
vmware.datastore.write[<url>,<datastore>,<mode>]				

Key				
	Amount of time for a write operation to the datastore (milliseconds).	Integer [2]	**url** - VMware service URL **datastore** - datastore name **mode** - latency (average value, default), maxlatency (maximum value)	
vmware.eventlog[<url>,<mode>]				
	VMware event log.	Log	**url** - VMware service URL **mode** - *all* (default), *skip* - skip processing of older data	See also: example of filtering VMware event log records.
vmware.fullname[<url>]				
	VMware service full name.	String	**url** - VMware service URL	
vmware.hv.cluster.name[<url>,<uuid>]				
	VMware hypervisor cluster name.	String	**url** - VMware service URL **uuid** - VMware hypervisor host name	
vmware.hv.cpu.usage[<url>,<uuid>]				
	VMware hypervisor processor usage (Hz).	Integer	**url** - VMware service URL **uuid** - VMware hypervisor host name	
vmware.hv.datacenter.name[<url>,<uuid>]				
	VMware hypervisor datacenter name.	String	**url** - VMware service URL **uuid** - VMware hypervisor host name	
vmware.hv.datastore.discovery[<url>,<uuid>]				
	Discovery of VMware hypervisor datastores.	JSON object	**url** - VMware service URL **uuid** - VMware hypervisor host name	
vmware.hv.datastore.list[<url>,<uuid>]				
	List of VMware hypervisor datastores.	JSON object	**url** - VMware service URL **uuid** - VMware hypervisor host name	
vmware.hv.datastore.read[<url>,<uuid>,<datastore>,<mode>]				

Key				
	Average amount of time for a read operation from the datastore (milliseconds).	Integer [2]	**url** - VMware service URL **uuid** - VMware hypervisor host name **datastore** - datastore name **mode** - latency (default)	
vmware.hv.datastore.size[<url>,<uuid>,<datastore>,<mode>]				
	VMware datastore space in bytes or in percentage from total.	Integer - for bytes Float - for percentage	**url** - VMware service URL **uuid** - VMware hypervisor host name **datastore** - datastore name **mode** - possible values: total (default), free, pfree (free, percentage), uncommitted	Available since Zabbix versions 3.0.6, 3.2.2
vmware.hv.datastore.write[<url>,<uuid>,<datastore>,<mode>]				
	Average amount of time for a write operation to the datastore (milliseconds).	Integer [2]	**url** - VMware service URL **uuid** - VMware hypervisor host name **datastore** - datastore name **mode** - latency (default)	
vmware.hv.discovery[<url>]				
	Discovery of VMware hypervisors.	JSON object	**url** - VMware service URL	
vmware.hv.fullname[<url>,<uuid>]				
	VMware hypervisor name.	String	**url** - VMware service URL **uuid** - VMware hypervisor host name	
vmware.hv.hw.cpu.freq[<url>,<uuid>]				
	VMware hypervisor processor frequency (Hz).	Integer	**url** - VMware service URL **uuid** - VMware hypervisor host name	
vmware.hv.hw.cpu.model[<url>,<uuid>]				
	VMware hypervisor processor model.	String	**url** - VMware service URL **uuid** - VMware hypervisor host name	
vmware.hv.hw.cpu.num[<url>,<uuid>]				

Key			
	Number of processor cores on VMware hypervisor.	Integer	**url** - VMware service URL **uuid** - VMware hypervisor host name
vmware.hv.hw.cpu.threads[<url>,<uuid>]			
	Number of processor threads on VMware hypervisor.	Integer	**url** - VMware service URL **uuid** - VMware hypervisor host name
vmware.hv.hw.memory[<url>,<uuid>]			
	VMware hypervisor total memory size (bytes).	Integer	**url** - VMware service URL **uuid** - VMware hypervisor host name
vmware.hv.hw.model[<url>,<uuid>]			
	VMware hypervisor model.	String	**url** - VMware service URL **uuid** - VMware hypervisor host name
vmware.hv.hw.uuid[<url>,<uuid>]			
	VMware hypervisor BIOS UUID.	String	**url** - VMware service URL **uuid** - VMware hypervisor host name
vmware.hv.hw.vendor[<url>,<uuid>]			
	VMware hypervisor vendor name.	String	**url** - VMware service URL **uuid** - VMware hypervisor host name
vmware.hv.memory.size.ballooned[<url>,<uuid>]			
	VMware hypervisor ballooned memory size (bytes).	Integer	**url** - VMware service URL **uuid** - VMware hypervisor host name
vmware.hv.memory.used[<url>,<uuid>]			
	VMware hypervisor used memory size (bytes).	Integer	**url** - VMware service URL **uuid** - VMware hypervisor host name
vmware.hv.network.in[<url>,<uuid>,<mode>]			
	VMware hypervisor network input statistics (bytes per second).	Integer [2]	**url** - VMware service URL **uuid** - VMware hypervisor host name **mode** - bps (default)
vmware.hv.network.out[<url>,<uuid>,<mode>]			

Key				
	VMware hypervisor network output statistics (bytes per second).	Integer [2]	**url** - VMware service URL **uuid** - VMware hypervisor host name **mode** - bps (default)	
vmware.hv.perfcounter[<url>,<uuid>,<path>,<instance>]				
	VMware hypervisor performance counter value.	Integer [2]	**url** - VMware service URL **uuid** - VMware hypervisor host name **path** - performance counter path [1] **instance** - performance counter instance. Use empty instance for aggregate values (default)	Available since Zabbix versions 2.2.9, 2.4.4
vmware.hv.sensor.health.state[<url>,<uuid>]				
	VMware hypervisor health state rollup sensor.	Integer: 0 - gray; 1 - green; 2 - yellow; 3 - red	**url** - VMware service URL **uuid** - VMware hypervisor host name	Available since Zabbix 2.2.16, 3.0.6, 3.2.2
vmware.hv.status[<url>,<uuid>]				
	VMware hypervisor status.	Integer: 0 - gray; 1 - green; 2 - yellow; 3 - red	**url** - VMware service URL **uuid** - VMware hypervisor host name	Uses host system overal status property since Zabbix 2.2.16, 3.0.6, 3.2.2
vmware.hv.uptime[<url>,<uuid>]				
	VMware hypervisor uptime (seconds).	Integer	**url** - VMware service URL **uuid** - VMware hypervisor host name	
vmware.hv.version[<url>,<uuid>]				
	VMware hypervisor version.	String	**url** - VMware service URL **uuid** - VMware hypervisor host name	
vmware.hv.vm.num[<url>,<uuid>]				
	Number of virtual machines on VMware hypervisor.	Integer	**url** - VMware service URL **uuid** - VMware hypervisor host name	
vmware.version[<url>]				
	VMware service version.	String	**url** - VMware service URL	
vmware.vm.cluster.name[<url>,<uuid>]				

Key				
	VMware virtual machine name.	String	**url** - VMware service URL **uuid** - VMware virtual machine host name	
vmware.vm.cpu.num[<url>,<uuid>]				
	Number of processors on VMware virtual machine.	Integer	**url** - VMware service URL **uuid** - VMware virtual machine host name	
vmware.vm.cpu.ready[<url>,<uuid>]				
	Time (in milliseconds) that the virtual machine was ready, but could not get scheduled to run on the physical CPU. CPU ready time is dependent on the number of virtual machines on the host and their CPU loads (%).	Integer [2]	**url** - VMware service URL **uuid** - VMware virtual machine host name	Available since Zabbix version 3.0.0
vmware.vm.cpu.usage[<url>,<uuid>]				
	VMware virtual machine processor usage (Hz).	Integer	**url** - VMware service URL **uuid** - VMware virtual machine host name	
vmware.vm.datacenter.name[<url>,<uuid>]				
	VMware virtual machine datacenter name.	String	**url** - VMware service URL **uuid** - VMware virtual machine host name	
vmware.vm.discovery[<url>]				
	Discovery of VMware virtual machines.	JSON object	**url** - VMware service URL	
vmware.vm.hv.name[<url>,<uuid>]				
	VMware virtual machine hypervisor name.	String	**url** - VMware service URL **uuid** - VMware virtual machine host name	
vmware.vm.memory.size[<url>,<uuid>]				
	VMware virtual machine total memory size (bytes).	Integer	**url** - VMware service URL **uuid** - VMware virtual machine host name	
vmware.vm.memory.size.ballooned[<url>,<uuid>]				

Key			
	VMware virtual machine ballooned memory size (bytes).	Integer	**url** - VMware service URL **uuid** - VMware virtual machine host name
vmware.vm.memory.size.compressed[<url>,<uuid>]			
	VMware virtual machine compressed memory size (bytes).	Integer	**url** - VMware service URL **uuid** - VMware virtual machine host name
vmware.vm.memory.size.private[<url>,<uuid>]			
	VMware virtual machine private memory size (bytes).	Integer	**url** - VMware service URL **uuid** - VMware virtual machine host name
vmware.vm.memory.size.shared[<url>,<uuid>]			
	VMware virtual machine shared memory size (bytes).	Integer	**url** - VMware service URL **uuid** - VMware virtual machine host name
vmware.vm.memory.size.swapped[<url>,<uuid>]			
	VMware virtual machine swapped memory size (bytes).	Integer	**url** - VMware service URL **uuid** - VMware virtual machine host name
vmware.vm.memory.size.usage.guest[<url>,<uuid>]			
	VMware virtual machine guest memory usage (bytes).	Integer	**url** - VMware service URL **uuid** - VMware virtual machine host name
vmware.vm.memory.size.usage.host[<url>,<uuid>]			
	VMware virtual machine host memory usage (bytes).	Integer	**url** - VMware service URL **uuid** - VMware virtual machine host name
vmware.vm.net.if.discovery[<url>,<uuid>]			
	Discovery of VMware virtual machine network interfaces.	JSON object	**url** - VMware service URL **uuid** - VMware virtual machine host name
vmware.vm.net.if.in[<url>,<uuid>,<instance>,<mode>]			
	VMware virtual machine network interface input statistics (bytes/packets per second).	Integer [2]	**url** - VMware service URL **uuid** - VMware virtual machine host name **instance** - network interface instance **mode** - bps (default)/pps - bytes/packets per second

Key				
vmware.vm.net.if.out[<url>,<uuid>,<instance>,<mode>]	VMware virtual machine network interface output statistics (bytes/packets per second).	Integer [2]	**url** - VMware service URL **uuid** - VMware virtual machine host name **instance** - network interface instance **mode** - bps (default)/pps - bytes/packets per second	
vmware.vm.perfcounter[<url>,<uuid>,<path>,<instance>]	VMware virtual machine performance counter value.	Integer [2]	**url** - VMware service URL **uuid** - VMware virtual machine host name **path** - performance counter path [1] **instance** - performance counter instance. Use empty instance for aggregate values (default)	Available since Zabbix versions 2.2.9, 2.4.4
vmware.vm.powerstate[<url>,<uuid>]	VMware virtual machine power state.	Integer: 0 - poweredOff; 1 - poweredOn; 2 - suspended	**url** - VMware service URL **uuid** - VMware virtual machine host name	
vmware.vm.storage.committed[<url>,<uuid>]	VMware virtual machine committed storage space (bytes).	Integer	**url** - VMware service URL **uuid** - VMware virtual machine host name	
vmware.vm.storage.uncommitted[<url>,<uuid>]	VMware virtual machine uncommitted storage space (bytes).	Integer	**url** - VMware service URL **uuid** - VMware virtual machine host name	
vmware.vm.storage.unshared[<url>,<uuid>]	VMware virtual machine unshared storage space (bytes).	Integer	**url** - VMware service URL **uuid** - VMware virtual machine host name	
vmware.vm.uptime[<url>,<uuid>]	VMware virtual machine uptime (seconds).	Integer	**url** - VMware service URL **uuid** - VMware virtual machine host name	

Key				
vmware.vm.vfs.dev.discovery[<url>,<uuid>]				
	Discovery of VMware virtual machine disk devices.	JSON object	**url** - VMware service URL **uuid** - VMware virtual machine host name	
vmware.vm.vfs.dev.read[<url>,<uuid>,<instance>,<mode>]				
	VMware virtual machine disk device read statistics (bytes/operations per second).	Integer [2]	**url** - VMware service URL **uuid** - VMware virtual machine host name **instance** - disk device instance **mode** - bps (default)/ops - bytes/operations per second	
vmware.vm.vfs.dev.write[<url>,<uuid>,<instance>,<mode>]				
	VMware virtual machine disk device write statistics (bytes/operations per second).	Integer [2]	**url** - VMware service URL **uuid** - VMware virtual machine host name **instance** - disk device instance **mode** - bps (default)/ops - bytes/operations per second	
vmware.vm.vfs.fs.discovery[<url>,<uuid>]				
	Discovery of VMware virtual machine file systems.	JSON object	**url** - VMware service URL **uuid** - VMware virtual machine host name	VMware Tools must be installed on the guest virtual machine.
vmware.vm.vfs.fs.size[<url>,<uuid>,<fsname>,<mode>]				
	VMware virtual machine file system statistics (bytes/percentages).	Integer	**url** - VMware service URL **uuid** - VMware virtual machine host name **fsname** - file system name **mode** - total/free/used/pfree/pused	VMware Tools must be installed on the guest virtual machine.

Footnotes

[1] The VMware performance counter path has the `group/counter[rollup]` format where:

- `group` - the performance counter group, for example *cpu*
- `counter` - the performance counter name, for example *usagemhz*
- `rollup` - the peformance counter rollup type, for example *average*

So the above example would give the following counter path: `cpu/usagemhz[average]`

The performance counter group descriptions, counter names and rollup types can be found in VMware documentation.

[2] The value of these items is obtained from VMware performance counters and the VMwarePerfFrequency parameter is used to refresh their data in Zabbix VMware cache:

- vmware.hv.datastore.read
- vmware.hv.datastore.write
- vmware.hv.network.in
- vmware.hv.network.out
- vmware.hv.perfcounter
- vmware.vm.cpu.ready
- vmware.vm.net.if.in
- vmware.vm.net.if.out
- vmware.vm.perfcounter
- vmware.vm.vfs.dev.read
- vmware.vm.vfs.dev.write

More info

See Virtual machine monitoring for detailed information how to configure Zabbix to monitor VMware environments.

6 Log file monitoring

Overview

Zabbix can be used for centralized monitoring and analysis of log files with/without log rotation support.

Notifications can be used to warn users when a log file contains certain strings or string patterns.

To monitor a log file you must have:

- Zabbix agent running on the host
- log monitoring item set up

Attention:
The size limit of a monitored log file depends on large file support.

Configuration

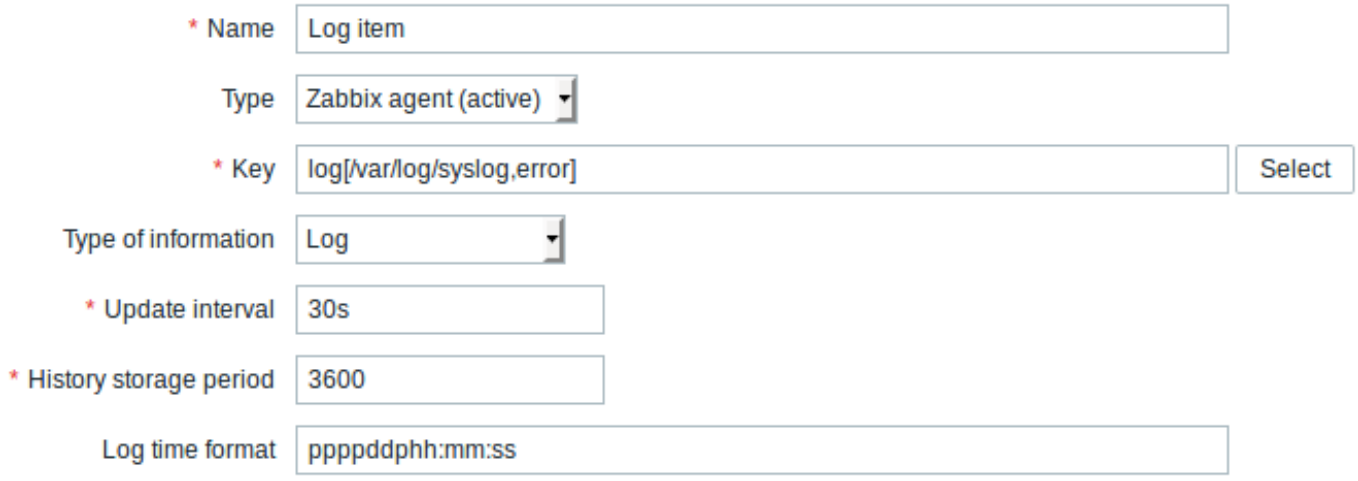
Verify agent parameters

Make sure that in the agent configuration file:

- 'Hostname' parameter matches the host name in the frontend
- Servers in the 'ServerActive' parameter are specified for the processing of active checks

Item configuration

Configure a log monitoring item.



All mandatory input fields are marked with a red asterisk.

Specifically for log monitoring items you enter:

Type	Select **Zabbix agent (active)** here.

Key	Use one of the following item keys: **log[]** or **logrt[]**: These two item keys allow to monitor logs and filter log entries by the content regexp, if present. For example: `log[/var/log/syslog,error]`. Make sure that the file has read permissions for the 'zabbix' user otherwise the item status will be set to 'unsupported'. **log.count[]** or **logrt.count[]**: These two item keys allow to return the number of matching lines only. See supported Zabbix agent item key section for details on using these item keys and their parameters.
Type of information	Select: For log[] or logrt[] items - `Log`; For log.count[] or logrt.count[] items - `Numeric (unsigned)`. If optionally using the `output` parameter, you may select the appropriate type of information other than `Log`. Note that choosing a non-Log type of information will lead to the loss of local timestamp.
Update interval (in sec)	The parameter defines how often Zabbix agent will check for any changes in the log file. Setting it to 1 second will make sure that you get new records as soon as possible.
Log time format	In this field you may optionally specify the pattern for parsing the log line timestamp. If left blank the timestamp will not be parsed. Supported placeholders: * **y**: *Year (0001-9999)* * **M**: *Month (01-12)* * **d**: *Day (01-31)* * **h**: *Hour (00-23)* * **m**: *Minute (00-59)* * **s**: *Second (00-59)* For example, consider the following line from the Zabbix agent log file: " 23480:20100328:154718.045 Zabbix agent started. Zabbix 1.8.2 (revision 11211)." It begins with six character positions for PID, followed by date, time, and the rest of the line. Log time format for this line would be "ppppppp:yyyyMMdd:hhmmss". Note that "p" and ":" chars are just placeholders and can be anything but "yMdhms".

Important notes

- The server and agent keep the trace of a monitored log's size and last modification time (for logrt) in two counters. Additionally:

```
  * The agent also internally uses inode numbers (on UNIX/GNU/Linux), file indexes (on Microsoft Windows)
  * On UNIX/GNU/Linux systems it is assumed that the file systems where log files are stored report inode
  * On Microsoft Windows Zabbix agent determines the file system type the log files reside on and uses:
      * On NTFS file systems 64-bit file indexes.
      * On ReFS file systems (only from Microsft Windows Server 2012) 128-bit file IDs.
      * On file systems where file indexes change (e.g. FAT32, exFAT) a fall-back algorithm is used to ta
  * The inode numbers, file indexes and MD5 sums are internally collected by Zabbix agent. They are not t
  * Do not modify the last modification time of log files with 'touch' utility, do not copy a log file wi
  * If there are several matching log files for ''logrt[]'' item and Zabbix agent is following the most r
* The agent starts reading the log file from the point it stopped the previous time.
* The number of bytes already analyzed (the size counter) and last modification time (the time counter) ar
* Whenever the log file becomes smaller than the log size counter known by the agent, the counter is reset
* If there are several matching files with the same last modification time in the directory, then the agen
* Zabbix agent processes new records of a log file once per //Update interval// seconds.
```

```
* Zabbix agent does not send more than **maxlines** of a log file per second. The limit prevents overloadi
* To find the required string Zabbix will process 10 times more new lines than set in MaxLinesPerSecond. T
* Additionally, log and log.count values are always limited to 50% of the agent send buffer size, even if
* In the absence of log items all agent buffer size is used for non-log values. When log values come in th
* For log file records longer than 256kB, only the first 256kB are matched against the regular expression
* Special note for "\" path separators: if file_format is "file\.log", then there should not be a "file" d
* Regular expressions for ''logrt'' are supported in filename only, directory regular expression matching
* On UNIX platforms a ''logrt[]'' item becomes NOTSUPPORTED if a directory where the log files are expecte
* On Microsoft Windows, if a directory does not exist the item will not become NOTSUPPORTED (for example,
* An absence of log files for ''logrt[]'' item does not make it NOTSUPPORTED. Errors of reading log files
* Zabbix agent log file can be helpful to find out why a ''log[]'' or ''logrt[]'' item became NOTSUPPORTED
```

Extracting matching part of regular expression

Sometimes we may want to extract only the interesting value from a target file instead of returning the whole line when a regular expression match is found.

Since Zabbix 2.2.0, log items have the ability to extract desired values from matched lines. This is accomplished by the additional **output** parameter in `log` and `logrt` items.

Using the 'output' parameter allows to indicate the subgroup of the match that we may be interested in.

So, for example

```
log[/path/to/the/file,"large result buffer allocation.*Entries: ([0-9]+)",,,,\1]
```

should allow returning the entry count as found in the content of:

```
Fr Feb 07 2014 11:07:36.6690 */ Thread Id 1400 (GLEWF) large result
buffer allocation - /Length: 437136/Entries: 5948/Client Ver: >=10/RPC
ID: 41726453/User: AUser/Form: CFG:ServiceLevelAgreement
```

The reason why Zabbix will return only the number is because 'output' here is defined by **\1** referring to the first and only subgroup of interest: **([0-9]+)**

And, with the ability to extract and return a number, the value can be used to define triggers.

Using maxdelay parameter

The 'maxdelay' parameter in log items allows ignoring some older lines from log files in order to get the most recent lines analyzed within the 'maxdelay' seconds.

> **Warning:**
> Specifying 'maxdelay' > 0 may lead to **ignoring important log file records and missed alerts**. Use it carefully at your own risk only when necessary.

By default items for log monitoring follow all new lines appearing in the log files. However, there are applications which in some situations start writing an enormous number of messages in their log files. For example, if a database or a DNS server is unavailable, such applications flood log files with thousands of nearly identical error messages until normal operation is restored. By default, all those messages will be dutifully analyzed and matching lines sent to server as configured in `log` and `logrt` items.

Built-in protection against overload consists of a configurable 'maxlines' parameter (protects server from too many incoming matching log lines) and a 4*'maxlines' limit (protects host CPU and I/O from overloading by agent in one check). Still, there are 2 problems with the built-in protection. First, a large number of potentially not-so-informative messages are reported to server and consume space in the database. Second, due to the limited number of lines analyzed per second the agent may lag behind the newest log records for hours. Quite likely, you might prefer to be sooner informed about the current situation in the log files instead of crawling through old records for hours.

The solution to both problems is using the 'maxdelay' parameter. If 'maxdelay' > 0 is specified, during each check the number of processed bytes, the number of remaining bytes and processing time is measured. From these numbers the agent calculates an estimated delay - how many seconds it would take to analyze all remaining records in a log file.

If the delay does not exceed 'maxdelay' then the agent proceeds with analyzing the log file as usual.

If the delay is greater than 'maxdelay' then the agent **ignores a chunk of a log file by "jumping" over it** to a new estimated position so that the remaining lines could be analyzed within 'maxdelay' seconds.

Note that agent does not even read ignored lines into buffer, but calculates an approximate position to jump to in a file.

The fact of skipping log file lines is logged in the agent log file like this:

```
14287:20160602:174344.206 item:"logrt["/home/zabbix32/test[0-9].log",ERROR,,1000,,,120.0]"
logfile:"/home/zabbix32/test1.log" skipping 679858 bytes
(from byte 75653115 to byte 76332973) to meet maxdelay
```

The "to byte" number is approximate because after the "jump" the agent adjusts the position in the file to the beginning of a log line which may be further in the file or earlier.

Depending on how the speed of growing compares with the speed of analyzing the log file you may see no "jumps", rare or often "jumps", large or small "jumps", or even a small "jump" in every check. Fluctuations in the system load and network latency also affect the calculation of delay and hence, "jumping" ahead to keep up with the "maxdelay" parameter.

Setting 'maxdelay' < 'update interval' is not recommended (it may result in frequent small "jumps").

Notes on handling 'copytruncate' log file rotation

`logrt` with the `copytruncate` option assumes that different log files have different records (at least their timestamps are different), therefore MD5 sums of initial blocks (up to the first 512 bytes) will be different. Two files with the same MD5 sums of initial blocks means that one of them is the original, another - a copy.

`logrt` with the `copytruncate` option makes effort to correctly process log file copies without reporting duplicates. However, things like producing multiple log file copies with the same timestamp, log file rotation more often than logrt[] item update interval, frequent restarting of agent are not recommended. The agent tries to handle all these situations reasonably well, but good results cannot be guaranteed in all circumstances.

Actions if communication fails between agent and server

Each matching line from `log[]` and `logrt[]` item and a result of each `log.count[]` and `logrt.count[]` item check requires a free slot in the designated 50% area in the agent send buffer. The buffer elements are regularly sent to server (or proxy) and the buffer slots are free again.

While there are free slots in the designated log area in the agent send buffer and communication fails between agent and server (or proxy) the log monitoring results are accumulated in the send buffer. This helps to mitigate short communication failures.

During longer communication failures all log slots get occupied and the following actions are taken:

- `log[]` and `logrt[]` item checks are stopped. When communication is restored and free slots in the buffer are available the checks are resumed from the previous position. No matching lines are lost, they are just reported later.
- `log.count[]` and `logrt.count[]` checks are stopped if `maxdelay = 0` (default). Behaviour is similar to `log[]` and `logrt[]` items as described above. Note that this can affect `log.count[]` and `logrt.count[]` results: for example, one check counts 100 matching lines in a log file, but as there are no free slots in the buffer the check is stopped. When communication is restored the agent counts the same 100 matching lines and also 70 new matching lines. The agent now sends count = 170 as if they were found in one check.
- `log.count[]` and `logrt.count[]` checks with `maxdelay > 0`: if there was no "jump" during the check, then behaviour is similar to described above. If a "jump" over log file lines took place then the position after "jump" is kept and the counted result is discarded. So, the agent tries to keep up with a growing log file even in case of communication failure.

7 Calculated items

Overview

With calculated items you can create calculations on the basis of other items.

Thus, calculated items are a way of creating virtual data sources. The values will be periodically calculated based on an arithmetical expression. All calculations are done by the Zabbix server - nothing related to calculated items is performed on Zabbix agents or proxies.

The resulting data will be stored in the Zabbix database as for any other item - this means storing both history and trend values for fast graph generation. Calculated items may be used in trigger expressions, referenced by macros or other entities same as any other item type.

To use calculated items, choose the item type **Calculated**.

Configurable fields

The **key** is a unique item identifier (per host). You can create any key name using supported symbols.

Calculation definition should be entered in the **Formula** field. There is virtually no connection between the formula and the key. The key parameters are not used in formula in any way.

The correct syntax of a simple formula is:

```
func(<key>|<hostname:key>,<parameter1>,<parameter2>,...)
```

Where:

ARGUMENT	DEFINITION
func	One of the functions supported in trigger expressions: last, min, max, avg, count, etc
key	The key of another item whose data you want to use. It may be defined as **key** or **hostname:key**. *Note:* Putting the whole key in double quotes ("...") is strongly recommended to avoid incorrect parsing because of spaces or commas within the key. If there are also quoted parameters within the key, those double quotes must be escaped by using the backslash (\). See **Example 5** below.
parameter(s)	Function parameter(s), if required.

Note:
All items that are referenced from the calculated item formula must exist and be collecting data (exceptions in functions and unsupported items). Also, if you change the item key of a referenced item, you have to manually update any formulas using that key.

Attention:
User macros in the formula will be expanded if used to reference a function parameter or a constant. User macros will NOT be expanded if referencing a function, host name, item key, item key parameter or operator.

A more complex formula may use a combination of functions, operators and brackets. You can use all functions and operators supported in trigger expressions. Note that the syntax is slightly different, however logic and operator precedence are exactly the same.

Unlike trigger expressions, Zabbix processes calculated items according to the item update interval, not upon receiving a new value.

Note:
If the calculation result is a float value it will be trimmed to an integer if the calculated item type of information is *Numeric (unsigned)*.

A calculated item may become unsupported in several cases:

1. referenced item(s)
   - is not found
   - is disabled
   - belongs to a disabled host
   - is not supported (see exceptions in functions and unsupported items, Expressions with unsupported items and unknown values and Operators)
2. no data to calculate a function
3. division by zero
4. incorrect syntax used

Support for calculated items was introduced in Zabbix 1.8.1.
Starting from Zabbix 3.2 calculated items in some cases may involve unsupported items as described in functions and unsupported items, Expressions with unsupported items and unknown values and Operators.

Usage examples

Example 1

Calculating percentage of free disk space on '/'.

Use of function **last**:

```
100*last("vfs.fs.size[/,free]")/last("vfs.fs.size[/,total]")
```

Zabbix will take the latest values for free and total disk spaces and calculate percentage according to the given formula.

Example 2

Calculating a 10-minute average of the number of values processed by Zabbix.

Use of function **avg**:

```
avg("Zabbix Server:zabbix[wcache,values]",600)
```

Note that extensive use of calculated items with long time periods may affect performance of Zabbix server.

Example 3

Calculating total bandwidth on eth0.

Sum of two functions:

```
last("net.if.in[eth0,bytes]")+last("net.if.out[eth0,bytes]")
```

Example 4

Calculating percentage of incoming traffic.

More complex expression:

```
100*last("net.if.in[eth0,bytes]")/(last("net.if.in[eth0,bytes]")+last("net.if.out[eth0,bytes]"))
```

Example 5

Using aggregated items correctly within a calculated item.

Take note of how double quotes are escaped within the quoted key:

```
last("grpsum[\"video\",\"net.if.out[eth0,bytes]\",\"last\"]") / last("grpsum[\"video\",\"nginx_stat.sh[act
```

8 Internal checks

Overview

Internal checks allow to monitor the internal processes of Zabbix. In other words, you can monitor what goes on with Zabbix server or Zabbix proxy.

Internal checks are calculated:

- on Zabbix server - if the host is monitored by server
- on Zabbix proxy - if the host is monitored by proxy

Internal checks are processed by server or proxy regardless of host maintenance status.

To use this item, choose the **Zabbix internal** item type.

Note:
Internal checks are processed by Zabbix pollers.

Supported checks

- Parameters without angle brackets are constants - for example, 'host' and 'available' in `zabbix[host,<type>,available]`. Use them in the item key *as is*.
- Values for items and item parameters that are "not supported on proxy" can only be gathered if the host is monitored by server. And vice versa, values "not supported on server" can only be gathered if the host is monitored by proxy.

Key			
▲	Description	Return value	Comments
zabbix[boottime]	Startup time of Zabbix server or Zabbix proxy process in seconds.	Integer.	
zabbix[history]			

Key			
	Number of values stored in the HISTORY table.	Integer.	Do not use if MySQL InnoDB, Oracle or PostgreSQL is used! *(not supported on proxy)*
zabbix[history_log]			
	Number of values stored in the HISTORY_LOG table.	Integer.	Do not use if MySQL InnoDB, Oracle or PostgreSQL is used! *(not supported on proxy)*
zabbix[history_str]			
	Number of values stored in the HISTORY_STR table.	Integer.	Do not use if MySQL InnoDB, Oracle or PostgreSQL is used! *(not supported on proxy)*
zabbix[history_text]			
	Number of values stored in the HISTORY_TEXT table.	Integer.	Do not use if MySQL InnoDB, Oracle or PostgreSQL is used! *(not supported on proxy)*
zabbix[history_uint]			
	Number of values stored in the HISTORY_UINT table.	Integer.	Do not use if MySQL InnoDB, Oracle or PostgreSQL is used! This item is supported since Zabbix 1.8.3. *(not supported on proxy)*
zabbix[host„items]			
	Number of enabled items (supported and not supported) on the host.	Integer.	This item is supported since Zabbix 3.0.0.

Key			
zabbix[host„items_unsupported]	Number of enabled unsupported items on the host.	Integer.	This item is supported since Zabbix 3.0.0.*
zabbix[host„maintenance]	Current mainte-nance status of a host.	0 - host in normal state, 1 - host in mainte-nance with data collection, 2 - host in mainte-nance without data collection.	This item is always processed by Zabbix server regardless of host location (on server or proxy). The proxy will not receive this item with configu-ration data. The second parameter must be empty and is reserved for future use.
zabbix[host,discovery,interfaces]	Details of all configured interfaces of the host in Zabbix frontend.	JSON object.	This item can be used in low-level discovery. This item is supported since Zabbix 3.4.0. *(not supported on proxy)*
zabbix[host,<type>,available]			

Key			
	Availability of a particular type of checks on the host. The value of this item corresponds to availability icons in the host list.	0 - not available, 1 - available, 2 - unknown.	Valid **types** are: *agent*, *snmp*, *ipmi*, *jmx* The item value is calculated according to configuration parameters regarding host unreachability/unavailability. This item is supported since Zabbix 2.0.0.
zabbix[hosts]	Number of monitored hosts.	Integer.	
zabbix[items]	Number of enabled items (supported and not supported).	Integer.	
zabbix[items_unsupported]	Number of not supported items.	Integer.	
zabbix[java„<param>]	Information about Zabbix Java gateway.	If <param> is *ping*, ”1” is returned. Can be used to check Java gateway availability using nodata() trigger function. If <param> is *version*, version of Java gateway is returned. Example: ”2.0.0”.	Valid values for **param** are: *ping*, *version* Second parameter must be empty and is reserved for future use.

Key			
zabbix[lld_queue]			
	Count of values enqueued in the low-level discovery processing queue.	Integer.	This item can be used to monitor the low-level discovery processing queue length. This item is supported since Zabbix 4.2.0.
zabbix[preprocessing_queue]			
	Count of values enqueued in the prepro-cessing queue.	Integer.	This item can be used to monitor the prepro-cessing queue length. This item is supported since Zabbix 3.4.0.
zabbix[process,<type>,<mode>,<state>]			

Key				
	Time a particular Zabbix process or a group of processes (identified by <type> and <mode>) spent in <state> in percentage. It is calculated for the last minute only. If <mode> is Zabbix process number that is not running (for example, with 5 pollers running <mode> is specified to be 6), such an item will turn into unsupported state. Minimum and maximum refers to the usage percentage for a single process. So if in a group of 3 pollers usage percentages per process were 2, 18 and 66, min would return 2 and max would return 66. Processes report what they are doing in shared memory and the self-monitoring process summarizes that data		Percentage of time. Float.	Supported **types** of server processes: *alert manager*, *alerter*, *configuration syncer*, *discoverer*, *escalator*, *history syncer*, *housekeeper*, *http poller*, *icmp pinger*, *ipmi manager*, *ipmi poller*, *java poller*, *lld manager*, *lld worker*, *poller*, *preprocessing manager*, *preprocessing worker*, *proxy poller*, *self-monitoring*, *snmp trapper*, *task manager*, *timer*, *trapper*, *unreachable poller*, *vmware collector* Supported **types** of proxy processes: *configuration syncer*, *data sender*, *discoverer*, *heartbeat sender*, *history syncer*, *housekeeper*, *http poller*, *icmp pinger*, *ipmi manager*, *ipmi poller*, *java poller*, *poller*, *preprocessing manager*, *preprocessing worker*, *self-*

Key			
zabbix[proxy,<name>,<param>]			
	Information about Zabbix proxy.	Integer.	**name**: proxy name Valid values for **param** are: *lastaccess* - timestamp of last heart beat message received from proxy Example: => zabbix[proxy,"Germany",lastacc `fuzzytime()` trigger function can be used to check availability of proxies. This item is always processed by Zabbix server regardless of host location (on server or proxy).
zabbix[proxy_history]			
	Number of values in the proxy history table waiting to be sent to the server.	Integer.	*(not supported on server)*
zabbix[queue,<from>,<to>]			
	Number of monitored items in the queue which are delayed at least by <from> seconds but less than by <to> seconds.	Integer.	**from** - default: 6 seconds **to** - default: infinity Time-unit symbols (s,m,h,d,w) are supported for these parameters.
zabbix[rcache,<cache>,<mode>]			

Key			
	Availability statistics of Zabbix configuration cache.	Integer (for size); float (for percentage).	**cache**: *buffer* Valid **modes** are: *total* - total size of buffer *free* - size of free buffer *pfree* - percentage of free buffer *used* - size of used buffer *pused* - percentage of used buffer *pused* mode is supported since Zabbix 4.0.0.
zabbix[requiredperformance]	Required performance of Zabbix server or Zabbix proxy, in new values per second expected.	Float.	Approximately correlates with "Required server performance, new values per second" in *Reports* → *System information*.
zabbix[stats,<ip>,<port>]			

Key				
	Remote Zabbix server or proxy internal metrics.		JSON object.	**ip** - IP/DNS/network mask list of servers/proxies to be remotely queried (default is 127.0.0.1) **port** - port of server/proxy to be remotely queried (default is 10051) Note that the stats request will only be accepted from the addresses listed in the 'StatsAllowedIP' server/proxy parameter on the target instance. A selected set of internal metrics is returned by this item. For details, see Remote monitoring of Zabbix stats. Supported since 4.2.0.
zabbix[stats,<ip>,<port>,queue,<from>,<to>]				

Key			
	Remote Zabbix server or proxy internal queue metrics (see `zabbix[queue,<from>,<to>]`).	JSON object.	**ip** - IP/DNS/network mask list of servers/proxies to be remotely queried (default is 127.0.0.1) **port** - port of server/proxy to be remotely queried (default is 10051) **from** - delayed by at least (default is 6 seconds) **to** - delayed by at most (default is infinity) Note that the stats request will only be accepted from the addresses listed in the 'StatsAllowedIP' server/proxy parameter on the target instance. Supported since 4.2.0.
zabbix[trends]	Number of values stored in the TRENDS table.	Integer.	Do not use if MySQL InnoDB, Oracle or PostgreSQL is used! *(not supported on proxy)*
zabbix[trends_uint]			

Key			
	Number of values stored in the TRENDS_UINT table.	Integer.	Do not use if MySQL InnoDB, Oracle or PostgreSQL is used! This item is supported since Zabbix 1.8.3. *(not supported on proxy)*
zabbix[triggers]			
	Number of enabled triggers in Zabbix database, with all items enabled on enabled hosts.	Integer.	*(not supported on proxy)*
zabbix[uptime]			
	Uptime of Zabbix server or Zabbix proxy process in seconds.	Integer.	
zabbix[vcache,buffer,<mode>]			
	Availability statistics of Zabbix value cache.	Integer (for size); float (for percentage).	Valid **modes** are: *total* - total size of buffer *free* - size of free buffer *pfree* - percentage of free buffer *used* - size of used buffer *pused* - percentage of used buffer *(not supported on proxy)*
zabbix[vcache,cache,<parameter>]			

Key				
zabbix[vmware,buffer,<mode>]	Effectiveness statistics of Zabbix value cache.	Integer. With the *mode* parameter: 0 - normal mode, 1 - low memory mode	Valid **parameter** values are: *requests* - total number of requests *hits* - number of cache hits (history values taken from the cache) *misses* - number of cache misses (history values taken from the database) *mode* - value cache operating mode This item is supported since Zabbix 2.2.0 and the *mode* parameter since Zabbix 3.0.0. *(not supported on proxy)* You may use this key with the *Change per second* preprocessing step in order to get values per second statistics.

Key					
	Availability statistics of Zabbix vmware cache.			Integer (for size); float (for percentage).	Valid **modes** are: *total* - total size of buffer *free* - size of free buffer *pfree* - percentage of free buffer *used* - size of used buffer *pused* - percentage of used buffer
zabbix[wcache,<cache>,<mode>]					
	Statistics and availability of Zabbix write cache.				Specifying <cache> is mandatory.
	Cache	**Mode**			
	values	all *(default)*	Total number of values processed by Zabbix server or Zabbix proxy, except unsupported items.	Integer.	Counter. You may use this key with the *Change per second* preprocess-ing step in order to get values per second statistics.
		float	Number of processed float values.	Integer.	Counter.
		uint	Number of processed unsigned integer values.	Integer.	Counter.
		str	Number of processed charac-ter/string values.	Integer.	Counter.
		log	Number of processed log values.	Integer.	Counter.
		text	Number of processed text values.	Integer.	Counter.
		not supported	Number of times item processing resulted in item becoming unsupported or keeping that state.	Integer.	Counter.

Key					
	history	pfree *(default)*	Percentage of free history buffer.	Float.	History cache is used to store item values. A low number indicates performance problems on the database side.
		free	Size of free history buffer.	Integer.	
		total	Total size of history buffer.	Integer.	
		used	Size of used history buffer.	Integer.	
		pused	Percentage of used history buffer.	Float.	*pused* mode is supported since Zabbix 4.0.0.
	index	pfree *(default)*	Percentage of free history index buffer.	Float.	History index cache is used to index values stored in history cache. *Index* cache is supported since Zabbix 3.0.0.
		free	Size of free history index history buffer.	Integer.	
		total	Total size of history index history buffer.	Integer.	
		used	Size of used history index history buffer.	Integer.	
		pused	Percentage of used history index buffer.	Float.	*pused* mode is supported since Zabbix 4.0.0.

Key					
	trend	pfree *(default)*	Percentage of free trend cache.	Float.	Trend cache stores aggregate for the current hour for all items that receive data. *(not supported on proxy)*
		free	Size of free trend buffer.	Integer.	*(not supported on proxy)*
		total	Total size of trend buffer.	Integer.	*(not supported on proxy)*
		used	Size of used trend buffer.	Integer.	*(not supported on proxy)*
		pused	Percentage of used trend buffer.	Float.	*(not supported on proxy)* *pused* mode is supported since Zabbix 4.0.0.

9 SSH checks

Overview

SSH checks are performed as agent-less monitoring. Zabbix agent is not needed for SSH checks.

To perform SSH checks Zabbix server must be initially configured with SSH2 support (libssh2 or libssh). See also: Requirements.

Attention:
Only libssh is supported starting with RHEL/CentOS 8. libssh is supported by Zabbix since 4.4.6.

Configuration

Passphrase authentication

SSH checks provide two authentication methods, a user/password pair and key-file based.

If you do not intend to use keys, no additional configuration is required, besides linking libssh2/libssh to Zabbix, if you're building from source.

Key file authentication

To use key based authentication for SSH items, certain changes to the server configuration are required.

Open the Zabbix server configuration file (zabbix_server.conf) as `root` and look for the following line:

```
# SSHKeyLocation=
```

Uncomment it and set full path to a folder where public and private keys will be located:

```
SSHKeyLocation=/home/zabbix/.ssh
```

Save the file and restart zabbix_server afterwards.

/home/zabbix here is the home directory for the *zabbix* user account and *.ssh* is a directory where by default public and private keys will be generated by a ssh-keygen command inside the home directory.

Usually installation packages of zabbix-server from different OS distributions create the *zabbix* user account with a home directory in not very well-known places (as for system accounts). For example, for CentOS it's */var/lib/zabbix*, for Debian it's */var/run/zabbix*.

Before starting to generate the keys, an approach to reallocate the home directory to a better known place (intuitively expected) could be considered. This will correspond with the *SSHKeyLocation* Zabbix server configuration parameter mentioned above.

These steps can be skipped if *zabbix* account has been added manually according to the installation section because in this case most likely the home directory is already located at */home/zabbix*.

To change the setting for the *zabbix* user account all working processes which are using it have to be stopped:

```
# service zabbix-agent stop
# service zabbix-server stop
```

To change the home directory location with an attempt to move it (if it exists) a command should be executed:

```
# usermod -m -d /home/zabbix zabbix
```

It's absolutely possible that a home directory did not exist in the old place (in the CentOS for example), so it should be created at the new place. A safe attempt to do that is:

```
# test -d /home/zabbix || mkdir /home/zabbix
```

To be sure that all is secure, additional commands could be executed to set permissions to the home directory:

```
# chown zabbix:zabbix /home/zabbix
# chmod 700 /home/zabbix
```

Previously stopped processes now can be started again:

```
# service zabbix-agent start
# service zabbix-server start
```

Now steps to generate public and private keys can be performed by a command:

```
# sudo -u zabbix ssh-keygen -t rsa
Generating public/private rsa key pair.
Enter file in which to save the key (/home/zabbix/.ssh/id_rsa):
Created directory '/home/zabbix/.ssh'.
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /home/zabbix/.ssh/id_rsa.
Your public key has been saved in /home/zabbix/.ssh/id_rsa.pub.
The key fingerprint is:
90:af:e4:c7:e3:f0:2e:5a:8d:ab:48:a2:0c:92:30:b9 zabbix@it0
The key's randomart image is:
+--[ RSA 2048]----+
|                 |
|       .         |
|      o          |
| .     o         |
|+     . S        |
|.+   o =         |
|E .   * =        |
|=o . ..* .       |
|... oo.o+        |
+-----------------+
```

Note: public and private keys (*id_rsa.pub* and *id_rsa* respectively) have been generated by default in the */home/zabbix/.ssh* directory which corresponds to the Zabbix server *SSHKeyLocation* configuration parameter.

Attention:
Key types other than "rsa" may be supported by the ssh-keygen tool and SSH servers but they may not be supported by libssh2, used by Zabbix.

Shell configuration form

This step should be performed only once for every host that will be monitored by SSH checks.

By using the following command the **public** key file can be installed on a remote host *10.10.10.10* so that then SSH checks can be performed with a *root* account:

```
# sudo -u zabbix ssh-copy-id root@10.10.10.10
The authenticity of host '10.10.10.10 (10.10.10.10)' can't be established.
RSA key fingerprint is 38:ba:f2:a4:b5:d9:8f:52:00:09:f7:1f:75:cc:0b:46.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '10.10.10.10' (RSA) to the list of known hosts.
root@10.10.10.10's password:
Now try logging into the machine, with "ssh 'root@10.10.10.10'", and check in:
  .ssh/authorized_keys
to make sure we haven't added extra keys that you weren't expecting.
```

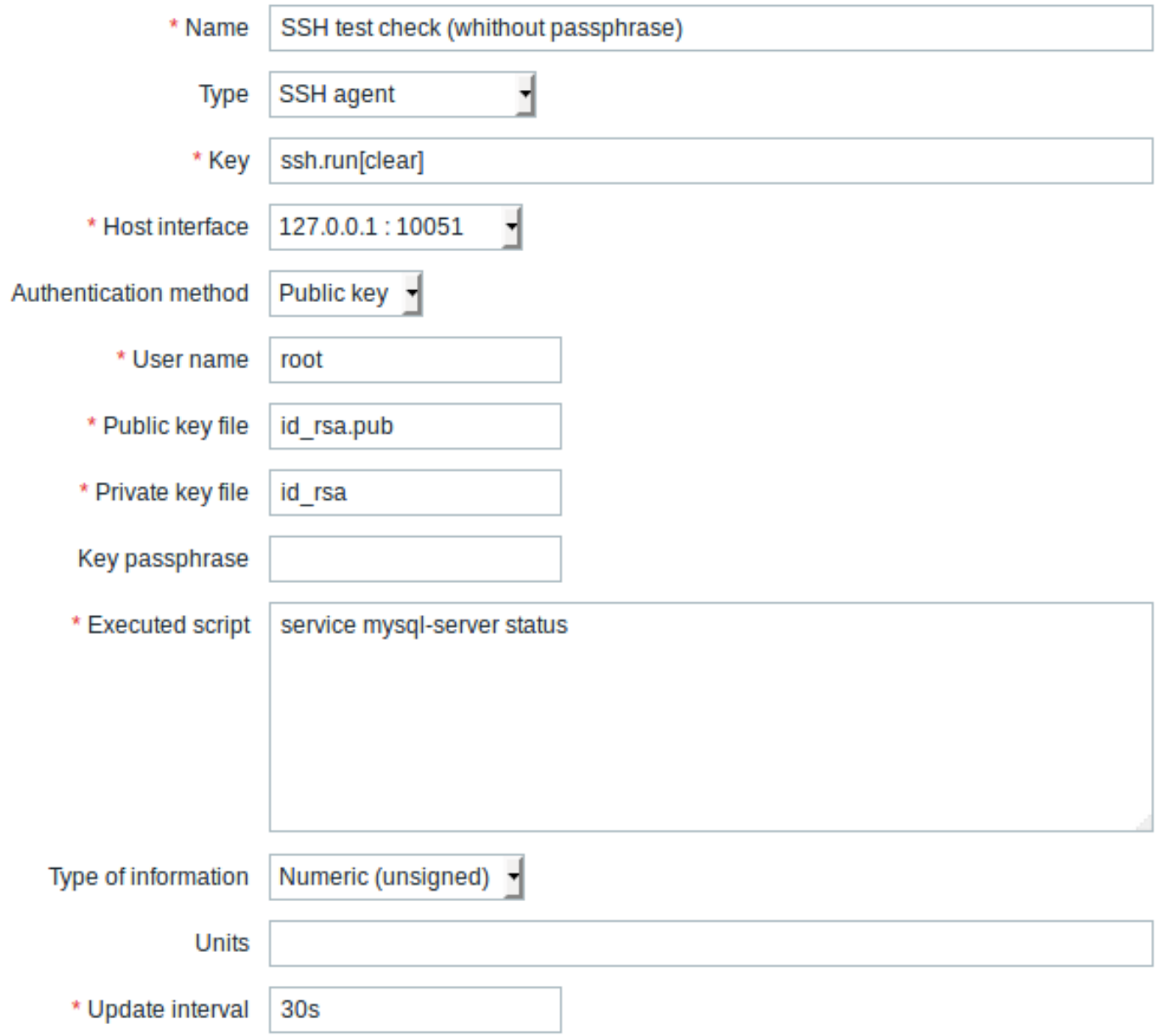
Now it's possible to check the SSH login using the default private key (*/home/zabbix/.ssh/id_rsa*) for *zabbix* user account:

```
# sudo -u zabbix ssh root@10.10.10.10
```

If the login is successful, then the configuration part in the shell is finished and remote SSH session can be closed.

Item configuration

Actual command(s) to be executed must be placed in the **Executed script** field in the item configuration.
Multiple commands can be executed one after another by placing them on a new line. In this case returned values also will be formatted as multi lined.



All mandatory input fields are marked with a red asterisk.

The fields that require specific information for SSH items are:

Parameter	Description	Comments
Type	Select **SSH agent** here.	
Key	Unique (per host) item key in format **ssh.run[<unique short description>,<ip>,<port>,<encoding>]**	<unique short description> is required and should be unique for all SSH items per host Default port is 22, not the port specified in the interface to which this item is assigned
Authentication method	One of the ”Password” or ”Public key”	
User name	User name to authenticate on remote host. Required	
Public key file	File name of public key if *Authentication method* is ”Public key”. Required	Example: *id_rsa.pub* - default public key file name generated by a command ssh-keygen
Private key file	File name of private key if *Authentication method* is ”Public key”. Required	Example: *id_rsa* - default private key file name
Password or *Key passphrase*	Password to authenticate or Passphrase **if** it was used for the private key	Leave the *Key passphrase* field empty if passphrase was not used See also known issues regarding passphrase usage
Executed script	Executed shell command(s) using SSH remote session	Examples: *date +%s* *service mysql-server status* *ps auxww | grep httpd | wc -l*

Attention:
libssh2 library may truncate executable scripts to ~32kB.

10 Telnet checks

Overview

Telnet checks are performed as agent-less monitoring. Zabbix agent is not needed for Telnet checks.

Configurable fields

Actual command(s) to be executed must be placed in the **Executed script** field in the item configuration.
Multiple commands can be executed one after another by placing them on a new line. In this case returned value also will be formated as multi lined.

Supported characters that the shell prompt can end with:

- $
- #
-
- %

Note:
A telnet prompt line which ended with one of these characters will be removed from the returned value, but only for the first command in the commands list, i.e. only at a start of the telnet session.

Key	Description	Comments
telnet.run[<unique short description>,<ip>,<port>,<encoding>]	Run a command on a remote device using telnet connection	

Attention:
If a telnet check returns a value with non-ASCII characters and in non-UTF8 encoding then the <*encoding*> parameter of the key should be properly specified. See encoding of returned values page for more details.

11 External checks

Overview

External check is a check executed by Zabbix server by running a shell script or a binary. However, when hosts are monitored by a Zabbix proxy, the external checks are executed by the proxy.

External checks do not require any agent running on a host being monitored.

The syntax of the item key is:

```
script[<parameter1>,<parameter2>,...]
```

Where:

ARGUMENT	DEFINITION
script	Name of a shell script or a binary.
parameter(s)	Optional command line parameters.

If you don't want to pass any parameters to the script you may use:

```
script[] or
script
```

Zabbix server will look in the directory defined as the location for external scripts (parameter 'ExternalScripts' in Zabbix server configuration file) and execute the command. The command will be executed as the user Zabbix server runs as, so any access permissions or environment variables should be handled in a wrapper script, if necessary, and permissions on the command should allow that user to execute it. Only commands in the specified directory are available for execution.

Warning:
Do not overuse external checks! As each script requires starting a fork process by Zabbix server, running many scripts can decrease Zabbix performance a lot.

Usage example

Executing the script **check_oracle.sh** with the first parameters '-h'. The second parameter will be replaced by IP address or DNS name, depending on the selection in the host properties.

```
check_oracle.sh["-h","{HOST.CONN}"]
```

Assuming host is configured to use IP address, Zabbix will execute:

```
check_oracle.sh '-h' '192.168.1.4'
```

External check result

The return value of the check is standard output together with standard error (the full output with trimmed trailing whitespace is returned since Zabbix 2.0).

Attention:
A text (character, log or text type of information) item will not become unsupported in case of standard error output.

In case the requested script is not found or Zabbix server has no permissions to execute it, the item will become unsupported and corresponding error message will be set. In case of a timeout, the item will be marked as unsupported as well, an according error message will be displayed and the forked process for the script will be killed.

12 Aggregate checks

Overview

In aggregate checks Zabbix server collects aggregate information from items by doing direct database queries.

Aggregate checks do not require any agent running on the host being monitored.

Syntax

The syntax of the aggregate item key is:

```
groupfunc["host group","item key",itemfunc,timeperiod]
```

Supported group functions (groupfunc) are:

Group function	Description
grpavg	Average value
grpmax	Maximum value
grpmin	Minimum value
grpsum	Sum of values

Multiple host groups may be included by inserting a comma-delimited array. Specifying a parent host group will include the parent group and all nested host groups with their items.

All items that are referenced from the aggregate item key must exist and be collecting data. Only enabled items on enabled hosts are included in the calculations.

Attention:
The key of the aggregate item must be updated manually, if the item key of a referenced item is changed.

Supported item functions (itemfunc) are:

Item function	Description
avg	Average value
count	Number of values
last	Last value
max	Maximum value
min	Minimum value
sum	Sum of values

The **timeperiod** parameter specifies a time period of latest collected values. Supported unit symbols can be used in this parameter for convenience, for example '5m' (minutes) instead of '300' (seconds) or '1d' (day) instead of '86400' (seconds).

Warning:
An amount of values (prefixed with **#**) is not supported in the timeperiod.

Timeperiod is ignored by the server if the third parameter (item function) is *last* and can thus be omitted:

```
groupfunc["host group","item key",last]
```

Note:
If the aggregate results in a float value it will be trimmed to an integer if the aggregated item type of information is *Numeric (unsigned)*.

An aggregate item may become unsupported if:

- none of the referenced items is found (which may happen if the item key is incorrect, none of the items exists or all included groups are incorrect)
- no data to calculate a function

Usage examples

Examples of keys for aggregate checks:

Example 1

Total disk space of host group 'MySQL Servers'.

```
grpsum["MySQL Servers","vfs.fs.size[/,total]",last]
```

Example 2

Average processor load of host group ’MySQL Servers’.

```
grpavg["MySQL Servers","system.cpu.load[,avg1]",last]
```

Example 3

5-minute average of the number of queries per second for host group ’MySQL Servers’.

```
grpavg["MySQL Servers",mysql.qps,avg,5m]
```

Example 4

Average CPU load on all hosts in multiple host groups.

```
grpavg[["Servers A","Servers B","Servers C"],system.cpu.load,last]
```

13 Trapper items

Overview

Trapper items accept incoming data instead of querying for it.

It is useful for any data you might want to ”push” into Zabbix.

To use a trapper item you must:

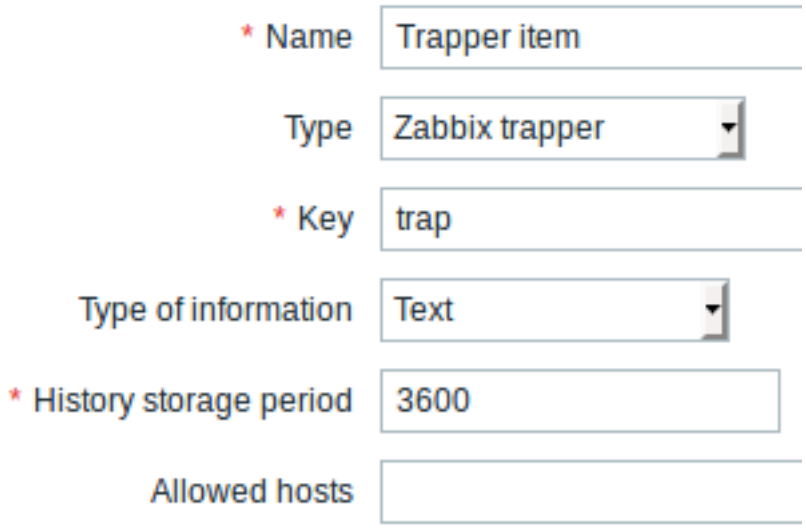
- have a trapper item set up in Zabbix
- send in the data into Zabbix

Configuration

Item configuration

To configure a trapper item:

- Go to: *Configuration* → *Hosts*
- Click on *Items* in the row of the host
- Click on *Create item*
- Enter parameters of the item in the form



All mandatory input fields are marked with a red asterisk.

The fields that require specific information for trapper items are:

Type	Select **Zabbix trapper** here.
Key	Enter a key that will be used to recognize the item when sending in data.
Type of information	Select the type of information that will correspond the format of data that will be sent in.

Allowed hosts	List of comma delimited IP addresses, optionally in CIDR notation, or hostnames. If specified, incoming connections will be accepted only from the hosts listed here. If IPv6 support is enabled then '127.0.0.1', '::127.0.0.1', '::ffff:127.0.0.1' are treated equally and '::/0' will allow any IPv4 or IPv6 address. '0.0.0.0/0' can be used to allow any IPv4 address. Note, that "IPv4-compatible IPv6 addresses" (0000::/96 prefix) are supported but deprecated by RFC4291. Example: Server=127.0.0.1, 192.168.1.0/24, 192.168.3.1-255, 192.168.1-10.1-255, ::1,2001:db8::/32, zabbix.domain Spaces and user macros are allowed in this field since Zabbix 2.2.0. Host macros: {HOST.HOST}, {HOST.NAME}, {HOST.IP}, {HOST.DNS}, {HOST.CONN} are allowed in this field since Zabbix 4.0.2.

Note:
You may have to wait up to 60 seconds after saving the item until the server picks up the changes from a configuration cache update, before you can send in values.

Sending in data

In the simplest of cases, we may use zabbix_sender utility to send in some 'test value':

```
zabbix_sender -z <server IP address> -p 10051 -s "New host" -k trap -o "test value"
```

To send in the value we use these keys:

-z - to specify Zabbix server IP address

-p - to specify Zabbix server port number (10051 by default)

-s - to specify the host (make sure to use the 'technical' host name here, instead of the 'visible' name)

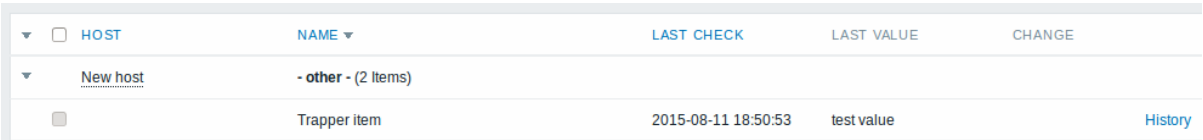
-k - to specify the key of the item we just defined

-o - to specify the actual value to send

Attention:
Zabbix trapper process does not expand macros used in the item key in attempt to check corresponding item key existence for targeted host.

Display

This is the result in *Monitoring* → *Latest data*:



Note that if a single numeric value is sent in, the data graph will show a horizontal line to the left and to the right of the time point of the value.

14 JMX monitoring

Overview

JMX monitoring can be used to monitor JMX counters of a Java application.

JMX monitoring has native support in Zabbix in the form of a Zabbix daemon called "Zabbix Java gateway", introduced since Zabbix 2.0.

To retrieve the value of a particular JMX counter on a host, Zabbix server queries the Zabbix **Java gateway**, which in turn uses the JMX management API to query the application of interest remotely.

For more details and setup see the Zabbix Java gateway section.

> **Warning:**
> Communication between Java gateway and the monitored JMX application should not be firewalled.

Enabling remote JMX monitoring for Java application

A Java application does not need any additional software installed, but it needs to be started with the command-line options specified below to have support for remote JMX monitoring.

As a bare minimum, if you just wish to get started by monitoring a simple Java application on a local host with no security enforced, start it with these options:

```
java \
-Dcom.sun.management.jmxremote \
-Dcom.sun.management.jmxremote.port=12345 \
-Dcom.sun.management.jmxremote.authenticate=false \
-Dcom.sun.management.jmxremote.ssl=false \
-jar /usr/share/doc/openjdk-6-jre-headless/demo/jfc/Notepad/Notepad.jar
```

This makes Java listen for incoming JMX connections on port 12345, from local host only, and tells it not to require authentication or SSL.

If you want to allow connections on another interface, set the -Djava.rmi.server.hostname parameter to the IP of that interface.

If you wish to be more stringent about security, there are many other Java options available to you. For instance, the next example starts the application with a more versatile set of options and opens it to a wider network, not just local host.

```
java \
-Djava.rmi.server.hostname=192.168.3.14 \
-Dcom.sun.management.jmxremote \
-Dcom.sun.management.jmxremote.port=12345 \
-Dcom.sun.management.jmxremote.authenticate=true \
-Dcom.sun.management.jmxremote.password.file=/etc/java-6-openjdk/management/jmxremote.password \
-Dcom.sun.management.jmxremote.access.file=/etc/java-6-openjdk/management/jmxremote.access \
-Dcom.sun.management.jmxremote.ssl=true \
-Djavax.net.ssl.keyStore=$YOUR_KEY_STORE \
-Djavax.net.ssl.keyStorePassword=$YOUR_KEY_STORE_PASSWORD \
-Djavax.net.ssl.trustStore=$YOUR_TRUST_STORE \
-Djavax.net.ssl.trustStorePassword=$YOUR_TRUST_STORE_PASSWORD \
-Dcom.sun.management.jmxremote.ssl.need.client.auth=true \
-jar /usr/share/doc/openjdk-6-jre-headless/demo/jfc/Notepad/Notepad.jar
```

Most (if not all) of these settings can be specified in /etc/java-6-openjdk/management/management.properties (or wherever that file is on your system).

Note that if you wish to use SSL, you have to modify startup.sh script by adding `-Djavax.net.ssl.*` options to Java gateway, so that it knows where to find key and trust stores.

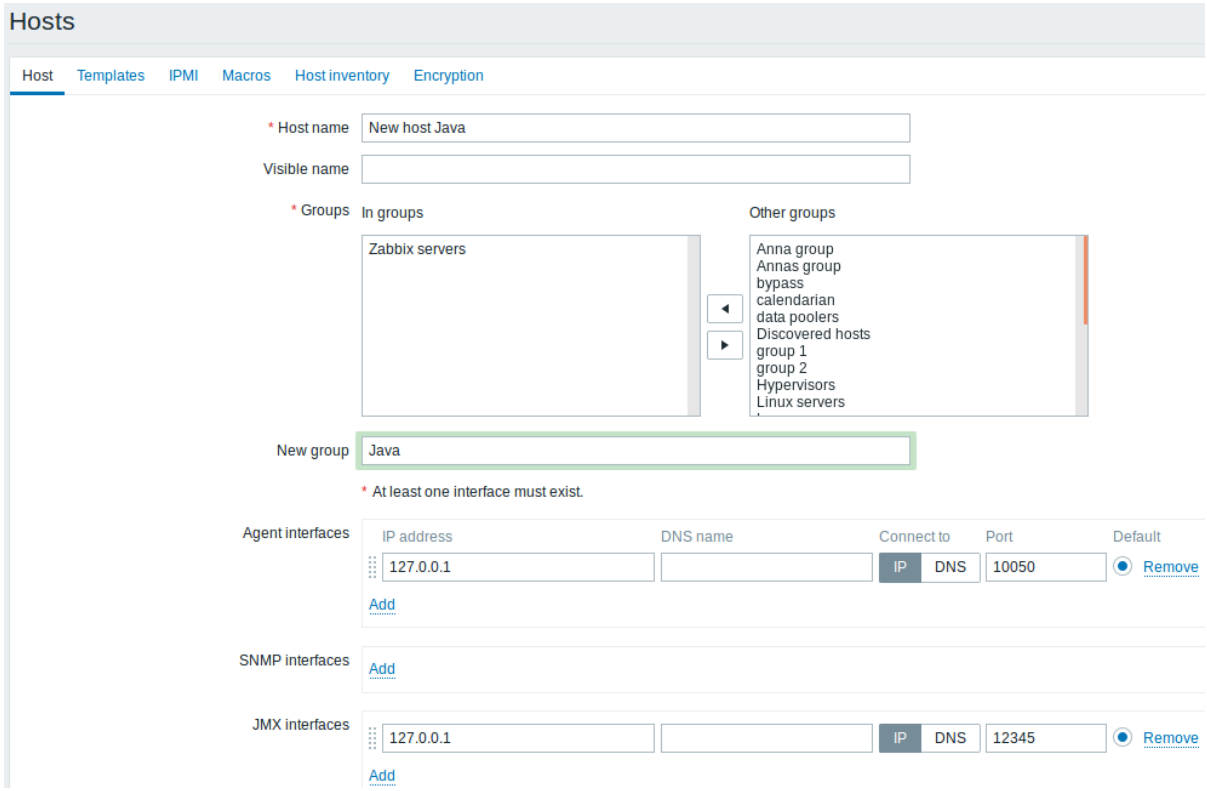
See Monitoring and Management Using JMX for a detailed description.

Configuring JMX interfaces and items in Zabbix frontend

With Java gateway running, server knowing where to find it and a Java application started with support for remote JMX monitoring, it is time to configure the interfaces and items in Zabbix GUI.

Configuring JMX interface

You begin by creating a JMX-type interface on the host of interest.

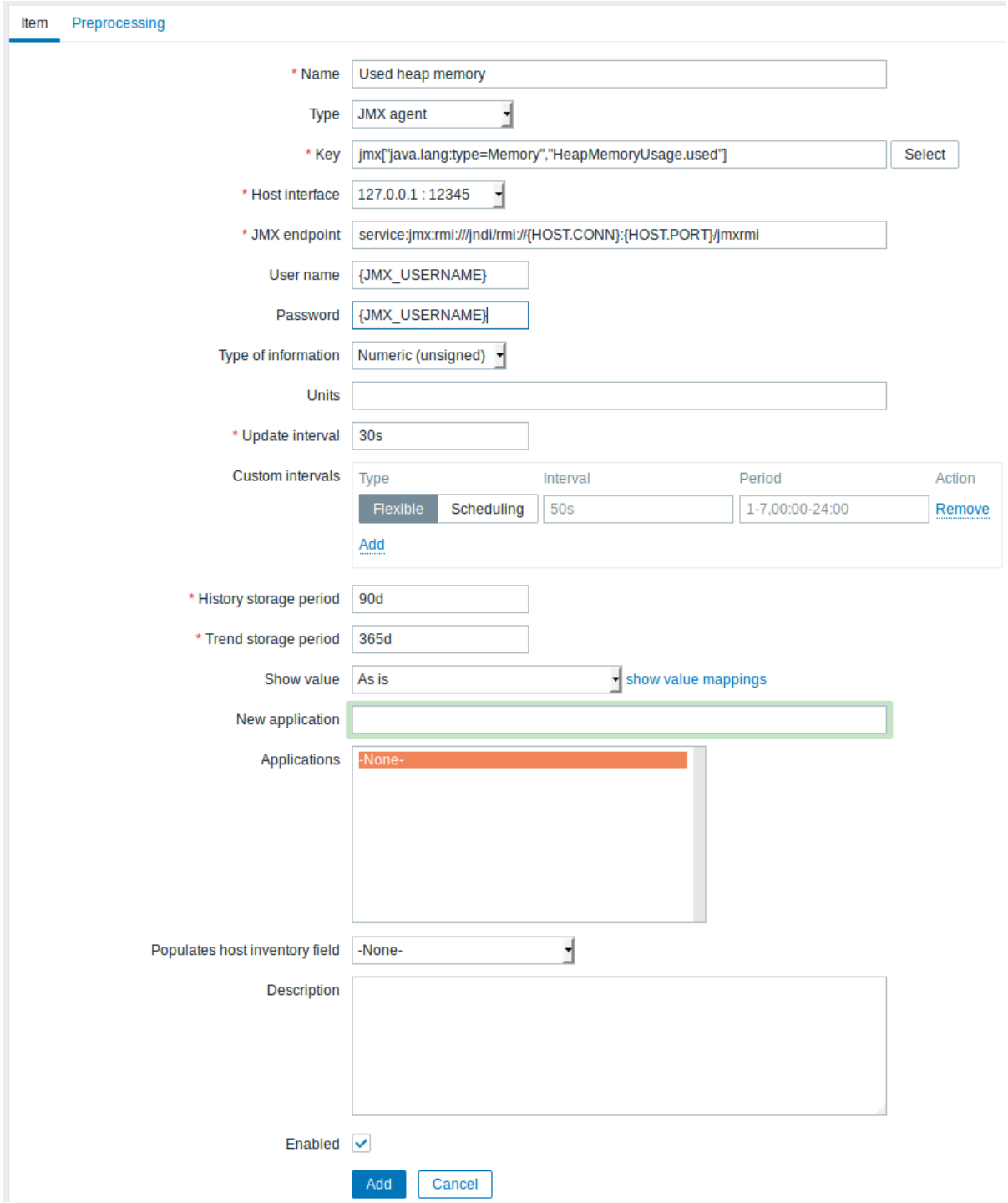


All mandatory input fields are marked with a red asterisk.

Adding JMX agent item

For each JMX counter you are interested in you add **JMX agent** item attached to that interface.

The key in the screenshot below says `jmx["java.lang:type=Memory","HeapMemoryUsage.used"]`.



All mandatory input fields are marked with a red asterisk.

The fields that require specific information for JMX items are:

Type	Set **JMX agent** here.
Key	The `jmx[]` item key contains two parameters: **object name** - the object name of an MBean; **attribute name** - an MBean attribute name with optional composite data field names separated by dots. See below for more detail on JMX item keys. Since Zabbix 3.4, you may discover MBeans and MBean attributes using a `jmx.discovery[]` low-level discovery item.

JMX endpoint	You may specify a custom JMX endpoint. Make sure that JMX endpoint connection parameters match the JMX interface. This can be achieved by using {HOST.*} macros as done in the default JMX endpoint. This field is supported since 3.4.0. {HOST.*} macros and user macros are supported.
User name	Specify the user name, if you have configured authentication on your Java application. User macros are supported.
Password	Specify the password, if you have configured authentication on your Java application. User macros are supported.

If you wish to monitor a Boolean counter that is either "true" or "false", then you specify type of information as "Numeric (unsigned)" and select "Boolean to decimal" preprocessing step in the Preprocessing tab. Server will store Boolean values as 1 or 0, respectively.

JMX item keys in more detail

Simple attributes

An MBean object name is nothing but a string which you define in your Java application. An attribute name, on the other hand, can be more complex. In case an attribute returns primitive data type (an integer, a string etc.) there is nothing to worry about, the key will look like this:

```
jmx[com.example:Type=Hello,weight]
```

In this example an object name is "com.example:Type=Hello", attribute name is "weight" and probably the returned value type should be "Numeric (float)".

Attributes returning composite data

It becomes more complicated when your attribute returns composite data. For example: your attribute name is "apple" and it returns a hash representing its parameters, like "weight", "color" etc. Your key may look like this:

```
jmx[com.example:Type=Hello,apple.weight]
```

This is how an attribute name and a hash key are separated, by using a dot symbol. Same way, if an attribute returns nested composite data the parts are separated by a dot:

```
jmx[com.example:Type=Hello,fruits.apple.weight]
```

Problem with dots

So far so good. But what if an attribute name or a hash key contains dot symbol? Here is an example:

```
jmx[com.example:Type=Hello,all.fruits.apple.weight]
```

That's a problem. How to tell Zabbix that attribute name is "all.fruits", not just "all"? How to distinguish a dot that is part of the name from the dot that separates an attribute name and hash keys?

Before **2.0.4** Zabbix Java gateway was unable to handle such situations and users were left with UNSUPPORTED items. Since 2.0.4 this is possible, all you need to do is to escape the dots that are part of the name with a backslash:

```
jmx[com.example:Type=Hello,all\.fruits.apple.weight]
```

Same way, if your hash key contains a dot you escape it:

```
jmx[com.example:Type=Hello,all\.fruits.apple.total\.weight]
```

Other issues

A backslash character in an attribute name should be escaped:

```
jmx[com.example:type=Hello,c:\\documents]
```

For handling any other special characters in JMX item key, please see the item key format section.

This is actually all there is to it. Happy JMX monitoring!

Non-primitive data types

Since Zabbix 4.0.0 it is possible to work with custom MBeans returning non-primitive data types, which override the **toString()** method.

Custom endpoint example with JBoss EAP 6.4

Custom endpoints allow working with different transport protocols other than the default RMI.

To illustrate this possibility, let's try to configure JBoss EAP 6.4 monitoring as an example. First, let's make some assumptions:

- You have already installed Zabbix Java gateway. If not, then you can do it in accordance with the documentation.
- Zabbix server and Java gateway are installed with the prefix /usr/local/
- JBoss is already installed in /opt/jboss-eap-6.4/ and is running in standalone mode
- We shall assume that all these components work on the same host
- Firewall and SELinux are disabled (or configured accordingly)

Let's make some simple settings in zabbix_server.conf:

```
JavaGateway=127.0.0.1
StartJavaPollers=5
```

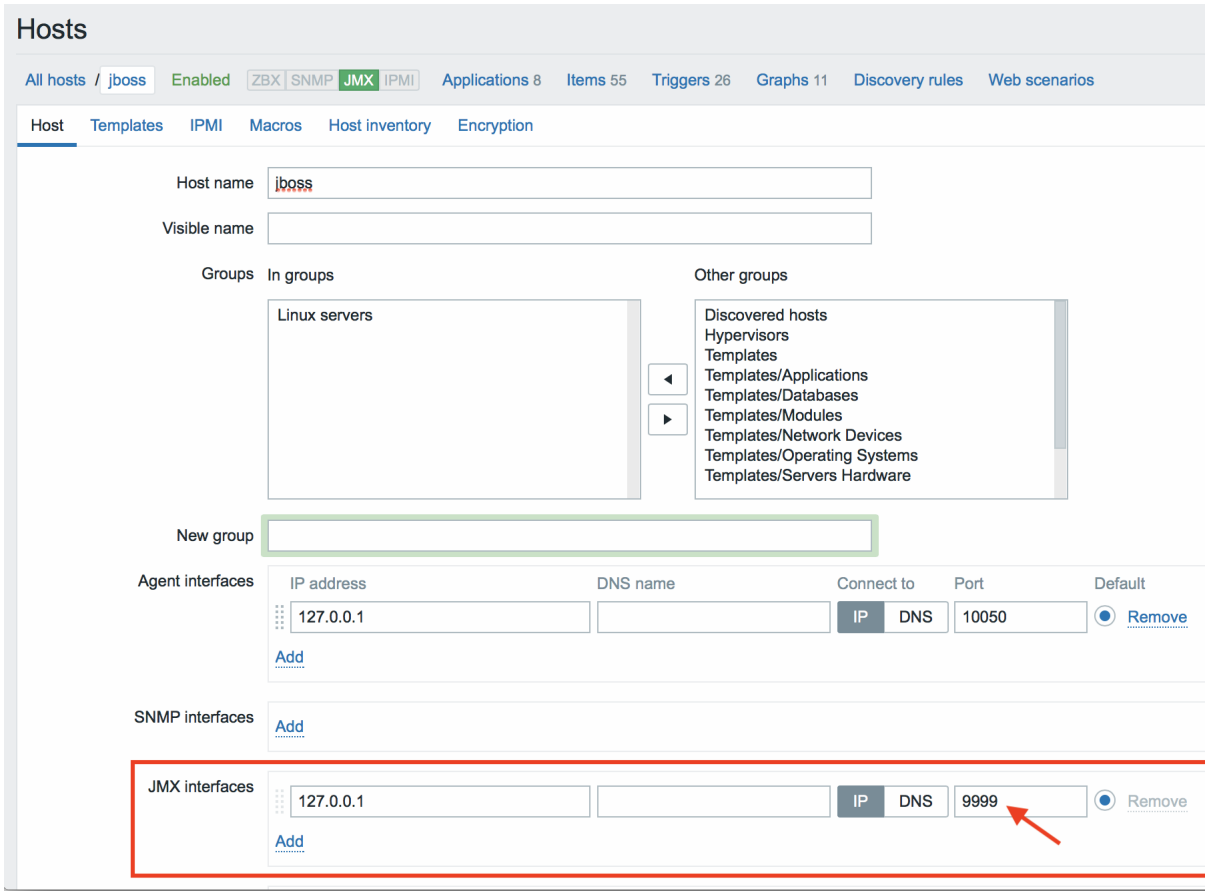
And in the zabbix_java/settings.sh configuration file (or zabbix_java_gateway.conf):

```
START_POLLERS=5
```

Check that JBoss listens to its standard management port:

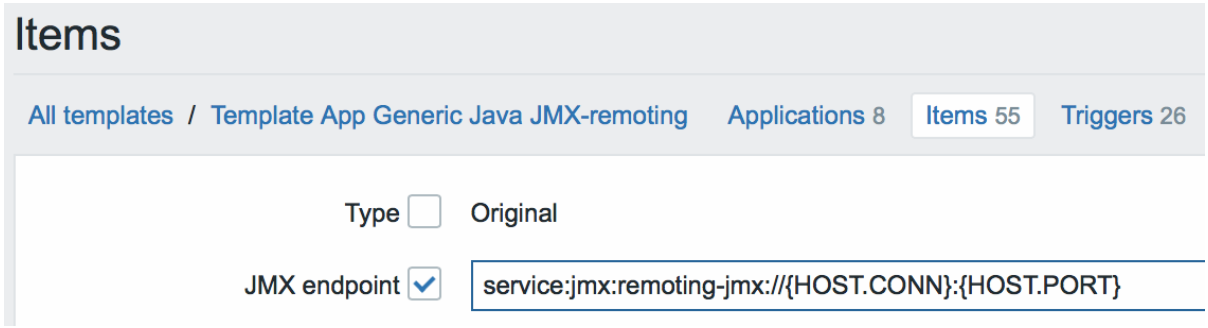
```
$ netstat -natp | grep 9999
tcp        0      0 127.0.0.1:9999          0.0.0.0:*               LISTEN      10148/java
```

Now let's create a host with JMX interface 127.0.0.1:9999 in Zabbix.



As we know that this version of JBoss uses the the JBoss Remoting protocol instead of RMI, we may mass update the JMX endpoint parameter in our JMX template accordingly:

```
service:jmx:remoting-jmx://{HOST.CONN}:{HOST.PORT}
```



Let's update the configuration cache:

```
$ /usr/local/sbin/zabbix_server -R config_cache_reload
```

Note that you may encounter an error first.

```
3. mc [root@centos7-dev]:/home/vagrant/zabbix-3.2.6/src/zabbix_java (ssh)
com.zabbix.gateway.ZabbixException: java.net.MalformedURLException: Unsupported protocol: remoting-jmx
        at com.zabbix.gateway.JMXItemChecker.getValues(JMXItemChecker.java:97) ~[zabbix-java-gateway-3.4.2.jar:na]
        at com.zabbix.gateway.SocketProcessor.run(SocketProcessor.java:63) ~[zabbix-java-gateway-3.4.2.jar:na]
        at java.util.concurrent.ThreadPoolExecutor.runWorker(ThreadPoolExecutor.java:1149) [na:1.8.0_144]
        at java.util.concurrent.ThreadPoolExecutor$Worker.run(ThreadPoolExecutor.java:624) [na:1.8.0_144]
        at java.lang.Thread.run(Thread.java:748) [na:1.8.0_144]
Caused by: java.net.MalformedURLException: Unsupported protocol: remoting-jmx
        at javax.management.remote.JMXConnectorFactory.newJMXConnector(JMXConnectorFactory.java:359) ~[na:1.8.0_144]
        at javax.management.remote.JMXConnectorFactory.connect(JMXConnectorFactory.java:269) ~[na:1.8.0_144]
        at com.zabbix.gateway.ZabbixJMXConnectorFactory$1.run(ZabbixJMXConnectorFactory.java:76) ~[zabbix-java-gatewa
-3.4.2.jar:na]
        at java.util.concurrent.Executors$RunnableAdapter.call(Executors.java:511) ~[na:1.8.0_144]
        at java.util.concurrent.FutureTask.run(FutureTask.java:266) ~[na:1.8.0_144]
        ... 3 common frames omitted
2017-11-07 13:52:12.644 [pool-1-thread-1] WARN  com.zabbix.gateway.SocketProcessor - error processing request
com.zabbix.gateway.ZabbixException: java.net.MalformedURLException: Unsupported protocol: remoting-jmx
        at com.zabbix.gateway.JMXItemChecker.getValues(JMXItemChecker.java:97) ~[zabbix-java-gateway-3.4.2.jar:na]
        at com.zabbix.gateway.SocketProcessor.run(SocketProcessor.java:63) ~[zabbix-java-gateway-3.4.2.jar:na]
        at java.util.concurrent.ThreadPoolExecutor.runWorker(ThreadPoolExecutor.java:1149) [na:1.8.0_144]
        at java.util.concurrent.ThreadPoolExecutor$Worker.run(ThreadPoolExecutor.java:624) [na:1.8.0_144]
        at java.lang.Thread.run(Thread.java:748) [na:1.8.0_144]
Caused by: java.net.MalformedURLException: Unsupported protocol: remoting-jmx
        at javax.management.remote.JMXConnectorFactory.newJMXConnector(JMXConnectorFactory.java:359) ~[na:1.8.0_144]
        at javax.management.remote.JMXConnectorFactory.connect(JMXConnectorFactory.java:269) ~[na:1.8.0_144]
        at com.zabbix.gateway.ZabbixJMXConnectorFactory$1.run(ZabbixJMXConnectorFactory.java:76) ~[zabbix-java-gatewa
-3.4.2.jar:na]
        at java.util.concurrent.Executors$RunnableAdapter.call(Executors.java:511) ~[na:1.8.0_144]
        at java.util.concurrent.FutureTask.run(FutureTask.java:266) ~[na:1.8.0_144]
        ... 3 common frames omitted
2017-11-07 13:52:14.889 [Thread-0] INFO  com.zabbix.gateway.JavaGateway - Zabbix Java Gateway 3.4.2 (revision 72885)
as stopped
2017-11-07 13:52:26.167 [main] INFO  com.zabbix.gateway.JavaGateway - Zabbix Java Gateway 3.4.2 (revision 72885) has
tarted
```

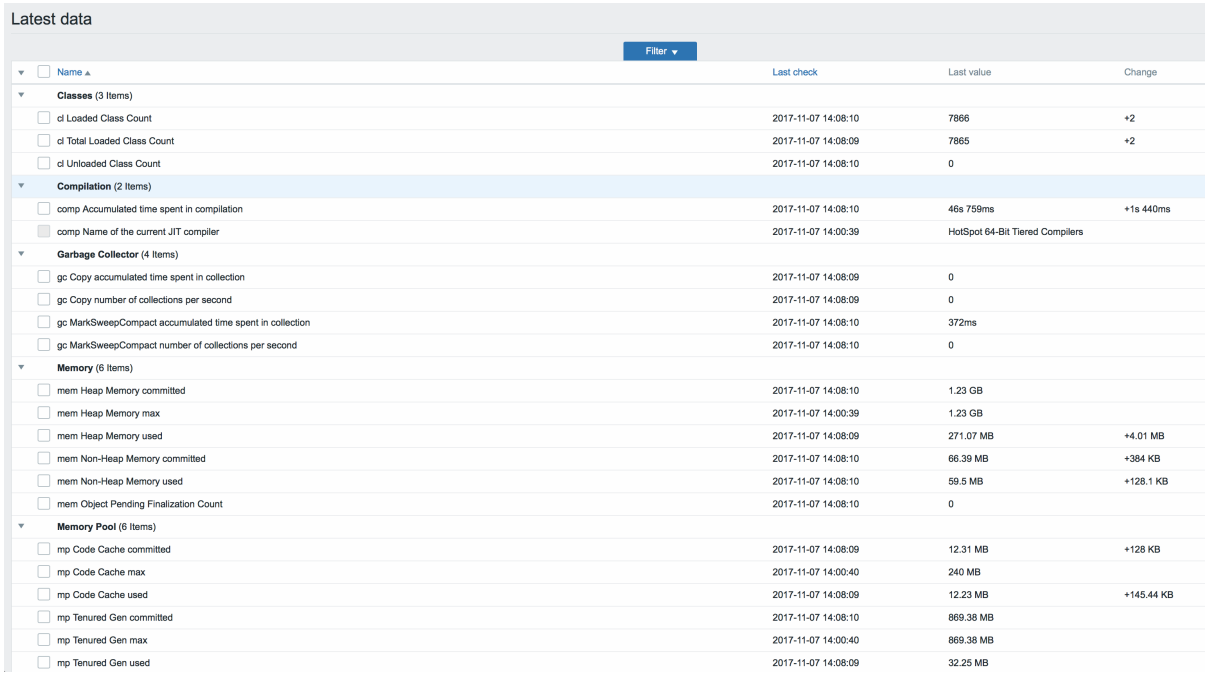
"Unsupported protocol: remoting-jmx" means that Java gateway does not know how to work with the specified protocol. That can be fixed by creating a ~/needed_modules.txt file with the following content:

```
jboss-as-remoting
jboss-logging
jboss-logmanager
jboss-marshalling
jboss-remoting
jboss-sasl
jcl-over-slf4j
jul-to-slf4j-stub
log4j-jboss-logmanager
remoting-jmx
slf4j-api
xnio-api
xnio-nio</pre>
```

and then executing the command:

```
$ for i in $(cat ~/needed_modules.txt); do find /opt/jboss-eap-6.4 -iname ${i}*.jar -exec cp {} /usr/local
```

Thus, Java gateway will have all the necessary modules for working with jmx-remoting. What's left is to restart the Java gateway, wait a bit and if you did everything right, see that JMX monitoring data begin to arrive in Zabbix:



15 ODBC monitoring

Overview

ODBC monitoring corresponds to the *Database monitor* item type in the Zabbix frontend.

ODBC is a C programming language middle-ware API for accessing database management systems (DBMS). The ODBC concept was developed by Microsoft and later ported to other platforms.

Zabbix may query any database, which is supported by ODBC. To do that, Zabbix does not directly connect to the databases, but uses the ODBC interface and drivers set up in ODBC. This function allows for more efficient monitoring of different databases for multiple purposes - for example, checking specific database queues, usage statistics and so on. Zabbix supports unixODBC, which is one of the most commonly used open source ODBC API implementations.

Installing unixODBC

The suggested way of installing unixODBC is to use the Linux operating system default package repositories. In the most popular Linux distributions unixODBC is included in the package repository by default. If it's not available, it can be obtained at the unixODBC homepage: http://www.unixodbc.org/download.html.

Installing unixODBC on RedHat/Fedora based systems using the *yum* package manager:

```
shell> yum -y install unixODBC unixODBC-devel
```

Installing unixODBC on SUSE based systems using the *zypper* package manager:

```
# zypper in unixODBC-devel
```

Note:
The unixODBC-devel package is needed to compile Zabbix with unixODBC support.

Installing unixODBC drivers

A unixODBC database driver should be installed for the database, which will be monitored. unixODBC has a list of supported databases and drivers: http://www.unixodbc.org/drivers.html. In some Linux distributions database drivers are included in package repositories. Installing MySQL database driver on RedHat/Fedora based systems using the *yum* package manager:

```
shell> yum install mysql-connector-odbc
```

Installing MySQL database driver on SUSE based systems using the *zypper* package manager:

```
zypper in MyODBC-unixODBC
```

Configuring unixODBC

ODBC configuration is done by editing the **odbcinst.ini** and **odbc.ini** files. To verify the configuration file location, type:

```
shell> odbcinst -j
```

odbcinst.ini is used to list the installed ODBC database drivers:

```
[mysql]
Description = ODBC for MySQL
Driver      = /usr/lib/libmyodbc5.so
```

Parameter details:

Attribute	Description
mysql	Database driver name.
Description	Database driver description.
Driver	Database driver library location.

odbc.ini is used to define data sources:

```
[test]
Description = MySQL test database
Driver      = mysql
Server      = 127.0.0.1
User        = root
Password    =
Port        = 3306
Database    = zabbix
```

Parameter details:

Attribute	Description
test	Data source name (DSN).
Description	Data source description.
Driver	Database driver name - as specified in odbcinst.ini
Server	Database server IP/DNS.
User	Database user for connection.
Password	Database user password.
Port	Database connection port.
Database	Database name.

To verify if ODBC connection is working successfully, a connection to database should be tested. That can be done with the **isql** utility (included in the unixODBC package):

```
shell> isql test
+---------------------------------------+
| Connected!                            |
|                                       |
| sql-statement                         |
| help [tablename]                      |
| quit                                  |
|                                       |
+---------------------------------------+
SQL>
```

Compiling Zabbix with ODBC support

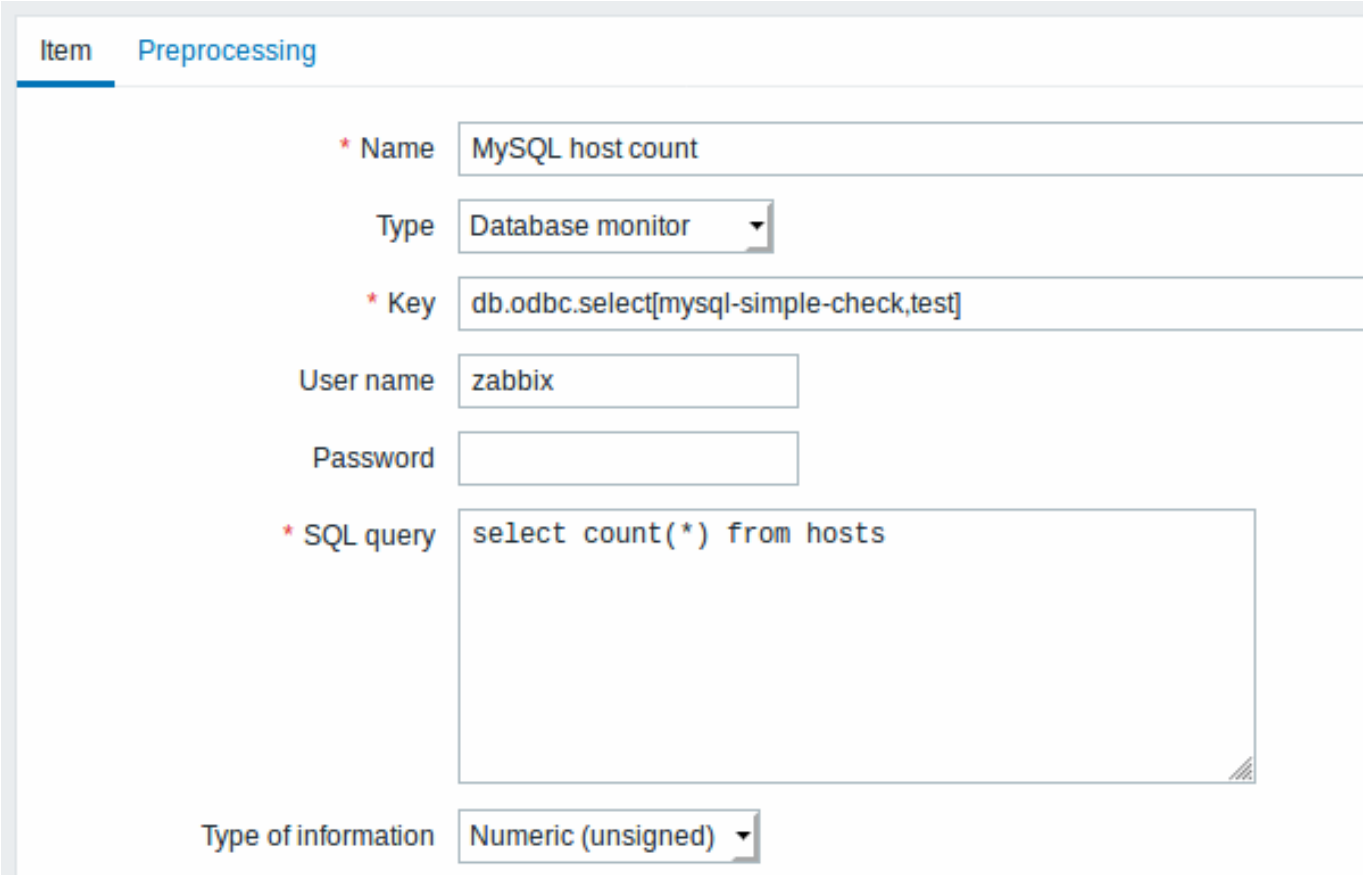
To enable ODBC support, Zabbix should be compiled with the following flag:

```
  --with-unixodbc[=ARG]   use odbc driver against unixODBC package
```

Note:
See more about Zabbix installation from the source code.

Item configuration in Zabbix frontend

Configure a database monitoring item.



All mandatory input fields are marked with a red asterisk.

Specifically for database monitoring items you must enter:

Type	Select *Database monitor* here.
Key	Enter one of the two supported item keys: **db.odbc.select**[unique_description,data_source_name] - this item is designed to return one value, i.e. the first column of the first row of the SQL query result. If a query returns more than one column, only the first column is read. If a query returns more than one line, only the first line is read. **db.odbc.get**[unique_description,data_source_name] - this item is capable of returning multiple rows/columns in JSON format. Thus it may be used as a master item that collects all data in one system call, while JSONPath preprocessing may be used in dependent items to extract individual values. For more information, see an example of the returned format, used in low-level discovery. This item is supported since Zabbix 4.4. The unique description will serve to identify the item in triggers etc. The data source name (DSN) must be set as specified in odbc.ini.
User name	Enter the database user name (optional if user is specified in odbc.ini)
Password	Enter the database user password (optional if password is specified in odbc.ini)
SQL query	Enter the SQL query. Note that with the `db.odbc.select[]` item the query must return one value only.
Type of information	It is important to know what type of information will be returned by the query, so that it is selected correctly here. With an incorrect *type of information* the item will turn unsupported.

Important notes

- Zabbix does not limit the query execution time. It is up to the user to choose queries that can be executed in a reasonable amount of time.
- The Timeout parameter value from Zabbix server is used as the ODBC login timeout (note that depending on ODBC drivers the login timeout setting might be ignored).
- The SQL command must return a result set like any query with `select ...`. The query syntax will depend on the RDBMS which will process them. The syntax of request to a storage procedure must be started with `call` keyword.
- See also known issues for ODBC checks

Error messages

ODBC error messages are structured into fields to provide detailed information. For example:

```
Cannot execute ODBC query: [SQL_ERROR]:[42601][7][ERROR: syntax error at or near ";"; Error while executin

                                                Native error code              Native error message
                                           SQLState
             Zabbix message     ODBC return code
```

Note that the error message length is limited to 2048 bytes, so the message can be truncated. If there is more than one ODBC diagnostic record Zabbix tries to concatenate them (separated with |) as far as the length limit allows.

1 Recommended UnixODBC settings for MySQL

Installation

```
*** Red Hat Enterprise Linux/CentOS**:

# yum install mysql-connector-odbc

***Debian/Ubuntu**:
```

Please refer to MySQL documentation to download necessary database driver for the corresponding platform.

For some additional information please refer to: installing unixODBC.

Configuration

ODBC configuration is done by editing **odbcinst.ini** and **odbc.ini** files. These configuration files can be found in */etc* folder. The file **odbcinst.ini** may be missing and in this case it is necessary to create it manually.

odbcinst.ini

```
[mysql]
Description = General ODBC for MySQL
Driver      = /usr/lib64/libmyodbc5.so
Setup       = /usr/lib64/libodbcmyS.so
FileUsage   = 1
```

Please consider the following examples of **odbc.ini** configuration parameters.

- An example with a connection through an IP:

```
[TEST_MYSQL]
Description = MySQL database 1
Driver  = mysql
Port = 3306
Server = 127.0.0.1
```

- An example with a connection through an IP and with the use of credentials. A Zabbix database is used by default:

```
[TEST_MYSQL_FILLED_CRED]
Description = MySQL database 2
Driver  = mysql
User = root
Port = 3306
Password = zabbix
Database = zabbix
Server = 127.0.0.1
```

- An example with a connection through a socket and with the use of credentials. A Zabbix database is used by default:

```
[TEST_MYSQL_FILLED_CRED_SOCK]
Description = MySQL database 3
Driver  = mysql
User = root
Password = zabbix
Socket = /var/run/mysqld/mysqld.sock
Database = zabbix
```

All other possible configuration parameter options can be found in MySQL official documentation web page.

2 Recommended UnixODBC settings for PostgreSQL

Installation

```
*** Red Hat Enterprise Linux/CentOS**:

# yum install postgresql-odbc

***Debian/Ubuntu**:
```

Please refer to PostgreSQL documentation to download necessary database driver for the corresponding platform.

For some additional information please refer to: installing unixODBC.

Configuration

ODBC configuration is done by editing the **odbcinst.ini** and **odbc.ini** files. These configuration files can be found in */etc* folder.
The file **odbcinst.ini** may be missing and in this case it is necessary to create it manually.

Please consider the following examples:

odbcinst.ini

```
[postgresql]
Description = General ODBC for PostgreSQL
Driver      = /usr/lib64/libodbcpsql.so
Setup       = /usr/lib64/libodbcpsqlS.so
FileUsage   = 1
# Since 1.6 if the driver manager was built with thread support you may add another entry to each driver e
# This entry alters the default thread serialization level.
Threading   = 2
```

odbc.ini

```
[TEST_PSQL]
Description = PostgreSQL database 1
Driver  = postgresql
#CommLog = /tmp/sql.log
Username = zbx_test
Password = zabbix
# Name of Server. IP or DNS
Servername = 127.0.0.1
# Database name
Database = zabbix
# Postmaster listening port
Port = 5432
# Database is read only
# Whether the datasource will allow updates.
ReadOnly = No
# PostgreSQL backend protocol
# Note that when using SSL connections this setting is ignored.
# 7.4+: Use the 7.4(V3) protocol. This is only compatible with 7.4 and higher backends.
Protocol = 7.4+
# Includes the OID in SQLColumns
ShowOidColumn = No
```

```
# Fakes a unique index on OID
FakeOidIndex  = No
# Row Versioning
# Allows applications to detect whether data has been modified by other users
# while you are attempting to update a row.
# It also speeds the update process since every single column does not need to be specified in the where c
RowVersioning = No
# Show SystemTables
# The driver will treat system tables as regular tables in SQLTables. This is good for Access so you can s
ShowSystemTables = No
# If true, the driver automatically uses declare cursor/fetch to handle SELECT statements and keeps 100 ro
Fetch = Yes
# Bools as Char
# Bools are mapped to SQL_CHAR, otherwise to SQL_BIT.
BoolsAsChar = Yes
# SSL mode
SSLmode = Yes
# Send tobackend on connection
ConnSettings =
```

3 Recommended UnixODBC settings for Oracle

Installation

Please refer to Oracle documentation for all the necessary instructions.

For some additional information please refer to: Installing unixODBC.

4 Recommended UnixODBC settings for MSSQL

Installation

```
*** Red Hat Enterprise Linux/CentOS**:

# yum -y install freetds unixODBC

***Debian/Ubuntu**:
```

Please refer to FreeTDS user guide to download necessary database driver for the corresponding platform.

For some additional information please refer to: installing unixODBC.

Configuration

ODBC configuration is done by editing the **odbcinst.ini** and **odbc.ini** files. These configuration files can be found in */etc* folder. The file **odbcinst.ini** may be missing and in this case it is necessary to create it manually.

Please consider the following examples:

odbcinst.ini

```
$ vi /etc/odbcinst.ini
[FreeTDS]
Driver = /usr/lib64/libtdsodbc.so.0
```

odbc.ini

```
$ vi /etc/odbc.ini
[sql1]
Driver = FreeTDS
Server = <SQL server 1 IP>
PORT = 1433
TDS_Version = 8.0
```

16 Dependent items

Overview

There are situations when one item gathers multiple metrics at a time or it even makes more sense to collect related metrics simultaneously, for example:

- CPU utilization of individual cores
- Incoming/outgoing/total network traffic

To allow for bulk metric collection and simultaneous use in several related items, Zabbix supports dependent items. Dependent items depend on the master item that collects their data simultaneously, in one query. A new value for the master item automatically populates the values of the dependent items. Dependent items cannot have a different update interval than the master item.

Zabbix preprocessing options can be used to extract the part that is needed for the dependent item from the master item data.

Preprocessing is managed by a `preprocessing manager` process, which has been added in Zabbix 3.4, along with workers that perform the preprocessing steps. All values (with or without preprocessing) from different data gatherers pass through the preprocessing manager before being added to the history cache. Socket-based IPC communication is used between data gatherers (pollers, trappers, etc) and the preprocessing process.

Zabbix server or Zabbix proxy (if host is monitored by proxy) are performing preprocessing steps and processing dependent items.

Item of any type, even dependent item, can be set as master item. Additional levels of dependent items can be used to extract smaller parts from the value of an existing dependent item.

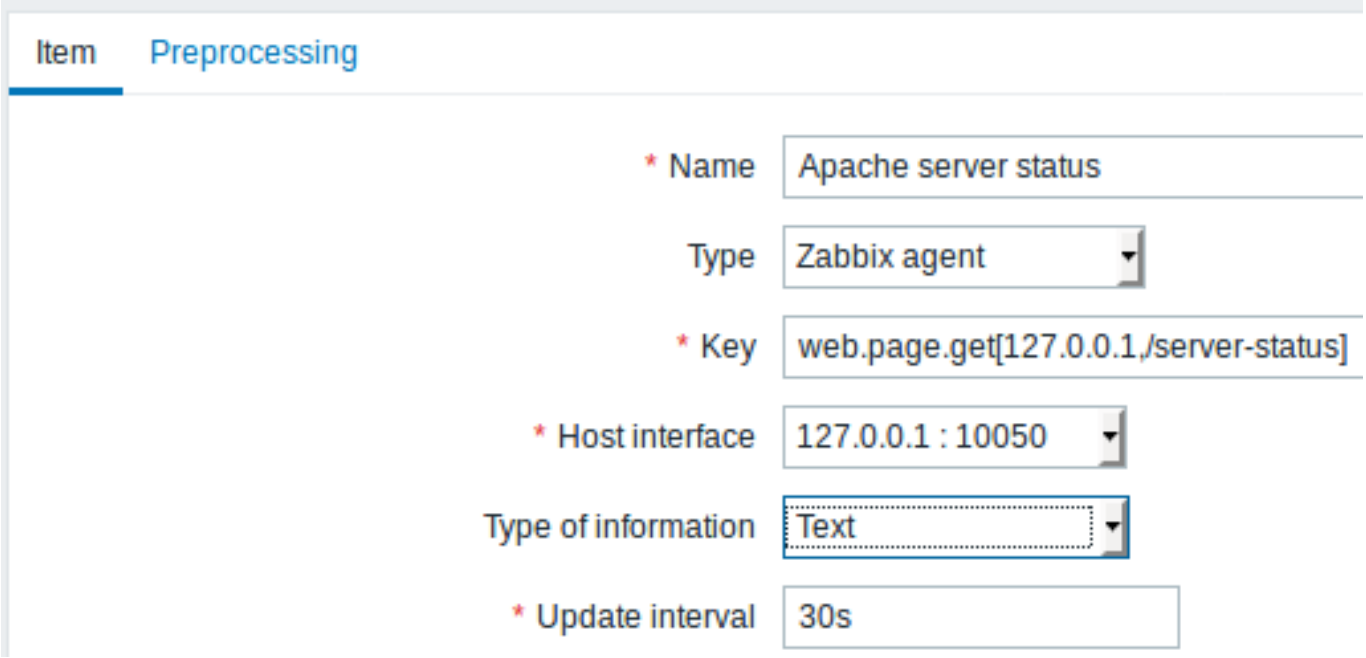
Limitations

- Only same host (template) dependencies are allowed
- An item prototype can depend on another item prototype or regular item from the same host
- Maximum count of dependent items for one master item is limited to 29999 (regardless of the number of dependency levels)
- Maximum 3 dependency levels allowed
- Dependent item on a host with master item from template will not be exported to XML

Item configuration

A dependent item depends on its master item for data. That is why the **master item** must be configured (or exist) first:

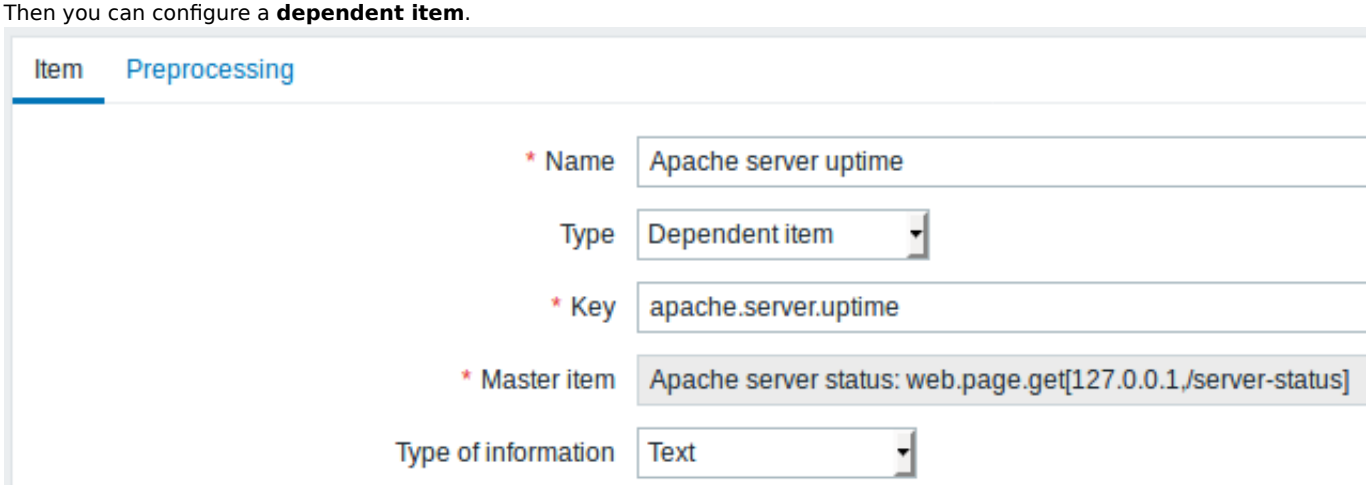
- Go to: *Configuration* → *Hosts*
- Click on *Items* in the row of the host
- Click on *Create item*
- Enter parameters of the item in the form



All mandatory input fields are marked with a red asterisk.

Click on *Add* to save the master item.

Then you can configure a **dependent item**.

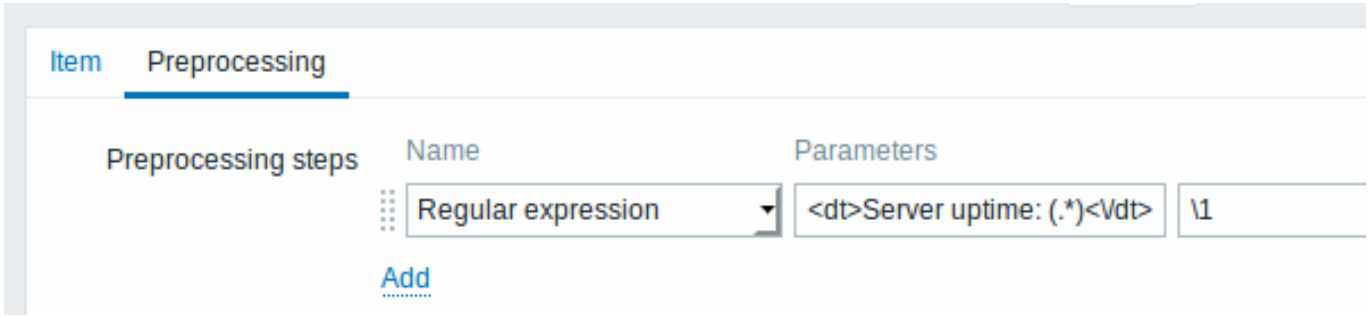


All mandatory input fields are marked with a red asterisk.

The fields that require specific information for dependent items are:

Type	Select **Dependent item** here.
Key	Enter a key that will be used to recognize the item.
Master item	Select the master item. Master item value will be used to populate dependent item value.
Type of information	Select the type of information that will correspond the format of data that will be stored.

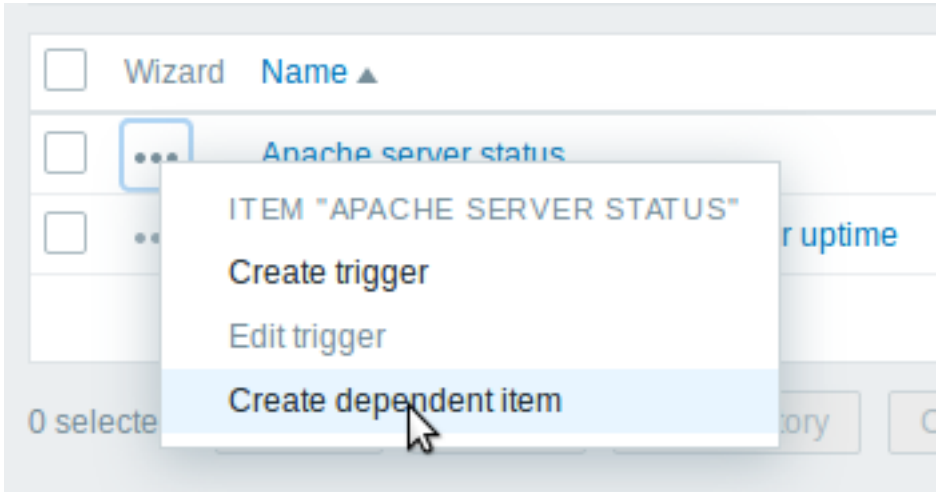
You may use item value preprocessing to extract the required part of the master item value.



Without preprocessing, the dependent item value will be exactly the same as the master item value.

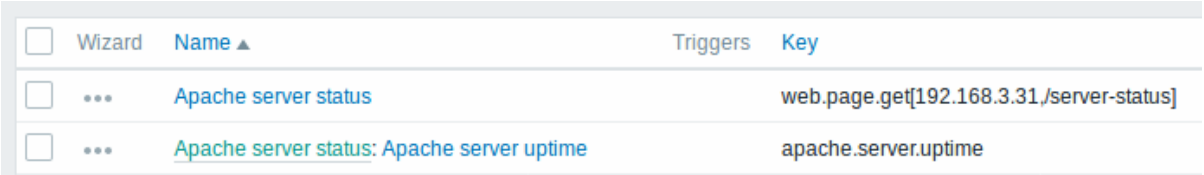
Click on *Add* to save the dependent item.

A shortcut to creating a dependent item quicker is to use the wizard in the item list:



Display

In the item list dependent items are displayed with their master item name as prefix.



Wizard	Name ▲	Triggers	Key
•••	Apache server status		web.page.get[192.168.3.31,/server-status]
•••	Apache server status: Apache server uptime		apache.server.uptime

If a master item is deleted, so are all its dependent items.

17 HTTP agent

Overview

This item type allows data polling using the HTTP/HTTPS protocol. Trapping is also possible using Zabbix sender or Zabbix sender protocol.

HTTP item check is executed by Zabbix server. However, when hosts are monitored by a Zabbix proxy, HTTP item checks are executed by the proxy.

HTTP item checks do not require any agent running on a host being monitored.

HTTP agent supports both HTTP and HTTPS. Zabbix will optionally follow redirects (see the *Follow redirects* option below). Maximum number of redirects is hard-coded to 10 (using cURL option CURLOPT_MAXREDIRS).

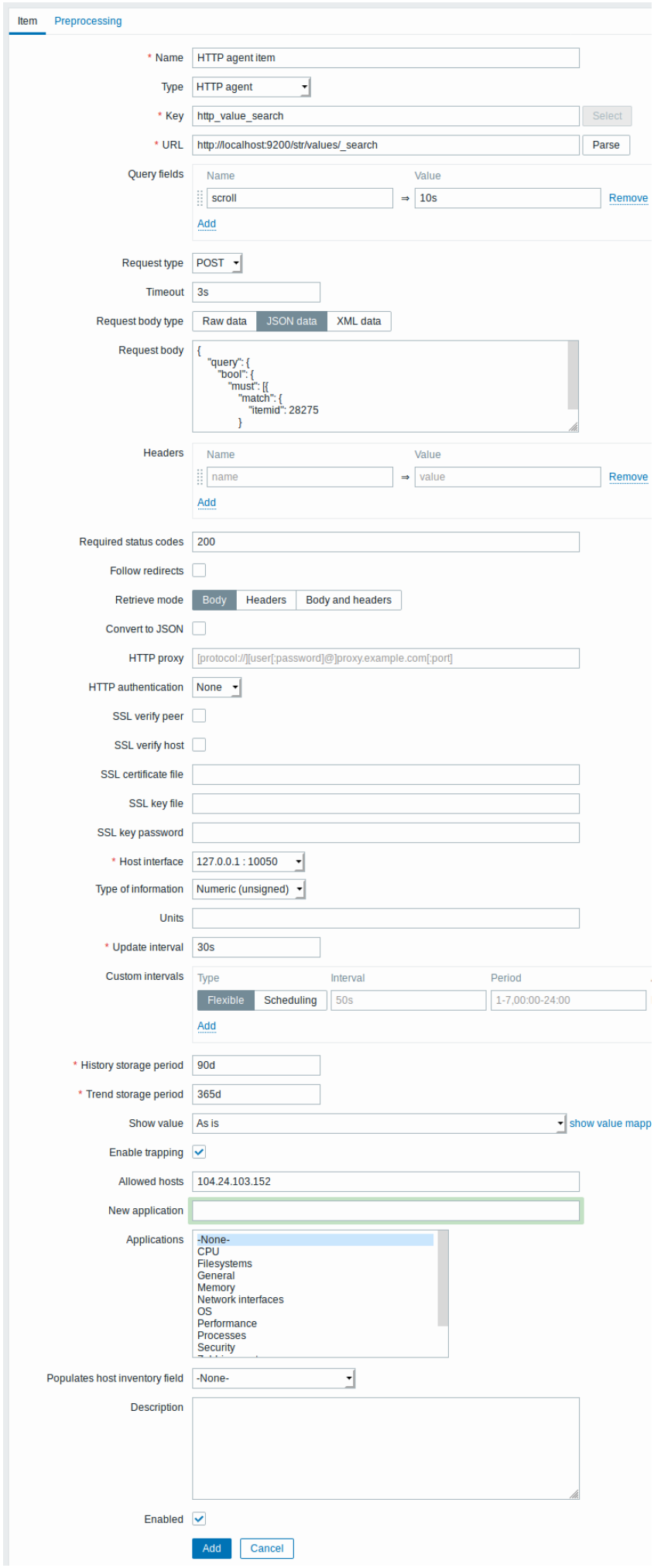
See also known issues for when using HTTPS protocol.

> **Attention:**
> Zabbix server/proxy must be initially configured with cURL (libcurl) support.

Configuration

To configure an HTTP item:

- Go to: *Configuration* → *Hosts*
- Click on *Items* in the row of the host
- Click on *Create item*
- Enter parameters of the item in the form


Item
Preprocessing
* Name
HTTP agent item
Type
HTTP agent
* Key
http_value_search
Select
* URL
http://localhost:9200/str/values/_search
Parse
Query fields
Name
Value
scroll
⇒
10s
Remove
Add
Request type
POST
Timeout
3s
Request body type
Raw data
JSON data
XML data
Request body
{
"query": {
"bool": {
"must": [{
"match": {
"itemid": 28275
}
Headers
Name
Value
name
⇒
value
Remove
Add
Required status codes
200
Follow redirects
Retrieve mode
Body
Headers
Body and headers
Convert to JSON
HTTP proxy
[protocol://][user[:password]@]proxy.example.com[:port]
HTTP authentication
None
SSL verify peer
SSL verify host
SSL certificate file
SSL key file
SSL key password
* Host interface
127.0.0.1 : 10050
Type of information
Numeric (unsigned)
Units
* Update interval
30s
Custom intervals
Type
Interval
Period
Flexible
Scheduling
50s
1-7,00:00-24:00
Add
* History storage period
90d
* Trend storage period
365d
Show value
As is
show value mapp
Enable trapping
Allowed hosts
104.24.103.152
New application
Applications
-None-
CPU
Filesystems
General
Memory
Network interfaces
OS
Performance
Processes
Security
Populates host inventory field
-None-
Description
Enabled
Add
Cancel

All mandatory input fields are marked with a red asterisk.

The fields that require specific information for HTTP items are:

Type	Select **HTTP agent** here.
Key	Enter a unique item key.
URL	URL to connect to and retrieve data. For example: https://www.google.com http://www.zabbix.com/download Domain names can be specified in Unicode characters. They are automatically punycode-converted to ASCII when executing the HTTP check. The *Parse* button can be used to separate optional query fields (like ?name=Admin&password=mypassword) from the URL, moving the attributes and values into *Query fields* for automatic URL-encoding. Limited to 2048 characters. Supported macros: {HOST.IP}, {HOST.CONN}, {HOST.DNS}, {HOST.HOST}, {HOST.NAME}, {ITEM.ID}, {ITEM.KEY}, user macros, low-level discovery macros. This sets the CURLOPT_URL cURL option.
Query fields	Variables for the URL (see above). Specified as attribute and value pairs. Values are URL-encoded automatically. Values from macros are resolved and then URL-encoded automatically. Supported macros: {HOST.IP}, {HOST.CONN}, {HOST.DNS}, {HOST.HOST}, {HOST.NAME}, {ITEM.ID}, {ITEM.KEY}, user macros, low-level discovery macros. This sets the CURLOPT_URL cURL option.
Request type	Select request method type: *GET*, *POST*, *PUT* or *HEAD*
Timeout	Zabbix will not spend more than the set amount of time on processing the URL (maximum is 1 minute). Actually this parameter defines the maximum time for making a connection to the URL and maximum time for performing an HTTP request. Therefore, Zabbix will not spend more than 2 x Timeout seconds on one check. Time suffixes are supported, e.g. 30s, 1m. Supported macros: user macros, low-level discovery macros. This sets the CURLOPT_TIMEOUT cURL option.
Request body type	Select the request body type: **Raw data** - custom HTTP request body, macros are substituted but no encoding is performed **JSON data** - HTTP request body in JSON format. Macros can be used as string, number, true and false; macros used as strings must be enclosed in double quotes. Values from macros are resolved and then escaped automatically. If "Content-Type" is not specified in headers then it will default to "Content-Type: application/json" **XML data** - HTTP request body in XML format. Macros can be used as a text node, attribute or CDATA section. Values from macros are resolved and then escaped automatically in a text node and attribute. If "Content-Type" is not specified in headers then it will default to "Content-Type: application/xml" *Note* that selecting *XML data* requires libxml2.
Request body	Enter the request body. Supported macros: {HOST.IP}, {HOST.CONN}, {HOST.DNS}, {HOST.HOST}, {HOST.NAME}, {ITEM.ID}, {ITEM.KEY}, user macros, low-level discovery macros.

Headers	Custom HTTP headers that will be sent when performing a request. Specified as attribute and value pairs. Supported macros: {HOST.IP}, {HOST.CONN}, {HOST.DNS}, {HOST.HOST}, {HOST.NAME}, {ITEM.ID}, {ITEM.KEY}, user macros, low-level discovery macros. This sets the CURLOPT_HTTPHEADER cURL option.
Required status codes	List of expected HTTP status codes. If Zabbix gets a code which is not in the list, the item will become unsupported. If empty, no check is performed. For example: 200,201,210-299 Supported macros in the list: user macros, low-level discovery macros. This uses the CURLINFO_RESPONSE_CODE cURL option.
Follow redirects	Mark the checkbox to follow HTTP redirects. This sets the CURLOPT_FOLLOWLOCATION cURL option.
Retrieve mode	Select the part of response that must be retrieved: **Body** - body only **Headers** - headers only **Body and headers** - body and headers
Convert to JSON	Headers are saved as attribute and value pairs under the "header" key. If 'Content-Type: application/json' is encountered then body is saved as an object, otherwise it is stored as string, for example: `{ "header": { "<key>": "<value>", "<key2>": "<value>" }, "body": <body> }`
HTTP proxy	You can specify an HTTP proxy to use, using the format `[protocol://][username[:password]@]proxy.mycompany.com[:` The optional `protocol://` prefix may be used to specify alternative proxy protocols (e.g. https, socks4, socks5; see documentation; the protocol prefix support was added in cURL 7.21.7). With no protocol specified, the proxy will be treated as an HTTP proxy. If you specify the wrong protocol, the connection will fail and the item will become unsupported. By default, 1080 port will be used. If specified, the proxy will overwrite proxy related environment variables like http_proxy, HTTPS_PROXY. If not specified, the proxy will not overwrite proxy-related environment variables. The entered value is passed on "as is", no sanity checking takes place. *Note* that only simple authentication is supported with HTTP proxy. Supported macros: {HOST.IP}, {HOST.CONN}, {HOST.DNS}, {HOST.HOST}, {HOST.NAME}, {ITEM.ID}, {ITEM.KEY}, user macros, low-level discovery macros. This sets the CURLOPT_PROXY cURL option.

HTTP authentication	Authentication type: **None** - no authentication used. **Basic** - basic authentication is used. **NTLM** - NTLM (Windows NT LAN Manager) authentication is used. **Kerberos** - Kerberos authentication is used. See also: Configuring Kerberos with Zabbix. Selecting an authentication method will provide two additional fields for entering a user name and password, where user macros and low-level discovery macros are supported. This sets the CURLOPT_HTTPAUTH cURL option.
SSL verify peer	Mark the checkbox to verify the SSL certificate of the web server. The server certificate will be automatically taken from system-wide certificate authority (CA) location. You can override the location of CA files using Zabbix server or proxy configuration parameter SSLCALocation. This sets the CURLOPT_SSL_VERIFYPEER cURL option.
SSL verify host	Mark the checkbox to verify that the Common Name field or the Subject Alternate Name field of the web server certificate matches. This sets the CURLOPT_SSL_VERIFYHOST cURL option.
SSL certificate file	Name of the SSL certificate file used for client authentication. The certificate file must be in PEM[1] format. If the certificate file contains also the private key, leave the SSL key file field empty. If the key is encrypted, specify the password in SSL key password field. The directory containing this file is specified by Zabbix server or proxy configuration parameter SSLCertLocation. Supported macros: {HOST.IP}, {HOST.CONN}, {HOST.DNS}, {HOST.HOST}, {HOST.NAME}, {ITEM.ID}, {ITEM.KEY}, user macros, low-level discovery macros. This sets the CURLOPT_SSLCERT cURL option.
SSL key file	Name of the SSL private key file used for client authentication. The private key file must be in PEM[1] format. The directory containing this file is specified by Zabbix server or proxy configuration parameter SSLKeyLocation. Supported macros: {HOST.IP}, {HOST.CONN}, {HOST.DNS}, {HOST.HOST}, {HOST.NAME}, {ITEM.ID}, {ITEM.KEY}, user macros, low-level discovery macros. This sets the CURLOPT_SSLKEY cURL option.
SSL key password	SSL private key file password. Supported macros: user macros, low-level discovery macros. This sets the CURLOPT_KEYPASSWD cURL option.
Enable trapping	With this checkbox marked, the item will also function as trapper item and will accept data sent to this item by Zabbix sender or using Zabbix sender protocol.

Allowed hosts	Visible only if *Enable trapping* checkbox is marked. List of comma delimited IP addresses, optionally in CIDR notation, or hostnames. If specified, incoming connections will be accepted only from the hosts listed here. If IPv6 support is enabled then '127.0.0.1', '::127.0.0.1', '::ffff:127.0.0.1' are treated equally and '::/0' will allow any IPv4 or IPv6 address. '0.0.0.0/0' can be used to allow any IPv4 address. Note, that "IPv4-compatible IPv6 addresses" (0000::/96 prefix) are supported but deprecated by RFC4291. Example: Server=127.0.0.1, 192.168.1.0/24, 192.168.3.1-255, 192.168.1-10.1-255, ::1,2001:db8::/32, zabbix.domain Spaces and user macros are allowed in this field. Host macros: {HOST.HOST}, {HOST.NAME}, {HOST.IP}, {HOST.DNS}, {HOST.CONN} are allowed in this field.

Note:
If the *HTTP proxy* field is left empty, another way for using an HTTP proxy is to set proxy-related environment variables. For HTTP - set the `http_proxy` environment variable for the Zabbix server user. For example: //http_proxy=http:%%//%%proxy_ip:proxy_port//.
For HTTPS - set the `HTTPS_PROXY` environment variable. For example: //HTTPS_PROXY=http:%%//%%proxy_ip:proxy_port//. More details are available by running a shell command: *# man curl*.

Attention:
[1] Zabbix supports certificate and private key files in PEM format only. In case you have your certificate and private key data in PKCS #12 format file (usually with extention *.p12 or *.pfx) you may generate the PEM file from it using the following commands:

```
openssl pkcs12 -in ssl-cert.p12 -clcerts -nokeys -out ssl-cert.pem
openssl pkcs12 -in ssl-cert.p12 -nocerts -nodes  -out ssl-cert.key
```

Examples

Example 1

Send simple GET requests to retrieve data from services such as Elasticsearch:

- Create a GET item with URL: `localhost:9200/?pretty`
- Notice the response:

```
{
  "name" : "YQ2VAY-",
  "cluster_name" : "elasticsearch",
  "cluster_uuid" : "kH4CYqh5QfqgeTsjh2F9zg",
  "version" : {
    "number" : "6.1.3",
    "build_hash" : "af51318",
    "build_date" : "2018-01-26T18:22:55.523Z",
    "build_snapshot" : false,
    "lucene_version" : "7.1.0",
    "minimum_wire_compatibility_version" : "5.6.0",
    "minimum_index_compatibility_version" : "5.0.0"
  },
  "tagline" : "You know, for search"
}
```

- Now extract the version number using a JSONPath preprocessing step: `$.version.number`

Example 2

Send simple POST requests to retrieve data from services such as Elasticsearch:

- Create a POST item with URL: `http://localhost:9200/str/values/_search?scroll=10s`

- Configure the following POST body to obtain the processor load (1 min average per core)

```
{
    "query": {
        "bool": {
            "must": [{
                "match": {
                    "itemid": 28275
                }
            }],
            "filter": [{
                "range": {
                    "clock": {
                        "gt": 1517565836,
                        "lte": 1517566137
                    }
                }
            }]
        }
    }
}
```

- Received:

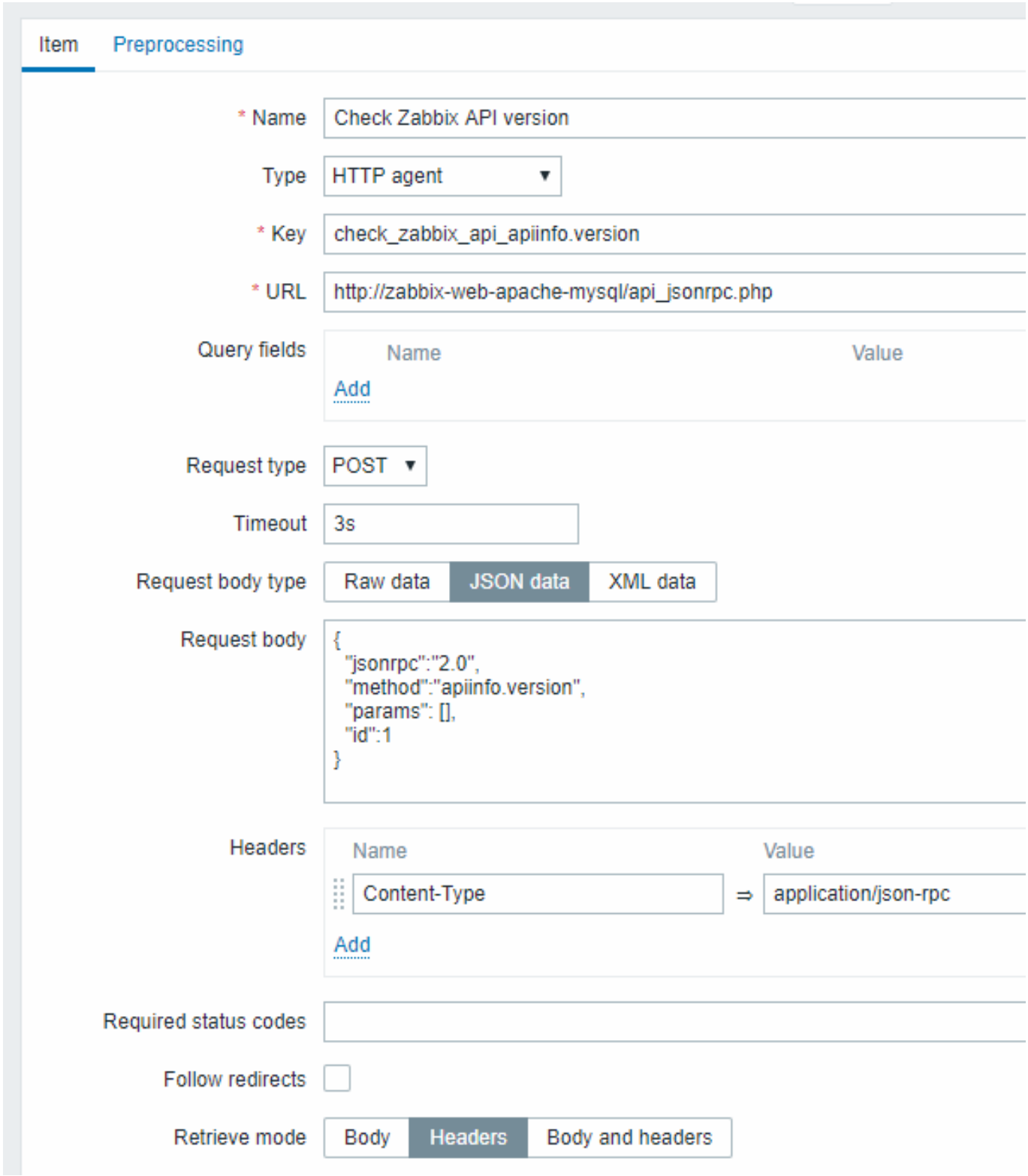
```
{
    "_scroll_id": "DnF1ZXJ5VGhlbkZldGNoBQAAAAAAAAAkFllRMlZBWS1UU1pxTmdEeGVwQjRBTFEAAAAAAAAAJRZZUTJWQVktVFN
    "took": 18,
    "timed_out": false,
    "_shards": {
        "total": 5,
        "successful": 5,
        "skipped": 0,
        "failed": 0
    },
    "hits": {
        "total": 1,
        "max_score": 1.0,
        "hits": [{
            "_index": "dbl",
            "_type": "values",
            "_id": "dqX9VWEBV6sEKSMyk6sw",
            "_score": 1.0,
            "_source": {
                "itemid": 28275,
                "value": "0.138750",
                "clock": 1517566136,
                "ns": 25388713,
                "ttl": 604800
            }
        }]
    }
}
```

- Now use a JSONPath preprocessing step to get the item value: `$.hits.hits[0]._source.value`

Example 3

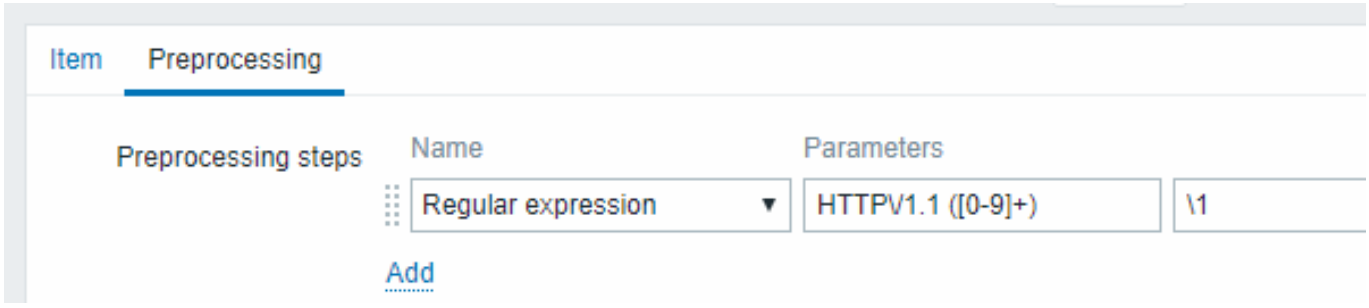
Checking if Zabbix API is alive, using apiinfo.version.

- Item configuration:

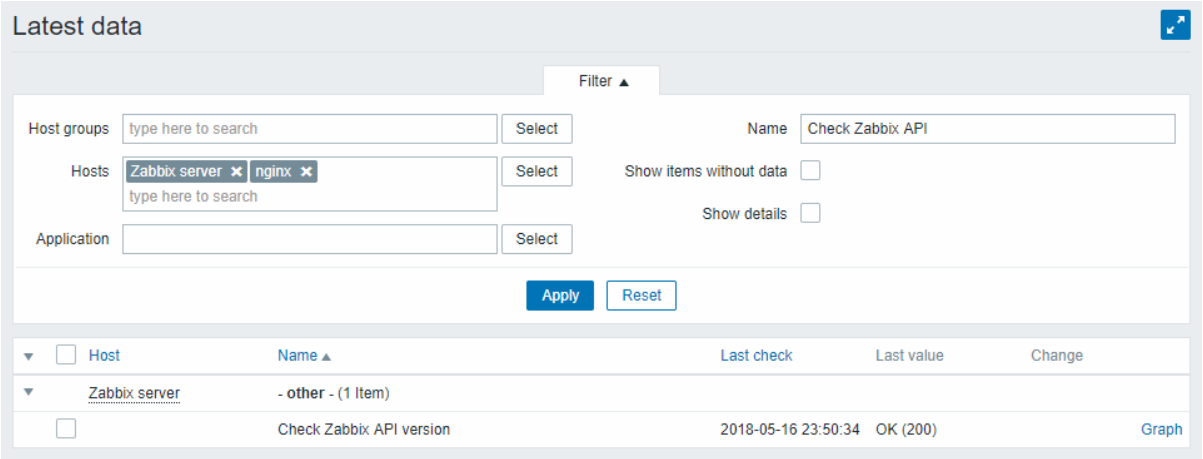


Note the use of the POST method with JSON data, setting request headers and asking to return headers only:

- Item value preprocessing with regular expression to get HTTP code:



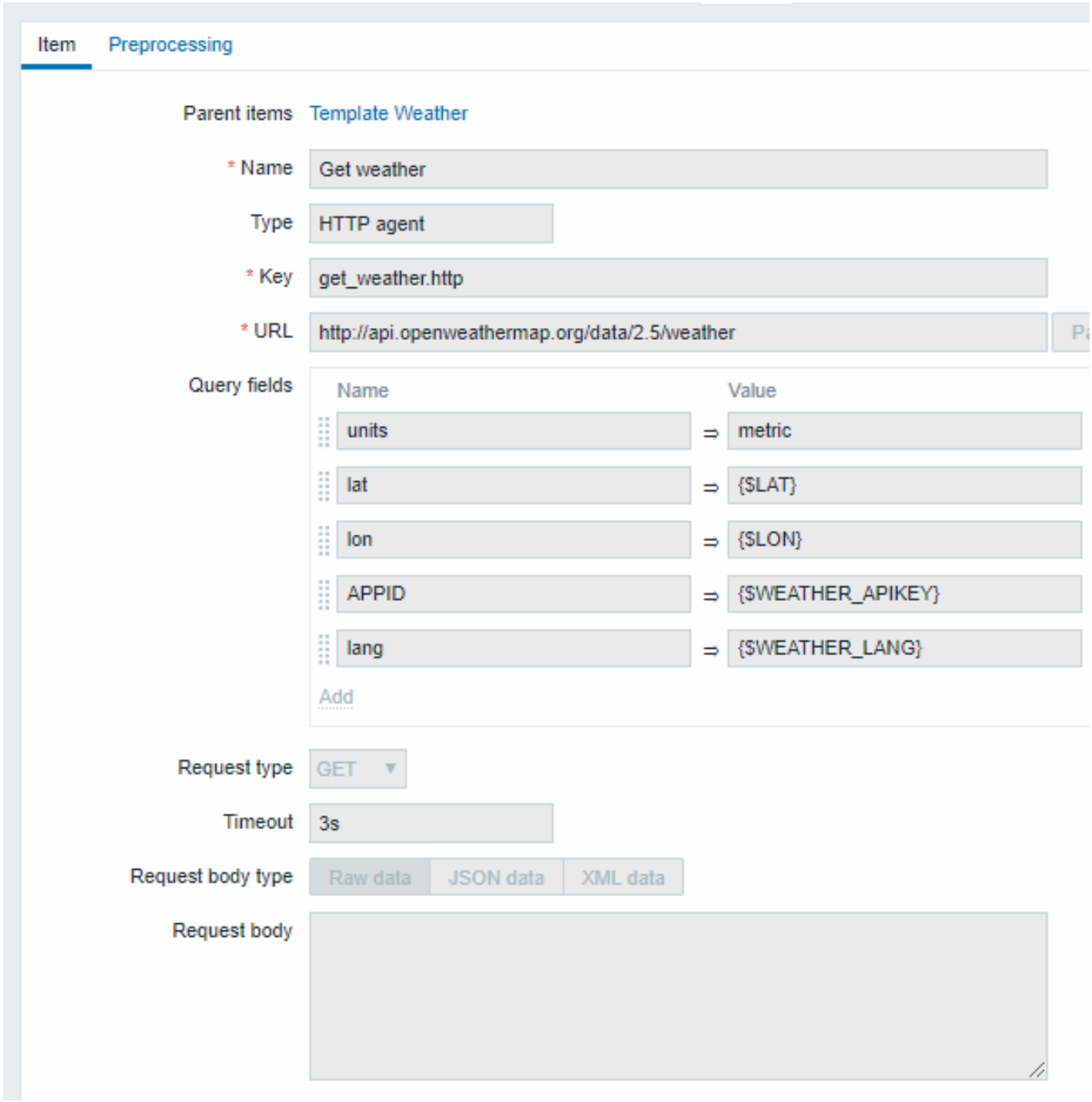
- Checking the result in *Latest data*:



Example 4

Retrieving weather information by connecting to the Openweathermap public service.

- Configure a master item for bulk data collection in a single JSON:



Note the usage of macros in query fields. Refer to the Openweathermap API for how to fill them.

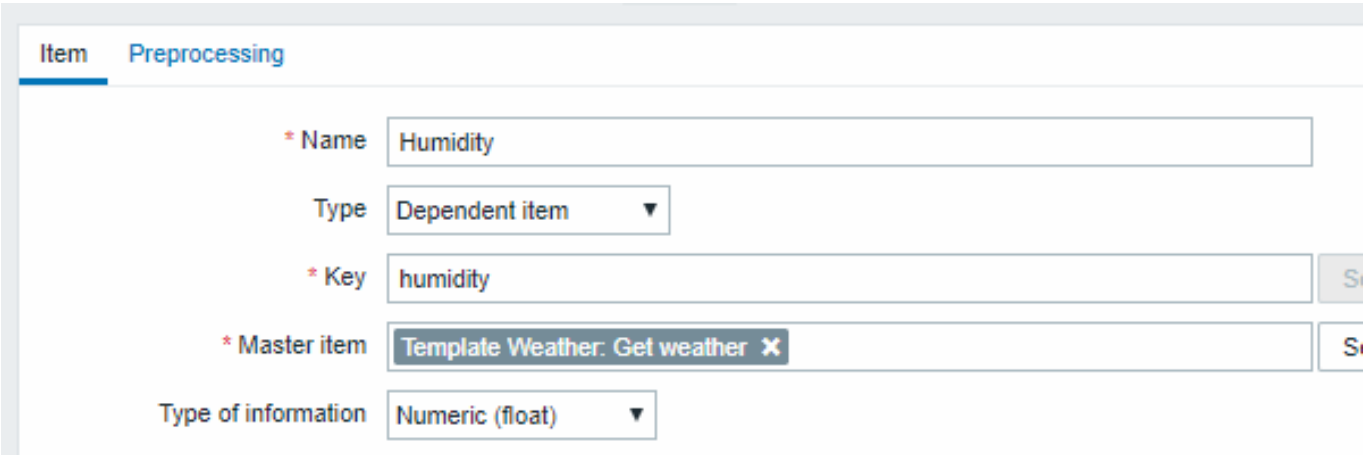
Sample JSON returned in response to HTTP agent:


```
{
    "body": {
        "coord": {
            "lon": 40.01,
            "lat": 56.11
        },
        "weather": [{
            "id": 801,
            "main": "Clouds",
            "description": "few clouds",
            "icon": "02n"
        }],
        "base": "stations",
        "main": {
            "temp": 15.14,
            "pressure": 1012.6,
```

```
            "humidity": 66,
            "temp_min": 15.14,
            "temp_max": 15.14,
            "sea_level": 1030.91,
            "grnd_level": 1012.6
        },
        "wind": {
            "speed": 1.86,
            "deg": 246.001
        },
        "clouds": {
            "all": 20
        },
        "dt": 1526509427,
        "sys": {
            "message": 0.0035,
            "country": "RU",
            "sunrise": 1526432608,
            "sunset": 1526491828
        },
        "id": 487837,
        "name": "Stavrovo",
        "cod": 200
    }
}
```

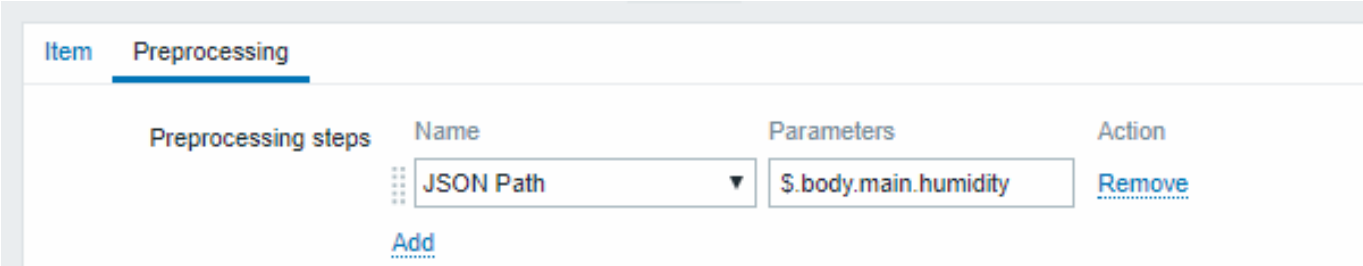

The next task is to configure dependent items that extract data from the JSON.

- Configure a sample dependent item for humidity:

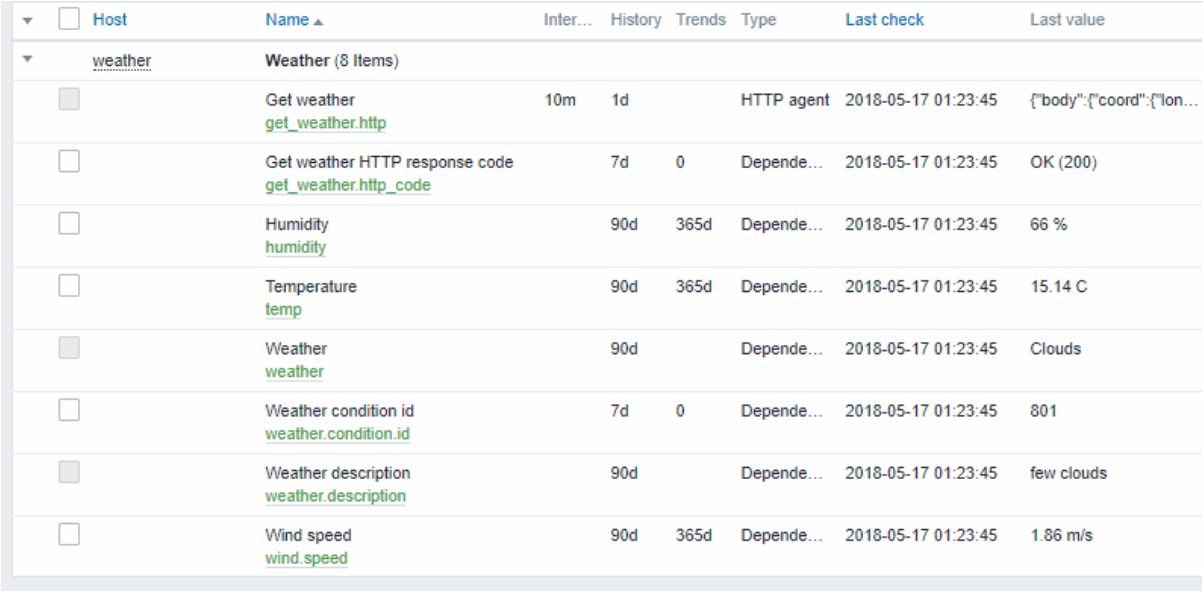


Other weather metrics such as 'Temperature' are added in the same manner.

- Sample dependent item value preprocessing with JSONPath:



- Check the result of weather data in *Latest data*:

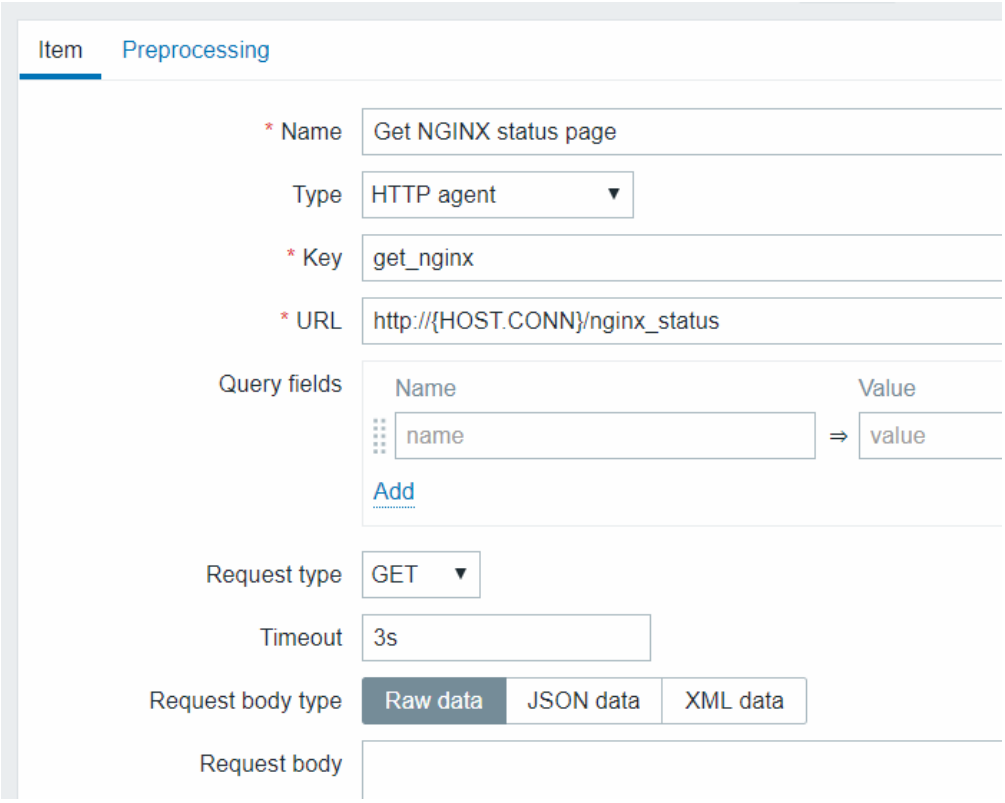


Host	Name ▲	Inter...	History	Trends	Type	Last check	Last value
weather	**Weather** (8 Items)						
	Get weather get_weather.http	10m	1d		HTTP agent	2018-05-17 01:23:45	{"body":{"coord":{"lon...
	Get weather HTTP response code get_weather.http_code		7d	0	Depende...	2018-05-17 01:23:45	OK (200)
	Humidity humidity		90d	365d	Depende...	2018-05-17 01:23:45	66 %
	Temperature temp		90d	365d	Depende...	2018-05-17 01:23:45	15.14 C
	Weather weather		90d		Depende...	2018-05-17 01:23:45	Clouds
	Weather condition id weather.condition.id		7d	0	Depende...	2018-05-17 01:23:45	801
	Weather description weather.description		90d		Depende...	2018-05-17 01:23:45	few clouds
	Wind speed wind.speed		90d	365d	Depende...	2018-05-17 01:23:45	1.86 m/s

Example 5

Connecting to Nginx status page and getting its metrics in bulk.

- Configure Nginx following the official guide.
- Configure a master item for bulk data collection:

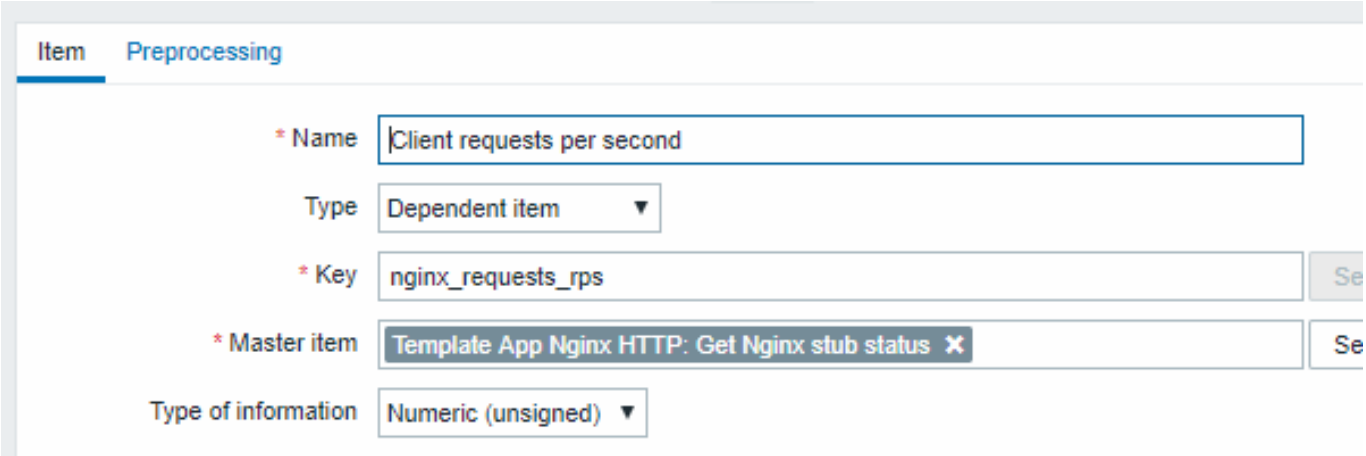


Sample Nginx stub status output:

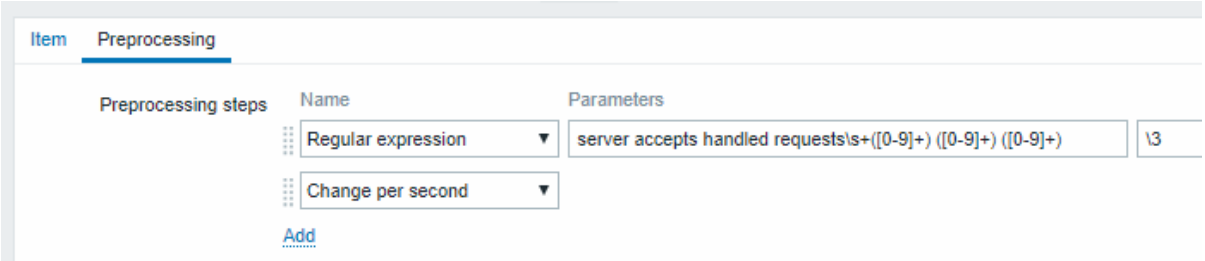
```
Active connections: 1 Active connections:
server accepts handled requests
 52 52 52
Reading: 0 Writing: 1 Waiting: 0
```

The next task is to configure dependent items that extract data.

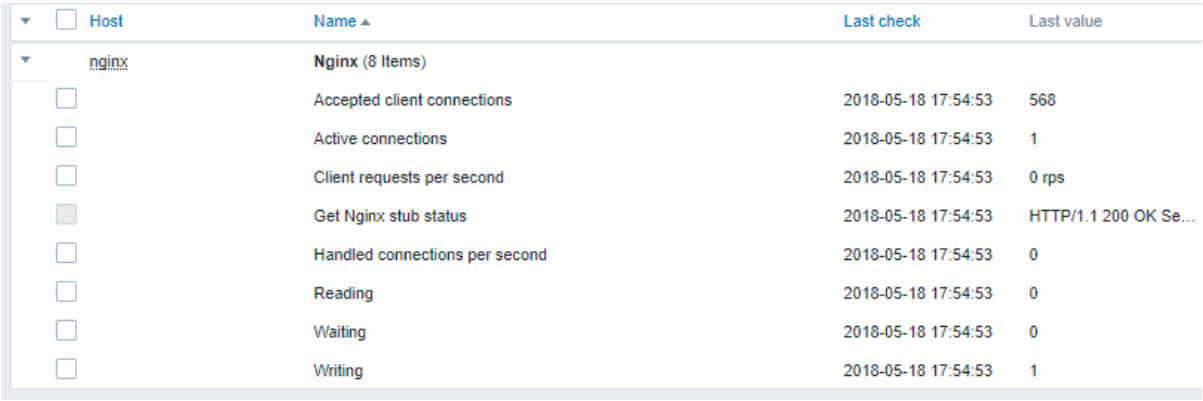
- Configure a sample dependent item for requests per second:



- Sample dependent item value preprocessing with regular expression:



- Check the complete result from stub module in *Latest data*:



18 Prometheus checks

Overview

Zabbix can query metrics exposed in the Prometheus line format.

Two steps are required to start gathering Prometheus data:

- an HTTP master item pointing to the appropriate data endpoint, e.g. `https://<prometheus host>/metrics`
- dependent items using a Prometheus preprocessing option to query required data from the metrics gathered by the master item

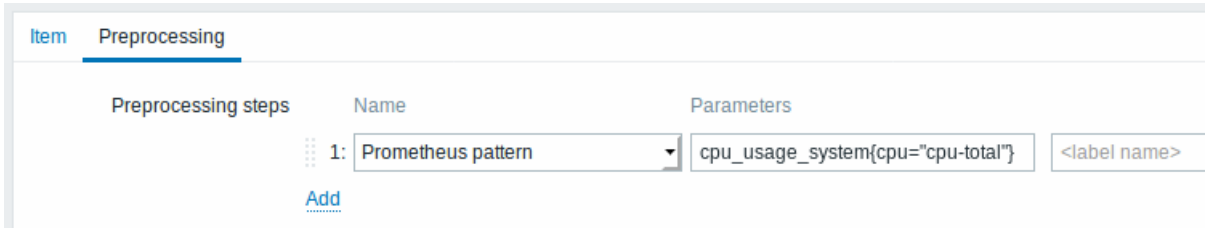
There are two Prometheus data preprocessing options:

- *Prometheus pattern* - used in normal items to query Prometheus data
- *Prometheus to JSON* - used in normal items and for low-level discovery. In this case queried Prometheus data are returned in a JSON format.

Configuration

Providing you have the HTTP master item configured, you need to create a dependent item that uses Prometheus preprocessing step:

- enter general dependent item parameters in the configuration form
- go to the Preprocessing tab
- select a *Prometheus* preprocessing option (*Prometheus pattern* or *Prometheus to JSON*)



Parameter	Description	Examples
Pattern	To define the required data pattern you may use a query language that is similar to Prometheus query language (see comparison table), e.g.: <metric name> - select by metric name {__name__="<metric name>"} - select by metric name {__name__=~"<regex>"} - select by metric name matching a regular expression {<label name>="<label value>",...} - select by label name {<label name>=~"<regex>",...} - select by label name matching a regular expression {__name__=~".*"}==<value> - select by metric value Or a combination of the above: <metric name>{<label1 name>="<label1 value>",<label2 name>=~"<regex>",...}==<value> Label value can be any sequence of UTF-8 characters, but the backslash, double-quote and line feed characters have to be escaped as \\, \" and \n respectively; other characters shall not be escaped.	*wmi_os_physical_memory_free_bytes* *cpu_usage_system{cpu="cpu-total"}* *cpu_usage_system{cpu=~".*"}* *cpu_usage_system{cpu="cpu-total",host=~".*"}* *wmi_service_state{name="dhcp"}==1* *wmi_os_timezone{timezone=~".*"}==1*
Output	Define label name (optional). In this case the value corresponding to the label name is returned. This field is only available for the *Prometheus pattern* option.	

Prometheus to JSON

Data from Prometheus can be used for low-level discovery. In this case data in JSON format are needed and the *Prometheus to JSON* preprocessing option will return exactly that.

For more details, see Discovery using Prometheus data.

Query language comparison

The following table lists differences and similarities between PromQL and Zabbix Prometheus preprocessing query language.

	PromQL instant vector selector	Zabbix Prometheus preprocessing
Differences		
Query target	Prometheus server URL	Plain text in Prometheus exposition format
Returns	Instant vector	Metric or label value (Prometheus pattern) Array of metrics for single value in JSON (Prometheus to JSON)

PromQL instant vector selector	Zabbix Prometheus preprocessing
Label matching operators	=, !=, =~, !~	=, =~
Regular expression used in label or metric name matching	RE2	PCRE
Comparison operators	See list	Only == (equal) is supported for value filtering
Similarities		
Selecting by metric name that equals string	<metric name> or {__name__="<metric name>"}	<metric name> or {__name__="<metric name>"}
Selecting by metric name that matches regular expression	{__name__=~"<regex>"}	{__name__=~"<regex>"}
Selecting by <label name> value that equals string	{<label name>="<label value>",...}	{<label name>="<label value>",...}

PromQL instant vector selector	Zabbix Prometheus preprocessing
Select by <label name> value that matches regular expression	{<label name>=~"<regex>",...}
Select by value that equals string	{__name__=~".*"} == <value>

3 History and trends

Overview

History and trends are the two ways of storing collected data in Zabbix.

Whereas history keeps each collected value, trends keep averaged information on hourly basis and therefore are less resource-hungry.

Keeping history

You can set for how many days history will be kept:

- in the item properties form
- when mass-updating items
- when setting up housekeeper tasks

Any older data will be removed by the housekeeper.

The general strong advice is to keep history for the smallest possible number of days and that way not to overload the database with lots of historical values.

Instead of keeping a long history, you can keep longer data of trends. For example, you could keep history for 14 days and trends for 5 years.

You can get a good idea of how much space is required by history versus trends data by referring to the database sizing page.

While keeping shorter history, you will still be able to review older data in graphs, as graphs will use trend values for displaying older data.

Attention:
If history is set to '0', the item will update only dependent items and inventory. No trigger functions will be evaluated because trigger evaluation is based on history data only.

Note:
As an alternative way to preserve history consider to use history export functionality of loadable modules.

Keeping trends

Trends is a built-in historical data reduction mechanism which stores minimum, maximum, average and the total number of values per every hour for numeric data types.

You can set for how many days trends will be kept:

- in the item properties form
- when mass-updating items
- when setting up Housekeeper tasks

Trends usually can be kept for much longer than history. Any older data will be removed by the housekeeper.

Zabbix server accumulates trend data in runtime in the trend cache, as the data flows in. Server flushes trends into the database (where frontend can find them) in these situations:

- a new hour has started and server receives a new value for the item;
- a new hour is about to end in less than 5 minutes (no new values)
- server stops

To see trends on a graph you need to wait at least to the beginning of the next hour (if item is updated frequently) and at most to the end of the next hour (if item is updated rarely), which is 2 hours maximum.

When server flushes trend cache and there are already trends in the database for this hour (for example, server has been restarted mid-hour), server needs to use update statements instead of simple inserts. Therefore on a bigger installation if restart is needed it is desirable to stop server in the end of one hour and start in the beginning of the next hour to avoid trend data overlap.

History tables do not participate in trend generation in any way.

Attention:
If trends are set to '0', Zabbix server does not calculate or store trends at all.

Note:
The trends are calculated and stored with the same data type as the original values. As a result the average value calculations of unsigned data type values are rounded and the less the value interval is the less precise the result will be. For example if item has values 0 and 1, the average value will be 0, not 0.5.
Also restarting server might result in the precision loss of unsigned data type average value calculations for the current hour.

4 User parameters

Overview

Sometimes you may want to run an agent check that does not come predefined with Zabbix. This is where user parameters come to help.

You may write a command that retrieves the data you need and include it in the user parameter in the agent configuration file ('UserParameter' configuration parameter).

A user parameter has the following syntax:

```
UserParameter=<key>,<command>
```

As you can see, a user parameter also contains a key. The key will be necessary when configuring an item. Enter a key of your choice that will be easy to reference (it must be unique within a host). Restart the agent.

Then, when configuring an item, enter the key to reference the command from the user parameter you want executed.

User parameters are commands executed by Zabbix agent. Up to 512KB of data can be returned before item preprocessing steps. Note, however, that the text value that can be eventually stored in database is limited to 64KB on MySQL (see info on other databases in the table).

/bin/sh is used as a command line interpreter under UNIX operating systems. User parameters obey the agent check timeout; if timeout is reached the forked user parameter process is terminated.

See also:

- Step-by-step tutorial on making use of user parameters
- Command execution

Examples of simple user parameters

A simple command:

```
UserParameter=ping,echo 1
```

The agent will always return '1' for an item with 'ping' key.

A more complex example:

```
UserParameter=mysql.ping,mysqladmin -uroot ping | grep -c alive
```

The agent will return '1', if MySQL server is alive, '0' - otherwise.

Flexible user parameters

Flexible user parameters accept parameters with the key. This way a flexible user parameter can be the basis for creating several items.

Flexible user parameters have the following syntax:

```
UserParameter=key[*],command
```

Parameter	Description
Key	Unique item key. The [*] defines that this key accepts parameters within the brackets. Parameters are given when configuring the item.
Command	Command to be executed to evaluate value of the key. *For flexible user parameters only*: You may use positional references $1...$9 in the command to refer to the respective parameter in the item key. Zabbix parses the parameters enclosed in [ ] of the item key and substitutes $1,...,$9 in the command accordingly. $0 will be substituted by the original command (prior to expansion of $0,...,$9) to be run. Positional references are interpreted regardless of whether they are enclosed between double (") or single (') quotes. To use positional references unaltered, specify a double dollar sign - for example, awk '{print $$2}'. In this case $$2 will actually turn into $2 when executing the command.

Attention:
Positional references with the $ sign are searched for and replaced by Zabbix agent only for flexible user parameters. For simple user parameters, such reference processing is skipped and, therefore, any $ sign quoting is not necessary.

Attention:
Certain symbols are not allowed in user parameters by default. See UnsafeUserParameters documentation for a full list.

Example 1

Something very simple:

```
UserParameter=ping[*],echo $1
```

We may define unlimited number of items for monitoring all having format ping[something].

- ping[0] - will always return '0'
- ping[aaa] - will always return 'aaa'

Example 2

Let's add more sense!

```
UserParameter=mysql.ping[*],mysqladmin -u$1 -p$2 ping | grep -c alive
```

This parameter can be used for monitoring availability of MySQL database. We can pass user name and password:

```
mysql.ping[zabbix,our_password]
```

Example 3

How many lines matching a regular expression in a file?

```
UserParameter=wc[*],grep -c "$2" $1
```

This parameter can be used to calculate number of lines in a file.

```
wc[/etc/passwd,root]
wc[/etc/services,zabbix]
```

Command result

The return value of the command is standard output together with standard error.

> **Attention:**
> A text (character, log or text type of information) item will not become unsupported in case of standard error output.

User parameters that return text (character, log, text type of information) can return whitespace. In case of invalid result the item will become unsupported.

1 Extending Zabbix agents

This tutorial provides step-by-step instructions on how to extend the functionality of Zabbix agent with the use of a user parameter.

Step 1

Write a script or command line to retrieve required parameter.

For example, we may write the following command in order to get total number of queries executed by a MySQL server:

```
mysqladmin -uroot status | cut -f4 -d":" | cut -f1 -d"S"
```

When executed, the command returns total number of SQL queries.

Step 2

Add the command to zabbix_agentd.conf:

```
UserParameter=mysql.questions,mysqladmin -uroot status | cut -f4 -d":" | cut -f1 -d"S"
```

mysql.questions is a unique identifier. It can be any valid key identifier, for example, *queries*.

Test this parameter by using Zabbix agent with "-t" flag (if running under root, however, note that the agent may have different permissions when launched as a daemon):

```
zabbix_agentd -t mysql.questions
```

Step 3

Restart Zabbix agent.

Agent will reload configuration file.

Test this parameter by using zabbix_get utility.

Step 4

Add new item with Key=mysql.questions to the monitored host. Type of the item must be either Zabbix Agent or Zabbix Agent (active).

Be aware that type of returned values must be set correctly on Zabbix server. Otherwise Zabbix won't accept them.

5 Loadable modules

1 Overview

Loadable modules offer a performance-minded option for extending Zabbix functionality.

There already are ways of extending Zabbix functionality by way of:

- user parameters (agent metrics)
- external checks (agent-less monitoring)
- `system.run[]` Zabbix agent item.

They work very well, but have one major drawback, namely fork(). Zabbix has to fork a new process every time it handles a user metric, which is not good for performance. It is not a big deal normally, however it could be a serious issue when monitoring embedded systems, having a large number of monitored parameters or heavy scripts with complex logic or long startup time.

Support of loadable modules offers ways for extending Zabbix agent, server and proxy without sacrificing performance.

A loadable module is basically a shared library used by Zabbix daemon and loaded on startup. The library should contain certain functions, so that a Zabbix process may detect that the file is indeed a module it can load and work with.

Loadable modules have a number of benefits. Great performance and ability to implement any logic are very important, but perhaps the most important advantage is the ability to develop, use and share Zabbix modules. It contributes to trouble-free maintenance and helps to deliver new functionality easier and independently of the Zabbix core code base.

Module licensing and distribution in binary form is governed by the GPL license (modules are linking with Zabbix in runtime and are using Zabbix headers; currently the whole Zabbix code is licensed under GPL license). Binary compatibility is not guaranteed by Zabbix.

Module API stability is guaranteed during one Zabbix LTS (Long Term Support) release cycle. Stability of Zabbix API is not guaranteed (technically it is possible to call Zabbix internal functions from a module, but there is no guarantee that such modules will work).

2 Module API

In order for a shared library to be treated as a Zabbix module, it should implement and export several functions. There are currently six functions in the Zabbix module API, only one of which is mandatory and the other five are optional.

2.1 Mandatory interface

The only mandatory function is **zbx_module_api_version()**:

```
int zbx_module_api_version(void);
```

This function should return the API version implemented by this module and in order for the module to be loaded this version must match module API version supported by Zabbix. Version of module API supported by Zabbix is ZBX_MODULE_API_VERSION. So this function should return this constant. Old constant ZBX_MODULE_API_VERSION_ONE used for this purpose is now defined to equal ZBX_MODULE_API_VERSION to preserve source compatibility, but it's usage is not recommended.

2.2 Optional interface

The optional functions are **zbx_module_init()**, **zbx_module_item_list()**, **zbx_module_item_timeout()**, **zbx_module_history_write_cbs()** and **zbx_module_uninit()**:

```
int zbx_module_init(void);
```

This function should perform the necessary initialization for the module (if any). If successful, it should return ZBX_MODULE_OK. Otherwise, it should return ZBX_MODULE_FAIL. In the latter case Zabbix will not start.

```
ZBX_METRIC  *zbx_module_item_list(void);
```

This function should return a list of items supported by the module. Each item is defined in a ZBX_METRIC structure, see the section below for details. The list is terminated by a ZBX_METRIC structure with "key" field of NULL.

```
void    zbx_module_item_timeout(int timeout);
```

If module exports **zbx_module_item_list()** then this function is used by Zabbix to specify the timeout settings in Zabbix configuration file that the item checks implemented by the module should obey. Here, the "timeout" parameter is in seconds.

```
ZBX_HISTORY_WRITE_CBS   zbx_module_history_write_cbs(void);
```

This function should return callback functions Zabbix server will use to export history of different data types. Callback functions are provided as fields of ZBX_HISTORY_WRITE_CBS structure, fields can be NULL if module is not interested in the history of certain type.

```
int zbx_module_uninit(void);
```

This function should perform the necessary uninitialization (if any) like freeing allocated resources, closing file descriptors, etc.

All functions are called once on Zabbix startup when the module is loaded, with the exception of zbx_module_uninit(), which is called once on Zabbix shutdown when the module is unloaded.

2.3 Defining items

Each item is defined in a ZBX_METRIC structure:

```
typedef struct
{
    char        *key;
    unsigned    flags;
    int     (*function)();
    char        *test_param;
}
ZBX_METRIC;
```

Here, **key** is the item key (e.g., ”dummy.random”), **flags** is either CF_HAVEPARAMS or 0 (depending on whether the item accepts parameters or not), **function** is a C function that implements the item (e.g., ”zbx_module_dummy_random”), and **test_param** is the parameter list to be used when Zabbix agent is started with the ”-p” flag (e.g., ”1,1000”, can be NULL). An example definition may look like this:

```
static ZBX_METRIC keys[] =
{
    { "dummy.random", CF_HAVEPARAMS, zbx_module_dummy_random, "1,1000" },
    { NULL }
}
```

Each function that implements an item should accept two pointer parameters, the first one of type AGENT_REQUEST and the second one of type AGENT_RESULT:

```
int zbx_module_dummy_random(AGENT_REQUEST *request, AGENT_RESULT *result)
{
    ...

    SET_UI64_RESULT(result, from + rand() % (to - from + 1));

    return SYSINFO_RET_OK;
}
```

These functions should return SYSINFO_RET_OK, if the item value was successfully obtained. Otherwise, they should return SYSINFO_RET_FAIL. See example ”dummy” module below for details on how to obtain information from AGENT_REQUEST and how to set information in AGENT_RESULT.

2.4 Providing history export callbacks

Attention:
History export via module is no longer supported by Zabbix proxy since Zabbix 4.0.0.

Module can specify functions to export history data by type: Numeric (float), Numeric (unsigned), Character, Text and Log:

```
typedef struct
{
    void    (*history_float_cb)(const ZBX_HISTORY_FLOAT *history, int history_num);
    void    (*history_integer_cb)(const ZBX_HISTORY_INTEGER *history, int history_num);
    void    (*history_string_cb)(const ZBX_HISTORY_STRING *history, int history_num);
    void    (*history_text_cb)(const ZBX_HISTORY_TEXT *history, int history_num);
    void    (*history_log_cb)(const ZBX_HISTORY_LOG *history, int history_num);
}
ZBX_HISTORY_WRITE_CBS;
```

Each of them should take ”history” array of ”history_num” elements as arguments. Depending on history data type to be exported, ”history” is an array of the following structures, respectively:

```
typedef struct
{
    zbx_uint64_t    itemid;
    int     clock;
    int     ns;
    double      value;
}
ZBX_HISTORY_FLOAT;

typedef struct
{
    zbx_uint64_t    itemid;
    int     clock;
    int     ns;
    zbx_uint64_t    value;
}
ZBX_HISTORY_INTEGER;

typedef struct
```

```
{
    zbx_uint64_t    itemid;
    int     clock;
    int     ns;
    const char  *value;
}
ZBX_HISTORY_STRING;

typedef struct
{
    zbx_uint64_t    itemid;
    int     clock;
    int     ns;
    const char  *value;
}
ZBX_HISTORY_TEXT;

typedef struct
{
    zbx_uint64_t    itemid;
    int     clock;
    int     ns;
    const char  *value;
    const char  *source;
    int     timestamp;
    int     logeventid;
    int     severity;
}
ZBX_HISTORY_LOG;
```

Callbacks will be used by Zabbix server history syncer processes in the end of history sync procedure after data is written into Zabbix database and saved in value cache.

2.5 Building modules

Modules are currently meant to be built inside Zabbix source tree, because the module API depends on some data structures that are defined in Zabbix headers.

The most important header for loadable modules is **include/module.h**, which defines these data structures. Other necessary system headers that help **include/module.h** to work properly are **stdlib.h** and **stdint.h**.

With this information in mind, everything is ready for the module to be built. The module should include **stdlib.h**, **stdint.h** and **module.h**, and the build script should make sure that these files are in the include path. See example "dummy" module below for details.

Another useful header is **include/log.h**, which defines **zabbix_log()** function, which can be used for logging and debugging purposes.

3 Configuration parameters

Zabbix agent, server and proxy support two parameters to deal with modules:

- LoadModulePath – full path to the location of loadable modules
- LoadModule – module(s) to load at startup. The modules must be located in a directory specified by LoadModulePath or the path must precede the module name. If the preceding path is absolute (starts with '/') then LoadModulePath is ignored. It is allowed to include multiple LoadModule parameters.

For example, to extend Zabbix agent we could add the following parameters:

```
LoadModulePath=/usr/local/lib/zabbix/agent/
LoadModule=mariadb.so
LoadModule=apache.so
LoadModule=kernel.so
LoadModule=/usr/local/lib/zabbix/dummy.so
```

Upon agent startup it will load the mariadb.so, apache.so and kernel.so modules from the /usr/local/lib/zabbix/agent directory while dummy.so will be loaded from /usr/local/lib/zabbix. It will fail if a module is missing, in case of bad permissions or if a shared library is not a Zabbix module.

4 Frontend configuration

Loadable modules are supported by Zabbix agent, server and proxy. Therefore, item type in Zabbix frontend depends on where the module is loaded. If the module is loaded into the agent, then the item type should be "Zabbix agent" or "Zabbix agent (active)". If the module is loaded into server or proxy, then the item type should be "Simple check".

History export through Zabbix modules does not need any frontend configuration. If the module is successfully loaded by server and provides **zbx_module_history_write_cbs()** function which returns at least one non-NULL callback function then history export will be enabled automatically.

5 Dummy module

Zabbix includes a sample module written in C language. The module is located under src/modules/dummy:

```
alex@alex:~trunk/src/modules/dummy$ ls -l
-rw-rw-r-- 1 alex alex 9019 Apr 24 17:54 dummy.c
-rw-rw-r-- 1 alex alex   67 Apr 24 17:54 Makefile
-rw-rw-r-- 1 alex alex  245 Apr 24 17:54 README
```

The module is well documented, it can be used as a template for your own modules.

After ./configure has been run in the root of Zabbix source tree as described above, just run **make** in order to build **dummy.so**.

```
/*
** Zabbix
** Copyright (C) 2001-2020 Zabbix SIA
**
** This program is free software; you can redistribute it and/or modify
** it under the terms of the GNU General Public License as published by
** the Free Software Foundation; either version 2 of the License, or
** (at your option) any later version.
**
** This program is distributed in the hope that it will be useful,
** but WITHOUT ANY WARRANTY; without even the implied warranty of
** MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the
** GNU General Public License for more details.
**
** You should have received a copy of the GNU General Public License
** along with this program; if not, write to the Free Software
** Foundation, Inc., 51 Franklin Street, Fifth Floor, Boston, MA  02110-1301, USA.
**/

####include <stdlib.h>
####include <string.h>
####include <time.h>
####include <stdint.h>

####include "module.h"

/* the variable keeps timeout setting for item processing */
static int  item_timeout = 0;

/* module SHOULD define internal functions as static and use a naming pattern different from Zabbix intern
/* symbols (zbx_*) and loadable module API functions (zbx_module_*) to avoid conflicts
static int  dummy_ping(AGENT_REQUEST *request, AGENT_RESULT *result);
static int  dummy_echo(AGENT_REQUEST *request, AGENT_RESULT *result);
static int  dummy_random(AGENT_REQUEST *request, AGENT_RESULT *result);

static ZBX_METRIC keys[] =
/*  KEY         FLAG        FUNCTION    TEST PARAMETERS */
{
    {"dummy.ping",      0,      dummy_ping, NULL},
    {"dummy.echo",      CF_HAVEPARAMS,  dummy_echo, "a message"},
    {"dummy.random",    CF_HAVEPARAMS,  dummy_random,   "1,1000"},
    {NULL}
};
```

```c
/******************************************************************************
 *                                                                            *
 * Function: zbx_module_api_version                                           *
 *                                                                            *
 * Purpose: returns version number of the module interface                    *
 *                                                                            *
 * Return value: ZBX_MODULE_API_VERSION - version of module.h module is       *
 *               compiled with, in order to load module successfully Zabbix   *
 *               MUST be compiled with the same version of this header file   *
 *                                                                            *
 ******************************************************************************/
int zbx_module_api_version(void)
{
    return ZBX_MODULE_API_VERSION;
}

/******************************************************************************
 *                                                                            *
 * Function: zbx_module_item_timeout                                          *
 *                                                                            *
 * Purpose: set timeout value for processing of items                         *
 *                                                                            *
 * Parameters: timeout - timeout in seconds, 0 - no timeout set               *
 *                                                                            *
 ******************************************************************************/
void    zbx_module_item_timeout(int timeout)
{
    item_timeout = timeout;
}

/******************************************************************************
 *                                                                            *
 * Function: zbx_module_item_list                                             *
 *                                                                            *
 * Purpose: returns list of item keys supported by the module                 *
 *                                                                            *
 * Return value: list of item keys                                            *
 *                                                                            *
 ******************************************************************************/
ZBX_METRIC  *zbx_module_item_list(void)
{
    return keys;
}

static int  dummy_ping(AGENT_REQUEST *request, AGENT_RESULT *result)
{
    SET_UI64_RESULT(result, 1);

    return SYSINFO_RET_OK;
}

static int  dummy_echo(AGENT_REQUEST *request, AGENT_RESULT *result)
{
    char    *param;

    if (1 != request->nparam)
    {
        /* set optional error message */
        SET_MSG_RESULT(result, strdup("Invalid number of parameters."));
        return SYSINFO_RET_FAIL;
    }
```

```
    param = get_rparam(request, 0);

    SET_STR_RESULT(result, strdup(param));

    return SYSINFO_RET_OK;
}

/******************************************************************************
 *                                                                            *
 * Function: dummy_random                                                     *
 *                                                                            *
 * Purpose: a main entry point for processing of an item                      *
 *                                                                            *
 * Parameters: request - structure that contains item key and parameters      *
 *              request->key - item key without parameters                    *
 *              request->nparam - number of parameters                        *
 *              request->params[N-1] - pointers to item key parameters        *
 *              request->types[N-1] - item key parameters types:              *
 *                  REQUEST_PARAMETER_TYPE_UNDEFINED (key parameter is empty) *
 *                  REQUEST_PARAMETER_TYPE_ARRAY (array)                      *
 *                  REQUEST_PARAMETER_TYPE_STRING (quoted or unquoted string) *
 *                                                                            *
 *             result - structure that will contain result                    *
 *                                                                            *
 * Return value: SYSINFO_RET_FAIL - function failed, item will be marked      *
 *                                  as not supported by zabbix                *
 *               SYSINFO_RET_OK - success                                     *
 *                                                                            *
 * Comment: get_rparam(request, N-1) can be used to get a pointer to the Nth  *
 *          parameter starting from 0 (first parameter). Make sure it exists  *
 *          by checking value of request->nparam.                             *
 *          In the same manner get_rparam_type(request, N-1) can be used to   *
 *          get a parameter type.                                             *
 *                                                                            *
 ******************************************************************************/
static int  dummy_random(AGENT_REQUEST *request, AGENT_RESULT *result)
{
    char    *param1, *param2;
    int from, to;

    if (2 != request->nparam)
    {
        /* set optional error message */
        SET_MSG_RESULT(result, strdup("Invalid number of parameters."));
        return SYSINFO_RET_FAIL;
    }

    param1 = get_rparam(request, 0);
    param2 = get_rparam(request, 1);

    /* there is no strict validation of parameters and types for simplicity sake */
    from = atoi(param1);
    to = atoi(param2);

    if (from > to)
    {
        SET_MSG_RESULT(result, strdup("Invalid range specified."));
        return SYSINFO_RET_FAIL;
    }

    SET_UI64_RESULT(result, from + rand() % (to - from + 1));
```

```
    return SYSINFO_RET_OK;
}

/******************************************************************************
 *                                                                            *
 * Function: zbx_module_init                                                  *
 *                                                                            *
 * Purpose: the function is called on agent startup                           *
 *          It should be used to call any initialization routines             *
 *                                                                            *
 * Return value: ZBX_MODULE_OK - success                                      *
 *               ZBX_MODULE_FAIL - module initialization failed               *
 *                                                                            *
 * Comment: the module won't be loaded in case of ZBX_MODULE_FAIL             *
 *                                                                            *
 ******************************************************************************/
int zbx_module_init(void)
{
    /* initialization for dummy.random */
    srand(time(NULL));

    return ZBX_MODULE_OK;
}

/******************************************************************************
 *                                                                            *
 * Function: zbx_module_uninit                                                *
 *                                                                            *
 * Purpose: the function is called on agent shutdown                          *
 *          It should be used to cleanup used resources if there are any      *
 *                                                                            *
 * Return value: ZBX_MODULE_OK - success                                      *
 *               ZBX_MODULE_FAIL - function failed                            *
 *                                                                            *
 ******************************************************************************/
int zbx_module_uninit(void)
{
    return ZBX_MODULE_OK;
}

/******************************************************************************
 *                                                                            *
 * Functions: dummy_history_float_cb                                          *
 *            dummy_history_integer_cb                                        *
 *            dummy_history_string_cb                                         *
 *            dummy_history_text_cb                                           *
 *            dummy_history_log_cb                                            *
 *                                                                            *
 * Purpose: callback functions for storing historical data of types float,    *
 *          integer, string, text and log respectively in external storage    *
 *                                                                            *
 * Parameters: history     - array of historical data                         *
 *             history_num - number of elements in history array              *
 *                                                                            *
 ******************************************************************************/
static void dummy_history_float_cb(const ZBX_HISTORY_FLOAT *history, int history_num)
{
    int i;

    for (i = 0; i < history_num; i++)
    {
        /* do something with history[i].itemid, history[i].clock, history[i].ns, history[i].value, ... */
```

```
    }
}

static void dummy_history_integer_cb(const ZBX_HISTORY_INTEGER *history, int history_num)
{
    int i;

    for (i = 0; i < history_num; i++)
    {
        /* do something with history[i].itemid, history[i].clock, history[i].ns, history[i].value, ... */
    }
}

static void dummy_history_string_cb(const ZBX_HISTORY_STRING *history, int history_num)
{
    int i;

    for (i = 0; i < history_num; i++)
    {
        /* do something with history[i].itemid, history[i].clock, history[i].ns, history[i].value, ... */
    }
}

static void dummy_history_text_cb(const ZBX_HISTORY_TEXT *history, int history_num)
{
    int i;

    for (i = 0; i < history_num; i++)
    {
        /* do something with history[i].itemid, history[i].clock, history[i].ns, history[i].value, ... */
    }
}

static void dummy_history_log_cb(const ZBX_HISTORY_LOG *history, int history_num)
{
    int i;

    for (i = 0; i < history_num; i++)
    {
        /* do something with history[i].itemid, history[i].clock, history[i].ns, history[i].value, ... */
    }
}

/******************************************************************************
 *                                                                            *
 * Function: zbx_module_history_write_cbs                                     *
 *                                                                            *
 * Purpose: returns a set of module functions Zabbix will call to export      *
 *          different types of historical data                                *
 *                                                                            *
 * Return value: structure with callback function pointers (can be NULL if    *
 *               module is not interested in data of certain types)           *
 *                                                                            *
 ******************************************************************************/
ZBX_HISTORY_WRITE_CBS   zbx_module_history_write_cbs(void)
{
    static ZBX_HISTORY_WRITE_CBS    dummy_callbacks =
    {
        dummy_history_float_cb,
        dummy_history_integer_cb,
        dummy_history_string_cb,
        dummy_history_text_cb,
```

```
        dummy_history_log_cb,
    };

    return dummy_callbacks;
}
```

The module exports three new items:

- `dummy.ping` - always returns '1'
- `dummy.echo[param1]` - returns the first parameter as it is, for example, `dummy.echo[ABC]` will return ABC
- `dummy.random[param1, param2]` - returns a random number within the range of param1-param2, for example, `dummy.random[1,1000000]`

6 Limitations

Support of loadable modules is implemented for the Unix platform only. It means that it does not work for Windows agents.

In some cases a module may need to read module-related configuration parameters from *zabbix_agentd.conf*. It is not supported currently. If you need your module to use some configuration parameters you should probably implement parsing of a module-specific configuration file.

6 Windows performance counters

Overview

You can effectively monitor Windows performance counters using the *perf_counter[]* key.

For example:

```
perf_counter["\Processor(0)\Interrupts/sec"]
```

or

```
perf_counter["\Processor(0)\Interrupts/sec", 10]
```

For more information on using this key or its English-only equivalent `perf_counter_en`, see Windows-specific item keys.

In order to get a full list of performance counters available for monitoring, you may run:

```
typeperf -qx
```

Numeric representation

Windows maintains numeric representations (indexes) for object and performance counter names. Zabbix supports these numeric representations as parameters to the `perf_counter`, `perf_counter_en` item keys and in `PerfCounter`, `PerfCounterEn` configuration parameters.

However, it's not recommended to use them unless you can guarantee your numeric indexes map to correct strings on specific hosts. If you need to create portable items that work across different hosts with various localized Windows versions, you can use the `perf_counter_en` key or `PerfCounterEn` configuration parameter which allow to use English names regardless of system locale.

To find out the numeric equivalents, run **regedit**, then find *HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows NT\CurrentVersion\Perflib\00*

The registry entry contains information like this:

```
1
1847
2
System
4
Memory
6
% Processor Time
10
File Read Operations/sec
12
File Write Operations/sec
14
File Control Operations/sec
16
```

```
File Read Bytes/sec
18
File Write Bytes/sec
....
```

Here you can find the corresponding numbers for each string part of the performance counter, like in '\System\% Processor Time':

```
System → 2
% Processor Time → 6
```

Then you can use these numbers to represent the path in numbers:

```
\2\6
```

Performance counter parameters

You can deploy some PerfCounter parameters for the monitoring of Windows performance counters.

For example, you can add these to the Zabbix agent configuration file:

```
PerfCounter=UserPerfCounter1,"\Memory\Page Reads/sec",30
or
PerfCounter=UserPerfCounter2,"\4\24",30
```

With such parameters in place, you can then simply use *UserPerfCounter1* or *UserPerfCounter2* as the keys for creating the respective items.

Remember to restart Zabbix agent after making changes to the configuration file.

7 Mass update

Overview

Sometimes you may want to change some attribute for a number of items at once. Instead of opening each individual item for editing, you may use the mass update function for that.

Using mass update

To mass-update some items, do the following:

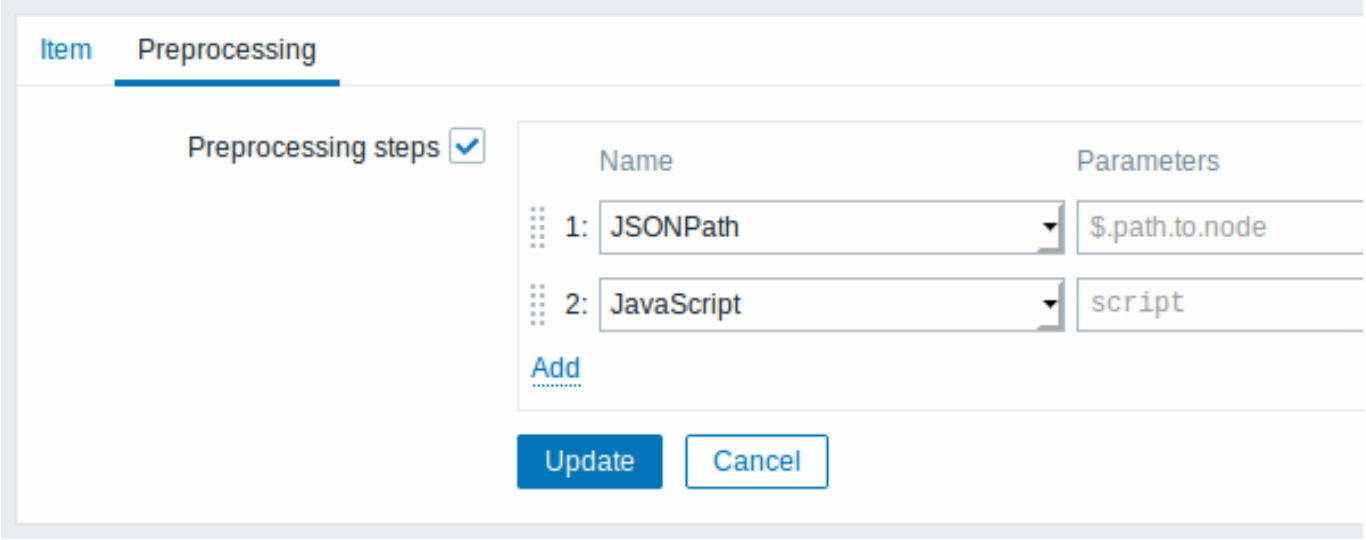
- Mark the checkboxes of the items to update in the list
- Click on *Mass update* below the list
- Navigate to the tab with required attributes (*Item* or *Preprocessing*)
- Mark the checkboxes of the attributes to update
- Enter new values for the attributes


Item
Preprocessing
Type
Original
Host interface
Original
JMX endpoint
Original
URL
Original
Request body type
Original
Request body
Original
Headers
Original
SNMP community
Original
Context name
Original
Security name
Original
Security level
Original
Authentication protocol
Original
Authentication passphrase
Original
Privacy protocol
Original
Privacy passphrase
Original
Port
Original
Type of information
Original
Units
Original
Authentication method
Original
User name
Original
Public key file
Original
Private key file
Original
Password
Original
Update interval
Original
History storage period
7d
Trend storage period
Original
Status
Original
Log time format
Original
Show value
Original
Enable trapping
Original
Allowed hosts
Original
Applications
Add
Replace
Remove
type here to search
Master item
Original
Description
Original
Update
Cancel

The *Applications* option allows to:

- *Add* - add new or existing applications to the items by specifying application name
- *Replace* - replace existing applications of the items with the one(s) specified in this field
- *Remove* - only remove specified applications from the items

The field for specifying applications is auto-complete - starting to type in it offers a dropdown of matching applications. If the application is new, it also appears in the dropdown and it is indicated by *(new)* after the string. Just scroll down to select.



When done, click on *Update*.

8 Value mapping

Overview

For a more ”human” representation of received values, you can use value maps that contain the mapping between numeric values and string representations.

Value mappings can be used in both the Zabbix frontend and notifications sent by email, SMS or script.

For example, an item which has value ’0’ or ’1’ can use value mapping to represent the values in a human-readable form:

- ’0’ => ’Not Available’
- ’1’ => ’Available’

Or, a backup related value map could be:

- ’F’ → ’Full’
- ’D’ → ’Differential’
- ’I’ → ’Incremental’

Thus, when configuring items you can use a value map to ”humanize” the way an item value will be displayed. To do that, you refer to the name of a previously defined value map in the *Show value* field.

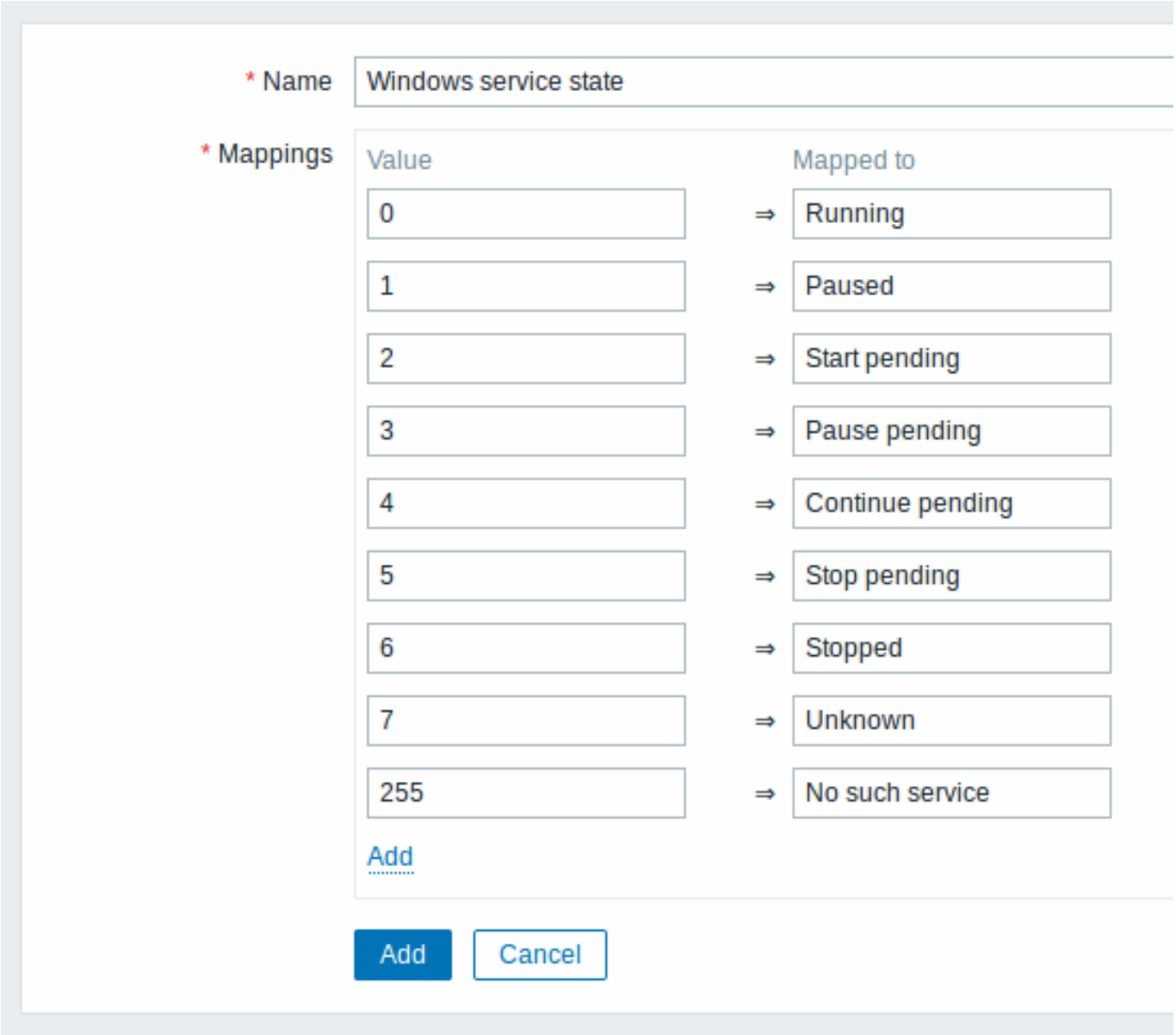
Note:
Value mapping can be used with items having *Numeric (unsigned)*, *Numeric (float)* and *Character* type of information.

Value mappings, starting with Zabbix 3.0, can be exported/imported, either separately, or with the respective template or host.

Configuration

To define a value map:

- Go to: *Administration* → *General*
- Select *Value mapping* from the dropdown
- Click on *Create value map* (or on the name of an existing map)



Parameters of a value map:

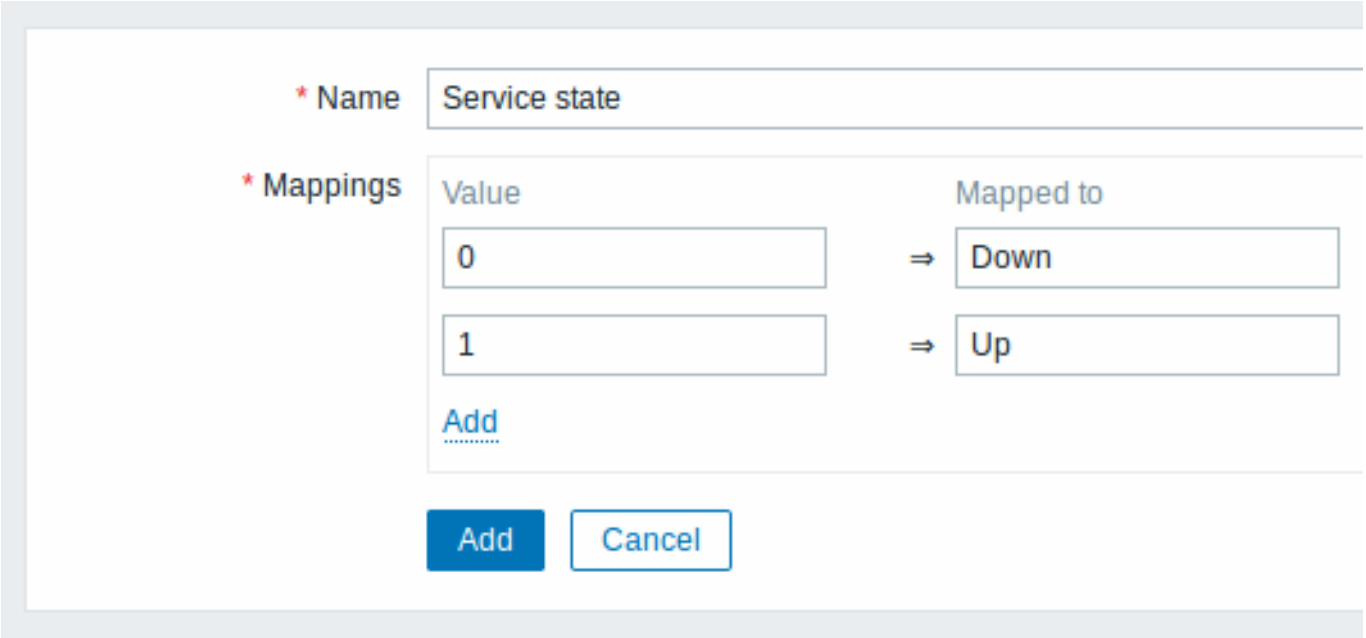
Parameter	Description
Name	Unique name of a set of value mappings.
Mappings	Individual mappings - pairs of numeric values and their string representations.

All mandatory input fields are marked with a red asterisk.

To add a new individual mapping, click on *Add*.

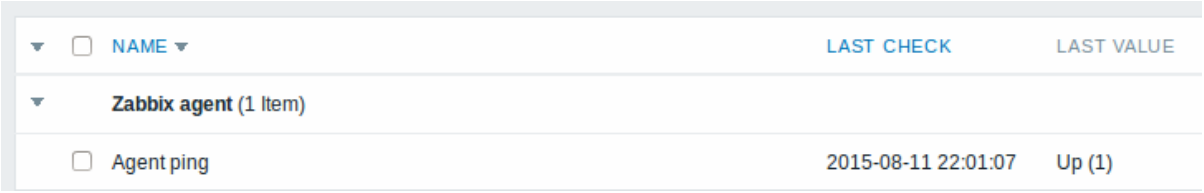
How this works

For example, one of the predefined agent items ’Ping to the server (TCP)’ uses an existing value map called ’Service state’ to display its values.



In the item configuration form you can see a reference to this value map in the *Show value* field:

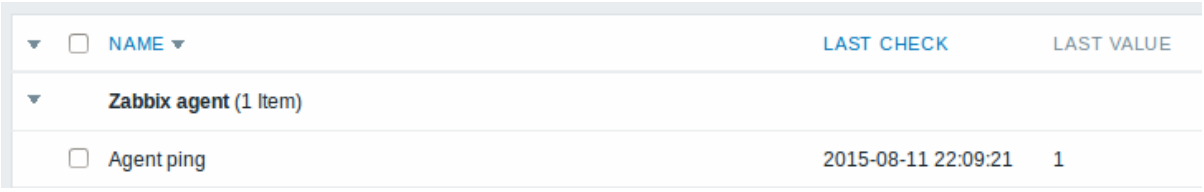
So in *Monitoring* → *Latest data* the mapping is put to use to display 'Up' (with the raw value in parentheses).



In the *Latest data* section displayed values are shortened to 20 symbols. If value mapping is used, this shortening is not applied to the mapped value, but only to the raw value separately (displayed in parenthesis).

Note:
A value being displayed in a human-readable form is also easier to understand when receiving notifications.

Without a predefined value map you would only get this:



So in this case you would either have to guess what the '1' stands for or do a search of documentation to find out.

9 Applications

Overview

Applications are used to group items in logical groups.

For example, the *MySQL Server* application can hold all items related to the MySQL server: availability of MySQL, disk space, processor load, transactions per second, number of slow queries, etc.

Applications are also used for grouping web scenarios.

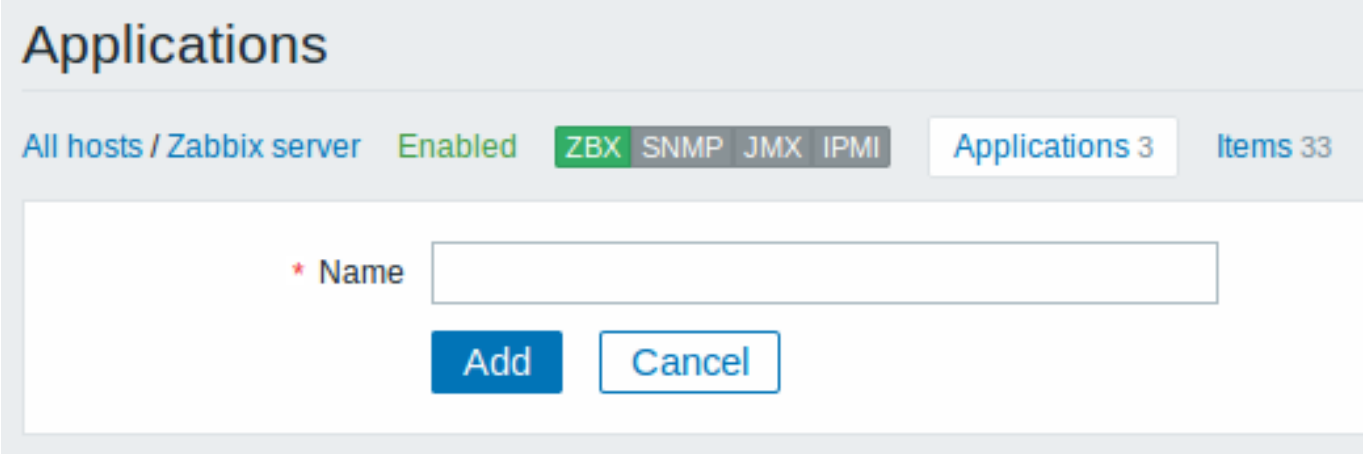
If you are using applications, then in *Monitoring* → *Latest data* you will see items and web scenarios grouped under their respective applications.

Configuration

To work with applications you must first create them and then link items or web scenarios to them.

To create an application, do the following:

- Go to *Configuration* → *Hosts* or *Templates*
- Click on *Applications* next to the required host or template
- Click on *Create application*
- Enter the application name and click on *Add* to save it



You can also create a new application directly in the item properties form.

Items are linked to applications in the item properties form. Select one or more applications the item will belong to.

Web scenarios are linked to applications in the web scenario definition form. Select the application the scenario will belong to.

10 Queue

Overview

The queue displays items that are waiting for a refresh. The queue is just a **logical** representation of data. There is no IPC queue or any other queue mechanism in Zabbix.

Items monitored by proxies are also included in the queue - they will be counted as queued for the proxy history data update period.

Only items with scheduled refresh times are displayed in the queue. This means that the following item types are excluded from the queue:

- log, logrt and event log active Zabbix agent items
- SNMP trap items
- trapper items
- web monitoring items
- dependent items

Statistics shown by the queue is a good indicator of the performance of Zabbix server.

The queue is retrieved directly from Zabbix server using JSON protocol. The information is available only if Zabbix server is running.

Reading the queue

To read the queue, go to *Administration* → *Queue*. *Overview* should be selected in the dropdown to the right.

Queue of items to be updated

Overview

Items	5 seconds	10 seconds	30 seconds	1 minute	5 minutes	More than 10 minutes
Zabbix agent	0	6	0	0	0	0
Zabbix agent (active)	0	0	0	0	0	0
Simple check	0	0	0	0	0	0
SNMPv1 agent	0	0	0	0	0	0
SNMPv2 agent	0	0	0	0	0	0
SNMPv3 agent	0	0	0	0	0	0
Zabbix internal	0	0	0	0	0	0
Zabbix aggregate	0	0	0	0	0	0
External check	0	0	0	0	0	0
Database monitor	0	0	0	0	0	0
HTTP agent	0	0	0	0	0	0
IPMI agent	0	0	0	0	0	0
SSH agent	0	0	0	0	0	0
TELNET agent	0	0	0	0	0	0
JMX agent	0	0	0	0	0	0
Calculated	0	0	0	0	0	0

The picture here is generally ”ok” so we may assume that the server is doing fine.

The queue shows six items waiting for 10 seconds. It would be great to know what items these are.

To do just that, select *Details* in the dropdown in the upper right corner. Now you can see a list of those delayed items.

Scheduled check	Delayed by	Host	Name
2018-11-01 10:22:45	20s	Remote proxy: My host	Incoming network traffic on eth0
2018-11-01 10:22:46	19s	Remote proxy: My host	Outgoing network traffic on eth0
2018-11-01 10:22:47	18s	Remote proxy: My host	Free inodes on / (percentage)
2018-11-01 10:22:48	17s	Remote proxy: My host	Free disk space on /
2018-11-01 10:22:49	16s	Remote proxy: My host	Free disk space on / (percentage)
2018-11-01 10:22:51	14s	Remote proxy: My host	Used disk space on /

With these details provided it may be possible to find out why these items might be delayed.

With one or two delayed items there perhaps is no cause for alarm. They might get updated in a second. However, if you see a bunch of items getting delayed for too long, there might be a more serious problem.

Queue of items to be updated

Overview

Items	5 seconds	10 seconds	30 seconds	1 minute	5 minutes	More than 10 minutes
Zabbix agent	0	1	1	26	0	0
Zabbix agent (active)	0	0	0	0	0	0
Simple check	0	0	0	0	0	0
SNMPv1 agent	0	0	0	0	0	0
SNMPv2 agent	0	0	0	0	0	0
SNMPv3 agent	0	0	0	0	0	0
Zabbix internal	0	0	0	0	0	0
Zabbix aggregate	0	0	0	0	0	0
External check	0	0	0	0	0	0
Database monitor	0	0	0	0	0	0
HTTP agent	0	0	0	0	0	0
IPMI agent	0	0	0	0	0	0
SSH agent	0	0	0	0	0	0
TELNET agent	0	0	0	0	0	0
JMX agent	0	0	0	0	0	0
Calculated	0	0	0	0	0	0

Is the agent down?

Queue item

A special internal item **zabbix[queue,<from>,<to>]** can be used to monitor the health of the queue in Zabbix. It will return the number of items delayed by the set amount of time. For more information see Internal items.

11 Value cache

Overview

To make the calculation of trigger expressions, calculated/aggregate items and some macros much faster, since Zabbix 2.2 a value cache option is supported by the Zabbix server.

This in-memory cache can be used for accessing historical data, instead of making direct SQL calls to the database. If historical values are not present in the cache, the missing values are requested from the database and the cache updated accordingly.

To enable the value cache functionality, an optional **ValueCacheSize** parameter is supported by the Zabbix server configuration file.

Two internal items are supported for monitoring the value cache: **zabbix[vcache,buffer,<mode>]** and **zabbix[vcache,cache,<parameter**
See more details with internal items.

12 Check now

Overview

Checking for a new item value in Zabbix is a cyclic process that is based on configured update intervals. While for many items the update intervals are quite short, there are others (including low-level discovery rules) for which the update intervals are quite long, so in real-life situations there may be a need to check for a new value quicker - to pick up changes in discoverable resources, for example. To accommodate such a necessity, it is possible to reschedule a passive check and retrieve a new value immediately.

This functionality is supported for **passive** checks only. The following item types are supported:

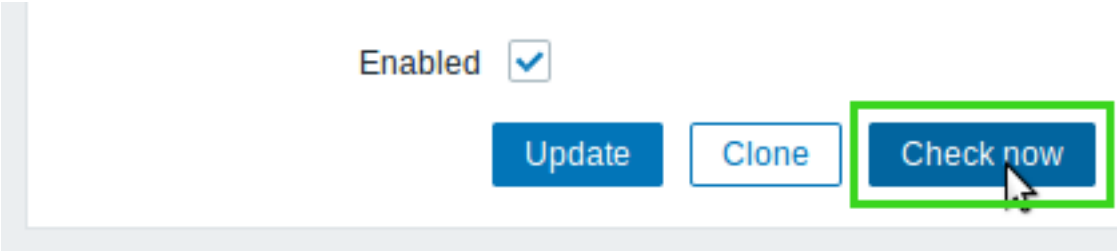
- Zabbix agent (passive)
- SNMPv1/v2/v3 agent
- IPMI agent
- Simple check
- Zabbix internal
- Zabbix aggregate
- External check
- Database monitor
- JMX agent
- SSH agent
- Telnet
- Calculated
- HTTP agent

Attention:
The check must be present in configuration cache in order to get executed; for more information see CacheUpdateFrequency. Before executing the check, the configuration cache is **not** updated, thus very recent changes to item/discovery rule configuration will not be picked up. Therefore, it is also not possible to check for a new value for an item/rule that has been created just now.

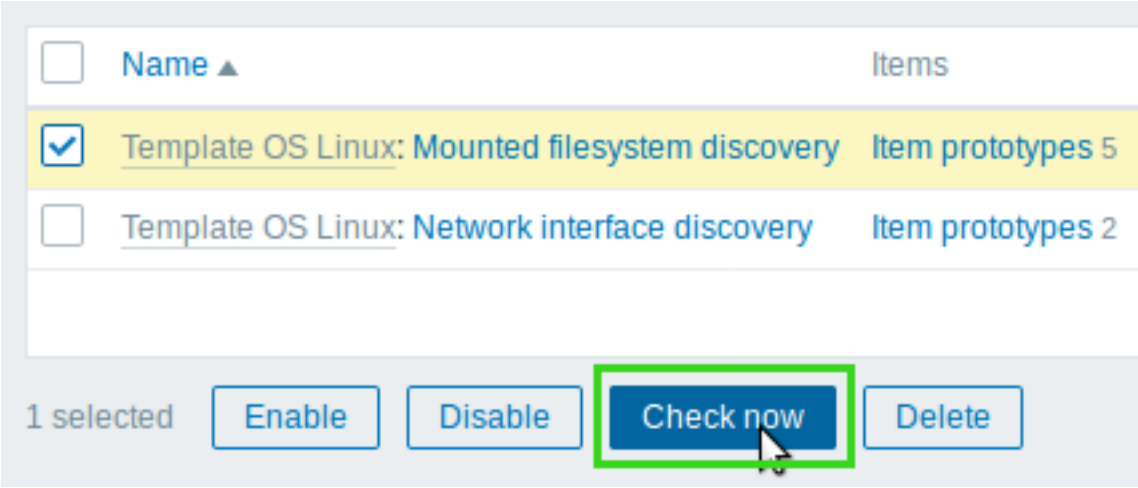
Configuration

To execute a passive check immediately:

- click on *Check now* in an existing item (or discovery rule) configuration form:



- click on *Check now* for selected items/rules in the list of items/discovery rules:



In the latter case several items/rules can be selected and ”checked now” at once.

3 Triggers

Overview

Triggers are logical expressions that ”evaluate” data gathered by items and represent the current system state.

While items are used to gather system data, it is highly impractical to follow these data all the time waiting for a condition that is alarming or deserves attention. The job of ”evaluating” data can be left to trigger expressions.

Trigger expressions allow to define a threshold of what state of data is ”acceptable”. Therefore, should the incoming data surpass the acceptable state, a trigger is ”fired” - or changes status to PROBLEM.

A trigger may have the following status:

VALUE	DESCRIPTION
OK	This is a normal trigger state. Called FALSE in older Zabbix versions.
PROBLEM	Normally means that something happened. For example, the processor load is too high. Called TRUE in older Zabbix versions.

Trigger status (the expression) is recalculated every time Zabbix server receives a new value that is part of the expression.

Triggers are evaluated based on history data only; trend data are never considered.

If time-based functions (**nodata()**, **date()**, **dayofmonth()**, **dayofweek()**, **time()**, **now()**) are used in the expression, the trigger is recalculated every 30 seconds by a Zabbix *history syncer* process. If both time-based and non-time-based functions are used in an expression, it is recalculated when a new value is received **and** every 30 seconds.

You can build trigger expressions with different degrees of complexity.

1 Configuring a trigger

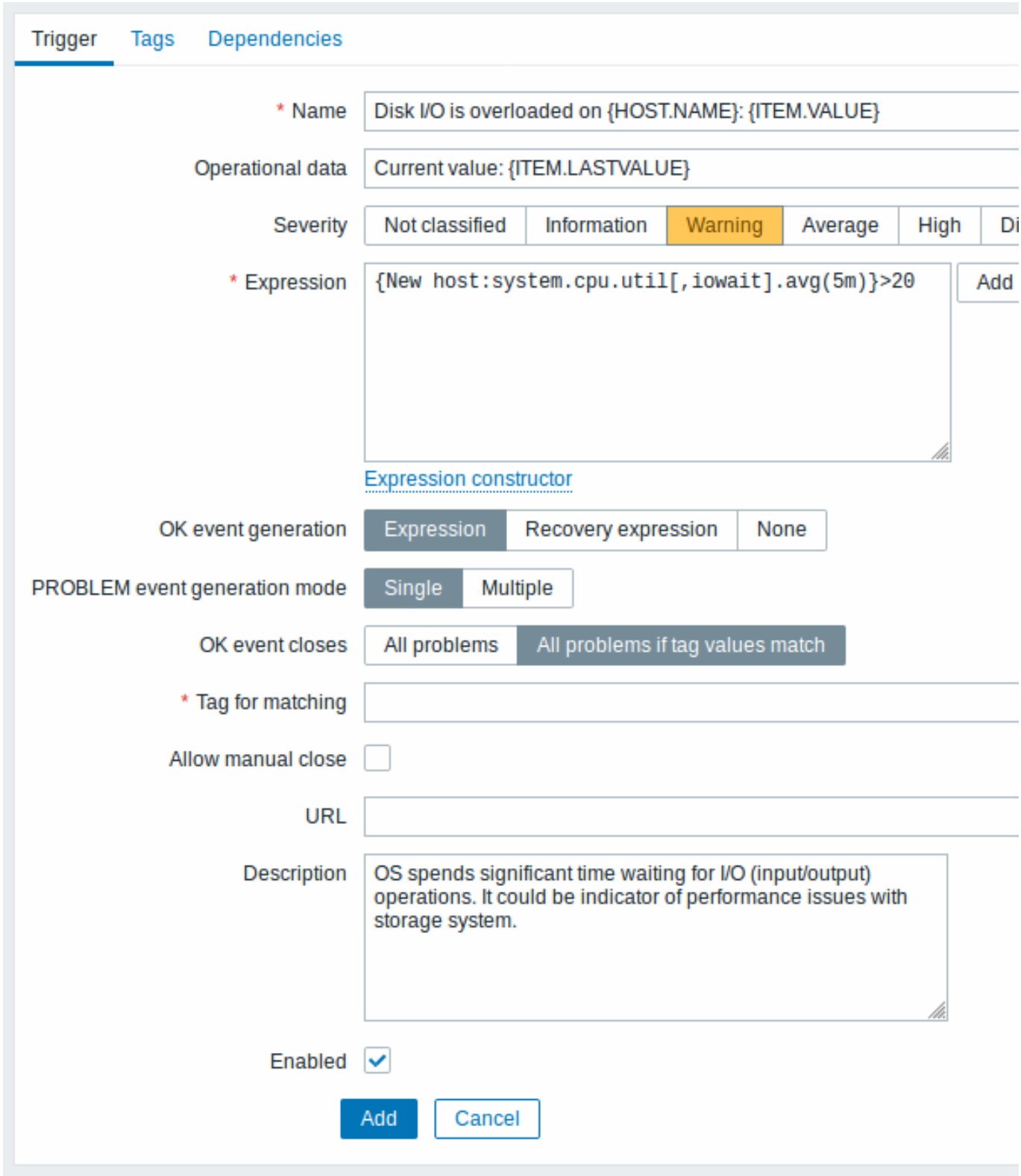
Overview

To configure a trigger, do the following:

- Go to: *Configuration* → *Hosts*
- Click on *Triggers* in the row of the host
- Click on *Create trigger* to the right (or on the trigger name to edit an existing trigger)
- Enter parameters of the trigger in the form

Configuration

The **Trigger** tab contains all the essential trigger attributes.

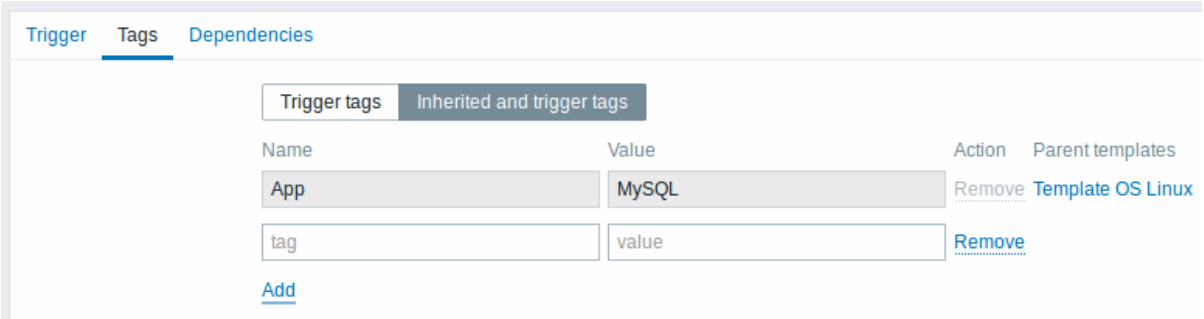


All mandatory input fields are marked with a red asterisk.

Parameter	Description
Name	Trigger name. Supported macros are: {HOST.HOST}, {HOST.NAME}, {HOST.CONN}, {HOST.DNS}, {HOST.IP}, {ITEM.VALUE}, {ITEM.LASTVALUE} and {$MACRO} user macros. **$1, $2...$9** macros can be used to refer to the first, second...ninth constant of the expression. *Note*: $1-$9 macros will resolve correctly if referring to constants in relatively simple, straightforward expressions. For example, the name "Processor load above $1 on {HOST.NAME}" will automatically change to "Processor load above 5 on New host" if the expression is {New host:system.cpu.load[percpu,avg1].last()}>5
Operational data	Operational data allow to define arbitrary strings along with macros. The macros will resolve dynamically to real time data in *Monitoring* → *Problems*. While macros in the trigger name (see above) will resolve to their values at the moment of a problem happening and will become the basis of a static problem name, the macros in the operational data maintain the ability to display the very latest information dynamically. Supported macros are: {HOST.HOST}, {HOST.NAME}, {HOST.CONN}, {HOST.DNS}, {HOST.IP}, {HOST.PORT}, {ITEM.VALUE}, {ITEM.LASTVALUE} and {$MACRO} user macros. This field is supported since Zabbix 4.4.
Severity	Set the required trigger severity by clicking the buttons.
Expression	Logical expression used to define the conditions of a problem. A problem is created after all the conditions included in the expression are met, i.e. the expression evaluates to TRUE. The problem will be resolved as soon as the expression evaluates to FALSE, unless additional recovery conditions are specified in *Recovery expression*.
OK event generation	OK event generation options: **Expression** - OK events are generated based on the same expression as problem events; **Recovery expression** - OK events are generated if the problem expression evaluates to FALSE and the recovery expression evaluates to TRUE; **None** - in this case the trigger will never return to an OK state on its own. Supported since Zabbix 3.2.0.
Recovery expression	Logical expression (optional) defining additional conditions that have to be met before the problem is resolved, after the original problem expression has already been evaluated as FALSE. Recovery expression is useful for trigger hysteresis. It is **not** possible to resolve a problem by recovery expression alone if the problem expression is still TRUE. This field is only available if 'Recovery expression' is selected for *OK event generation*. Supported since Zabbix 3.2.0.
PROBLEM event generation mode	Mode for generating problem events: **Single** - a single event is generated when a trigger goes into the 'Problem' state for the first time; **Multiple** - an event is generated upon *every* 'Problem' evaluation of the trigger.
OK event closes	Select if OK event closes: **All problems** - all problems of this trigger **All problems if tag values match** - only those trigger problems with matching event tag values Supported since Zabbix 3.2.0.

Parameter	Description
Tag for matching	Enter event tag name to use for event correlation. This field is displayed if 'All problems if tag values match' is selected for the *OK event closes* property and is mandatory in this case. Supported since Zabbix 3.2.0.
Allow manual close	Check to allow manual closing of problem events generated by this trigger. Manual closing is possible when acknowledging problem events. Supported since Zabbix 3.2.0.
URL	If not empty, the URL entered here is available as a link in several frontend locations, e.g. when clicking on the problem name in *Monitoring* → *Problems* (*URL* option in the *Trigger* menu) and *Problems* dashboard widget. Supported macros: {EVENT.ID}, {ITEM.VALUE}, {ITEM.LASTVALUE}, {TRIGGER.ID}, several {HOST.*} macros, user macros.
Description	Text field used to provide more information about this trigger. May contain instructions for fixing specific problem, contact detail of responsible staff, etc. *Starting with Zabbix 2.2*, the description may contain the same set of macros as trigger name.
Enabled	Unchecking this box will disable the trigger if required.

The **Tags** tab allows you to define trigger-level tags. All problems of this trigger will be tagged with the values entered here.



In addition the *Inherited and trigger tags* option allows to view tags defined on template level, if the trigger comes from that template. If there are multiple templates with the same tag, these tags are displayed once and template names are separated with commas. A trigger does not "inherit" and display host-level tags.

Parameter	Description
Name/Value	Set custom tags to mark trigger events. Tags are a pair of tag name and value. You can use only the name or pair it with a value. A trigger may have several tags with the same name, but different values. User macros, user macro context, low-level discovery macros and macro functions with `{{ITEM.VALUE}}`, `{{ITEM.LASTVALUE}}` and low-level discovery macros are supported in event tags. Low-level discovery macros can be used inside macro context. {TRIGGER.ID} macro is supported in trigger tag values since Zabbix 4.4.1. It may be useful for identifying triggers created from trigger prototypes and, for example, suppressing problems from these triggers during maintenance. If the total length of expanded value exceeds 255, it will be cut to 255 characters. See all macros supported for event tags. Event tags can be used for event correlation, in action conditions and will also be seen in *Monitoring* → *Problems* or the *Problems* widget. Supported since Zabbix 3.2.0.

The **Dependencies** tab contains all the dependencies of the trigger.

Click on *Add* to add a new dependency.

> **Note:**
> You can also configure a trigger by opening an existing one, pressing the *Clone* button and then saving under a different name.

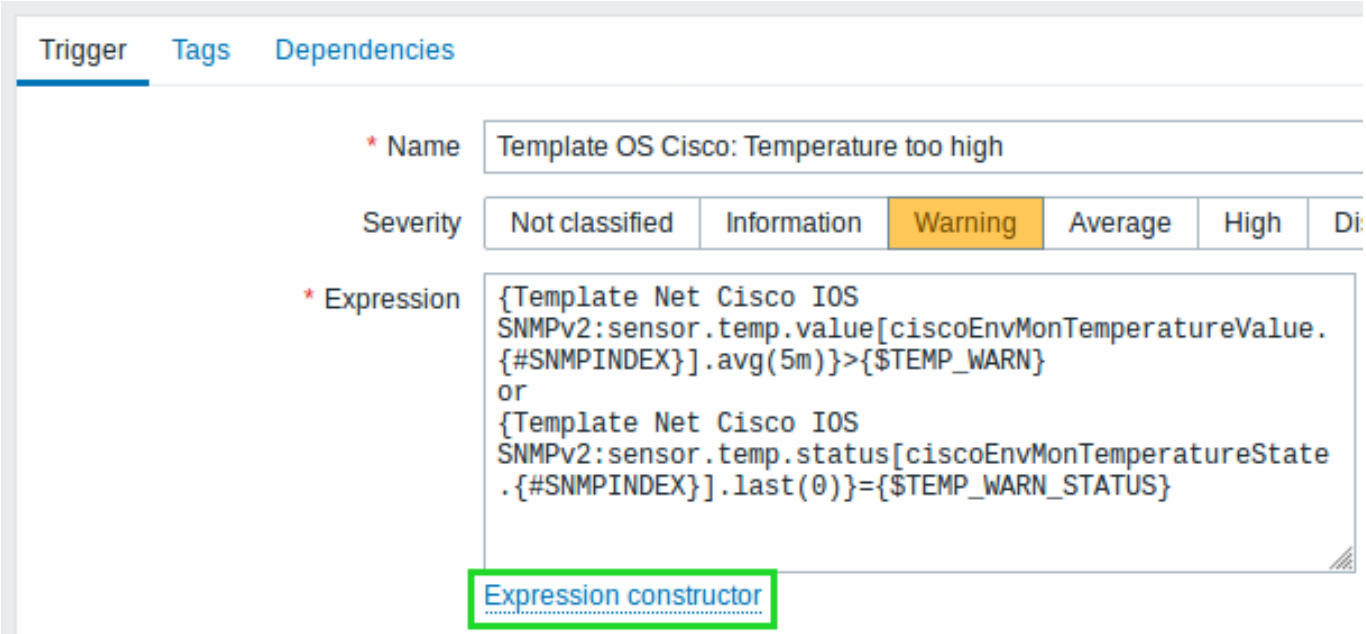
Testing expressions

It is possible to test the configured trigger expression as to what the expression result would be depending on the received value.

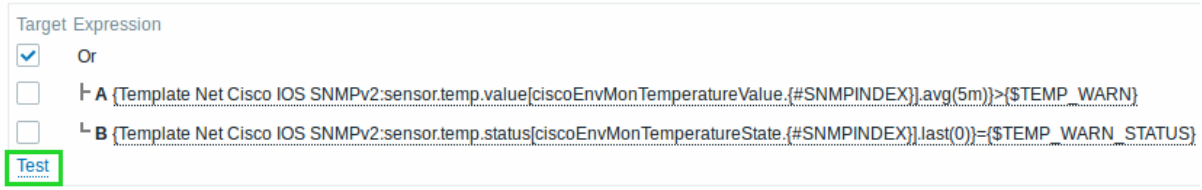
Following expression from an official template is taken as an example:

```
{Template Net Cisco IOS SNMPv2:sensor.temp.value[ciscoEnvMonTemperatureValue.{#SNMPINDEX}].avg(5m)}>{$TEMP
or
{Template Net Cisco IOS SNMPv2:sensor.temp.status[ciscoEnvMonTemperatureState.{#SNMPINDEX}].last(0)}={$TEM
```

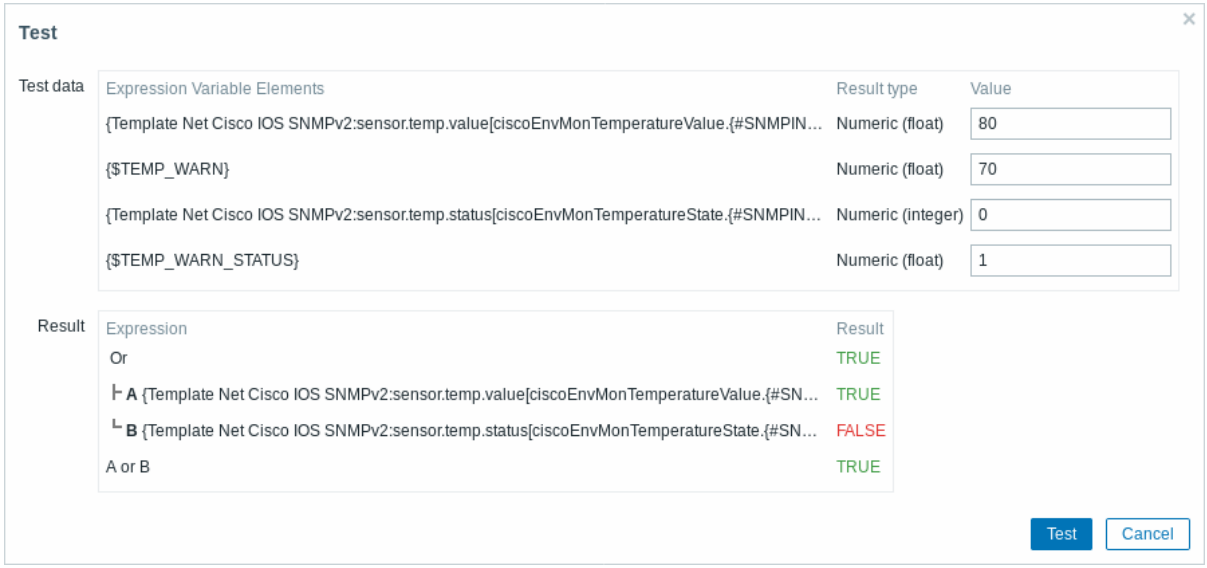
To test the expression, click on *Expression constructor* under the expression field.



In the Expression constructor, all individual expressions are listed. To open the testing window, click on *Test* below the expression list.



In the testing window you can enter sample values (”80, 70, 0, 1” in this example) and then see the expression result, by clicking on the *Test* button.



The result of the individual expressions as well as the whole expression can be seen.

"TRUE" result means the specified expression is correct. In this particular case A, "80" is greater than {$TEMP_WARN} specified value, "70" in this example. Respectively, "TRUE" result appears.

"FALSE" result means the specified expression is incorrect. In this particular case B, {$TEMP_WARN_STATUS}, "1" in this example, needs to be equal with specified "0" value, that is wrong. Respectively, "FALSE" result appears.

Chosen Expression type is "OR"/"TRUE". If at least one of the specified conditions (A or B in this case) is TRUE, overall result will be TRUE as well. That means, current value exceeds the warning value and a Problem has occurred.

2 Trigger expression

Overview

The expressions used in triggers are very flexible. You can use them to create complex logical tests regarding monitored statistics.

A simple useful expression might look like:

```
{<server>:<key>.<function>(<parameter>)}<operator><constant>
```

While the syntax is exactly the same, from the functional point of view there are two types of trigger expressions:

- problem expression - defines the conditions of the problem
- recovery expression (optional) - defines additional conditions of the problem resolution

When defining a problem expression alone, this expression will be used both as the problem threshold and the problem recovery threshold. As soon as the problem expression evaluates to TRUE, there is a problem. As soon as the problem expression evaluates to FALSE, the problem is resolved.

When defining both problem expression and the supplemental recovery expression, problem resolution becomes more complex: not only the problem expression has to be FALSE, but also the recovery expression has to be TRUE. This is useful to avoid trigger flapping in hysteresis.

Functions

Trigger functions allow to reference the collected values, current time and other factors.

A complete list of supported functions is available.

All functions return numeric values only. String comparison is not supported. If you want string comparison, upgrade to Zabbix 5.0.

Function parameters

Most of numeric functions accept the number of seconds as a parameter.

You may use the prefix **#** to specify that a parameter has a different meaning:

FUNCTION CALL	MEANING
sum(600)	Sum of all values in no more than the latest 600 seconds
sum(#5)	Sum of all values in no more than the latest 5 values

The function **last** uses a different meaning for values when prefixed with the hash mark - it makes it choose the n-th previous value, so given the values 3, 7, 2, 6, 5 (from most recent to least recent), **last(#2)** would return *7* and **last(#5)** would return *5*.

Several functions support an additional, second `time_shift` parameter. This parameter allows to reference data from a period of time in the past. For example, **avg(1h,1d)** will return the average value for an hour one day ago.

You can use the supported unit symbols in trigger expressions, for example '5m' (minutes) instead of '300' seconds or '1d' (day) instead of '86400' seconds. '1K' will stand for '1024' bytes.

Numbers with a '+' sign are not supported.

Operators

The following operators are supported for triggers **(in descending priority of execution)**:

PRIORITY	OPERATOR	DEFINITION	**Notes for unknown values**
1	**-**	Unary minus	**-**Unknown → Unknown
2	**not**	Logical NOT	**not** Unknown → Unknown
3	*	Multiplication	0 * Unknown → Unknown (yes, Unknown, not 0 - to not lose Unknown in arithmetic operations) 1.2 * Unknown → Unknown
	/	Division	Unknown / 0 → error Unknown / 1.2 → Unknown 0.0 / Unknown → Unknown
4	**+**	Arithmetical plus	1.2 + Unknown → Unknown
	-	Arithmetical minus	1.2 - Unknown → Unknown
5	**<**	Less than. The operator is defined as: A<B ⇔ (A<B-0.000001)	1.2 < Unknown → Unknown
	<=	Less than or equal to. The operator is defined as: A<=B ⇔ (A≤B+0.000001)	Unknown <= Unknown → Unknown
	>	More than. The operator is defined as: A>B ⇔ (A>B+0.000001)	

PRIORITY	OPERATOR	DEFINITION	Notes for unknown values
	>=	More than or equal to. The operator is defined as: A>=B ⇔ (A≥B-0.000001)	
6	**=**	Is equal. The operator is defined as: A=B ⇔ (A≥B-0.000001) and (A≤B+0.000001)	
	<>	Not equal. The operator is defined as: A<>B ⇔ (A<B-0.000001) or (A>B+0.000001)	
7	**and**	Logical AND	0 **and** Unknown → 0 1 **and** Unknown → Unknown Unknown **and** Unknown → Unknown
8	**or**	Logical OR	1 **or** Unknown → 1 0 **or** Unknown → Unknown Unknown **or** Unknown → Unknown

not, **and** and **or** operators are case-sensitive and must be in lowercase. They also must be surrounded by spaces or parentheses.

All operators, except unary **-** and **not**, have left-to-right associativity. Unary **-** and **not** are non-associative (meaning **-(-1)** and **not (not 1)** should be used instead of **--1** and **not not 1**).

Evaluation result:

- **<**, **<=**, **>**, **>=**, **=**, **<>** operators shall yield '1' in the trigger expression if the specified relation is true and '0' if it is false. If at least one operand is Unknown the result is Unknown;
- **and** for known operands shall yield '1' if both of its operands compare unequal to '0'; otherwise, it yields '0'; for unknown operands **and** yields '0' only if one operand compares equal to '0'; otherwise, it yields 'Unknown';
- **or** for known operands shall yield '1' if either of its operands compare unequal to '0'; otherwise, it yields '0'; for unknown operands **or** yields '1' only if one operand compares unequal to '0'; otherwise, it yields 'Unknown';
- The result of the logical negation operator **not** for a known operand is '0' if the value of its operand compares unequal to '0'; '1' if the value of its operand compares equal to '0'. For unknown operand **not** yields 'Unknown'.

Value caching

Values required for trigger evaluation are cached by Zabbix server. Because of this trigger evaluation causes a higher database load for some time after the server restarts. The value cache is not cleared when item history values are removed (either manually or by housekeeper), so the server will use the cached values until they are older than the time periods defined in trigger functions or server is restarted.

Examples of triggers

Example 1

Processor load is too high on www.zabbix.com

```
{www.zabbix.com:system.cpu.load[all,avg1].last()}>5
```

'www.zabbix.com:system.cpu.load[all,avg1]' gives a short name of the monitored parameter. It specifies that the server is 'www.zabbix.com' and the key being monitored is 'system.cpu.load[all,avg1]'. By using the function 'last()', we are referring to the most recent value. Finally, '>5' means that the trigger is in the PROBLEM state whenever the most recent processor load measurement from www.zabbix.com is greater than 5.

Example 2

www.zabbix.com is overloaded

```
{www.zabbix.com:system.cpu.load[all,avg1].last()}>5 or {www.zabbix.com:system.cpu.load[all,avg1].min(10m)}
```

The expression is true when either the current processor load is more than 5 or the processor load was more than 2 during last 10 minutes.

Example 3

/etc/passwd has been changed

Use of function diff:

```
{www.zabbix.com:vfs.file.cksum[/etc/passwd].diff()}=1
```

The expression is true when the previous value of checksum of /etc/passwd differs from the most recent one.

Similar expressions could be useful to monitor changes in important files, such as /etc/passwd, /etc/inetd.conf, /kernel, etc.

Example 4

Someone is downloading a large file from the Internet

Use of function min:

```
{www.zabbix.com:net.if.in[eth0,bytes].min(5m)}>100K
```

The expression is true when number of received bytes on eth0 is more than 100 KB within last 5 minutes.

Example 5

Both nodes of clustered SMTP server are down

Note use of two different hosts in one expression:

```
{smtp1.zabbix.com:net.tcp.service[smtp].last()}=0 and {smtp2.zabbix.com:net.tcp.service[smtp].last()}=0
```

The expression is true when both SMTP servers are down on both smtp1.zabbix.com and smtp2.zabbix.com.

Example 6

Zabbix agent needs to be upgraded

Use of function str():

```
{zabbix.zabbix.com:agent.version.str("beta8")}=1
```

The expression is true if Zabbix agent has version beta8 (presumably 1.0beta8).

Example 7

Server is unreachable

```
{zabbix.zabbix.com:icmpping.count(30m,0)}>5
```

The expression is true if host "zabbix.zabbix.com" is unreachable more than 5 times in the last 30 minutes.

Example 8

No heartbeats within last 3 minutes

Use of function nodata():

```
{zabbix.zabbix.com:tick.nodata(3m)}=1
```

To make use of this trigger, 'tick' must be defined as a Zabbix trapper item. The host should periodically send data for this item using zabbix_sender. If no data is received within 180 seconds, the trigger value becomes PROBLEM.

Note that 'nodata' can be used for any item type.

Example 9

CPU activity at night time

Use of function time():

```
{zabbix:system.cpu.load[all,avg1].min(5m)}>2 and {zabbix:system.cpu.load[all,avg1].time()}>000000 and {zab
```

The trigger may change its status to true, only at night (00:00-06:00) time.

Example 10

Check if client local time is in sync with Zabbix server time

Use of function fuzzytime():

```
{MySQL_DB:system.localtime.fuzzytime(10)}=0
```

The trigger will change to the problem state in case when local time on server MySQL_DB and Zabbix server differs by more than 10 seconds. Note that 'system.localtime' must be configured as a passive check.

Example 11

Comparing average load today with average load of the same time yesterday (using a second `time_shift` parameter).

```
{server:system.cpu.load.avg(1h)}/{server:system.cpu.load.avg(1h,1d)}>2
```

This expression will fire if the average load of the last hour tops the average load of the same hour yesterday more than two times.

Example 12

Using the value of another item to get a trigger threshold:

```
{Template PfSense:hrStorageFree[{#SNMPVALUE}].last()}<{Template PfSense:hrStorageSize[{#SNMPVALUE}].last()
```

The trigger will fire if the free storage drops below 10 percent.

Example 13

Using evaluation result to get the number of triggers over a threshold:

```
({server1:system.cpu.load[all,avg1].last()}>5) + ({server2:system.cpu.load[all,avg1].last()}>5) + ({server
```

The trigger will fire if at least two of the triggers in the expression are over 5.

Hysteresis

Sometimes an interval is needed between problem and recovery states, rather than a simple threshold. For example, if we want to define a trigger that reports a problem when server room temperature goes above 20°C and we want it to stay in the problem state until the temperature drops below 15°C, a simple trigger threshold at 20°C will not be enough.

Instead, we need to define a trigger expression for the problem event first (temperature above 20°C). Then we need to define an additional recovery condition (temperature below 15°C). This is done by defining an additional *Recovery expression* parameter when defining a trigger.

In this case, problem recovery will take place in two steps:

- First, the problem expression (temperature above 20°C) will have to evaluate to FALSE
- Second, the recovery expression (temperature below 15°C) will have to evaluate to TRUE

The recovery expression will be evaluated only when the problem event is resolved first.

Warning:
The recovery expression being TRUE alone does not resolve a problem if the problem expression is still TRUE!

Example 1

Temperature in server room is too high.

Problem expression:

{server:temp.last()}>20

Recovery expression:

{server:temp.last()}<=15

Example 2

Free disk space is too low.

Problem expression: it is less than 10GB for last 5 minutes

{server:vfs.fs.size[/,free].max(5m)}<10G

Recovery expression: it is more than 40GB for last 10 minutes

{server:vfs.fs.size[/,free].min(10m)}>40G

Expressions with unsupported items and unknown values

Versions before Zabbix 3.2 are very strict about unsupported items in a trigger expression. Any unsupported item in the expression immediately renders trigger value to Unknown.

Since Zabbix 3.2 there is a more flexible approach to unsupported items by admitting unknown values into expression evaluation:

- For some functions their values are not affected by whether an item is supported or unsupported. Such functions are now evaluated even if they refer to unsupported items. See the list in functions and unsupported items.
- Logical expressions with OR and AND can be evaluated to known values in two cases regardless of unknown operands:
  - "1 or Unsuported_item1.some_function() or Unsuported_item2.some_function() or ..." can be evaluated to '1' (True),
  - "0 and Unsuported_item1.some_function() and Unsuported_item2.some_function() and ..." can be evaluated to '0' (False).
    Zabbix tries to evaluate logical expressions taking unsupported items as Unknown values. In the two cases mentioned above a known value will be produced; in other cases trigger value will be Unknown.
- If a function evaluation for supported item results in error, the function value is Unknown and it takes part in further expression evaluation.

Note that unknown values may "disappear" only in logical expressions as described above. In arithmetic expressions unknown values always lead to result Unknown (except division by 0).

If a trigger expression with several unsupported items evaluates to Unknown the error message in the frontend refers to the last unsupported item evaluated.

3 Trigger dependencies

Overview

Sometimes the availability of one host depends on another. A server that is behind some router will become unreachable if the router goes down. With triggers configured for both, you might get notifications about two hosts down - while only the router was the guilty party.

This is where some dependency between hosts might be useful. With dependency set notifications of the dependants could be withheld and only the notification for the root problem sent.

While Zabbix does not support dependencies between hosts directly, they may be defined with another, more flexible method - trigger dependencies. A trigger may have one or more triggers it depends on.

So in our simple example we open the server trigger configuration form and set that it depends on the respective trigger of the router. With such dependency the server trigger will not change state as long as the trigger it depends on is in 'PROBLEM' state - and thus no dependant actions will be taken and no notifications sent.

If both the server and the router are down and dependency is there, Zabbix will not execute actions for the dependent trigger.

Actions on dependent triggers will not be executed if the trigger they depend on:

- changes its state from 'PROBLEM' to 'UNKNOWN'
- is closed manually, by correlation or with the help of time- based functions
- is resolved by a value of an item not involved in dependent trigger
- is disabled, has disabled item or disabled item host

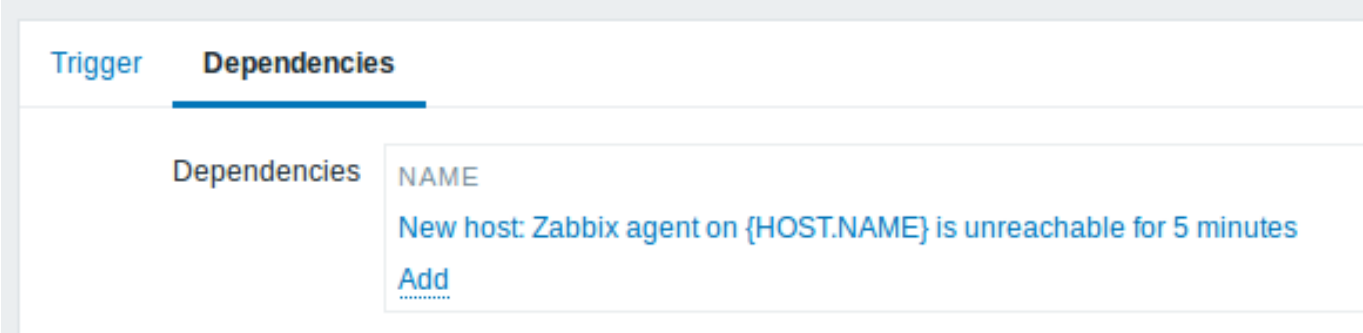
Note that "secondary" (dependent) trigger in the above-mentioned cases will not be immediately updated.

Also:

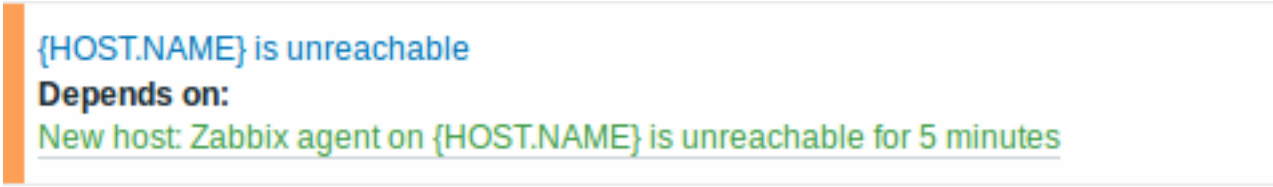
- Trigger dependency may be added from any host trigger to any other host trigger, as long as it wouldn't result in a circular dependency.
- Trigger dependency may be added from a template to a template. If a trigger from template A depends on a trigger from template B, template A may only be linked to a host (or another template) together with template B, but template B may be linked to a host (or another template) alone.
- Trigger dependency may be added from template trigger to a host trigger. In this case, linking such a template to a host will create a host trigger that depends on the same trigger template trigger was depending on. This allows to, for example, have a template where some triggers depend on router (host) triggers. All hosts linked to this template will depend on that specific router.
- Trigger dependency from a host trigger to a template trigger may not be added.
- Trigger dependency may be added from a trigger prototype to another trigger prototype (within the same low-level discovery rule) or a real trigger. A trigger prototype may not depend on a trigger prototype from a different LLD rule or on a trigger created from trigger prototype. Host trigger prototype cannot depend on a trigger from a template.

Configuration

To define a dependency, open the Dependencies tab in a trigger configuration form. Click on *Add* in the 'Dependencies' block and select one or more triggers that our trigger will depend on.



Click *Update*. Now the trigger has an indication of its dependency in the list.



Example of several dependencies

For example, a Host is behind a Router2 and the Router2 is behind a Router1.

```
Zabbix - Router1 - Router2 - Host
```

If Router1 is down, then obviously Host and Router2 are also unreachable yet we don't want to receive three notifications about Host, Router1 and Router2 all being down.

So in this case we define two dependencies:

```
'Host is down' trigger depends on 'Router2 is down' trigger
'Router2 is down' trigger depends on 'Router1 is down' trigger
```

Before changing the status of the 'Host is down' trigger, Zabbix will check for corresponding trigger dependencies. If found, and one of those triggers is in 'Problem' state, then the trigger status will not be changed and thus actions will not be executed and notifications will not be sent.

Zabbix performs this check recursively. If Router1 or Router2 is unreachable, the Host trigger won't be updated.

4 Trigger severity

Trigger severity defines how important a trigger is. Zabbix supports the following trigger severities:

SEVERITY	DEFINITION	COLOUR
Not classified	Unknown severity.	Grey
Information	For information purposes.	Light blue
Warning	Be warned.	Yellow
Average	Average problem.	Orange

SEVERITY	DEFINITION	COLOUR
High	Something important has happened.	Light red
Disaster	Disaster. Financial losses, etc.	Red

The severities are used for:

- visual representation of triggers. Different colours for different severities.
- audio in global alarms. Different audio for different severities.
- user media. Different media (notification channel) for different severities. For example, SMS - high severity, email - other.
- limiting actions by conditions against trigger severities

It is possible to customise trigger severity names and colours.

5 Customising trigger severities

Trigger severity names and colours for severity related GUI elements can be configured in *Administration* → *General* → *Trigger severities*. Colours are shared among all GUI themes.

Translating customised severity names

> **Attention:**
> If Zabbix frontend translations are used, custom severity names will override translated names by default.

Default trigger severity names are available for translation in all locales. If a severity name is changed, custom name is used in all locales and additional manual translation is needed.

Custom severity name translation procedure:

- set required custom severity name, for example 'Important'
- edit <frontend_dir>/locale/<required_locale>/LC_MESSAGES/frontend.po
- add 2 lines:

```
msgid "Important"
msgstr "<translation string>"
```

and save file.

- create .mo files as described in <frontend_dir>/locale/README

Here **msgid** should match the new custom severity name and **msgstr** should be the translation for it in the specific language.

This procedure should be performed after each severity name change.

6 Mass update

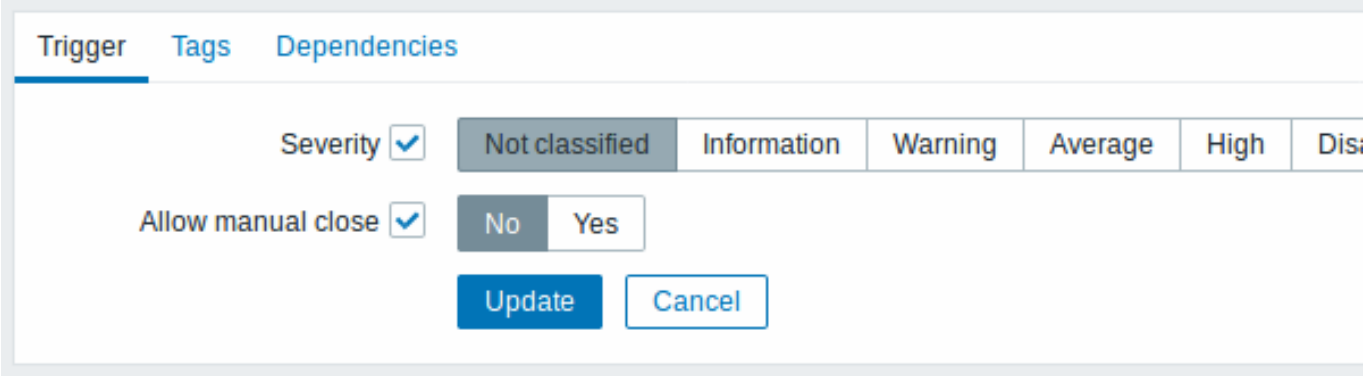
Overview

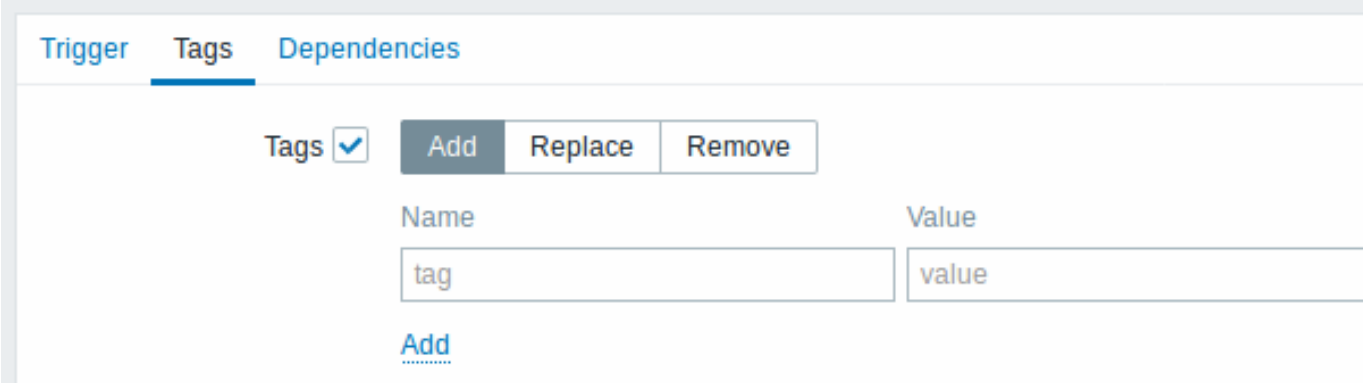
With mass update you may change some attribute for a number of triggers at once, saving you the need to open each individual trigger for editing.

Using mass update

To mass-update some triggers, do the following:

- Mark the checkboxes of the triggers you want to update in the list
- Click on *Mass update* below the list
- Navigate to the tab with required attributes (*Trigger*, *Tags* or *Dependencies*)
- Mark the checkboxes of any attribute to update

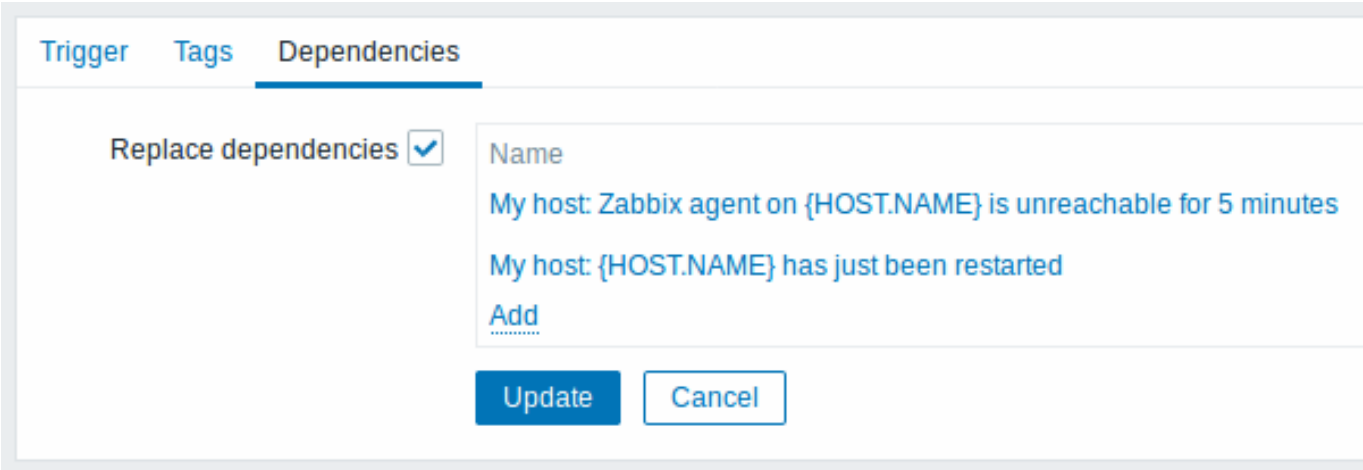




The following options are available when selecting the respective button for tag update:

- *Add* - allows to add new tags for the triggers;
- *Replace* - will remove any existing tags from the trigger and replace them with the one(s) specified below;
- *Remove* - will remove specified tags from triggers.

Note, that tags with the same name, but different values are not considered 'duplicates' and can be added to the same trigger.



Replace dependencies - will remove any existing dependencies from the trigger and replace them with the one(s) specified.

Click on *Update* to apply the changes.

7 Predictive trigger functions

Overview

Sometimes there are signs of the upcoming problem. These signs can be spotted so that actions may be taken in advance to prevent or at least minimize the impact of the problem.

Zabbix has tools to predict the future behaviour of the monitored system based on historic data. These tools are realized through predictive trigger functions.

1 Functions

Two things one needs to know is how to define a problem state and how much time is needed to take action. Then there are two ways to set up a trigger signalling about a potential unwanted situation. First: trigger must fire when the system after "time to

act" is expected to be in problem state. Second: trigger must fire when the system is going to reach the problem state in less than "time to act". Corresponding trigger functions to use are **forecast** and **timeleft**. Note that underlying statistical analysis is basically identical for both functions. You may set up a trigger whichever way you prefer with similar results.

2 Parameters

Both functions use almost the same set of parameters. Use the list of supported functions for reference.

2.1 Time interval

First of all you should specify the historic period Zabbix should analyse to come up with prediction. You do it in a familiar way by means of `sec` or `#num` parameter and optional `time_shift` like you do it with **avg**, **count**, **delta**, **max**, **min** and **sum** functions.

2.2 Forecasting horizon

(**forecast** only)
Parameter `time` specifies how far in the future Zabbix should extrapolate dependencies it finds in historic data. No matter if you use `time_shift` or not, `time` is always counted starting from the current moment.

2.3 Threshold to reach

(**timeleft** only)
Parameter `threshold` specifies a value the analysed item has to reach, no difference if from above or from below. Once we have determined f(t) (see below) we should solve equation f(t) = `threshold` and return the root which is closer to now and to the right from now or 999999999999.9999 if there is no such root.

Note:
When item values approach the threshold and then cross it, **timeleft** assumes that intersection is already in the past and therefore switches to the next intersection with `threshold` level, if any. Best practice should be to use predictions as a complement to ordinary problem diagnostics, not as a substitution.[a]

[a] According to specification these are voltages on chip pins and generally speaking may need scaling.

2.4 Fit functions

Default `fit` is the *linear* function. But if your monitored system is more complicated you have more options to choose from.

`fit`	x = f(t)
linear	$x = a + b*t$
polynomialN[1]	$x = a_0 + a_1*t + a_2*t^2 + ... + a_n*t^n$
exponential	$x = a*\exp(b*t)$
logarithmic	$x = a + b*\log(t)$
power	$x = a*t^b$

2.5 Modes

(**forecast** only)
Every time a trigger function is evaluated it gets data from the specified history period and fits a specified function to the data. So, if the data is slightly different the fitted function will be slightly different. If we simply calculate the value of the fitted function at a specified time in the future you will know nothing about how the analysed item is expected to behave between now and that moment in the future. For some `fit` options (like *polynomial*) a simple value from the future may be misleading.

`mode`	**forecast** result
value	f(now + `time`)
max	$\max_{\text{now} <= t <= \text{now} + \texttt{time}}$ f(t)
min	$\min_{\text{now} <= t <= \text{now} + \texttt{time}}$ f(t)
delta	*max - min*
avg	average of f(t) (now <= t <= now + `time`) according to definition

3 Details

To avoid calculations with huge numbers we consider the timestamp of the first value in specified period plus 1 ns as a new zero-time (current epoch time is of order 10^9, epoch squared is 10^{18}, double precision is about 10^{-16}). 1 ns is added to provide all

[1] `Secure` indicates that the cookie should only be transmitted over a secure HTTPS connection from the client. When set to 'true', the cookie will only be set if a secure connection exists.

positive time values for *logarithmic* and *power* fits which involve calculating log(t). Time shift does not affect *linear*, *polynomial*, *exponential* (apart from easier and more precise calculations) but changes the shape of *logarithmic* and *power* functions.

4 Potential errors

Functions return -1 in such situations:

- specified evaluation period contains no data;
- result of mathematical operation is not defined[2];
- numerical complications (unfortunately, for some sets of input data range and precision of double-precision floating-point format become insufficient)[3].

Note:
No warnings or errors are flagged if chosen fit poorly describes provided data or there is just too few data for accurate prediction.

5 Examples and dealing with errors

To get a warning when you are about to run out of free disk space on your host you may use a trigger expression like this:

```
{host:vfs.fs.size[/,free].timeleft(1h,,0)}<1h
```

However, error code -1 may come into play and put your trigger in a problem state. Generally it's good because you get a warning that your predictions don't work correctly and you should look at them more thoroughly to find out why. But sometimes it's bad because -1 can simply mean that there was no data about the host free disk space obtained in the last hour. If you are getting too many false positive alerts consider using more complicated trigger expression[4]:

```
{host:vfs.fs.size[/,free].timeleft(1h,,0)}<1h and {host:vfs.fs.size[/,free].timeleft(1h,,0)}<>-1
```

Situation is a bit more difficult with **forecast**. First of all, -1 may or may not put the trigger in a problem state depending on whether you have expression like `{host:item.forecast(...)}<...` or like `{host:item.forecast(...)}>...`

Furthermore, -1 may be a valid forecast if it's normal for the item value to be negative. But probability of this situation in the real world situation is negligible (see how operator **=** works). So add `... or {host:item.forecast(...)}=-1` or `... and {host:item.forecast(...)}<>-1` if you want or don't want to treat -1 as a problem respectively.

See also

1. Predictive trigger functions (pdf) on zabbix.org

4 Events

Overview

There are several types of events generated in Zabbix:

- trigger events - whenever a trigger changes its status (*OK→PROBLEM→OK*)
- discovery events - when hosts or services are detected
- auto registration events - when active agents are auto-registered by server
- internal events - when an item/low-level discovery rule becomes unsupported or a trigger goes into an unknown state

Note:
Internal events are supported starting with Zabbix 2.2 version.

Events are time-stamped and can be the basis of actions such as sending notification e-mail etc.

To view details of events in the frontend, go to *Monitoring* → *Problems*. There you can click on the event date and time to view details of an event.

More information is available on:

[2] For example fitting *exponential* or *power* functions involves calculating log() of item values. If data contains zeros or negative numbers you will get an error since log() is defined for positive values only.

[3] For *linear*, *exponential*, *logarithmic* and *power* fits all necessary calculations can be written explicitly. For *polynomial* only *value* can be calculated without any additional steps. Calculating *avg* involves computing polynomial antiderivative (analytically). Computing *max*, *min* and *delta* involves computing polynomial derivative (analytically) and finding its roots (numerically). Solving f(t) = 0 involves finding polynomial roots (numerically).

[4] But in this case -1 can cause your trigger to recover from the problem state. To be fully protected use: `{host:vfs.fs.size[/,free].timeleft(1h,,0)}<1h and ({TRIGGER.VALUE}=0 and {host:vfs.fs.size[/,free].timeleft(1h,,0)}<>-1 or {TRIGGER.VALUE}=1)`

- trigger events
- other event sources

1 Trigger event generation

Overview

Change of trigger status is the most frequent and most important source of events. Each time the trigger changes its state, an event is generated. The event contains details of the trigger state's change - when it happened and what the new state is.

Two types of events are created by triggers - Problem and OK.

Problem events

A problem event is created:

- when a trigger expression evaluates to TRUE if the trigger is in OK state;
- each time a trigger expression evaluates to TRUE if multiple problem event generation is enabled for the trigger.

OK events

An OK event closes the related problem event(s) and may be created by 3 components:

- triggers - based on 'OK event generation' and 'OK event closes' settings;
- event correlation
- task manager – when an event is manually closed

Triggers

Triggers have an 'OK event generation' setting that controls how OK events are generated:

- *Expression* - an OK event is generated for a trigger in problem state when its expression evaluates to FALSE. This is the simplest setting, enabled by default.
- *Recovery expression* - an OK event is generated for a trigger in problem state when its expression evaluates to FALSE and the recovery expression evaluates to TRUE. This can be used if trigger recovery criteria is different from problem criteria.
- *None* - an OK event is never generated. This can be used in conjunction with multiple problem event generation to simply send a notification when something happens.

Additionally triggers have an 'OK event closes' setting that controls which problem events are closed:

- *All problems* - an OK event will close all open problems created by the trigger
- *All problems if tag values match* - an OK event will close open problems created by the trigger and having at least one matching tag value. The tag is defined by 'Tag for matching' trigger setting. If there are no problem events to close then OK event is not generated. This is often called trigger level event correlation.

Event correlation

Event correlation (also called global event correlation) is a way to set up custom event closing (resulting in OK event generation) rules.

The rules define how the new problem events are paired with existing problem events and allow to close the new event or the matched events by generating corresponding OK events.

However, event correlation must be configured very carefully, as it can negatively affect event processing performance or, if misconfigured, close more events than intended (in the worst case even all problem events could be closed). A few configuration tips:

1. always reduce the correlation scope by setting a unique tag for the control event (the event that is paired with old events) and use the 'new event tag' correlation condition
2. don't forget to add a condition based on the old event when using 'close old event' operation, or all existing problems could be closed
3. avoid using common tag names used by different correlation configurations

Task manager

If the 'Allow manual close' setting is enabled for trigger, then it's possible to manually close problem events generated by the trigger. This is done in the frontend when updating a problem. The event is not closed directly – instead a 'close event' task is created, which is handled by the task manager shortly. The task manager will generate a corresponding OK event and the problem event will be closed.

2 Other event sources

Discovery events

Zabbix periodically scans the IP ranges defined in network discovery rules. Frequency of the check is configurable for each rule individually. Once a host or a service is discovered, a discovery event (or several events) are generated.

Zabbix generates the following events:

Event	When generated
Service Up	Every time Zabbix detects active service.
Service Down	Every time Zabbix cannot detect service.
Host Up	If at least one of the services is UP for the IP.
Host Down	If all services are not responding.
Service Discovered	If the service is back after downtime or discovered for the first time.
Service Lost	If the service is lost after being up.
Host Discovered	If host is back after downtime or discovered for the first time.
Host Lost	If host is lost after being up.

Active agent auto-discovery events

Active agent auto-registration creates events in Zabbix.

If configured, active agent auto-registration event is created when a previously unknown active agent asks for checks or if the host metadata has changed. The server adds a new auto-registered host, using the received IP address and port of the agent.

For more information, see the active agent auto-registration page.

Internal events

Internal events happen when:

- an item changes state from 'normal' to 'unsupported'
- an item changes state from 'unsupported' to 'normal'
- a low-level discovery rule changes state from 'normal' to 'unsupported'
- a low-level discovery rule changes state from 'unsupported' to 'normal'
- a trigger changes state from 'normal' to 'unknown'
- a trigger changes state from 'unknown' to 'normal'

Internal events are supported since Zabbix 2.2. The aim of introducing internal events is to allow users to be notified when any internal event takes place, for example, an item becomes unsupported and stops gathering data.

Internal events are only created when internal actions for these events are enabled. To stop generation of internal events (for example, for items becoming unsupported), disable all actions for internal events in Configuration → Actions → Internal actions.

Note:
If internal actions are disabled, while an object is in the 'unsupported' state, recovery event for this object will still be created.

If internal actions are enabled, while an object is in the 'unsupported' state, recovery event for this object will be created, even though 'problem event' has not been created for the object.

3 Manual closing of problems

Overview

While generally problem events are resolved automatically when trigger status goes from 'Problem' to 'OK', there may be cases when it is difficult to determine if a problem has been resolved by means of a trigger expression. In such cases, the problem needs to be resolved manually.

For example, *syslog* may report that some kernel parameters need to be tuned for optimal performance. In this case the issue is reported to Linux administrators, they fix it and then close the problem manually.

Problems can be closed manually only for triggers with the *Allow manual close* option enabled.

When a problem is "manually closed", Zabbix generates a new internal task for Zabbix server. Then the *task manager* process executes this task and generates an OK event, therefore closing problem event.

A manually closed problem does not mean that the underlying trigger will never go into a 'Problem' state again. The trigger expression is re-evaluated and may result in a problem:

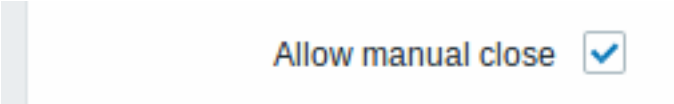
- When new data arrive for any item included in the trigger expression (note that the values discarded by a throttling preprocessing step are not considered as received and will not cause trigger expression to be re-evaluated);
- When time-based functions are used in the expression. Complete time-based function list can be found on Triggers page.

Configuration

Two steps are required to close a problem manually.

Trigger configuration

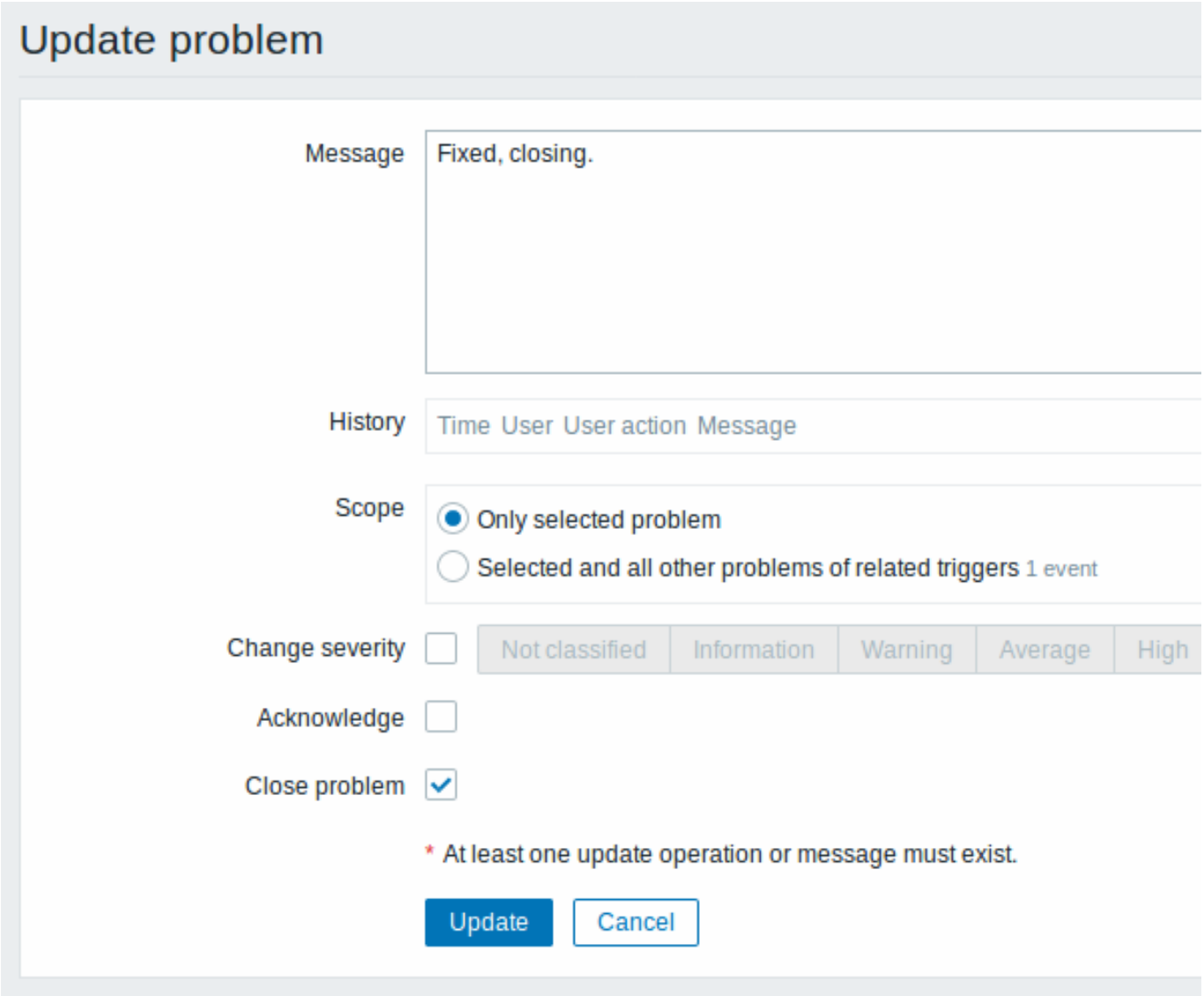
In trigger configuration, enable the *Allow manual close* option.



Problem update screen

If a problem arises for a trigger with the *Manual close* flag, you can go to the problem update screen of that problem and close the problem manually.

To close the problem, check the *Close problem* option in the form and click on *Update*.



All mandatory input fields are marked with a red asterisk.

The request is processed by Zabbix server. Normally it will take a few seconds to close the problem. During that process *CLOSING* is displayed in *Monitoring* → *Problems* as the status of the problem.

Verification

It can be verified that a problem has been closed manually:

- in event details, available through *Monitoring* → *Problems*;
- by using the {EVENT.UPDATE.HISTORY} macro in notification messages that will provide this information.

5 Event correlation

Overview

Event correlation allows to correlate problem events to their resolution in a manner that is very precise and flexible.

Event correlation can be defined:

- on trigger level - one trigger may be used to relate separate problems to their solution
- globally - problems can be correlated to their solution from a different trigger/polling method using global correlation rules

1 Trigger-based event correlation

Overview

Trigger-based event correlation allows to correlate separate problems reported by one trigger.

While generally an OK event can close all problem events created by one trigger, there are cases when a more detailed approach is needed. For example, when monitoring log files you may want to discover certain problems in a log file and close them individually rather than all together.

This is the case with triggers that have *Multiple Problem Event Generation* enabled. Such triggers are normally used for log monitoring, trap processing, etc.

It is possible in Zabbix to relate problem events based on the event tags. Tags are used to extract values and create identification for problem events. Taking advantage of that, problems can also be closed individually based on matching tag.

In other words, the same trigger can create separate events identified by the event tag. Therefore problem events can be identified one-by-one and closed separately based on the identification by the event tag.

How it works

In log monitoring you may encounter lines similar to these:

```
Line1: Application 1 stopped
Line2: Application 2 stopped
Line3: Application 1 was restarted
Line4: Application 2 was restarted
```

The idea of event correlation is to be able to match the problem event from Line1 to the resolution from Line3 and the problem event from Line2 to the resolution from Line4, and close these problems one by one:

```
Line1: Application 1 stopped
Line3: Application 1 was restarted #problem from Line 1 closed

Line2: Application 2 stopped
Line4: Application 2 was restarted #problem from Line 2 closed
```

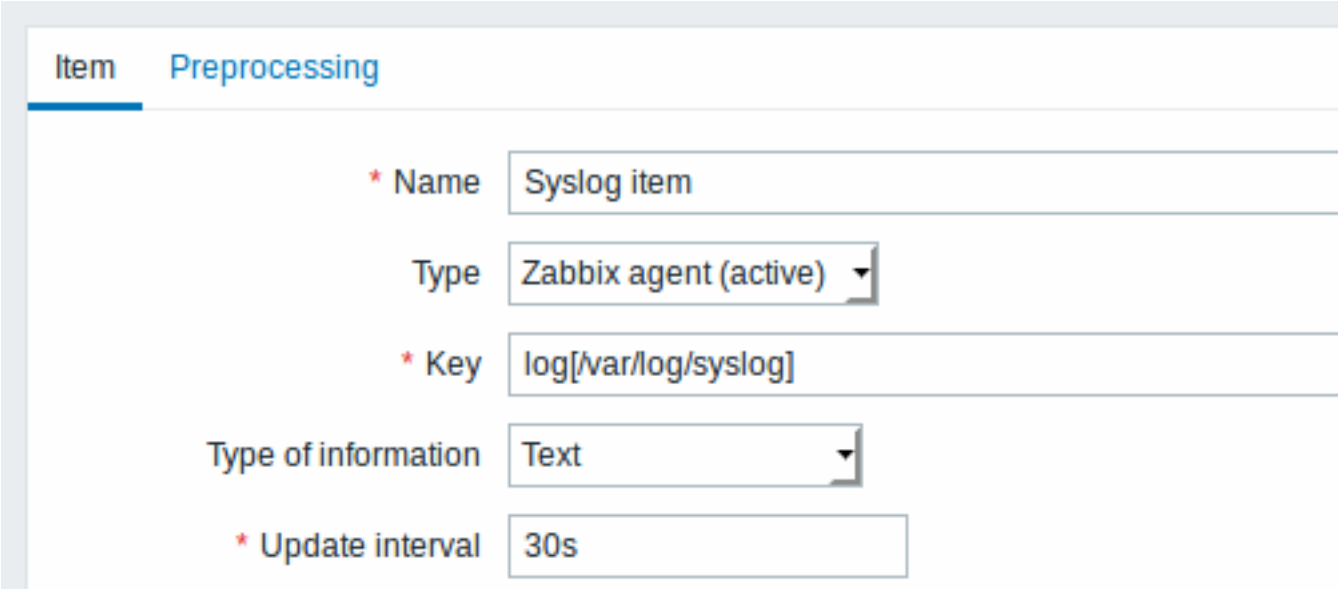
To do this you need to tag these related events as, for example, ”Application 1” and ”Application 2”. That can be done by applying a regular expression to the log line to extract the tag value. Then, when events are created, they are tagged ”Application 1” and ”Application 2” respectively and problem can be matched to the resolution.

Configuration

Item

To begin with, you may want to set up an item that monitors a log file, for example:

```
log[/var/log/syslog]
```



With the item set up, wait a minute for the configuration changes to be picked up and then go to Latest data to make sure that the item has started collecting data.

Trigger

With the item working you need to configure the trigger. It's important to decide what entries in the log file are worth paying attention to. For example, the following trigger expression will search for a string like 'Stopping' to signal potential problems:

```
{My host:log[/var/log/syslog].regexp("Stopping")}=1
```

Attention:
To make sure that each line containing the string "Stopping" is considered a problem also set the *Problem event generation mode* in trigger configuration to 'Multiple'.

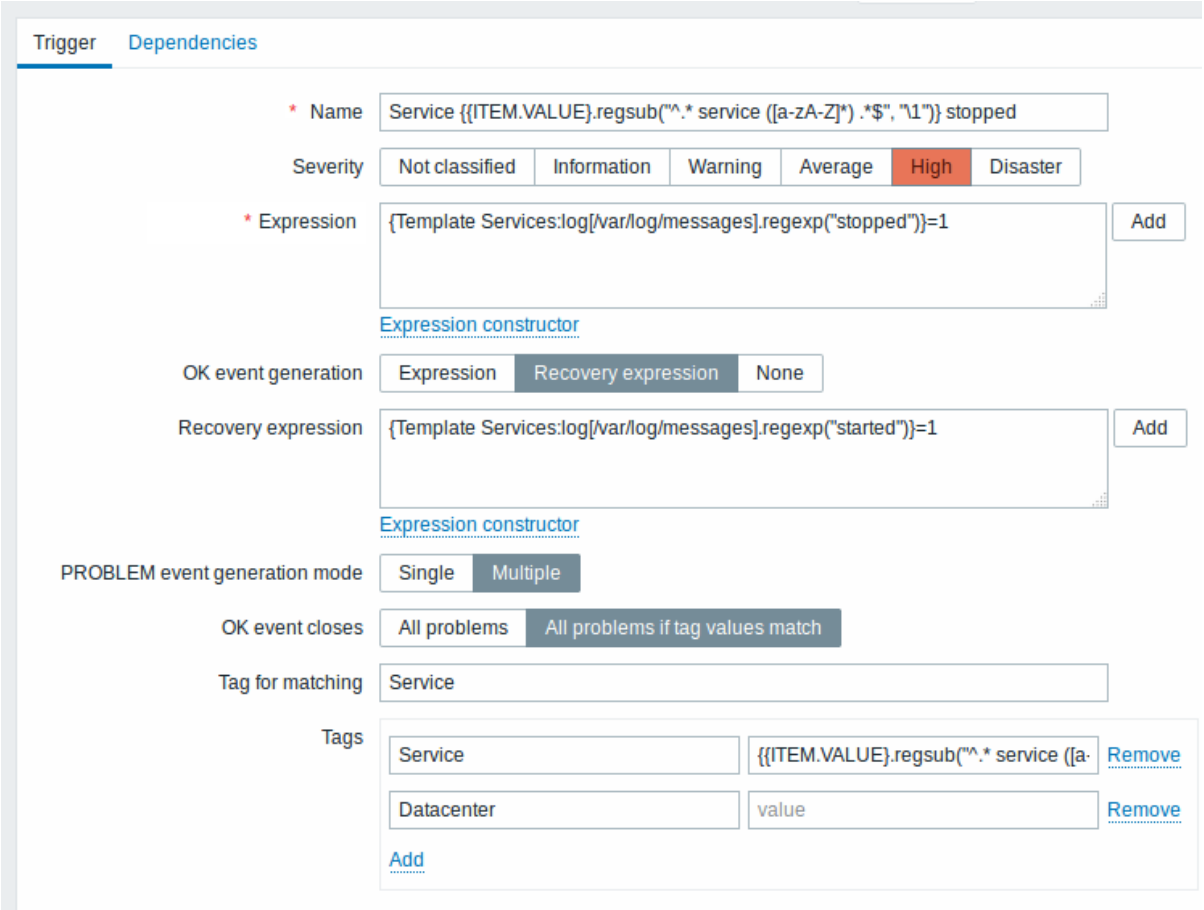
Then define a recovery expression. The following recovery expression will resolve all problems if a log line is found containing the string "Starting":

```
{My host:log[/var/log/syslog].regexp("Starting")}=1
```

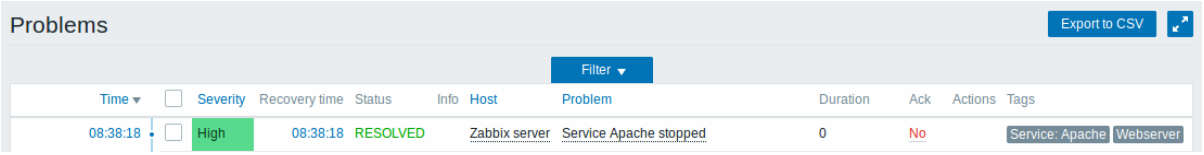
Since we do not want that it's important to make sure somehow that the corresponding root problems are closed, not just all problems. That's where tagging can help.

Problems and resolutions can be matched by specifying a tag in the trigger configuration. The following settings have to be made:

- *Problem event generation mode*: Multiple
- *OK event closes*: All problems if tag values match
- enter the name of the tag for event matching
- configure the tags to extract tag values from log lines



If configured successfully you will be able to see problem events tagged by application and matched to their resolution in *Monitoring → Problems*.



Warning:
Because misconfiguration is possible, when similar event tags may be created for **unrelated** problems, please review the cases outlined below!

- With two applications writing error and recovery messages to the same log file a user may decide to use two *Application* tags in the same trigger with different tag values by using separate regular expressions in the tag values to extract the names of, say, application A and application B from the {ITEM.VALUE} macro (e.g. when the message formats differ). However, this may not work as planned if there is no match to the regular expressions. Non-matching regexps will yield empty tag values and a single empty tag value in both problem and OK events is enough to correlate them. So a recovery message from application A may accidentally close an error message from application B.
- Actual tags and tag values only become visible when a trigger fires. If the regular expression used is invalid, it is silently replaced with an *UNKNOWN* string. If the initial problem event with an *UNKNOWN* tag value is missed, there may appear subsequent OK events with the same *UNKNOWN* tag value that may close problem events which they shouldn't have closed.
- If a user uses the {ITEM.VALUE} macro without macro functions as the tag value, the 255-character limitation applies. When log messages are long and the first 255 characters are non-specific, this may also result in similar event tags for unrelated problems.

Event tags

Overview

There is an option to define custom event tags in Zabbix. Tags can be defined on template, host and trigger levels.

After the tags are defined, corresponding new events get marked with tag data:

- with template level tags - host problems that are created by triggers from this template will be marked
- with host level tags - all problems of the host will be marked
- with trigger level tags - problem of this trigger will be marked

An event inherits all tags from the whole chain of templates, hosts, triggers. Completely identical `tag:value` combinations (after resolved macros) are merged into one rather than being duplicated, when marking the event.

Having custom event tags allows for more flexibility. Most importantly, events can be correlated based on event tags. In other uses, actions can be defined based on event tags.

Event tags are realized as a pair of the *tag name* and *value*. You can use only the name or pair it with a value:

`MySQL, Service:MySQL, Services, Services:Customer, Applications, Application:Java, Priority:High`

An entity (trigger, template, host or event) may have several tags with the same name, but different values - these tags will not be considered 'duplicates'. Similarly, a tag with no value and the same tag with a value can be used simultaneously.

Note:
Tags are not supported for host prototypes and hosts created from prototypes.

Use cases

Some use cases for this functionality are as follows:

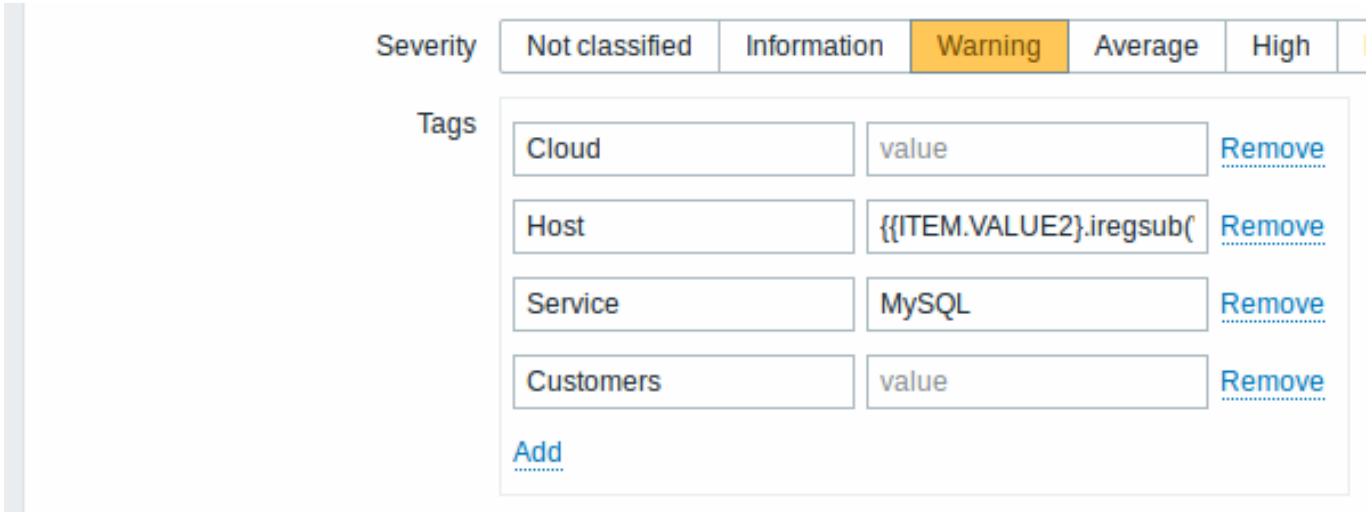
1. Mark trigger events in the frontend

```
   * Define tags on trigger level;
   * See how all trigger problems are marked with these tags in //Monitoring// → //Problems//.
- Mark all template-inherited problems
   * Define a tag on template level, for example 'App=MySQL';
   * See how those host problems that are created by triggers from this template are marked with these tag
- Mark all host problems
   * Define a tag on host level, for example 'Service=JIRA';
   * See how all problems of the host triggers are marked with these tags in //Monitoring// → //Problems//
- Identify problems in a log file and close them separately
   * Define tags in the log trigger that will identify events using value extraction by the ''%%{{%%ITEM.V
   * In trigger configuration, have multiple problem event generation mode;
   * In trigger configuration, use [[:manual/config/event_correlation|event correlation]]: select the opti
   * See problem events created with a tag and closed individually.
- Use it to filter notifications
   * Define tags on the trigger level to mark events by different tags;
   * Use tag filtering in action conditions to receive notifications only on the events that match tag dat
- Use information extracted from item value as tag value
   * Use an ''%%{{%%ITEM.VALUE<N>}.regsub()}'' macro in the tag value;
   * See tag values in //Monitoring// → //Problems// as extracted data from item value.
- Identify problems better in notifications
   * Define tags on the trigger level;
   * Use an {EVENT.TAGS} macro in the problem notification;
   * Easier identify which application/service the notification belongs to.
- Simplify configuration tasks by using tags on the template level
   * Define tags on the template trigger level;
   * See these tags on all triggers created from template triggers.
- Create triggers with tags from low-level discovery (LLD)
   * Define tags on trigger prototypes;
   * Use LLD macros in the tag name or value;
   * See these tags on all triggers created from trigger prototypes.
```

Configuration

Event tags can be defined in:

- template configuration - affecting all triggers from the template when linked to hosts
- host configuration - affecting all triggers of the host
- individual trigger configuration:



Event tags can be defined for triggers, template triggers and trigger prototypes.

Macro support

The following macros may be used in trigger-level tags:

- {ITEM.VALUE}, {ITEM.LASTVALUE}, {HOST.HOST}, {HOST.NAME}, {HOST.CONN}, {HOST.DNS}, {HOST.IP}, {HOST.PORT} and {HOST.ID} macros can be used to populate the tag name or tag value.
- {INVENTORY.*} macros can be used to reference host inventory values from one or several hosts in a trigger expression (supported since 4.0.0).
- User macros and user macro context is supported for the tag name/value. User macro context may include low-level discovery macros.
- Low-level discovery macros can be used for the tag name/value in trigger prototypes.

{EVENT.TAGS} and {EVENT.RECOVERY.TAGS} macros can be used in trigger-based notifications and they will resolve to a comma separated list of event tags or recovery event tags.

The following macros may be used in template and host-level tags:

- {HOST.HOST}, {HOST.NAME}, {HOST.CONN}, {HOST.DNS}, {HOST.IP}, {HOST.PORT} and {HOST.ID} macros
- {INVENTORY.*} macros
- User macros

Substring extraction in trigger tags

Substring extraction is supported for populating the tag name or tag value, using a macro function - applying a regular expression to the value obtained by the {ITEM.VALUE}, {ITEM.LASTVALUE} macro or a low-level discovery macro. For example:

```
{{ITEM.VALUE}.regsub(pattern, output)}
{{ITEM.VALUE}.iregsub(pattern, output)}

{{#LLDMACRO}.regsub(pattern, output)}
{{#LLDMACRO}.iregsub(pattern, output)}
```

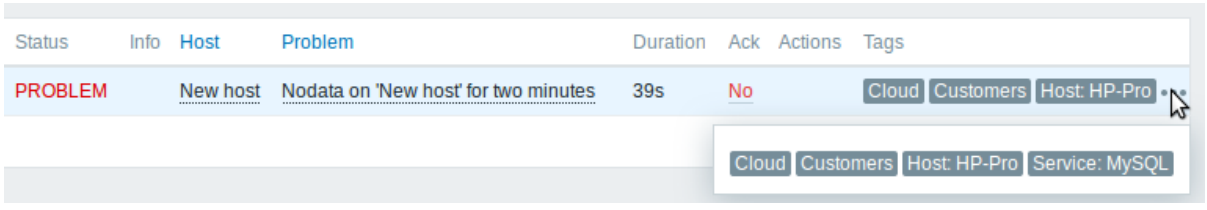
Tag name and value will be cut to 255 characters if their length exceeds 255 characters after macro resolution.

See also: Using macro functions in low-level discovery macros for event tagging.

Viewing event tags

Event tags, if defined, can be seen with new events in:

- *Monitoring → Problems*
- *Monitoring → Problems → Event details*
- *Monitoring → Dashboard → Problems* widget (in popup window that opens when rolling the mouse over problem name|



Only the first three tag entries are displayed. If there are more than three tag entries, it is indicated by three dots. If you roll your mouse over these three dots, all tag entries are displayed in a pop-up window.

Note that the order in which tags are displayed is affected by tag filtering and the *Tag display priority* option in the filter of *Monitoring → Problems* or the *Problems* dashboard widget.

2 Global event correlation

Overview

Global event correlation allows to reach out over all metrics monitored by Zabbix and create correlations.

It is possible to correlate events created by completely different triggers and apply the same operations to them all. By creating intelligent correlation rules it is actually possible to save yourself from thousands of repetitive notifications and focus on root causes of a problem!

Global event correlation is a powerful mechanism, which allows you to untie yourself from one-trigger based problem and resolution logic. So far, a single problem event was created by one trigger and we were dependent on that same trigger for the problem resolution. We could not resolve a problem created by one trigger with another trigger. But with event correlation based on event tagging, we can.

For example, a log trigger may report application problems, while a polling trigger may report the application to be up and running. Taking advantage of event tags you can tag the log trigger as *Status: Down* while tag the polling trigger as *Status: Up*. Then, in a global correlation rule you can relate these triggers and assign an appropriate operation to this correlation such as closing the old events.

In another use, global correlation can identify similar triggers and apply the same operation to them. What if we could get only one problem report per network port problem? No need to report them all. That is also possible with global event correlation.

Global event correlation is configured in **correlation rules**. A correlation rule defines how the new problem events are paired with existing problem events and what to do in case of a match (close the new event, close matched old events by generating corresponding OK events). If a problem is closed by global correlation, it is reported in the *Info* column of *Monitoring → Problems*.

Configuring global correlation rules is available to Zabbix Super Admin level users only.

> **Attention:**
> Event correlation must be configured very carefully, as it can negatively affect event processing performance or, if misconfigured, close more events than was intended (in the worst case even all problem events could be closed).

To configure global correlation **safely**, observe the following important tips:

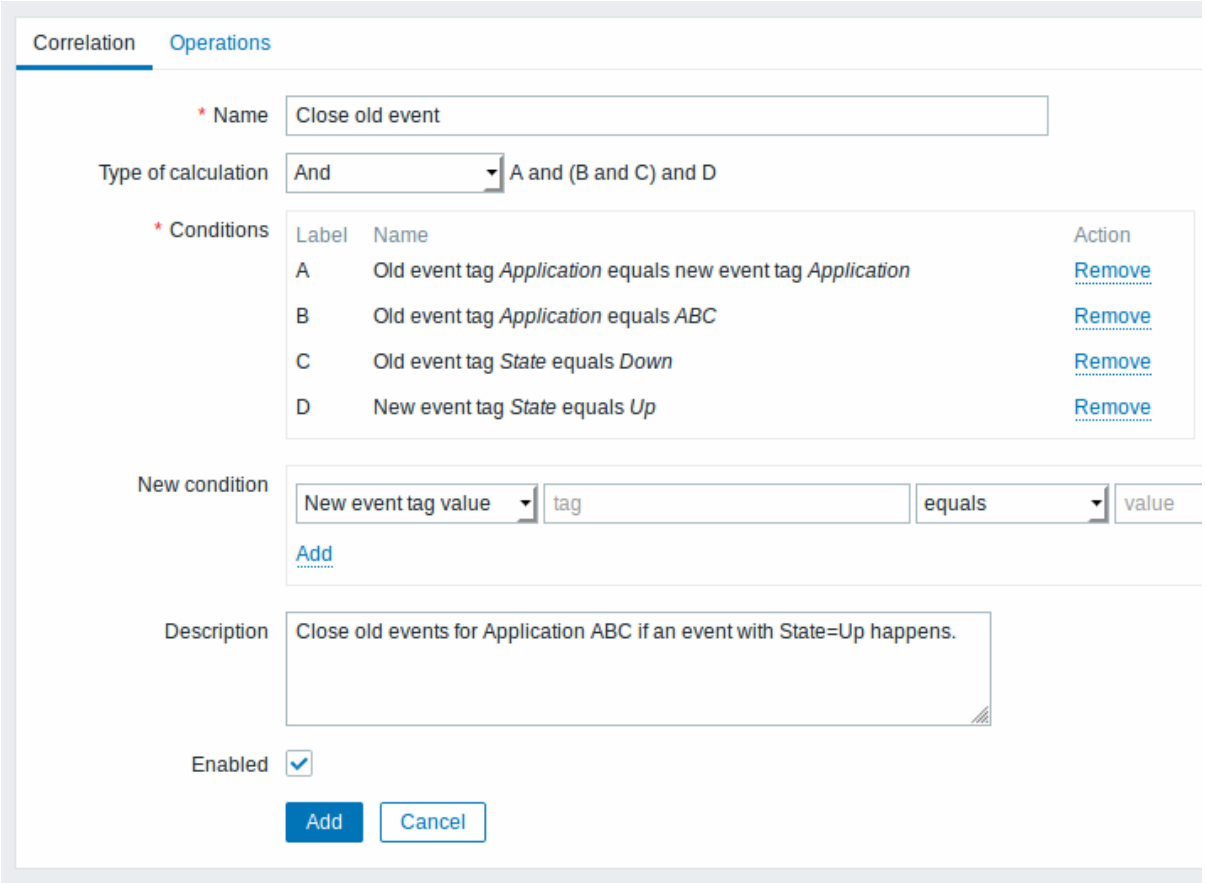
- Reduce the correlation scope. Always set a unique tag for the new event that is paired with old events and use the *New event tag* correlation condition;
- Add a condition based on the old event when using the *Close old event* operation (or else all existing problems could be closed);
- Avoid using common tag names that may end up being used by different correlation configurations;
- Keep the number of correlation rules limited to the ones you really need.

See also: known issues.

Configuration

To configure event correlation rules globally:

- Go to *Configuration → Event correlation*
- Click on *Create correlation* to the right (or on the correlation name to edit an existing rule)
- Enter parameters of the correlation rule in the form

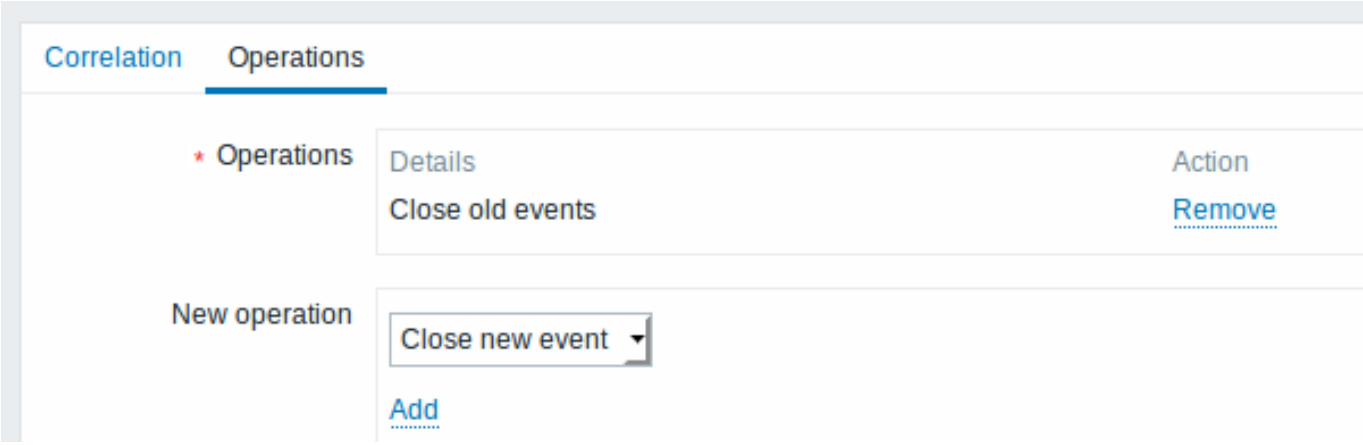


All mandatory input fields are marked with a red asterisk.

Parameter	Description
Name	Unique correlation rule name.
Type of calculation	The following options of calculating conditions are available: **And** - all conditions must be met **Or** - enough if one condition is met **And/Or** - AND with different condition types and OR with the same condition type **Custom expression** - a user-defined calculation formula for evaluating action conditions. It must include all conditions (represented as uppercase letters A, B, C, ...) and may include spaces, tabs, brackets ( ), **and** (case sensitive), **or** (case sensitive), **not** (case sensitive).
Conditions	List of conditions, as selected from the *New condition* field.

Parameter	Description
New condition	Select conditions for correlating events and click on *Add*. *Note* that if no old event condition is specified, all old events may be matched and closed. Similarly if no new event condition is specified, all new events may be matched and closed. The following conditions are available: **Old event tag** - specify the old event tag for matching. **New event tag** - specify the new event tag for matching. **New event host group** - specify the new event host group for matching. **Event tag pair** - specify new event tag and old event tag for matching. In this case there will be a match if the **values** of the tags in both events match. Tag *names* need not match. This option is useful for matching runtime values, which may not be known at the time of configuration (see also Example 1). **Old event tag value** - specify the old event tag name and value for matching, using the following operators: *equals* - has the old event tag value *does not equal* - does not have the old event tag value *contains* - has the string in the old event tag value *does not contain* - does not have the string in the old event tag value **New event tag value** - specify the new event tag name and value for matching, using the following operators: *equals* - has the new event tag value *does not equal* - does not have the new event tag value *contains* - has the string in the new event tag value *does not contain* - does not have the string in the new event tag value
Description	Correlation rule description.
Enabled	If you mark this checkbox, the correlation rule will be enabled.

- Select the operation of the correlation rule in the form



Parameter	Description
Operations	List of operations, selected from the *New operation* field.
New operation	Select operation to perform when event is correlated and click on *Add*. The following operations are available: **Close old events** - close old events when a new event happens. Always add a condition based on the old event when using the *Close old events* operation or all existing problems could be closed. **Close new event** - close the new event when it happens

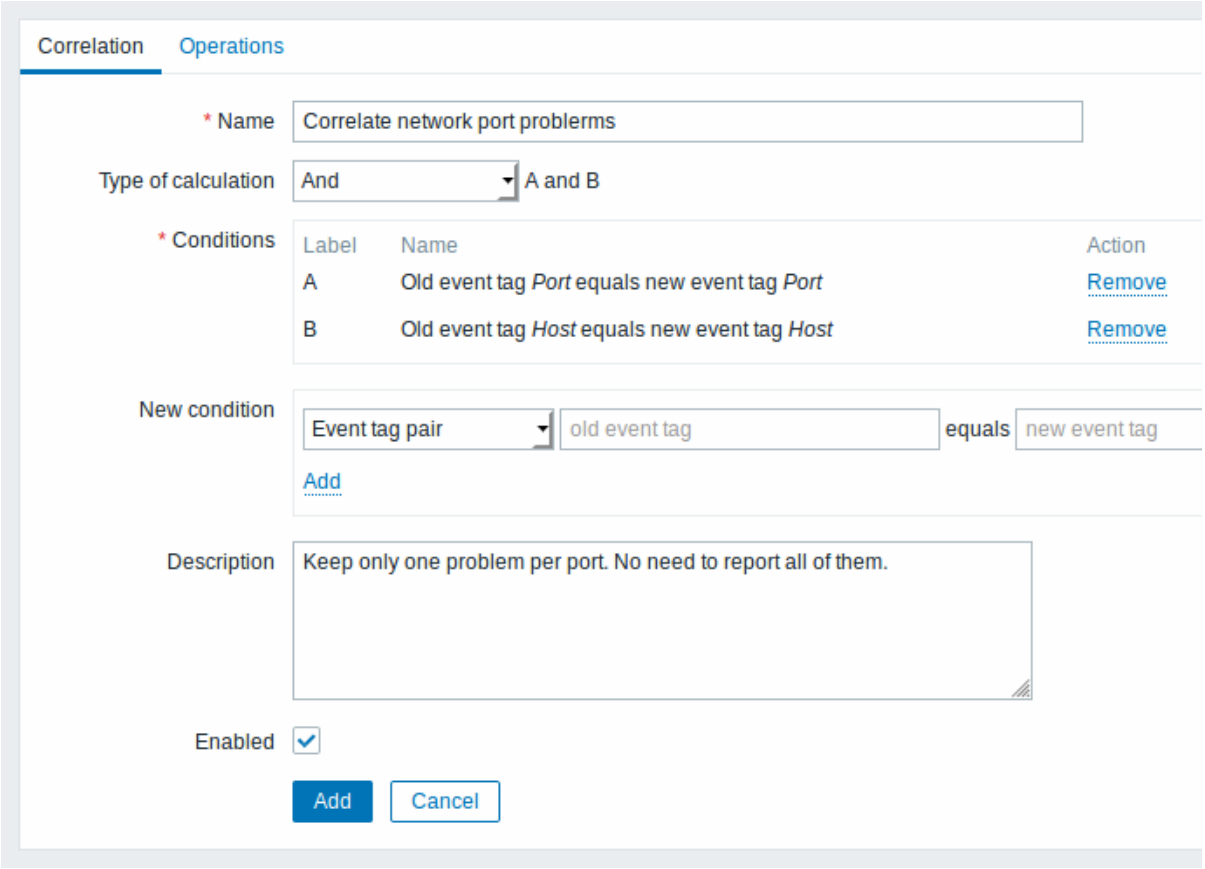
Warning:
Because misconfiguration is possible, when similar event tags may be created for **unrelated** problems, please review the cases outlined below!

- Actual tags and tag values only become visible when a trigger fires. If the regular expression used is invalid, it is silently replaced with an *UNKNOWN* string. If the initial problem event with an *UNKNOWN* tag value is missed, there may appear subsequent OK events with the same *UNKNOWN* tag value that may close problem events which they shouldn't have closed.
- If a user uses the {ITEM.VALUE} macro without macro functions as the tag value, the 255-character limitation applies. When log messages are long and the first 255 characters are non-specific, this may also result in similar event tags for unrelated problems.

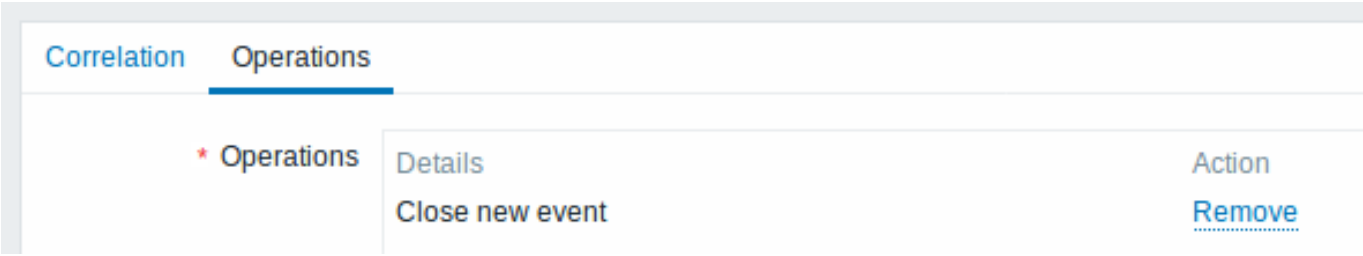
Examples

Example 1

Stop repetitive problem events from the same network port.



This global correlation rule will correlate problems if *Host* and *Port* tag values exist on the trigger and they are the same in the original event and the new one.



This operation will close new problem events on the same network port, keeping only the original problem open.

6 Visualisation

1 Graphs

Overview

With lots of data flowing into Zabbix, it becomes much easier for the users if they can look at a visual representation of what is going on rather than only numbers.

This is where graphs come in. Graphs allow to grasp the data flow at a glance, correlate problems, discover when something started or make a presentation of when something might turn into a problem.

Zabbix provides users with:

- built-in simple graphs of one item data
- the possibility to create more complex customised graphs
- access to a comparison of several items quickly in ad-hoc graphs
- modern customisable vector graphs

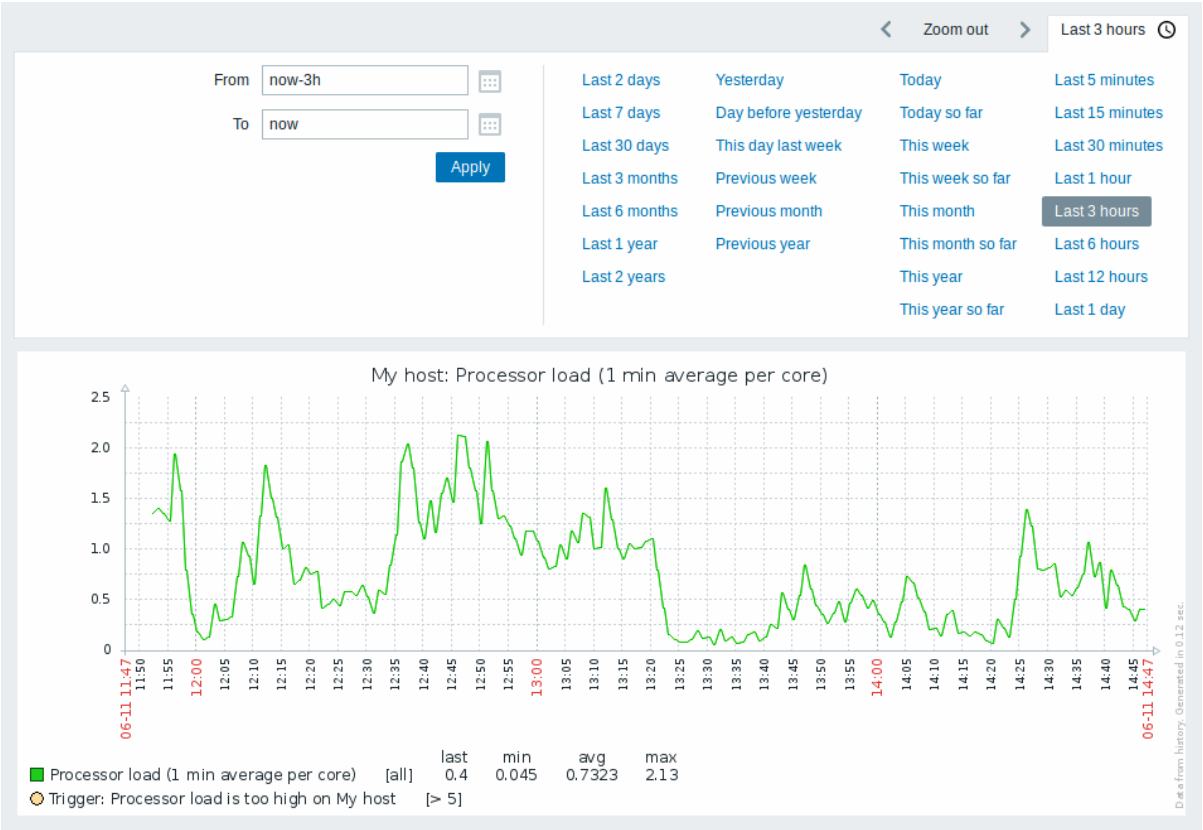
1 Simple graphs

Overview

Simple graphs are provided for the visualization of data gathered by items.

No configuration effort is required on the user part to view simple graphs. They are freely made available by Zabbix.

Just go to *Monitoring* → *Latest data* and click on the Graph link for the respective item and a graph will be displayed.



Note:
Simple graphs are provided for all numeric items. For textual items, a link to History is available in *Monitoring* → *Latest data*.

Time period selector

Take note of the time period selector above the graph. It allows to select often required periods with one mouse click.

Note that such options as *Today*, *This week*, *This month*, *This year* display the whole period, including the hours/days in the future. *Today so far*, in contrast, only displays the hours passed.

Once a period is selected, it can be moved back and forth in time by clicking on the arrow buttons. The *Zoom out* button allows to zoom out the period two times or by 50% in each direction. Zoom out is also possible by double-clicking in the graphs. The whole time period selector can be collapsed by clicking on the tab label containing the selected period string.

The *From/To* fields display the selected period in either:

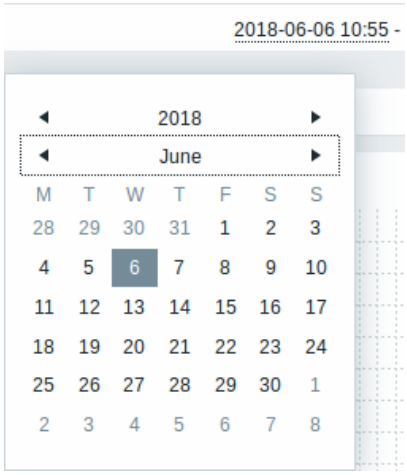
- absolute time syntax in format `Y-m-d H:i:s`

- relative time syntax, e.g.: `now-1d`

A date in relative format can contain one or several mathematical operations (- or +), e.g. `now-1d` or `now-1d-2h+5m`. For relative time the following abbreviations are supported:

- now
- s (seconds)
- m (minutes)
- h (hours)
- d (days)
- w (weeks)
- M (months)
- y (years)

It is possible to pick a specific start/end date by clicking on the calendar icon next to the *From/To* fields. In this case, the date picker pop up will open.



Within the date picker, it is possible to navigate between the blocks of year/month/date using Tab and Shift+Tab. Keyboard arrows or arrow buttons allow to select the desired value. Pressing Enter (or clicking on the desired value) activates the choice.

Another way of controlling the displayed time is to highlight an area in the graph with the left mouse button. The graph will zoom into the highlighted area once you release the left mouse button.

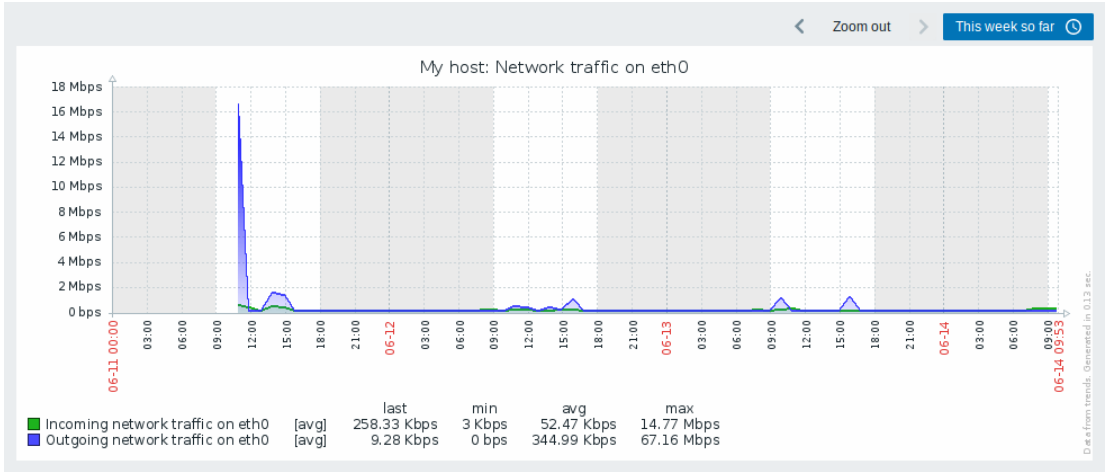
In case no time value is specified or field is left blank, time value will be set to "00:00:00". This doesn't apply to today's date selection: in that case time will be set to current value.

Recent data vs longer periods

For very recent data a **single** line is drawn connecting each received value. The single line is drawn as long as there is at least one horizontal pixel available for one value.

For data that show a longer period **three lines** are drawn - a dark green one shows the average, while a light pink and a light green line shows the maximum and minimum values at that point in time. The space between the highs and the lows is filled with yellow background.

Working time (working days) is displayed in graphs as a white background, while non-working time is displayed in grey (with the *Original blue* default frontend theme).

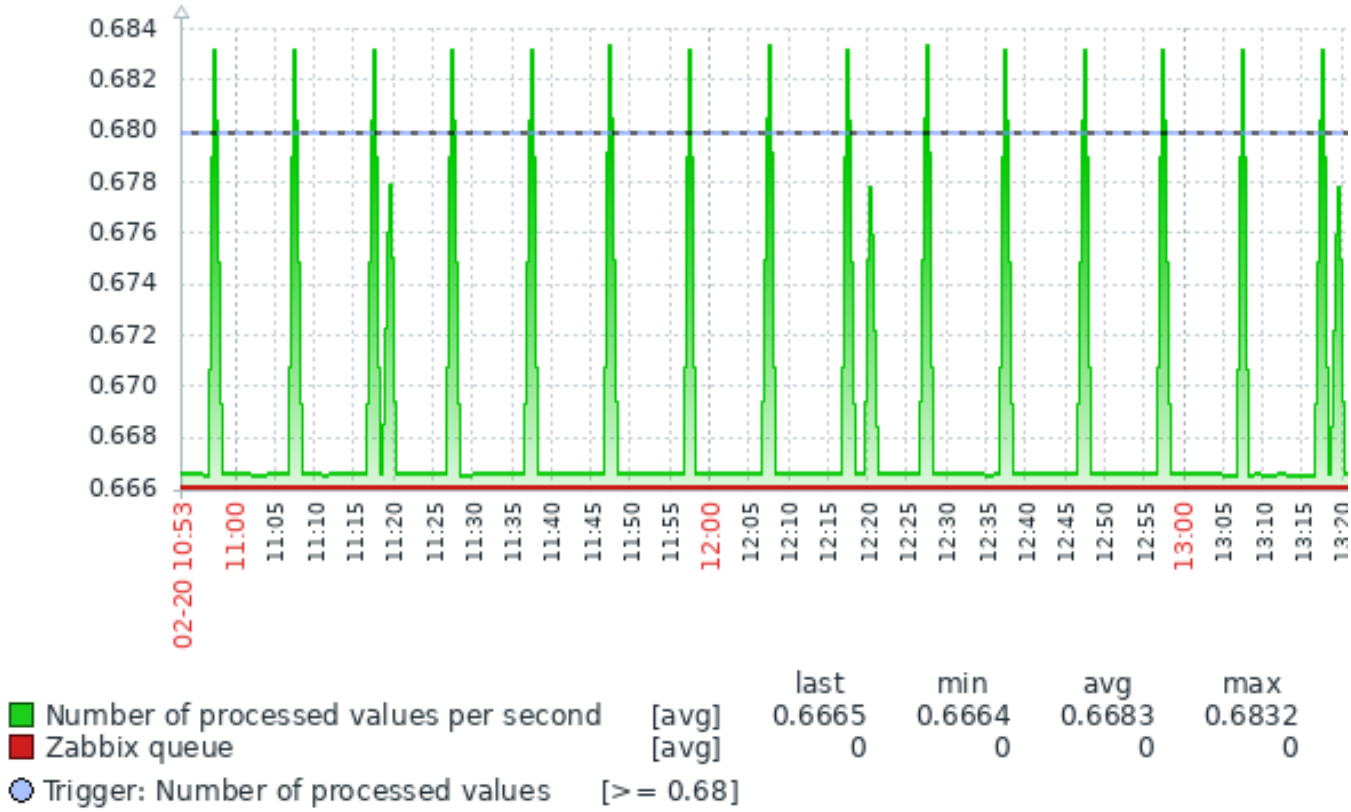


Working time is always displayed in simple graphs, whereas displaying it in custom graphs is a user preference.

Working time is not displayed if the graph shows more than 3 months.

Trigger lines

Simple triggers are displayed as lines with black dashes over trigger severity color -- take note of the blue line on the graph and the trigger information displayed in the legend. Up to 3 triggers can be displayed on the graph. Triggers are always displayed in simple graphs, whereas displaying them in custom graphs is a user preference.



Generating from history/trends

Graphs can be drawn based on either item history or trends.

For the users who have frontend debug mode activated, a grey, vertical caption is displayed at the bottom right of a graph indicating where the data come from.

Several factors influence whether history of trends is used:

- longevity of item history. For example, item history can be kept for 14 days. In that case, any data older than the fourteen days will be coming from trends.
- data congestion in the graph. If the amount of seconds to display in a horizontal graph pixel exceeds 3600/16, trend data are displayed (even if item history is still available for the same period).
- if trends are disabled, item history is used for graph building - if available for that period. This is supported starting with Zabbix 2.2.1 (before, disabled trends would mean an empty graph for the period even if item history was available).

Absence of data

For items with a regular update interval, nothing is displayed in the graph if item data are not collected.

However, for trapper items and items with a scheduled update interval (and regular update interval set to 0), a straight line is drawn leading up to the first collected value and from the last collected value to the end of graph; the line is on the level of the first/last value respectively.

Switching to raw values

A dropdown on the upper right allows to switch from the simple graph to the *Values/500 latest values* listings. This can be useful for viewing the numeric values making up the graph.

The values represented here are raw, i.e. no units or postprocessing of values is used. Value mapping, however, is applied.

Known issues

See known issues for graphs.

2 Custom graphs

Overview

Custom graphs, as the name suggests, offer customisation capabilities.

While simple graphs are good for viewing data of a single item, they do not offer configuration capabilities.

Thus, if you want to change graph style or the way lines are displayed or compare several items, for example incoming and outgoing traffic in a single graph, you need a custom graph.

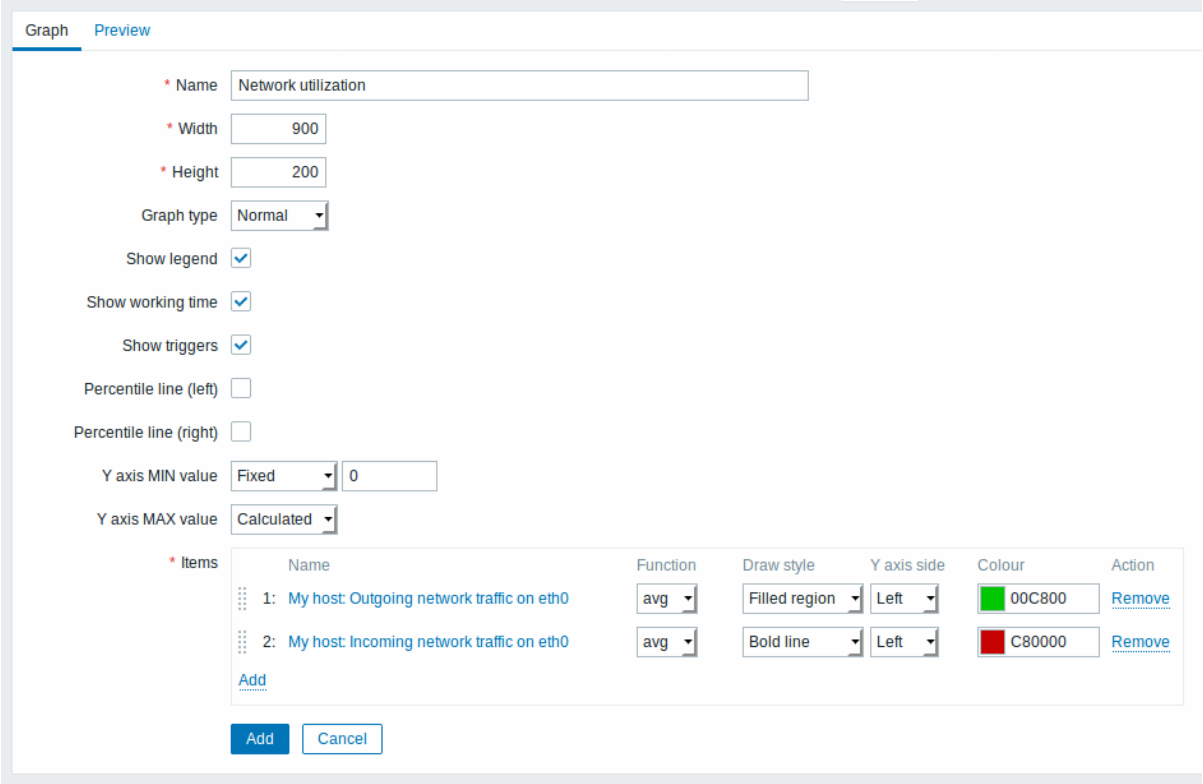
Custom graphs are configured manually.

They can be created for a host or several hosts or for a single template.

Configuring custom graphs

To create a custom graph, do the following:

- Go to *Configuration → Hosts (or Templates)*
- Click on *Graphs* in the row next to the desired host or template
- In the Graphs screen click on *Create graph*
- Edit graph attributes



All mandatory input fields are marked with a red asterisk.

Graph attributes:

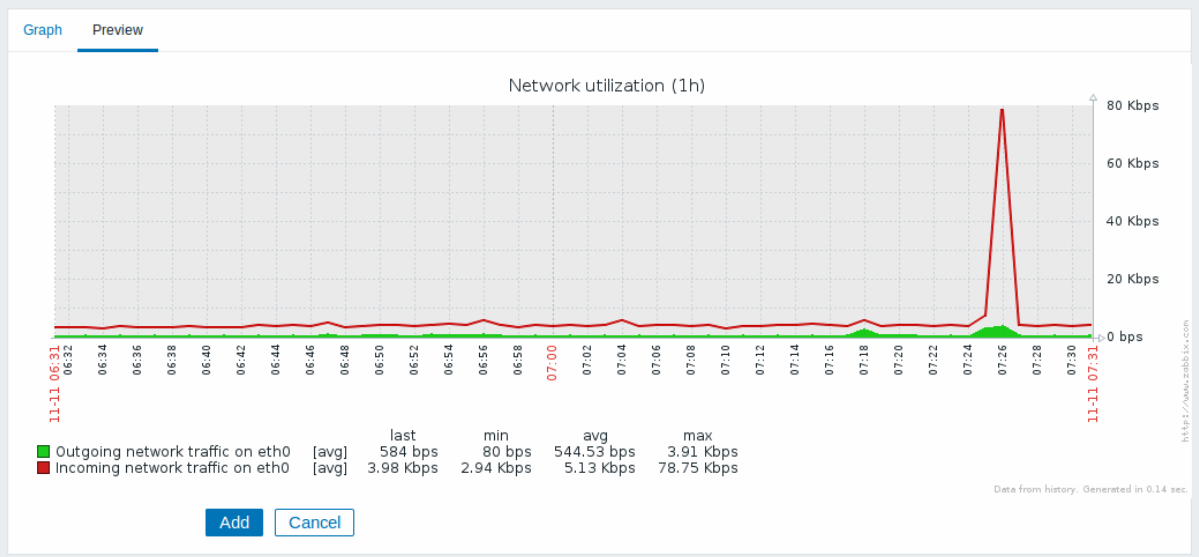
Parameter	Description
Name	Unique graph name. Starting with Zabbix 2.2, item values can be referenced in the name by using simple macros with the standard `{host:key.func(param)}` syntax. Only **avg**, **last**, **max** and **min** as functions with seconds as parameter are supported within this macro. {HOST.HOST<1-9>} macros are supported for the use within this macro, referencing the first, second, third, etc. host in the graph, for example `{{HOST.HOST1}:key.func(param)}`.
Width	Graph width in pixels (for preview and pie/exploded graphs only).

Parameter		Description
Height		Graph height in pixels.
Graph type		Graph type: **Normal** - normal graph, values displayed as lines **Stacked** - stacked graph, filled areas displayed **Pie** - pie graph **Exploded** - ”exploded” pie graph, portions displayed as ”cut out” of the pie
Show legend		Checking this box will set to display the graph legend.
Show working time		If selected, non-working hours will be shown with gray background. Not available for pie and exploded pie graphs.
Show triggers		If selected, simple triggers will be displayed as lines with black dashes over trigger severity color. Not available for pie and exploded pie graphs.
Percentile line (left)		Display percentile for left Y axis. If, for example, 95% percentile is set, then the percentile line will be at the level where 95 per cent of the values fall under. Displayed as a bright green line. Only available for normal graphs.
Percentile line (right)		Display percentile for right Y axis. If, for example, 95% percentile is set, then the percentile line will be at the level where 95 per cent of the values fall under. Displayed as a bright red line. Only available for normal graphs.
Y axis MIN value		Minimum value of Y axis: **Calculated** - Y axis minimum value will be automatically calculated **Fixed** - fixed minimum value for Y axis. Not available for pie and exploded pie graphs. **Item** - last value of the selected item will be the minimum value
Y axis MAX value		Maximum value of Y axis: **Calculated** - Y axis maximum value will be automatically calculated **Fixed** - fixed maximum value for Y axis. Not available for pie and exploded pie graphs. **Item** - last value of the selected item will be the maximum value
3D view		Enable 3D style. For pie and exploded pie graphs only.
Items		Items, data of which are to be displayed in this graph. Click on *Add* to select items. You can also select various displaying options (function, draw style, left/right axis display, colour).
	Sort order (0→100)	Draw order. 0 will be processed first. Can be used to draw lines or regions behind (or in front of) another. You can drag and drop items by the arrow in the beginning of line to set the sort order or which item is displayed in front of the other.
	Name	Name of the selected item is displayed as a link. Clicking on the link opens the list of other available items.
	Type	Type (only available for pie and exploded pie graphs): **Simple** - value of the item is represented proportionally on the pie **Graph sum** - value of the item represents the whole pie Note that colouring of the ”graph sum” item will only be visible to the extent that it is not taken up by ”proportional” items.

Parameter		Description
	Function	Select what values will be displayed when more than one value exists per vertical graph pixel for an item: **all** - display all possible values (minimum, maximum, average) in the graph. Note that for shorter periods this setting has no effect; only for longer periods, when data congestion in a vertical graph pixel increases, 'all' starts displaying minimum, maximum and average values. This function is only available for *Normal* graph type. See also: Generating graphs from history/trends. **avg** - display the average values **last** - display the latest values. This function is only available if either *Pie/Exploded pie* is selected as graph type. **max** - display the maximum values **min** - display the minimum values
	Draw style	Select the draw style (only available for normal graphs; for stacked graphs filled region is always used) to apply to the item data - *Line*, *Bold line*, *Filled region*, *Dot*, *Dashed line*, *Gradient line*.
	Y axis side	Select the Y axis side to show the item data - *Left*, *Right*.
	Colour	Select the colour to apply to the item data.

Graph preview

In the *Preview* tab, a preview of the graph is displayed so you can immediately see what you are creating.



Note that the preview will not show any data for template items.

In this example, pay attention to the dashed bold line displaying the trigger level and the trigger information displayed in the legend.

Note:
3 triggers is the hard-coded limit for the number of triggers displayed in the legend.
If graph height is set as less than 120 pixels, no trigger will be displayed in the legend.

3 Ad-hoc graphs

Overview

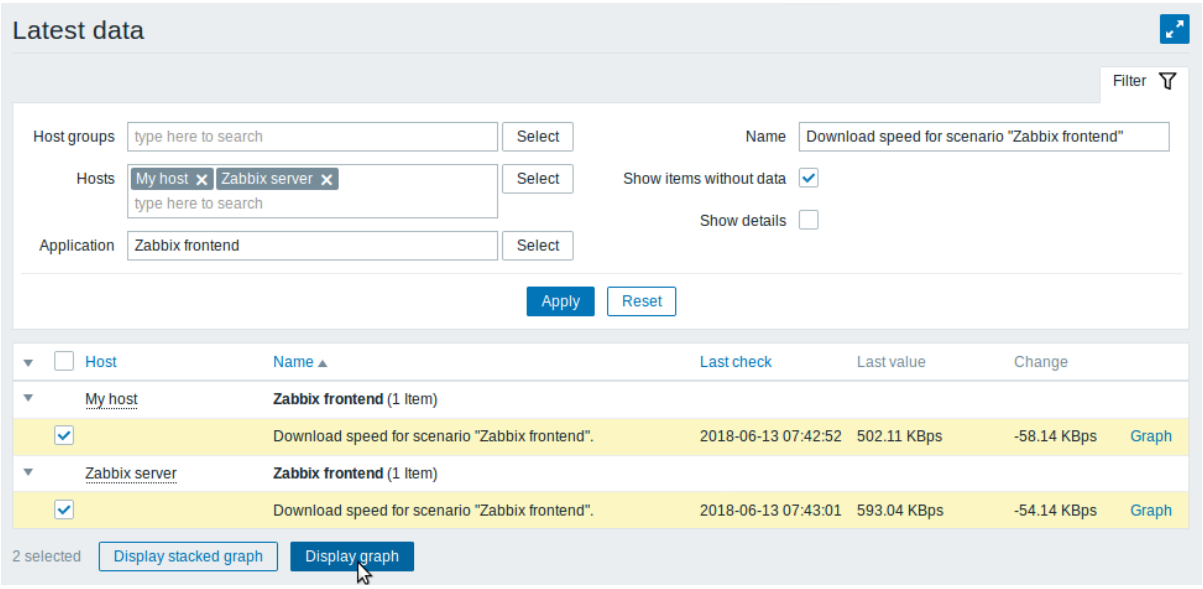
While a simple graph is great for accessing data of one item and custom graphs offer customisation options, none of the two allow to quickly create a comparison graph for multiple items with little effort and no maintenance.

To address this issue, since Zabbix 2.4 it is possible to create ad-hoc graphs for several items in a very quick way.

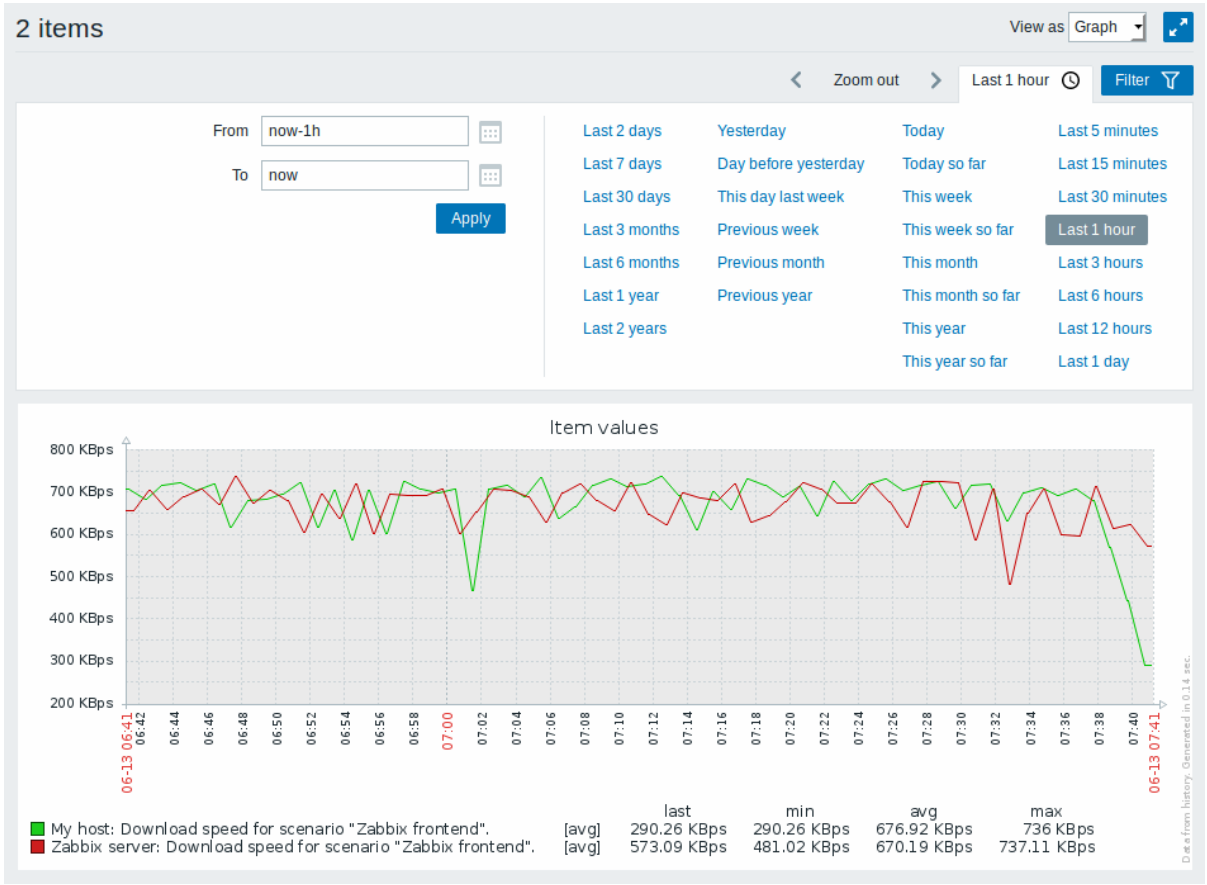
Configuration

To create an ad-hoc graph, do the following:

- Go to *Monitoring → Latest data*
- Use filter to display items that you want
- Mark checkboxes of the items you want to graph
- Click on *Display stacked graph* or *Display graph* buttons

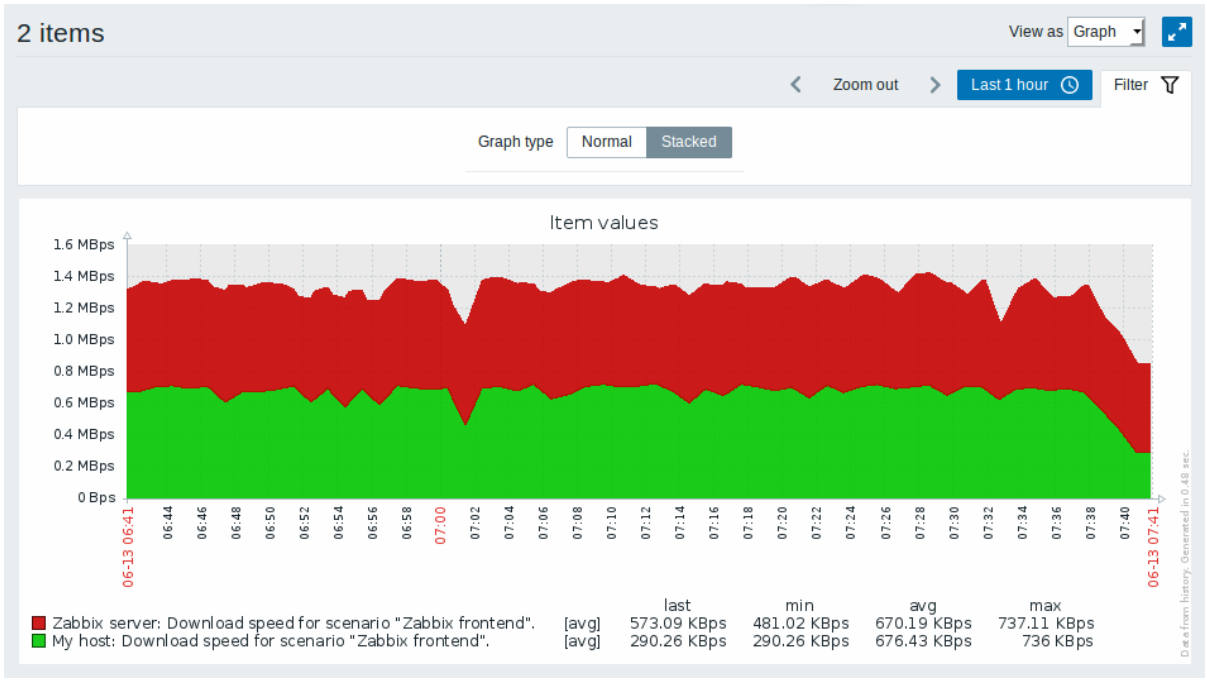


Your graph is created instantly:



Note that to avoid displaying too many lines in the graph, only the average value for each item is displayed (min/max value lines are not displayed). Triggers and trigger information is not displayed in the graph.

In the created graph window you have the time period selector available and the possibility to switch from the "normal" line graph to a stacked one (and back).



4 Aggregation in graphs

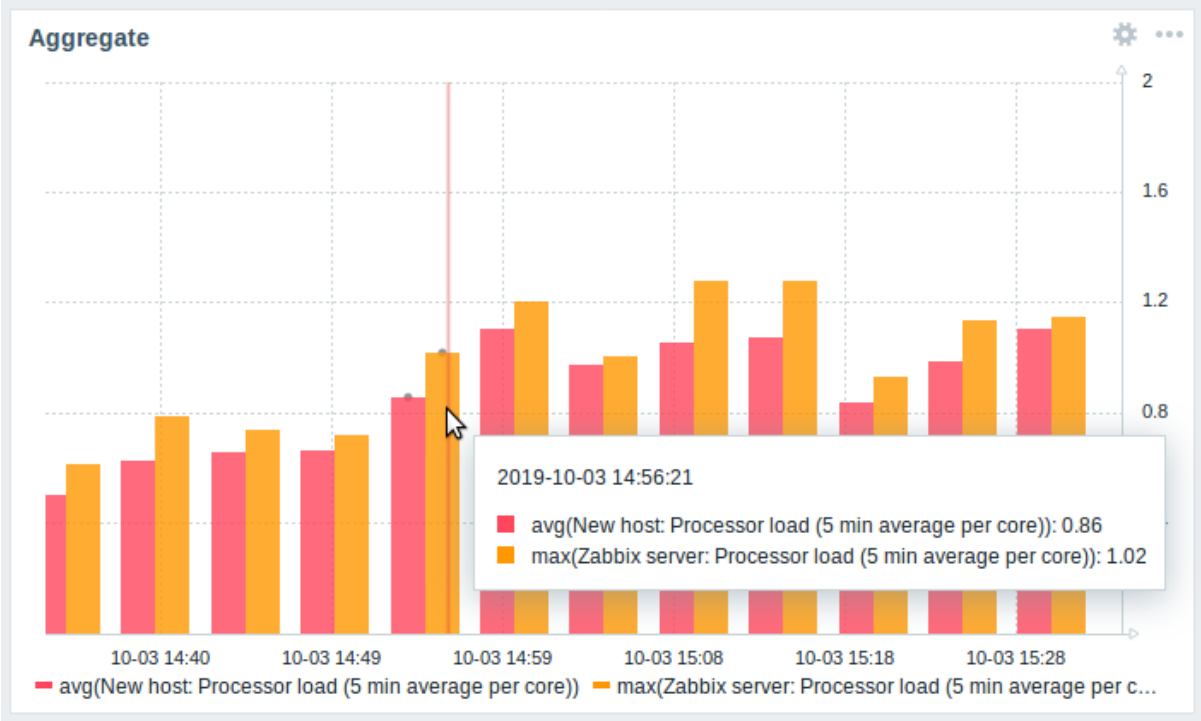
Overview

The aggregation functions, available in the graph widget of the dashboard, allow to display an aggregated value for the chosen interval (5 minutes, an hour, a day), instead of all values.

The aggregation options are as follows:

- min
- max
- avg
- count
- sum
- first (first value displayed)
- last (last value displayed)

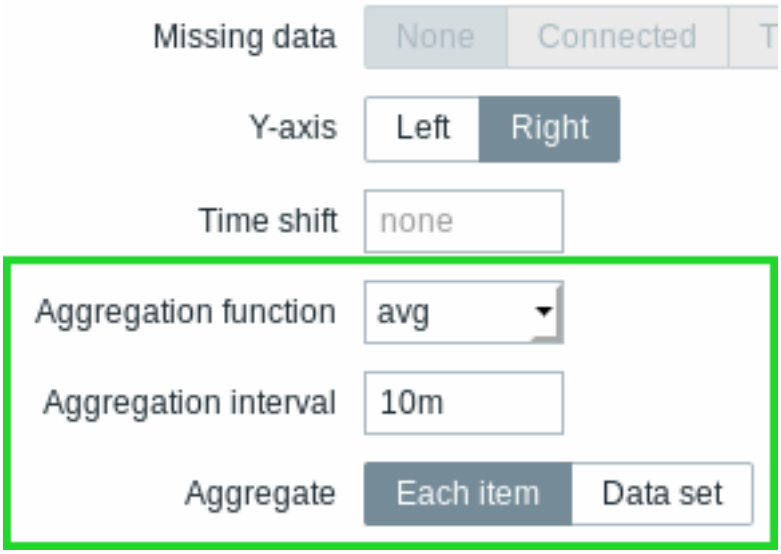
The most exciting use of data aggregation is the possibility to create nice side-by-side comparisons of data for some period:



When hovering over a point in time in the graph, date and time is displayed, in addition to items and their aggregated values. Items are displayed in parentheses, prefixed by the aggregation function used. Note that this is the date and time of the point in graph, not of the actual values.

Configuration

The options for aggregation are available in data set settings when configuring a graph widget.



You may pick the aggregation function and the time interval. As the data set may comprise several items, there is also another option allowing to show aggregated data for each item separately or for all data set items as one aggregated value.

See the widget configuration page for more details.

Use cases

Average request count to Nginx server

View the average request count per second per day to Nginx server:

- add the request count per second item to the data set
- select the aggregate function `avg` and specify interval `1d`
- a bar graph is displayed, where each bar represents the average number of requests per second per day

Minimum weekly disk space among clusters

View the lowest disk space among clusters over a week.

- add to the data set: hosts `cluster*`, key "Free disk space on /data"
- select the aggregate function `min` and specify interval `1w`
- a bar graph is displayed, where each bar represents the minimum disk space per week for each /data volume of the cluster

2 Network maps

Overview

If you have a network to look after, you may want to have an overview of your infrastructure somewhere. For that purpose you can create maps in Zabbix - of networks and of anything you like.

All users can create network maps. The maps can be public (available to all users) or private (available to selected users).

Proceed to configuring a network map.

1 Configuring a network map

Overview

Configuring a map in Zabbix requires that you first create a map by defining its general parameters and then you start filling the actual map with elements and their links.

You can populate the map with elements that are a host, a host group, a trigger, an image or another map.

Icons are used to represent map elements. You can define the information that will be displayed with the icons and set that recent problems are displayed in a special way. You can link the icons and define information to be displayed on the links.

You can add custom URLs to be accessible by clicking on the icons. Thus you may link a host icon to host properties or a map icon to another map.

Maps are managed in *Monitoring* → *Maps*, where they can be configured, managed and viewed. In the monitoring view you can click on the icons and take advantage of the links to some scripts and URLs.

Network maps are based on vector graphics (SVG) since Zabbix 3.4.

Public and private maps

All users in Zabbix (including non-admin users) can create network maps. Maps have an owner - the user who created them. Maps can be made public or private.

- *Public* maps are visible to all users, although to see it the user must have read access to at least one map element. Public maps can be edited in case a user/ user group has read-write permissions for this map and at least read permissions to all elements of the corresponding map including triggers in the links.
- *Private* maps are visible only to their owner and the users/user groups the map is shared with by the owner. Regular (non-Super admin) users can only share with the groups and users they are member of. Admin level users can see private maps regardless of being the owner or belonging to the shared user list. Private maps can be edited by the owner of the map and in case a user/ user group has read-write permissions for this map and at least read permissions to all elements of the corresponding map including triggers in the links.

Map elements that the user does not have read permission to are displayed with a greyed out icon and all textual information on the element is hidden. However, trigger label is visible even if the user has no permission to the trigger.

To add an element to the map the user must also have at least read permission to it.

Creating a map

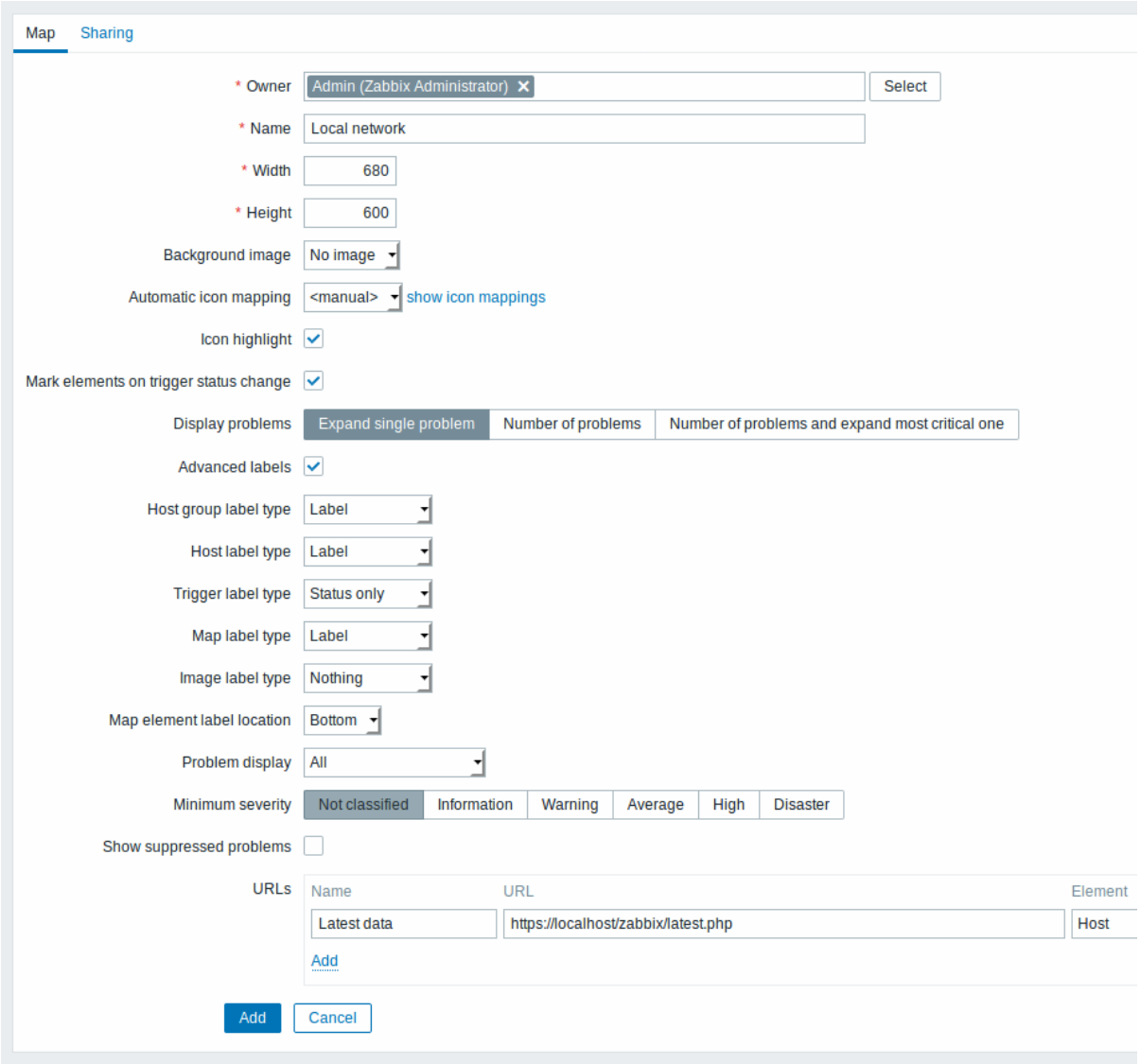
To create a map, do the following:

- Go to *Monitoring* → *Maps*
- Go to the view with all maps

- Click on *Create map*

You can also use the *Clone* and *Full clone* buttons in the configuration form of an existing map to create a new map. Clicking on *Clone* will retain general layout attributes of the original map, but no elements. *Full clone* will retain both the general layout attributes and all elements of the original map.

The **Map** tab contains general map attributes:



All mandatory input fields are marked with a red asterisk.

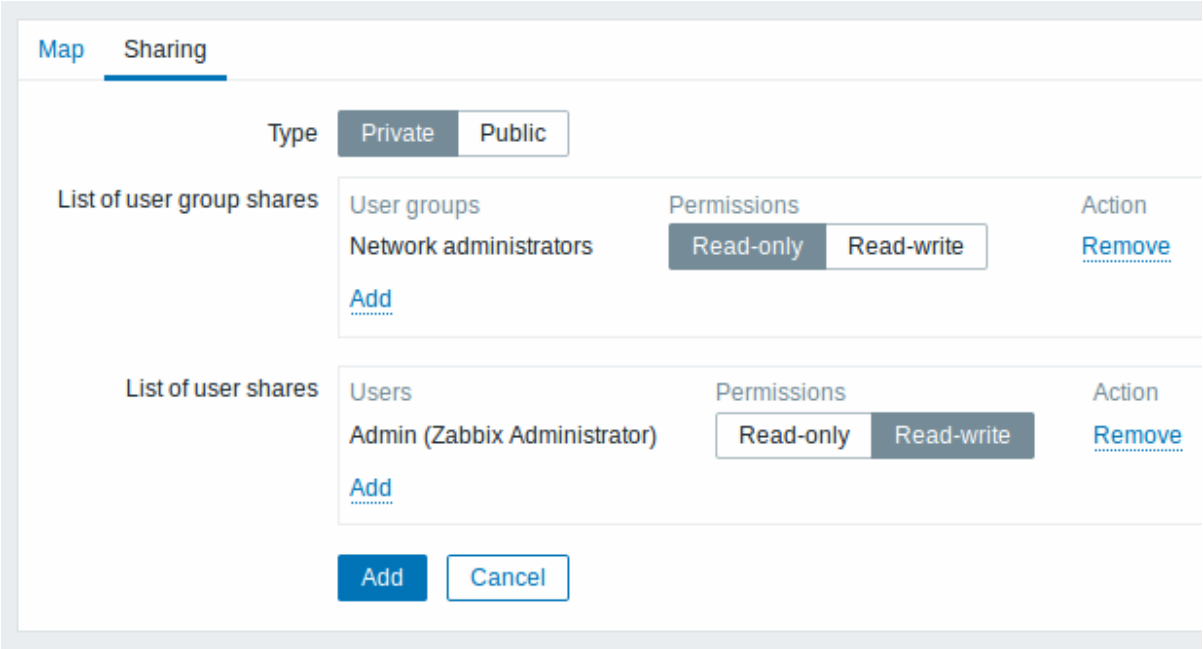
General map attributes:

Parameter	Description
Owner	Name of map owner.
Name	Unique map name.
Width	Map width in pixels.
Height	Map height in pixels.
Background image	Use background image: **No image** - no background image (white background) **Image** - selected image to be used as a background image. No scaling is performed. You may use a geographical map or any other image to enhance your map.
Automatic icon mapping	You can set to use an automatic icon mapping, configured in *Administration → General → Icon mapping*. Icon mapping allows to map certain icons against certain host inventory fields.

Parameter	Description
Icon highlighting	If you check this box, map elements will receive highlighting. Elements with an active trigger will receive a round background, in the same colour as the highest severity trigger. Moreover, a thick green line will be displayed around the circle, if all problems are acknowledged. Elements with ”disabled” or ”in maintenance” status will get a square background, gray and orange respectively. See also: Viewing maps
Mark elements on trigger status change	A recent change of trigger status (recent problem or resolution) will be highlighted with markers (inward-pointing red triangles) on the three sides of the element icon that are free of the label. Markers are displayed for 30 minutes.
Display problems	Select how problems are displayed with a map element: **Expand single problem** - name of the most critical problem is displayed **Number of problems** - the total number of problems is displayed **Number of problems and expand most critical one** - name of the most critical problem and the total number of problems is displayed. ’Most critical’ is determined based on problem severity and, if equal, problem event ID (higher ID or later problem displayed first). *For trigger map element* it is based on problem severity and, if equal, trigger position in the trigger list. In case of multiple problems of the same trigger, the most recent one will be displayed.
Advanced labels	If you check this box you will be able to define separate label types for separate element types.
Map element label type	Label type used for map elements: **Label** - map element label **IP address** - IP address **Element name** - element name (for example, host name) **Status only** - status only (OK or PROBLEM) **Nothing** - no labels are displayed
Map element label location	Label location in relation to the map element: **Bottom** - beneath the map element **Left** - to the left **Right** - to the right **Top** - above the map element
Problem display	Display problem count as: **All** - full problem count will be displayed **Separated** - unacknowledged problem count will be displayed separated as a number of the total problem count **Unacknowledged only** - only the unacknowledged problem count will be displayed
Minimum trigger severity	Problems below the selected minimum severity level will not be displayed in the map. For example, with *Warning* selected, changes with *Information* and *Not classified* level triggers will not be reflected in the map. This parameter is supported starting with Zabbix 2.2.
Show suppressed problems	Mark the checkbox to display problems which would otherwise be suppressed (not shown) because of host maintenance.
URLs	URLs for each element type can be defined (with a label). These will be displayed as links when a user clicks on the element in the map viewing mode. Macros can be used in map URL names and values. For a full list, see supported macros and search for ’map URL names and values’.

Sharing

The **Sharing** tab contains the map type as well as sharing options (user groups, users) for private maps:



Parameter	Description
Type	Select map type: **Private** - map is visible only to selected user groups and users **Public** - map is visible to all
List of user group shares	Select user groups that the map is accessible to. You may allow read-only or read-write access.
List of user shares	Select users that the map is accessible to. You may allow read-only or read-write access.

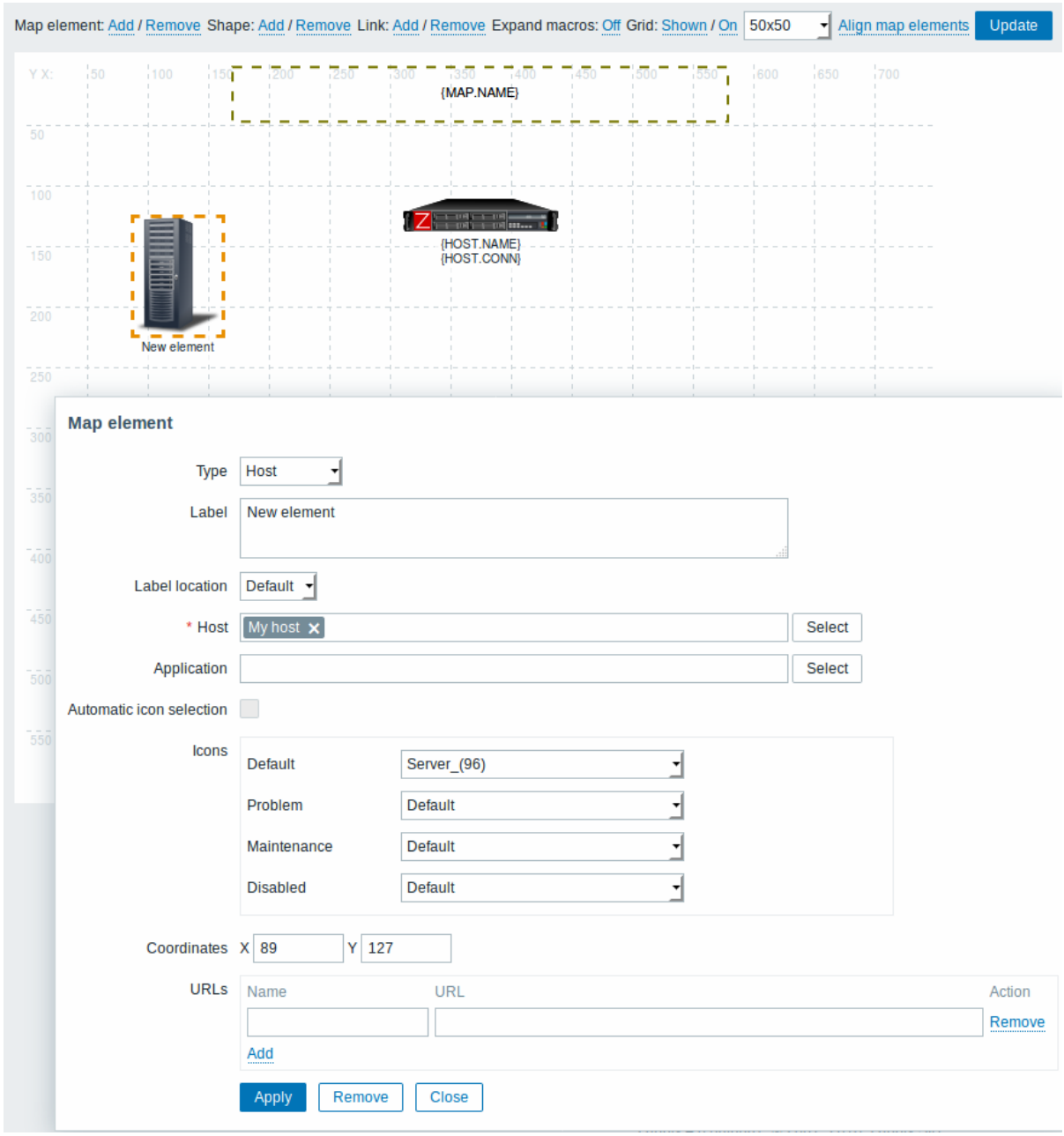
When you click on *Add* to save this map, you have created an empty map with a name, dimensions and certain preferences. Now you need to add some elements. For that, click on *Constructor* in the map list to open the editable area.

Adding elements

To add an element, click on *Add* next to `Map element`. The new element will appear at the top left corner of the map. Drag and drop it wherever you like.

Note that with the Grid option "On", elements will always align to the grid (you can pick various grid sizes from the dropdown, also hide/show the grid). If you want to put elements anywhere without alignment, turn the option to "Off". (Random elements can later again be aligned to the grid with the *Align map elements* button.)

Now that you have some elements in place, you may want to start differentiating them by giving names etc. By clicking on the element, a form is displayed and you can set the element type, give a name, choose a different icon etc.



Map element attributes:

Parameter	Description
Type	Type of the element: **Host** - icon representing status of all triggers of the selected host **Map** - icon representing status of all elements of a map **Trigger** - icon representing status of one or more triggers **Host group** - icon representing status of all triggers of all hosts belonging to the selected group **Image** - an icon, not linked to any resource
Label	Icon label, any string. Macros and multi-line strings can be used in labels. For a full list of supported macros, see supported macros and search for 'map element labels'.
Label location	Label location in relation to the icon: **Default** - map's default label location **Bottom** - beneath the icon **Left** - to the left **Right** - to the right **Top** - above the icon

Parameter	Description
Host	Enter the host, if the element type is 'Host'. This field is auto-complete so starting to type the name of a host will offer a dropdown of matching hosts. Scroll down to select. Click on 'x' to remove the selected.
Map	Select the map, if the element type is 'Map'.
Triggers	If the element type is 'Trigger', select one or more triggers in the *New triggers* field below and click on *Add*. The order of selected triggers can be changed, but only within the same severity of triggers. Multiple trigger selection also affects {HOST.*} macro resolution both in the construction and view modes. // 1 In construction mode// the first displayed {HOST.*} macros will be resolved depending on the first trigger in the list (based on trigger severity). // 2 View mode// depends on the Display problems parameter in General map attributes. * If *Expand single problem* mode is chosen the first displayed {HOST.*} macros will be resolved depending on the latest detected problem trigger (not mattering the severity) or the first trigger in the list (in case no problem detected); * If *Number of problems and expand most critical one* mode is chosen the first displayed {HOST.*} macros will be resolved depending on the trigger severity.
Host group	Enter the host group, if the element type is 'Host group'. This field is auto-complete so starting to type the name of a group will offer a dropdown of matching groups. Scroll down to select. Click on 'x' to remove the selected.
Application	You can select an application, allowing to only display problems of triggers that belong to the given application. This field is available for host and host group element types, and supported since Zabbix **2.4.0**.
Automatic icon selection	In this case an icon mapping will be used to determine which icon to display.
Icons	You can choose to display different icons for the element in these cases: default, problem, maintenance, disabled.
Coordinate X	X coordinate of the map element.
Coordinate Y	Y coordinate of the map element.
URLs	Element-specific URLs can be set for the element. These will be displayed as links when a user clicks on the element in the map viewing mode. If the element has its own URLs and there are map level URLs for its type defined, they will be combined in the same menu. Macros can be used in map element names and values. For a full list, see supported macros and search for 'map URL names and values'.

Attention:
Added elements are not automatically saved. If you navigate away from the page, all changes may be lost.
Therefore it is a good idea to click on the **Update** button in the top right corner. Once clicked, the changes are saved regardless of what you choose in the following popup.
Selected grid options are also saved with each map.

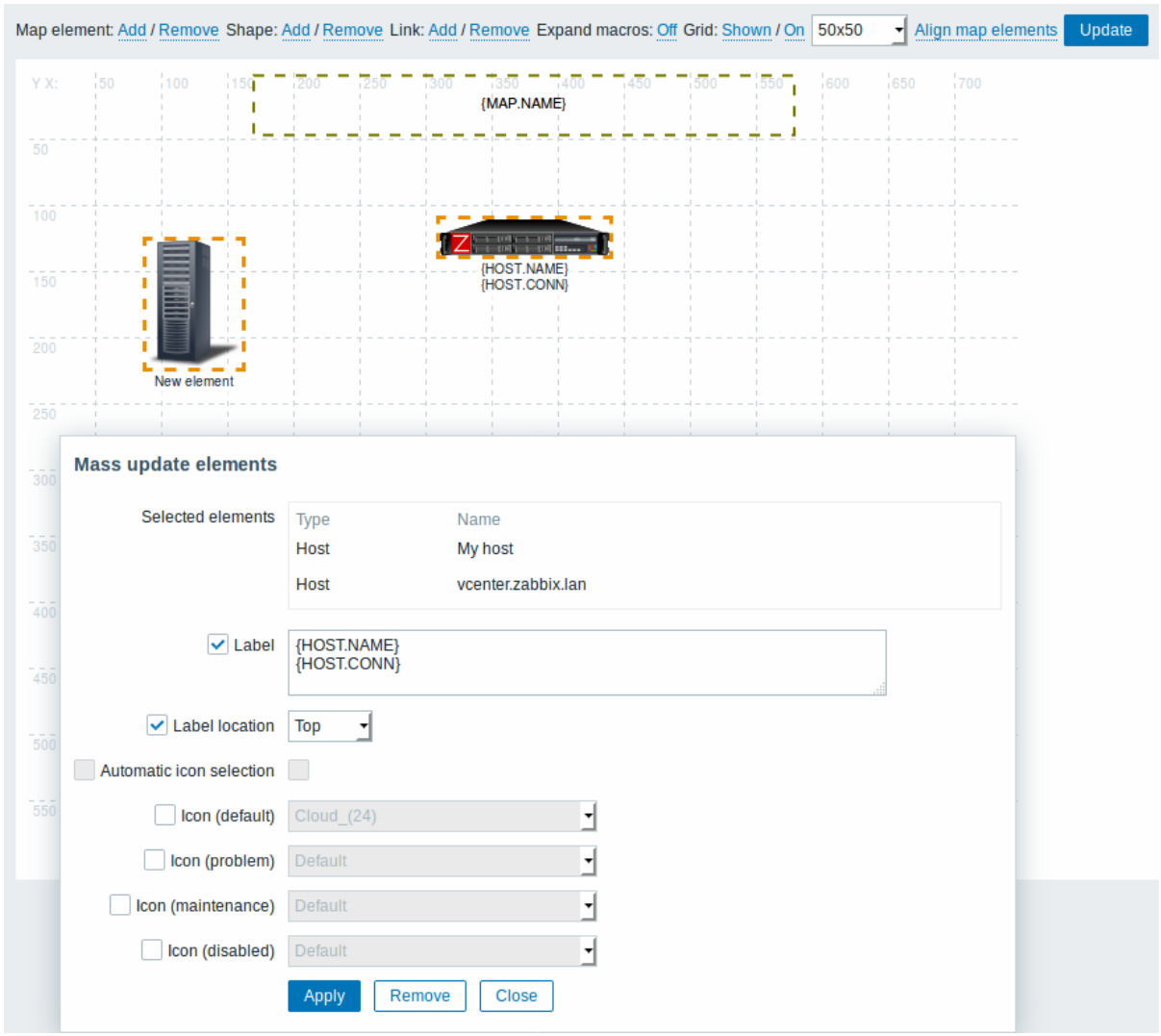
Selecting elements

To select elements, select one and then hold down *Ctrl* to select the others.

You can also select multiple elements by dragging a rectangle in the editable area and selecting all elements in it (option available since Zabbix 2.0).

Once you select more than one element, the element property form shifts to the mass-update mode so you can change attributes

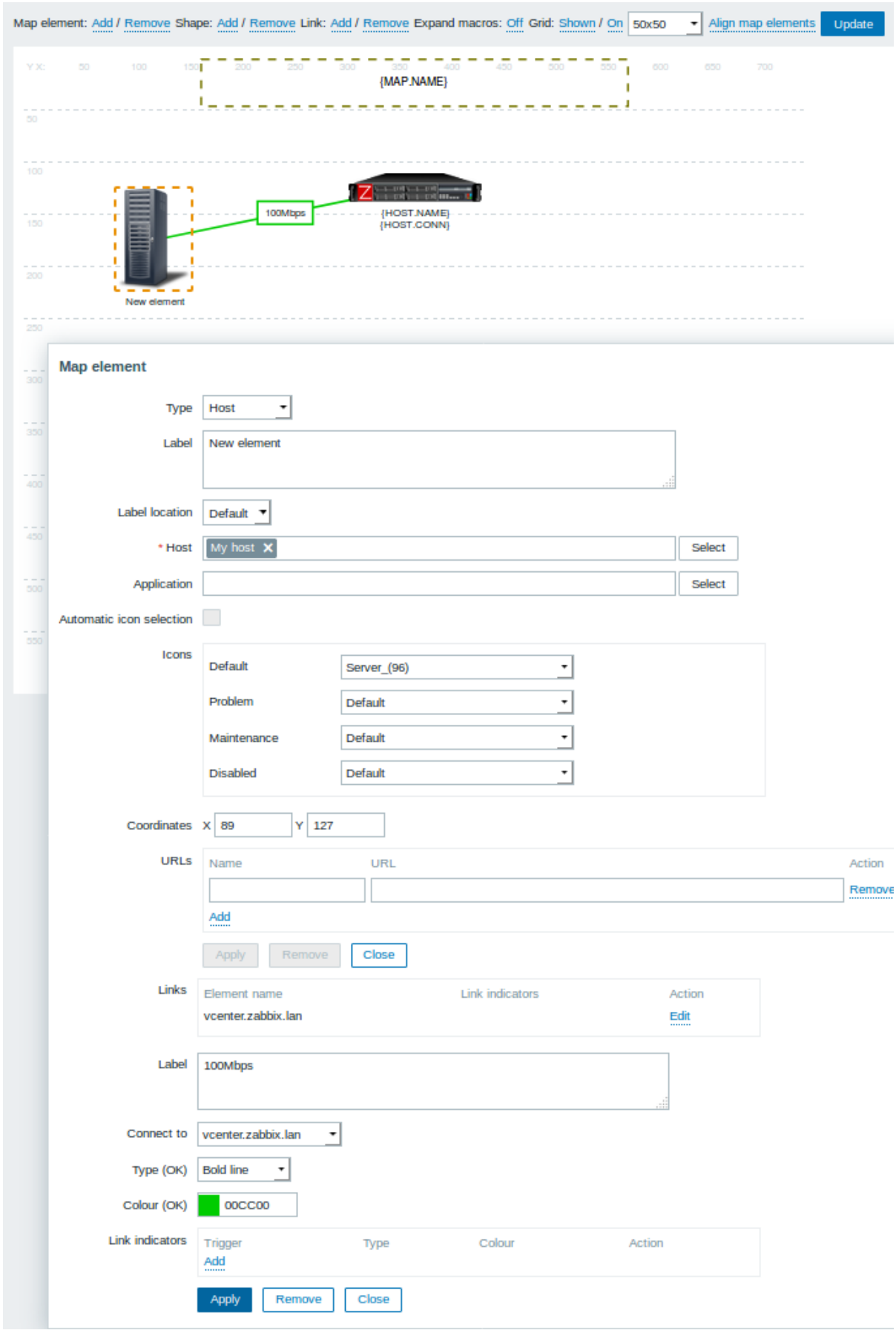
of selected elements in one go. To do so, mark the attribute using the checkbox and enter a new value for it. You may use macros here (such as, say, {HOST.NAME} for the element label).



Linking elements

Once you have put some elements on the map, it is time to start linking them. To link two elements you must first select them. With the elements selected, click on *Add* next to Link.

With a link created, the single element form now contains an additional *Links* section. Click on *Edit* to edit link attributes.



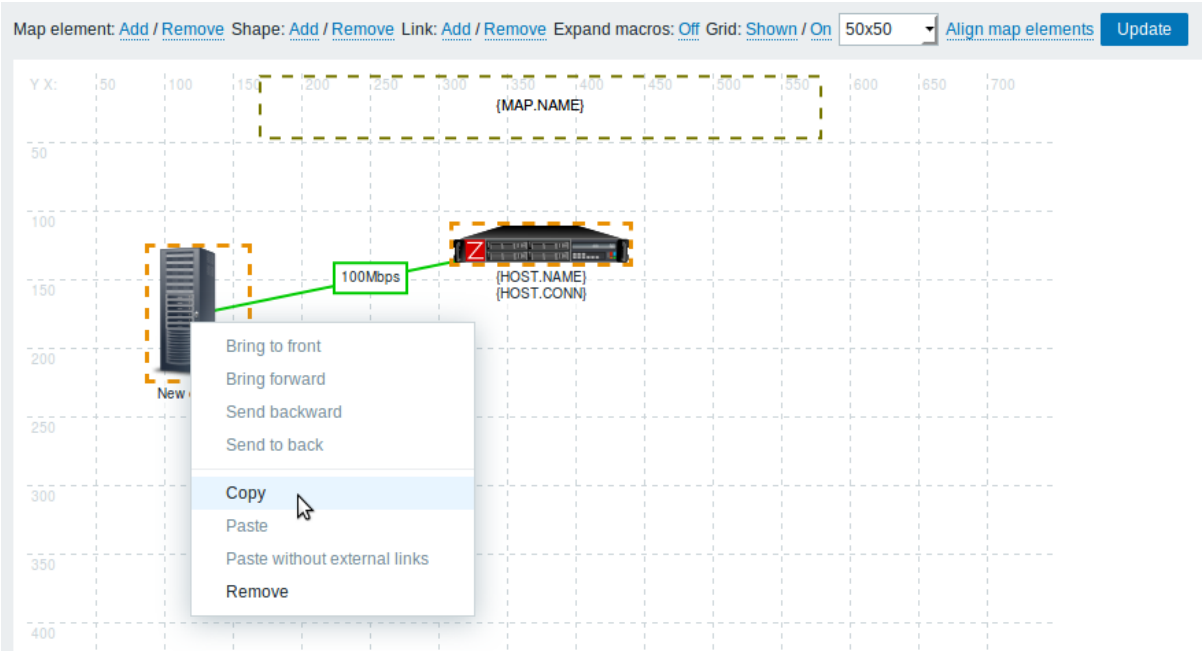
Link attributes:

Parameter	Description
Label	Label that will be rendered on top of the link. The {host:key.func(param)} macro is supported in this field, but only with `avg`, `last`, `min` and `max` trigger functions, with seconds as parameter.
Connect to	The element that the link connects to.
Type (OK)	Default link style: **Line** - single line **Bold line** - bold line **Dot** - dots **Dashed line** - dashed line
Colour (OK)	Default link colour.
Link indicators	List of triggers linked to the link. In case a trigger has status PROBLEM, its style is applied to the link.

Moving and copy-pasting elements

Several selected elements can be **moved** to another place in the map by clicking on one of the selected elements, holding down the mouse button and moving the cursor to the desired location.

One or more elements can be **copied** by selecting the elements, then clicking on a selected element with the right mouse button and selecting *Copy* from the menu.



To paste the elements, click on a map area with the right mouse button and select *Paste* from the menu. The *Paste without external links* option will paste the elements retaining only the links that are between the selected elements.

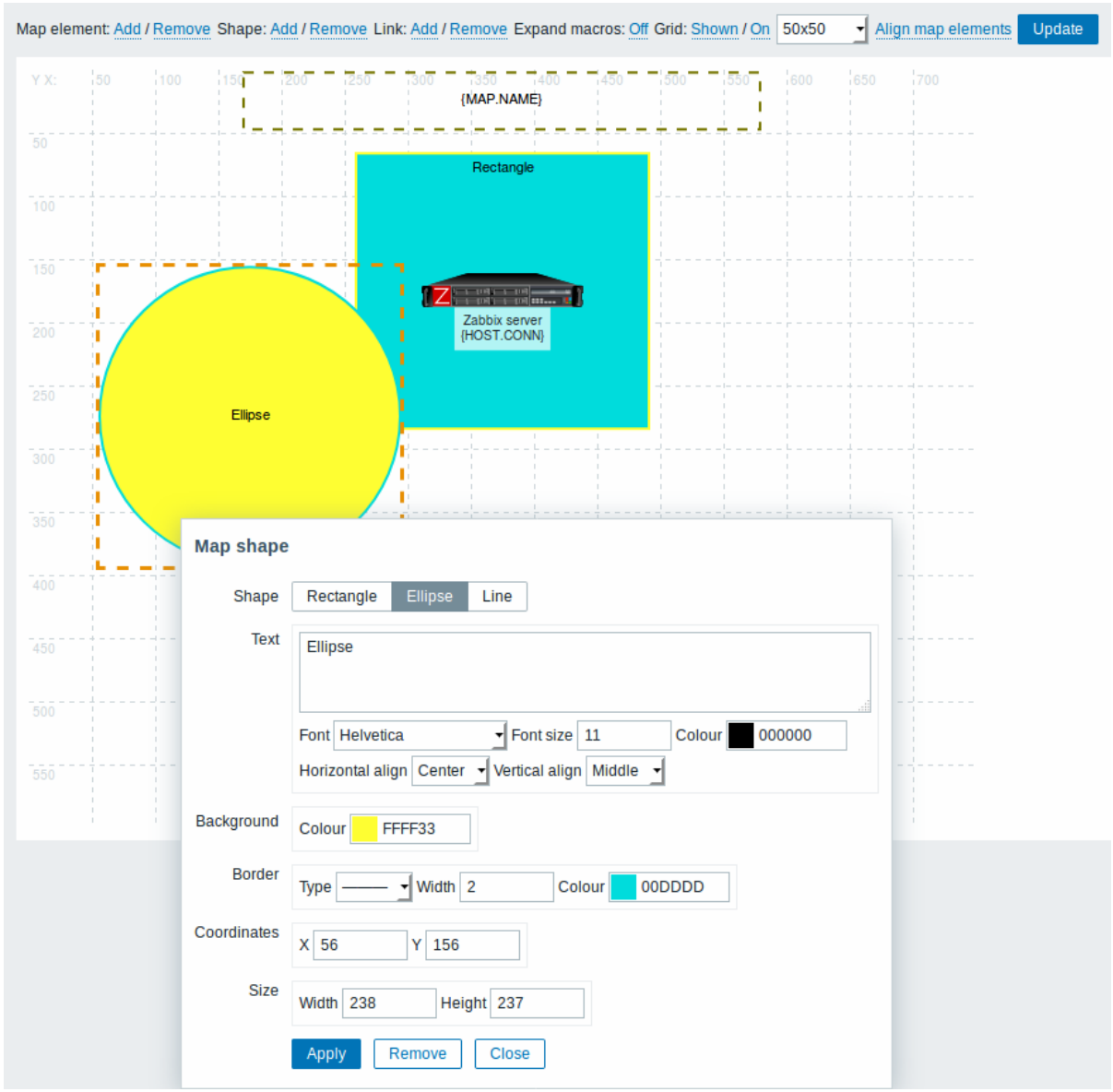
Copy-pasting works within the same browser window. Keyboard shortcuts are not supported.

Adding shapes

In addition to map elements, it is also possible to add some shapes. Shapes are not map elements; they are just a visual representation. For example, a rectangle shape can be used as a background to group some hosts. Rectangle and ellipse shapes can be added.

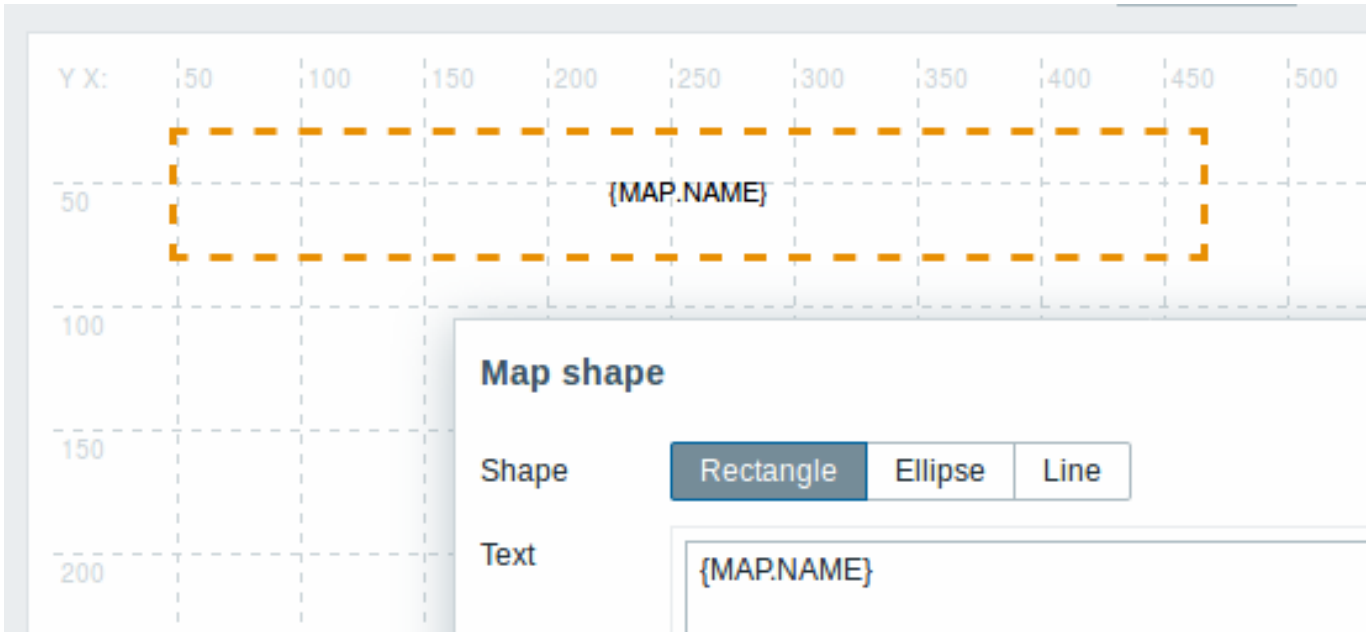
To add a shape, click on *Add* next to Shape. The new shape will appear at the top left corner of the map. Drag and drop it wherever you like.

A new shape is added with default colours. By clicking on the shape, a form is displayed and you can customize the way a shape looks, add text, etc.



To select shapes, select one and then hold down *Ctrl* to select the others. With several shapes selected, common properties can be mass updated, similarly as with elements.

Text can be added in the shapes. To display text only the shape can be made invisible by removing the shape border (select 'None' in the *Border* field). For example, take note of how the {MAP.NAME} macro, visible in the screenshot above, is actually a rectangle shape with text, which can be seen when clicking on the macro:



{MAP.NAME} resolves to the configured map name, when viewing the map.

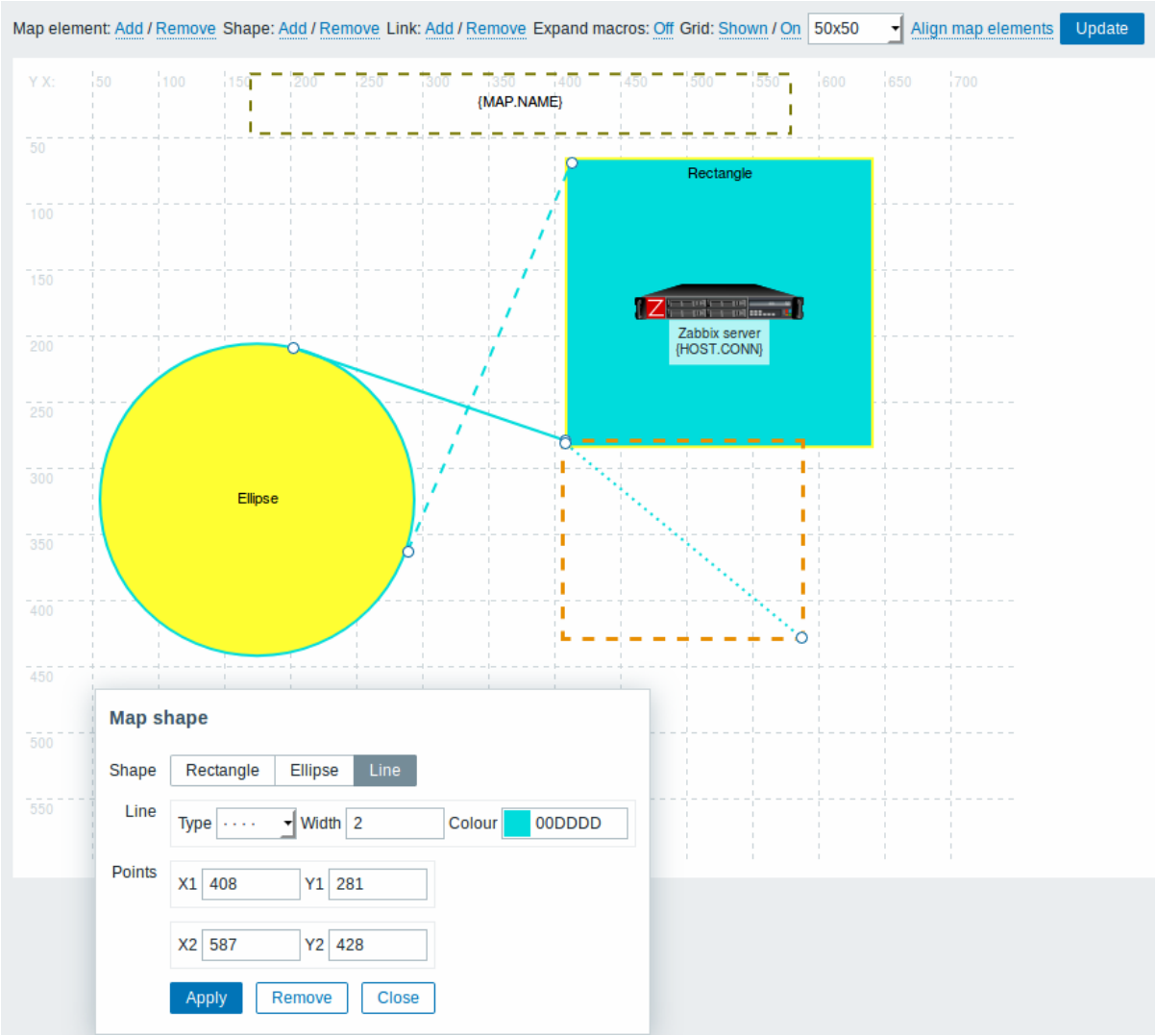
If hyperlinks are used in the text, they become clickable when viewing the map.

Line wrapping for text is always ”on” within shapes. However, within an ellipse the lines are wrapped as though the ellipse were a rectangle. Word wrapping is not implemented, so long words (words that do not fit the shape) are not wrapped, but are masked (constructor page) or clipped (other pages with maps).

Adding lines

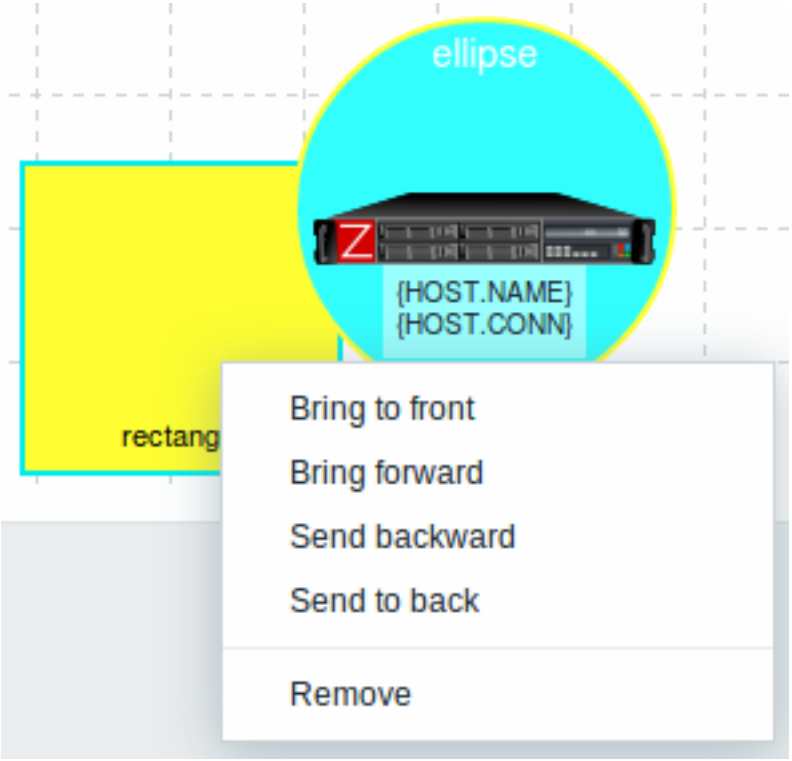
In addition to shapes, it is also possible to add some lines. Lines can be used to link elements or shapes in a map.

To add a line, click on *Add* next to Shape. A new shape will appear at the top left corner of the map. Select it and click on *Line* in the editing form to change the shape into a line. Then adjust line properties, such as line type, width, colour, etc.



Ordering shapes and lines

To bring one shape in front of the other (or vice versa) click on the shape with the right mouse button bringing up the map shape menu.

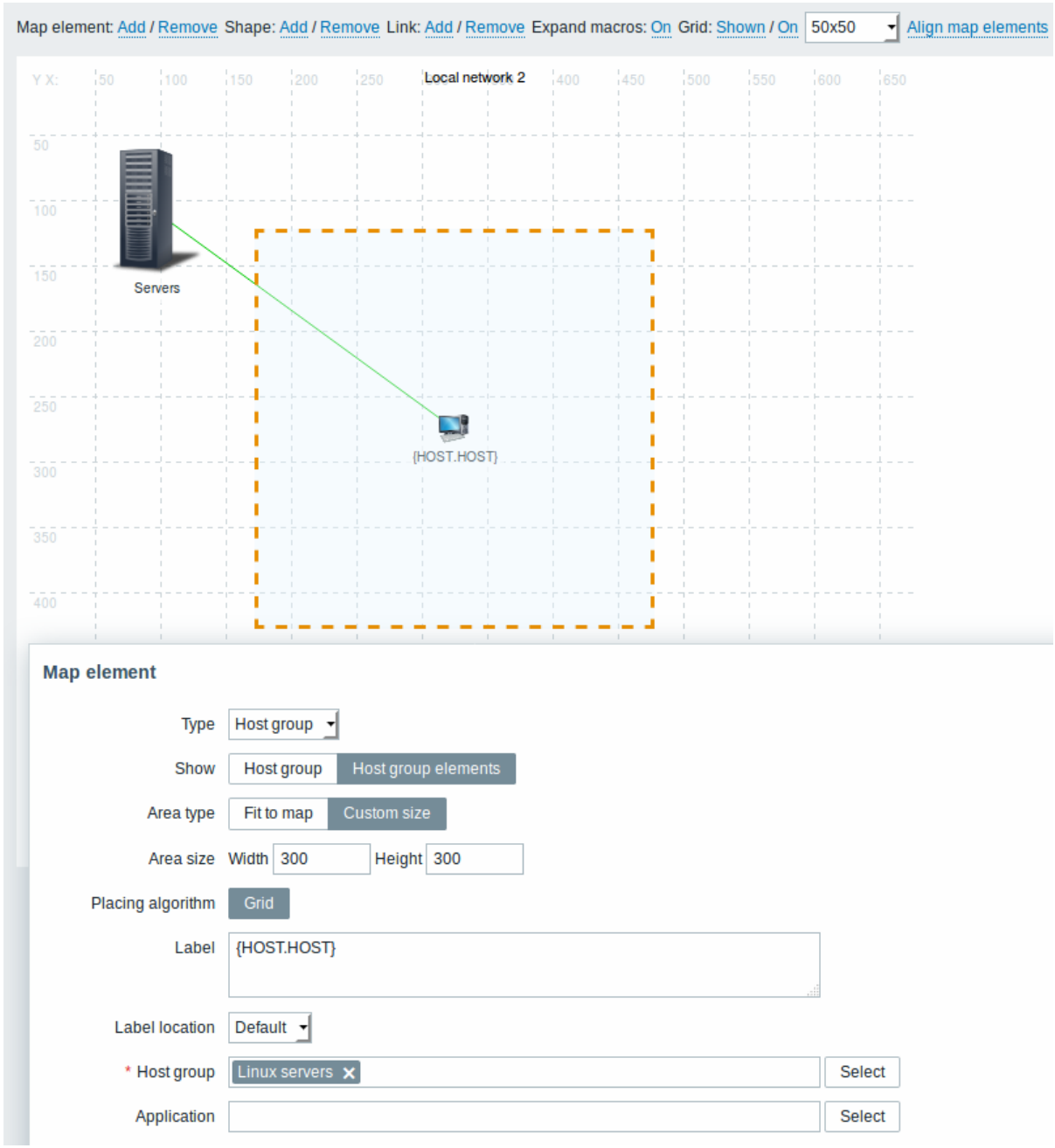


2 Host group elements

Overview

This section explains how to add a “Host group” type element when configuring a network map.

Configuration



All mandatory input fields are marked with a red asterisk.

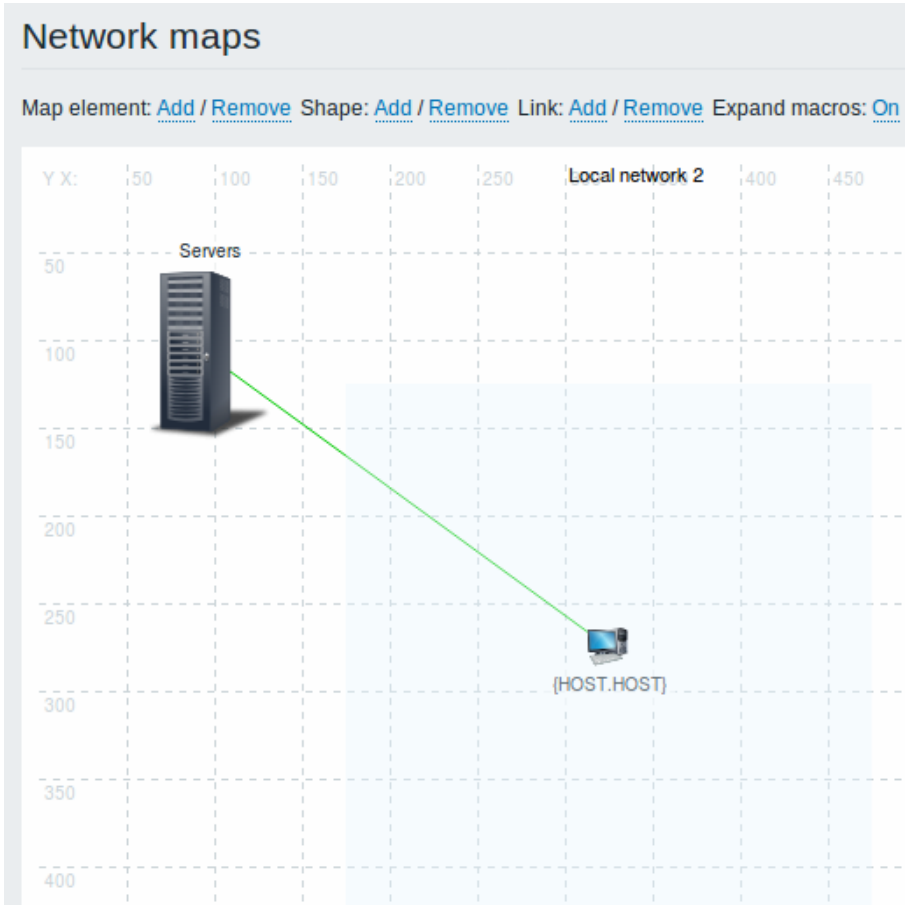
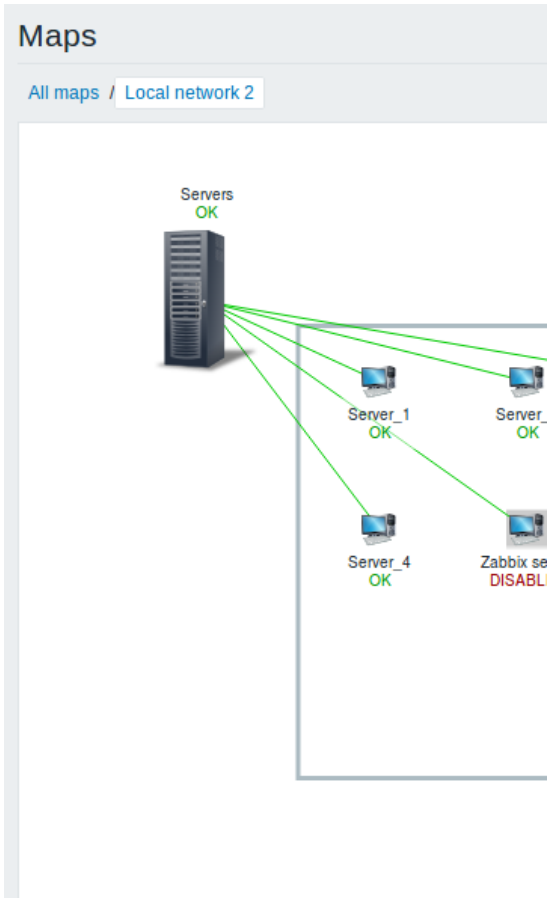
This table consists of parameters typical for *Host group* element type:

Parameter	Description
Type	Select Type of the element: **Host group** - icon representing status of all triggers of all hosts belonging to the selected group
Show	Show options: **Host group** - selecting this option will result as one single icon displaying corresponding information about the certain host group **Host group elements** - selecting this option will result as multiple icons displaying corresponding information about each single element (host) of the certain host group
Area type	This setting is available if “Host group elements” parameter is selected: **Fit to map** - all host group elements are equally placed within the map **Custom size** - manual setting of the map area for all the host group elements to be displayed

Parameter	Description
Area size	This setting is available if “Host group elements” parameter and “Area type” parameter are selected: **Width** - numeric value to be entered to specify map area width **Height** - numeric value to be entered to specify map area height
Placing algorithm	**Grid** – only available option of displaying all the host group elements
Label	Icon label, any string. Macros and multi-line strings can be used in labels. If the type of the map element is “Host group” specifying certain macros has impact on the map view displaying corresponding information about each single host. For example, if {HOST.IP} macro is used, edit map view will only display the macro {HOST.IP} itself while map view will include and display each host’s unique IP address

Viewing host group elements

This option is available if ”Host group elements” show option is chosen. When selecting ”Host group elements” as the *show* option, you will at first see only one icon for the host group. However, when you save the map and then go to the map view, you will see that the map includes all the elements (hosts) of the certain host group:

Map editing view	Map view
	

Notice how the {HOST.NAME} macro is used. In map editing the macro name in unresolved, while in map view all the unique names of the hosts are displayed.

3 Link indicators

Overview

You can assign some triggers to a link between elements in a network map. When these triggers go into a problem state, the link can reflect that.

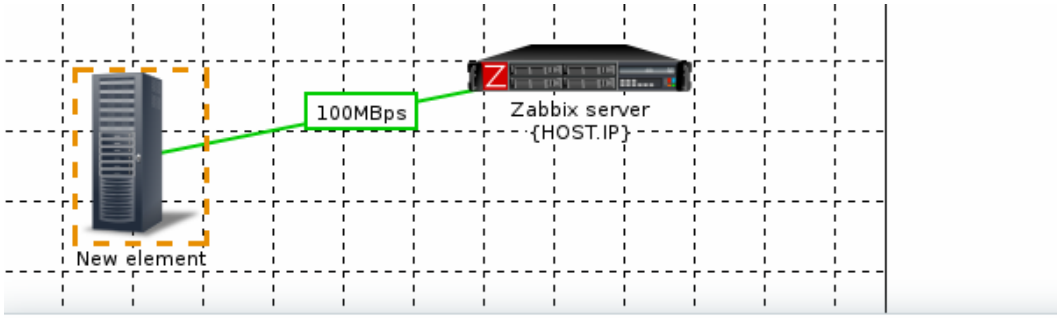
When you configure a link, you set the default link type and color. When you assign triggers to a link, you can assign different link types and colors with these triggers.

Should any of these triggers go into a problem state, their link style and color will be displayed on the link. So maybe your default link was a green line. Now, with the trigger in problem state, your link may become bold red (if you have defined it so).

Configuration

To assign triggers as link indicators, do the following:

- select a map element
- click on *Edit* in the *Links* section for the appropriate link
- click on *Add* in the *Link indicators* block and select one or more triggers



Map element

Type: Host

Label: New element

Label location: Default

*Host: New host × Select

Application: Select

Automatic icon selection

Icons

Default	Server_(96)
Problem	Server_(128)
Maintenance	Server_(24)
Disabled	Default

Coordinates: X 89 Y 127

URLs

NAME	URL

Add

Apply Remove Close

Links

ELEMENT NAME	LINK INDICATORS
Zabbix server	New host: Zabbix agent on New host is unreachable for 5 minutes

Label: 100MBps

Connect to: Zabbix server

Type (OK): Bold line

Colour (OK): 00CC00

Link indicators

TRIGGER	TYPE	COLOU
New host: Zabbix agent on New host is unreachable for 5 minutes	Line	DI

Add

Apply Remove Close

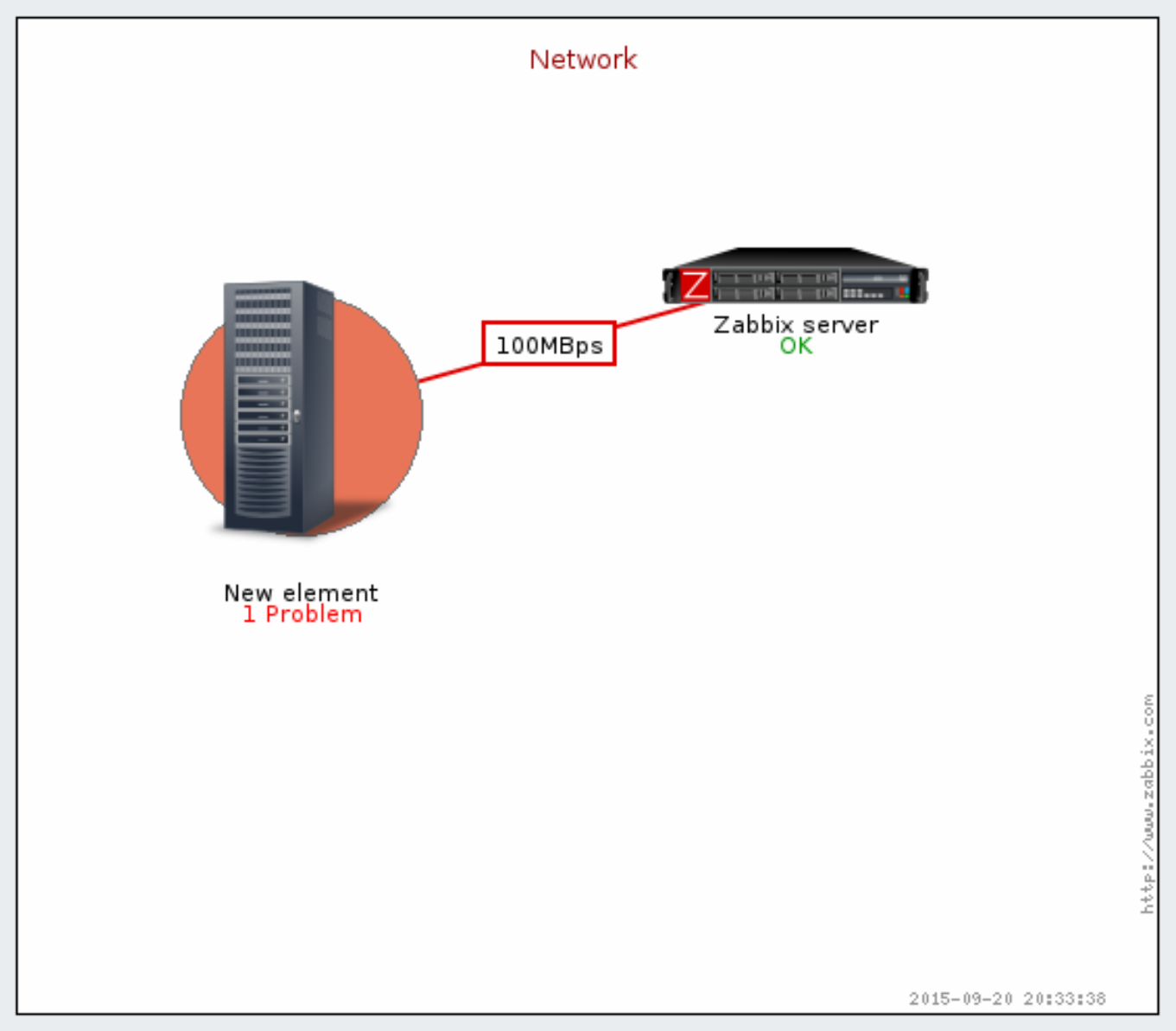
All mandatory input fields are marked with a red asterisk.

Added triggers can be seen in the *Link indicators* list.

You can set the link type and color for each trigger directly from the list. When done, click on *Apply*, close the form and click on *Update* to save the map changes.

Display

In *Monitoring* → *Maps* the respective color will be displayed on the link if the trigger goes into a problem state.



Note:
If multiple triggers go into a problem state, the problem with the highest severity will determine the link style and color. If multiple triggers with the same severity are assigned to the same map link, the one with the lowest ID takes precedence. Note also that:

1. *Minimimum trigger severity* and *Show suppressed problem* settings from map configuration affect which problems are taken into account.
2. In case with triggers with multiple problems (multiple problem generation), each problem may have severity that differs from trigger severity (changed manually), may have different tags (due to macros) and may be suppressed.

3 Screens

Overview

On Zabbix screens you can group information from various sources for a quick overview on a single screen. Building the screens is quite easy and intuitive.

Essentially a screen is a table. You choose how many cells per table and what elements to display in the cells. The following elements can be displayed:

- simple graphs
- simple graph prototypes
- user-defined custom graphs
- custom graph prototypes
- maps
- plain text information
- server information (overview)
- host information (overview)
- trigger information (overview)
- host/host group issues (status of problems)
- problems by severity
- data overview
- clock
- history of events
- history of recent actions
- URL (data taken from another location)

Global screens are managed in *Monitoring* → *Screens*, where they can be configured, managed and viewed. They can also be added to the favourites section of *Monitoring* → *Dashboard*.

Host-level screens are configured on template level and then generated for hosts once the template is linked to the hosts.

To configure a screen you must first create it by defining its general properties and then add individual elements in the cells.

All users in Zabbix (including non-admin users) can create screens. Screens have an owner - the user who created them.

Screens can be made public or private. Public screens are visible to all users.

Private screens are visible only to their owner. Private screens can be shared by the owner to other users and user groups. Regular (non-Super admin) users can only share with the groups and users they are member of. Private screens will be visible to their owner and the users the screen is shared with as long as they have read permissions to all screen elements. Admin level users, as long as they have read permissions to all screen elements, can see and edit private screens regardless of being the owner or belonging to the shared user list.

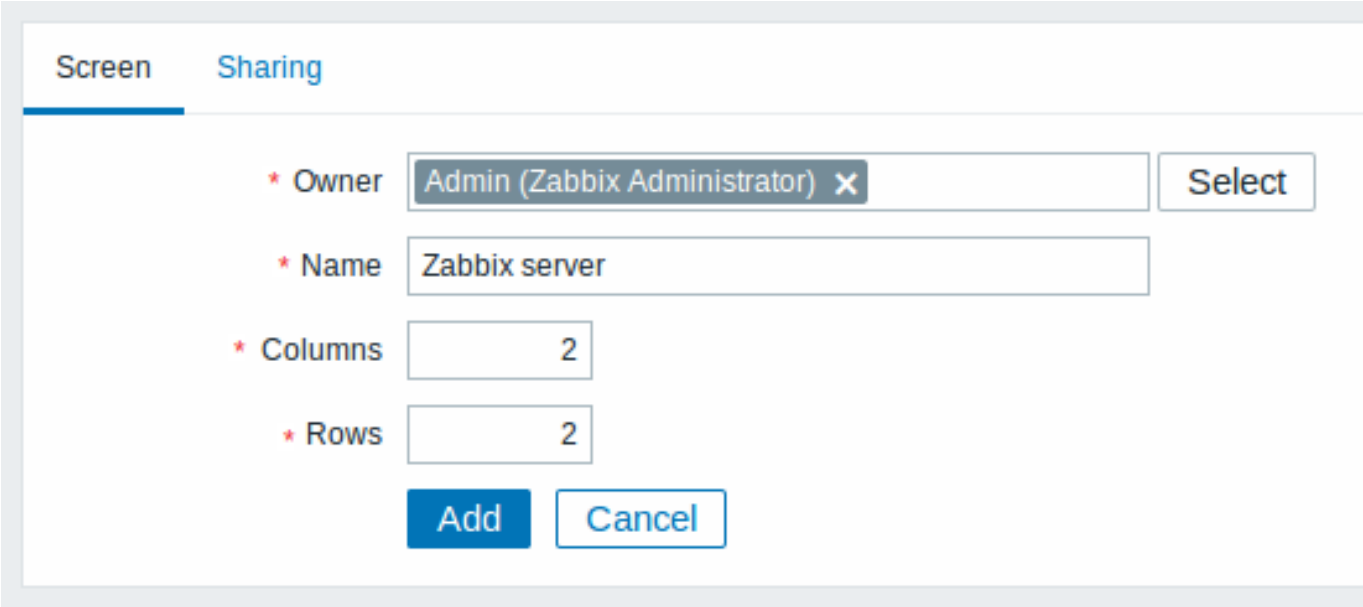
Warning:
For both public and private screens a user must have at least read permissions to all screen elements in order to see the screen. To add an element to a screen a user must also have at least read permission to it.

Creating a screen

To create a screen, do the following:

- Go to *Monitoring* → *Screens*
- Go to the view with all screens
- Click on *Create Screen*

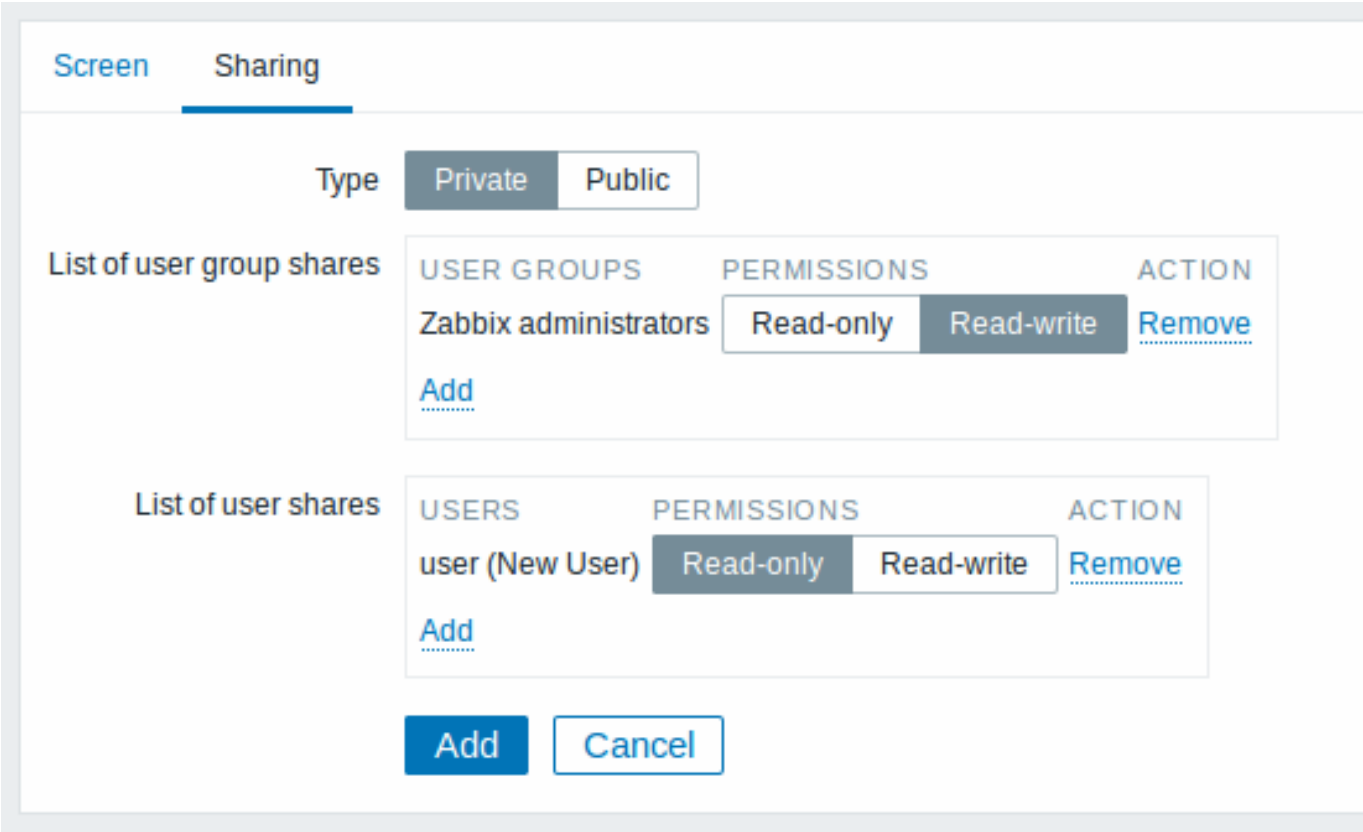
The **Screen** tab contains general screen attributes:



All mandatory input fields are marked with a red asterisk.

Give your screen a unique name and set the number of columns (vertical cells) and rows (horizontal cells).

The **Sharing** tab contains the screen type as well as sharing options (user groups, users) for private screens:



Parameter	Description
Owner	Select the screen owner.
Type	Select screen type: **Private** - screen is visible only to selected user groups and users **Public** - screen is visible to all
List of user group shares	Select user groups that the screen is accessible to. You may allow read-only or read-write access.
List of user shares	Select users that the screen is accessible to. You may allow read-only or read-write access.

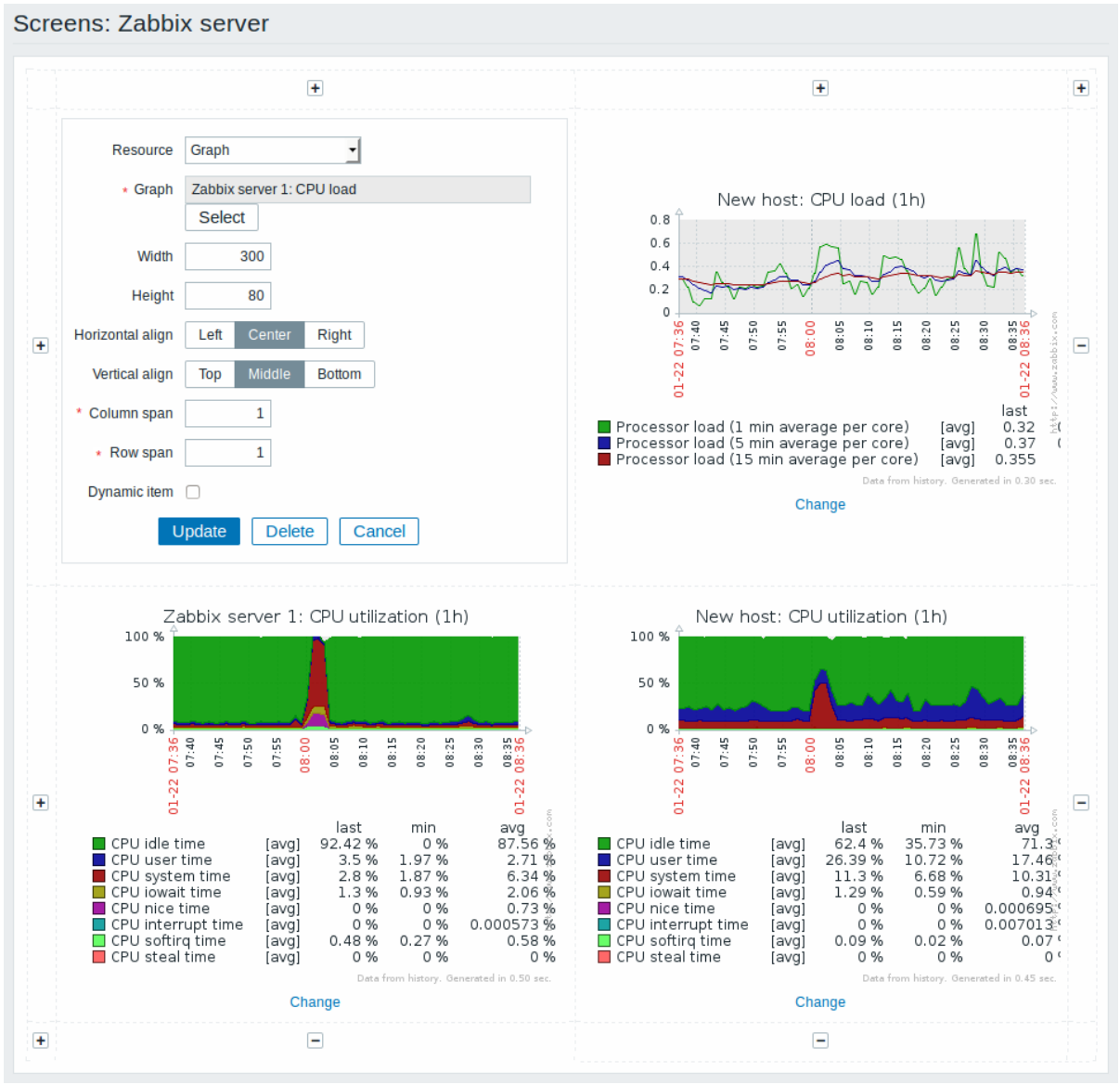
Click on *Add* to save the screen.

Adding elements

To add elements to the screen, click on *Constructor* next to the screen name in the list.

On a new screen you probably only see links named *Change*. Clicking those links opens a form whereby you set what to display in each cell.

On an existing screen you click on the existing elements to open the form whereby you set what to display.



All mandatory input fields are marked with a red asterisk.

Screen element attributes:

Parameter	Description
Resource	Information displayed in the cell: **Action log** - history of recent actions **Clock** - digital or analog clock displaying current server or local time **Data overview** - latest data for a group of hosts **Graph** - single custom graph **Graph prototype** - custom graph from low-level discovery rule **History of events** - latest events **Host group issues** - status of triggers filtered by the host group (includes triggers without events, since Zabbix 2.2) **Host info** - high level host related information **Host issues** - status of triggers filtered by the host (includes triggers without events, since Zabbix 2.2) **Map** - single map **Plain text** - plain text data **Simple graph** - single simple graph **Simple graph prototype** - simple graph based on item generated by low-level discovery **System information** - high-level information about Zabbix server **Problems by severity** - displays problems by severity (similar to the Dashboard) **Trigger info** - high level trigger related information **Trigger overview** - status of triggers for a host group **URL** - include content from the specified resource See also more information on configuring each resource.
Horizontal align	Possible values: **Center** **Left** **Right**
Vertical align	Possible values: **Middle** **Top** **Bottom**
Column span	Extend cell to a number of columns, same way as HTML column spanning works.
Row span	Extend cell to a number of rows, same way as HTML row spanning works.

Take note of the '+' and '-' controls on each side of the table.

Clicking on '+' above the table will add a column. Clicking on '-' beneath the table will remove a column.

Clicking on '+' on the left side of the table will add a row. Clicking on '-' on the right side of the table will remove a row.

Attention:
If graph height is set as less than 120 pixels, no trigger will be displayed in the legend.

Dynamic elements

For some of the elements there is an extra option called *Dynamic item*. Checking this box at first does not to seem to change anything.

However, once you go to *Monitoring* → *Screens*, you may realize that now you have extra dropdowns there for selecting the host. Thus you have a screen where some elements display the same information while others display information depending on the currently selected host.

The benefit of this is that you do not need to create extra screens just because you want to see the same graphs containing data from various hosts.

Dynamic item option is available for several screen elements:

- Graphs (custom graphs)
- Graph prototypes
- Simple graphs

- Simple graph prototypes
- Plain text
- URL

Note:
Clicking on a dynamic graph opens it in full view; although with custom graphs and graph prototypes that is currently supported with the default host only (i.e. with host 'not selected' in the dropdown). When selecting another host in the dropdown, the dynamic graph is created using item data of that host and the resulting graph is not clickable.

Note:
Dynamic URL elements will not be displayed in *Monitoring → Screens*, unless a host is selected. Without a selected host the "No host selected" message will be visible only.

1 Screen elements

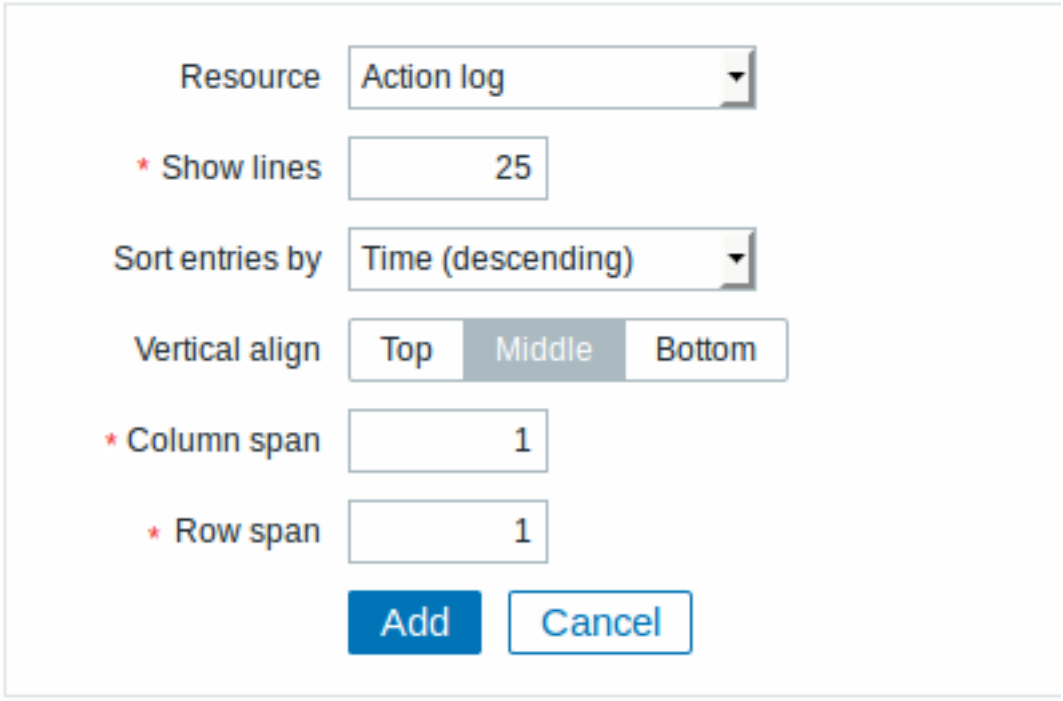
Overview

This section lists available screen elements and provides details for screen element configuration.

1 Action log

In the action log element you can display details of action operations (notifications, remote commands). It replicates information from *Reports → Audit*.

To configure, select *Action log* as resource:



All mandatory input fields are marked with a red asterisk.

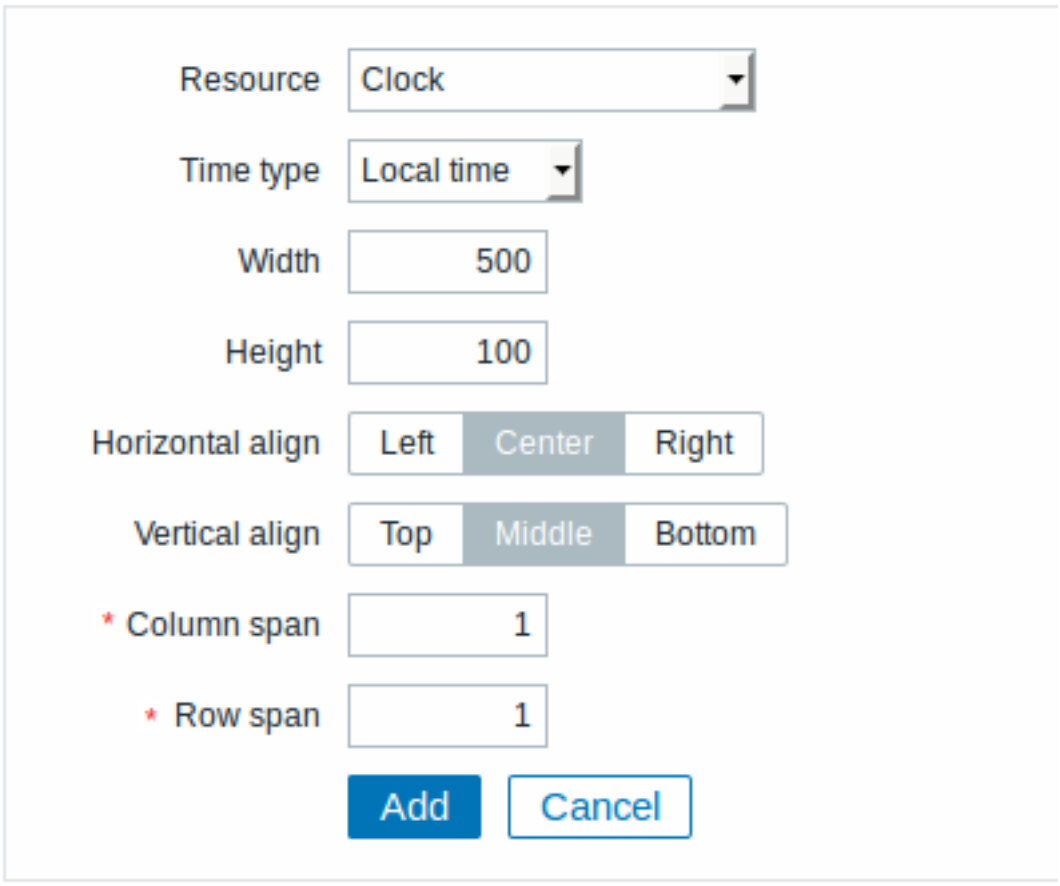
You may set the following specific options:

Show lines	Set how many action log lines will be displayed in the screen cell.
Sort entries by	Sort entries by: **Time** (descending or ascending) **Type** (descending or ascending) **Status** (descending or ascending) **Recipient** (descending or ascending).

2 Clock

In the clock element you may display local, server or specified host time.

To configure, select *Clock* as resource:



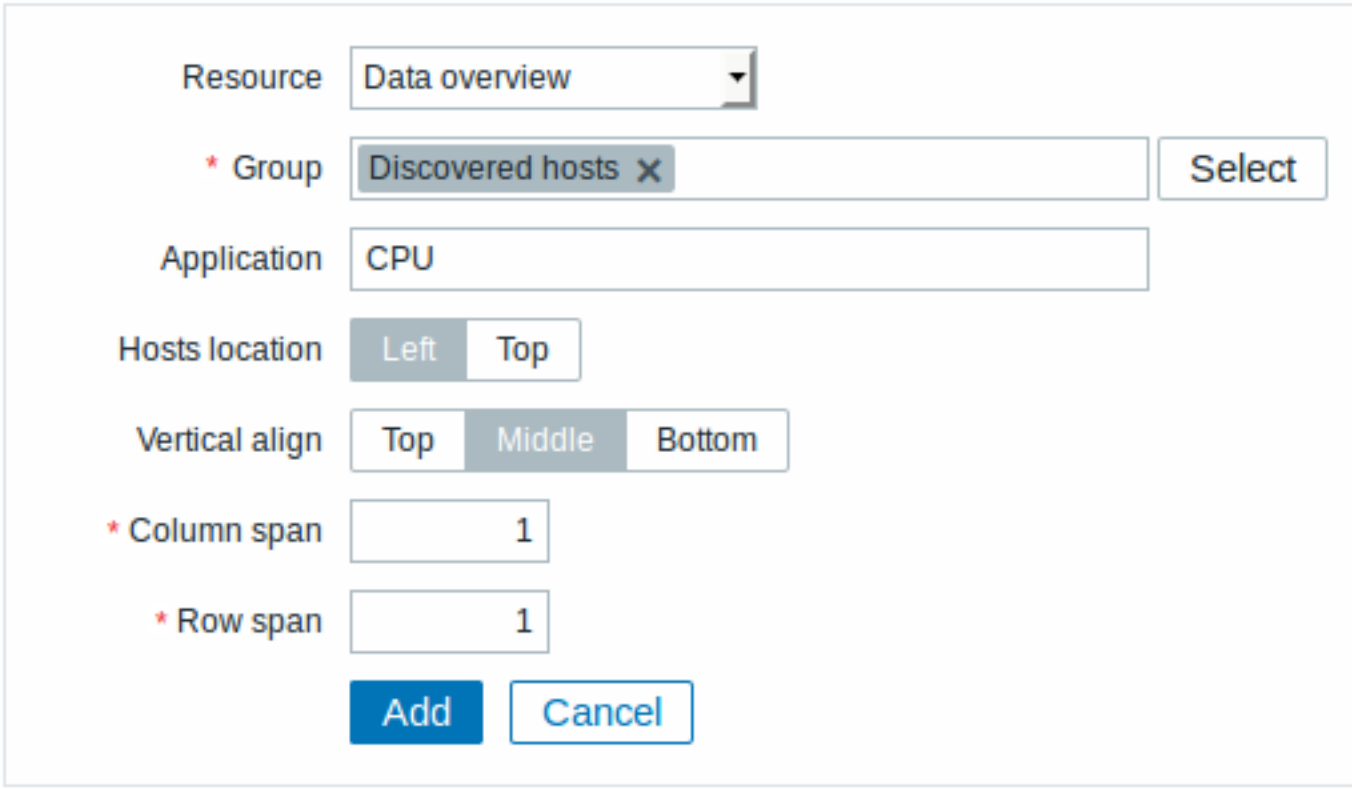
You may set the following specific options:

Time type	Select local, server or specified host time.
Item	Select the item for displaying time. To display host time, use the `system.localtime[local]` item. This item must exist on the host. This field is available only when *Host time* is selected.
Width	Select clock width.
Height	Select clock height.

3 Data overview

In the data overview element you can display the latest data for a group of hosts. It replicates information from *Monitoring* → *Overview* (when *Data* is selected as Type there).

To configure, select *Data overview* as resource:



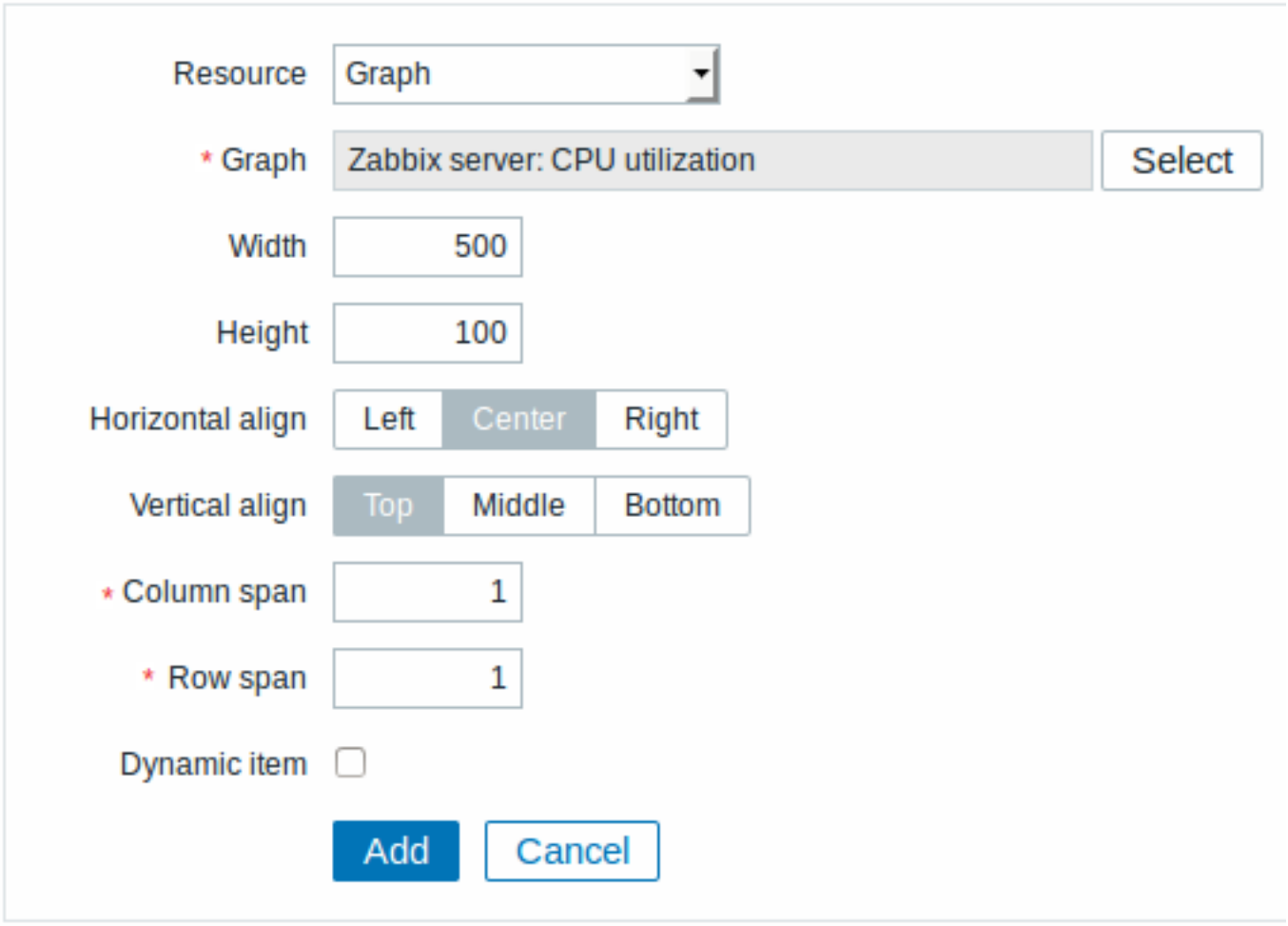
You may set the following specific options:

Group	Select host group.
Application	Enter application name.
Hosts location	Select host location - left or top.

4 Graph

In the graph element you can display a single custom graph.

To configure, select *Graph* as resource:



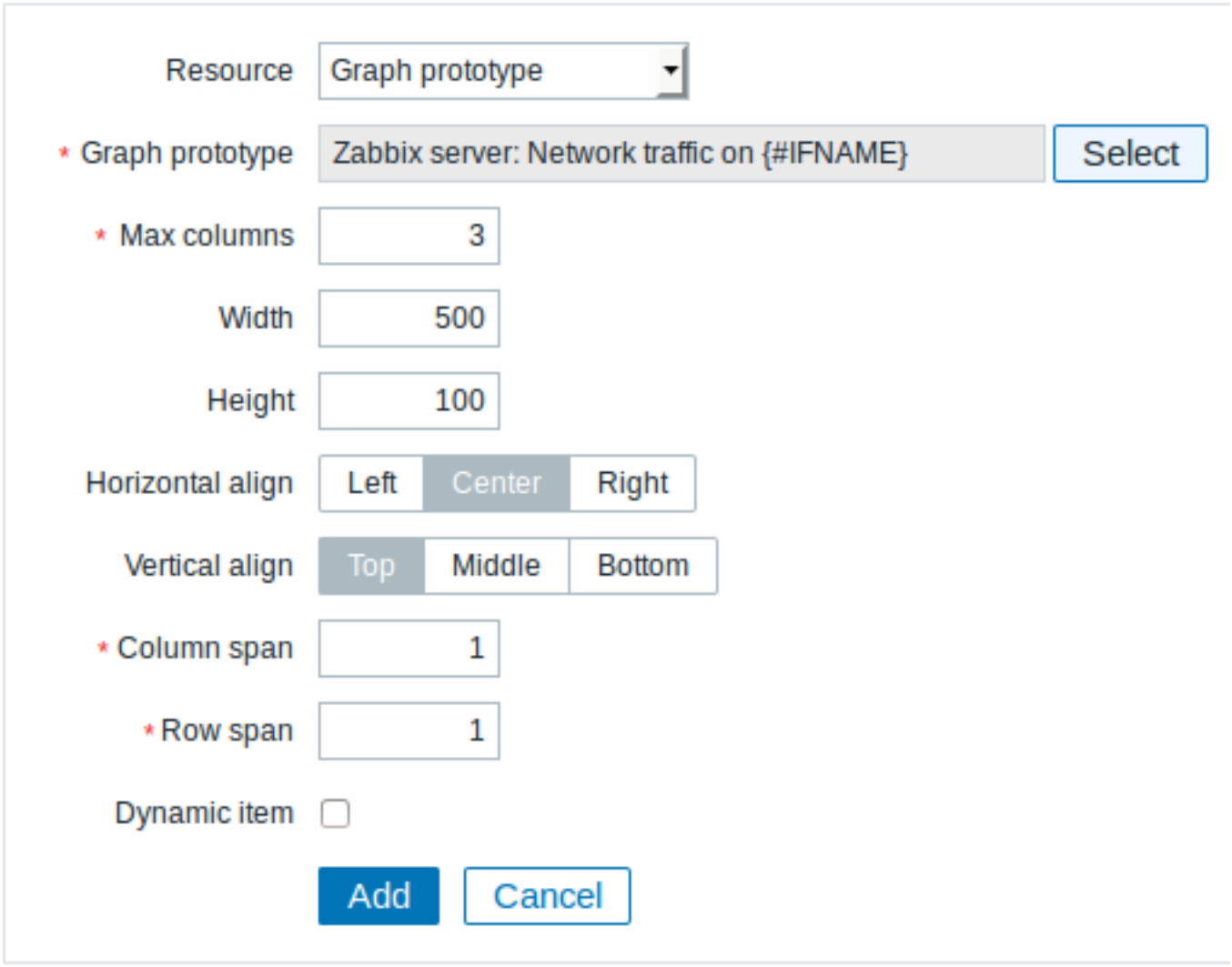
You may set the following specific options:

Graph	Select the graph to display.
Width	Select graph width. Note that a line graph may actually take up more space due to legend text.
Height	Select graph height. Note that a line graph may actually take up more space due to legend text.
Dynamic item	Set graph to display different data depending on the selected host.

5 Graph prototype

In the graph prototype element you can display a custom graph from a low-level discovery rule.

To configure, select *Graph prototype* as resource:



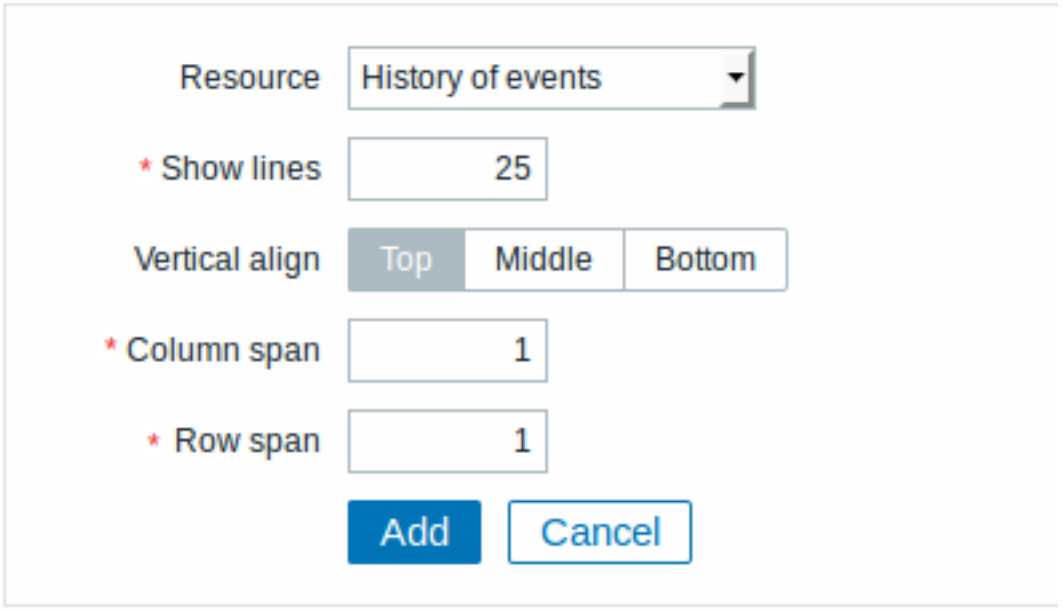
You may set the following specific options:

Graph prototype	Select the graph prototype to display.
Max columns	In how many columns generated graphs should be displayed in the screen cell. Useful when there are many LLD-generated graphs.
Width	Select graph width. Note that a line graph may actually take up more space due to legend text.
Height	Select graph height. Note that a line graph may actually take up more space due to legend text.
Dynamic item	Set graph to display different data depending on the selected host.

6 History of events

In the history of events element you can display latest events.

To configure, select *History of events* as resource:



You may set the following specific option:

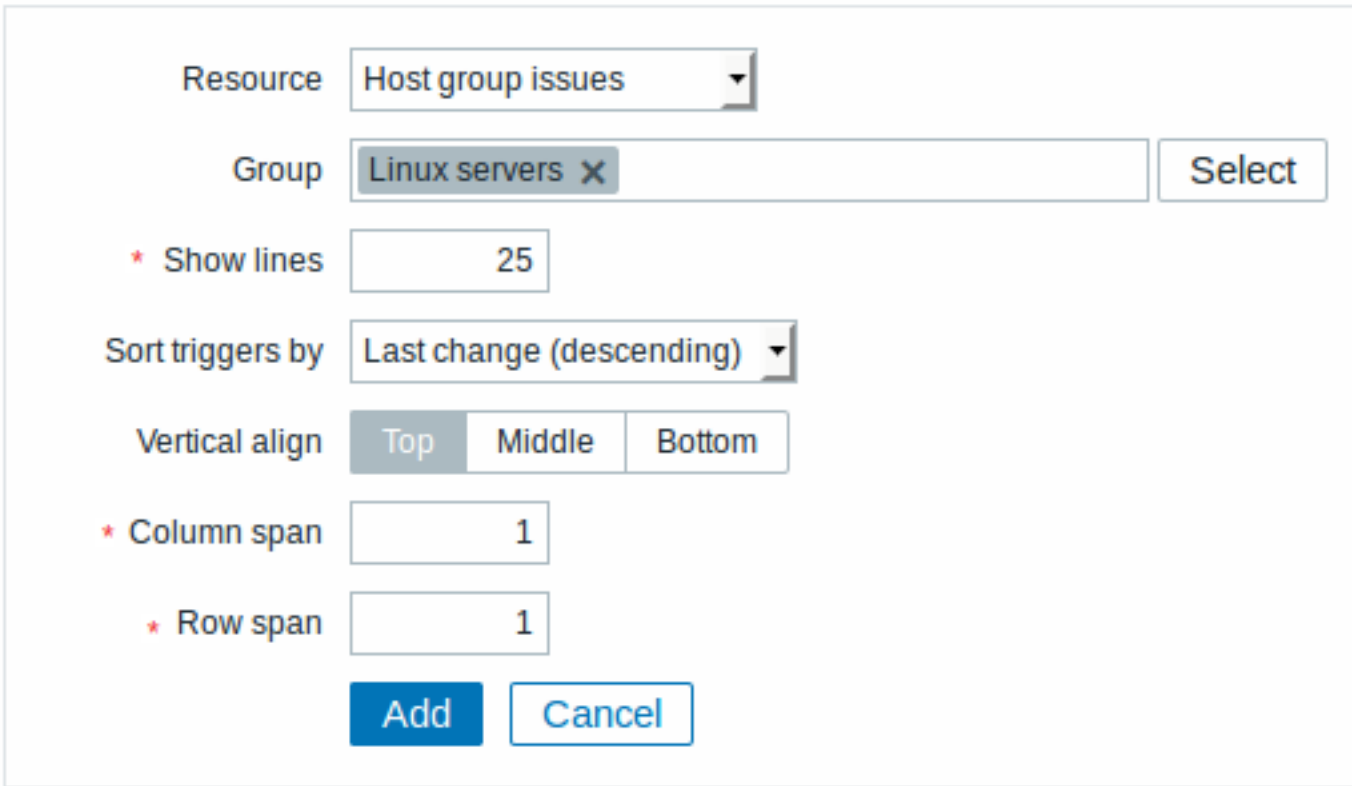
Show lines	Set how many event lines will be displayed in the screen cell.

7 Host group issues

In the host group issue element you can display problem details filtered by the selected host group.

The problem severity colour displayed is originally from the underlying trigger, but can be adjusted in the problem update screen.

To configure, select *Host group issues* as resource:



You may set the following specific options:

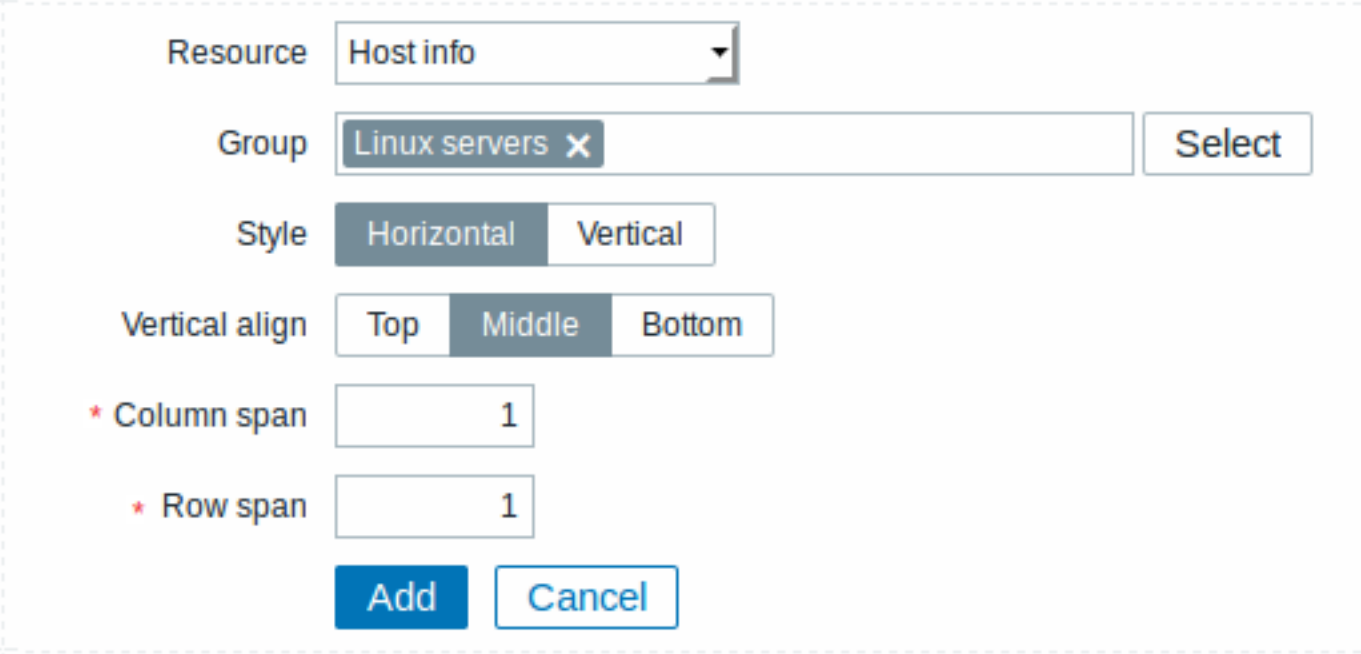
Group	Select host group.
Show lines	Set how many problem lines will be displayed in the screen cell.

Sort triggers by	Select from the dropdown to sort problems by last change, severity (both descending) or host (ascending).

8 Host info

In the host information element you can display high-level information about host availability.

To configure, select *Host info* as resource:



You may set the following specific options:

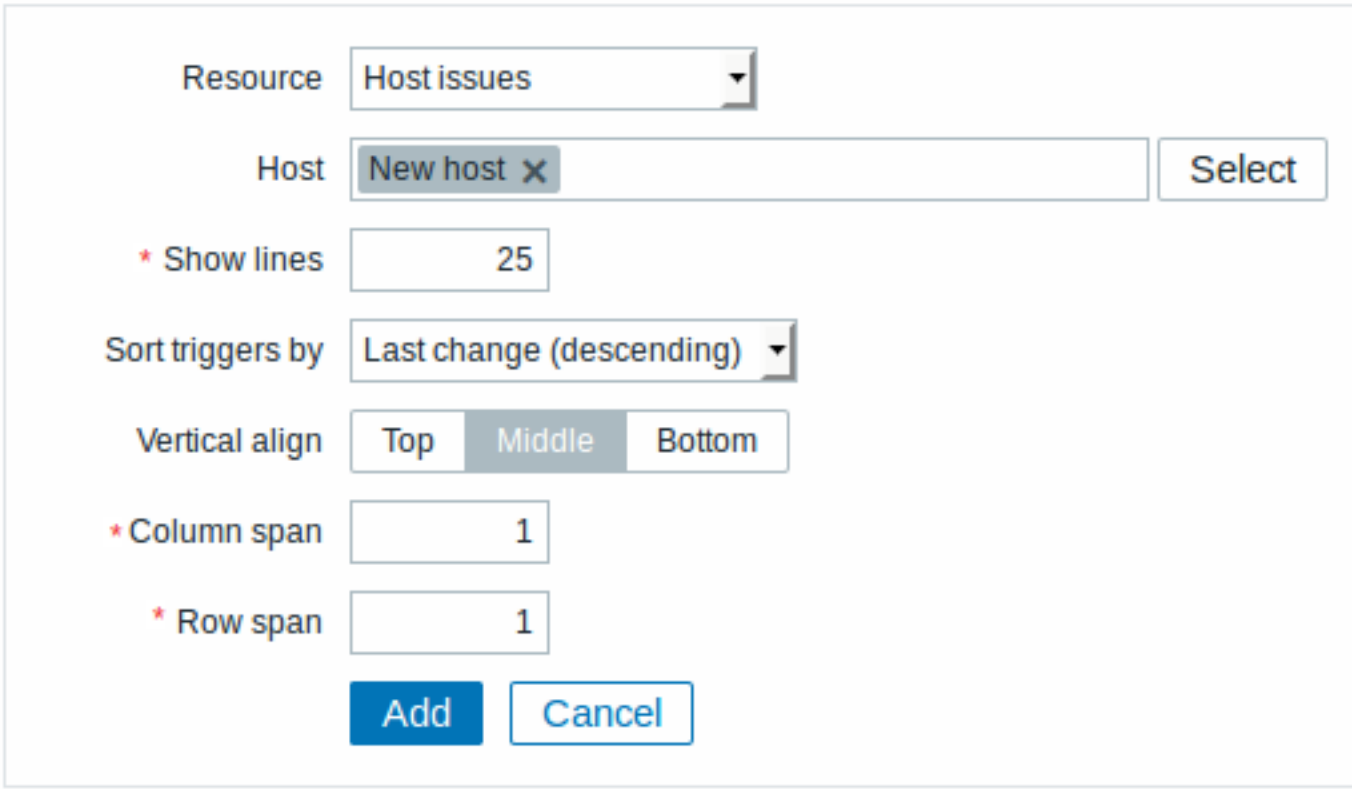
Group	Select host group(s).
Style	Select vertical or horizontal display.

9 Host issues

In the host issue element you can display problem details filtered by the selected host.

The problem severity colour displayed is originally from the underlying trigger, but can be adjusted in the problem update screen.

To configure, select *Host issues* as resource:



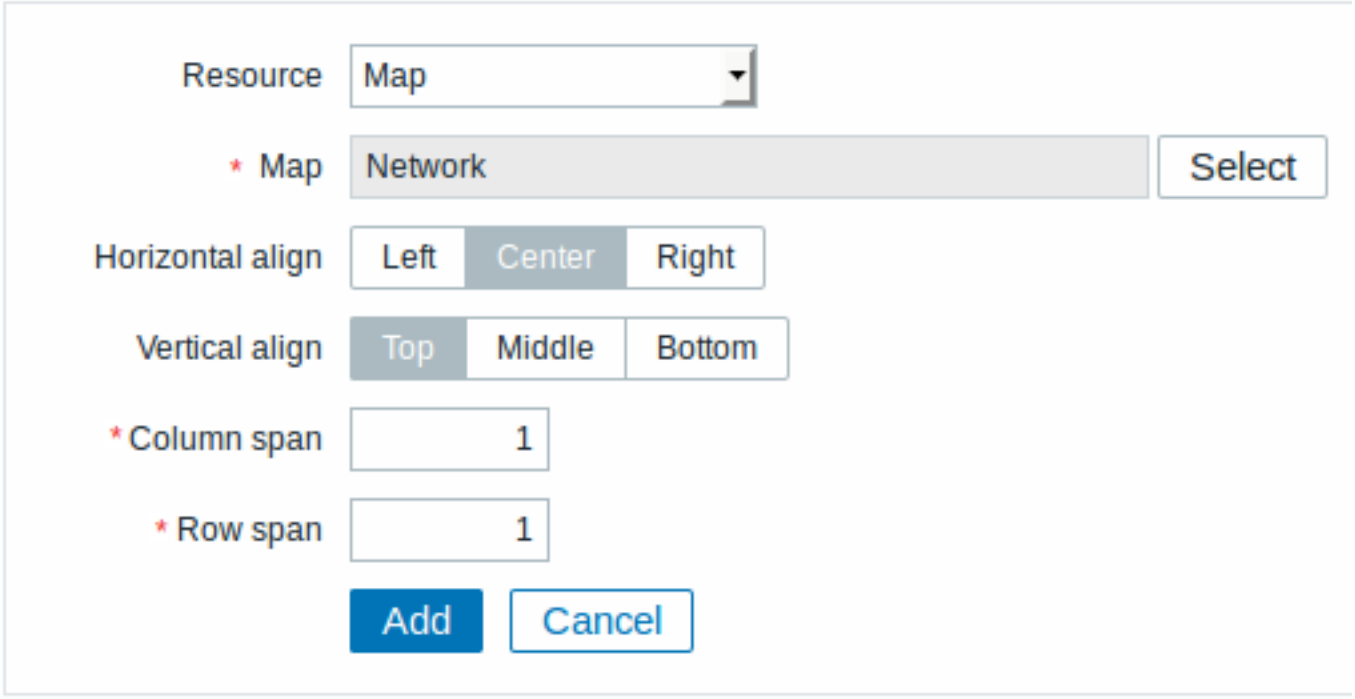
You may set the following specific options:

Host	Select the host.
Show lines	Set how many problem lines will be displayed in the screen cell.
Sort triggers by	Select from the dropdown to sort problems by last change, severity (both descending) or host (ascending).

10 Map

In the map element you can display a configured network map.

To configure, select *Map* as resource:



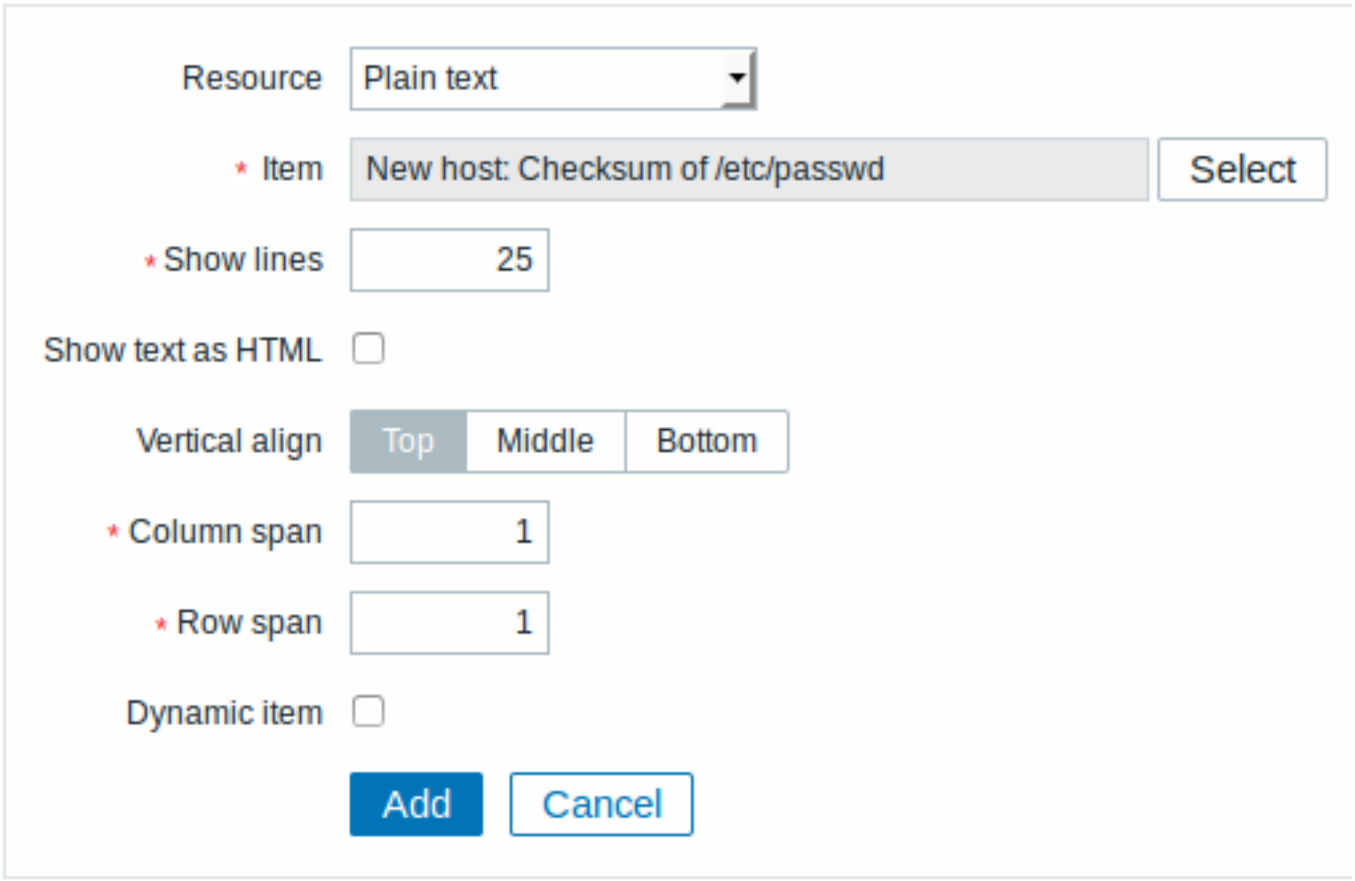
You may set the following specific options:

Map	Select the map to display.

11 Plain text

In the plain text element you can display latest item data in plain text.

To configure, select *Plain text* as resource:



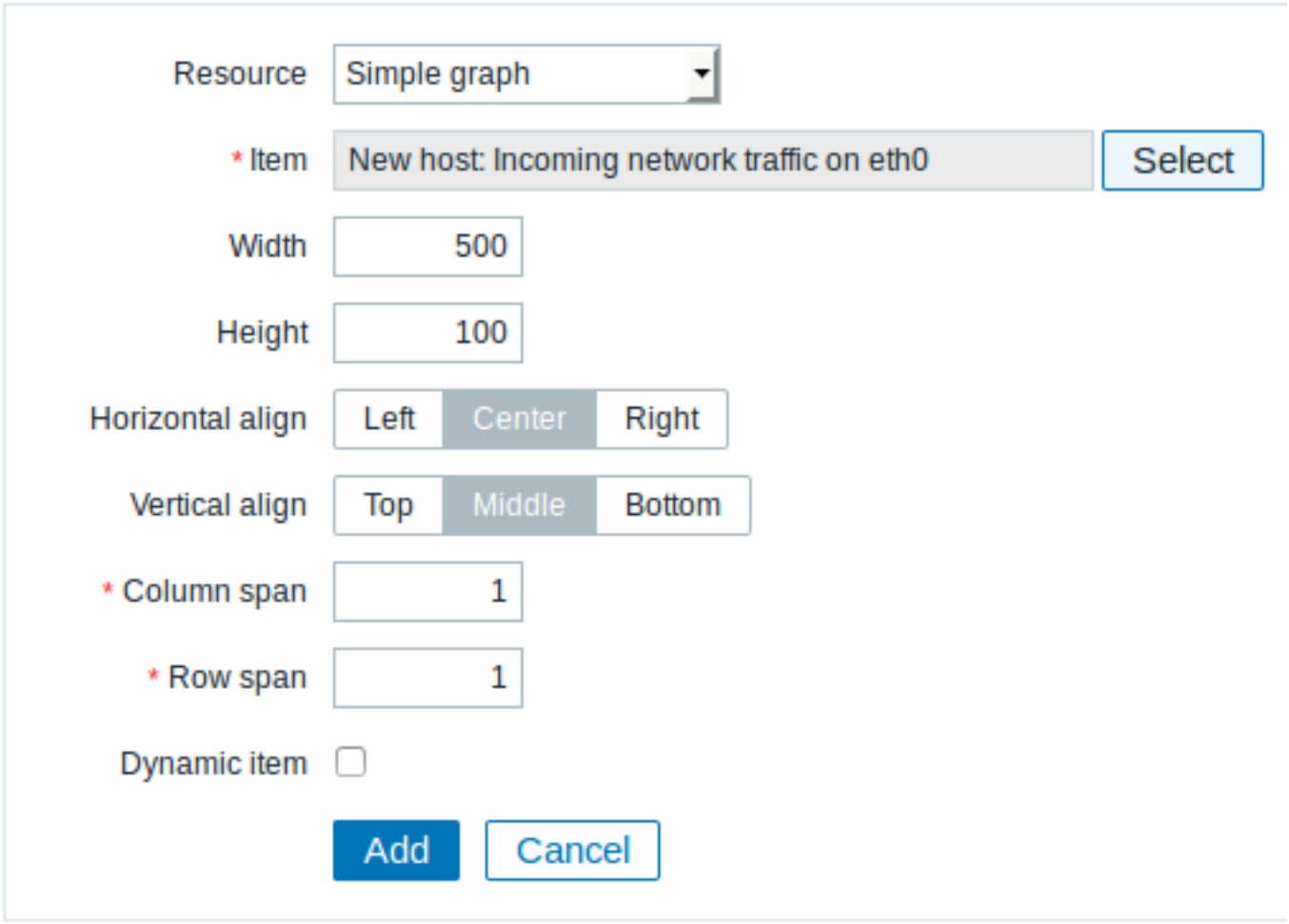
You may set the following specific options:

Item	Select the item.
Show lines	Set how many latest data lines will be displayed in the screen cell.
Show text as HTML	Set to display text as HTML.
Dynamic item	Set to display different data depending on the selected host.

12 Simple graph

In the simple graph element you can display a single simple graph.

To configure, select *Simple graph* as resource:



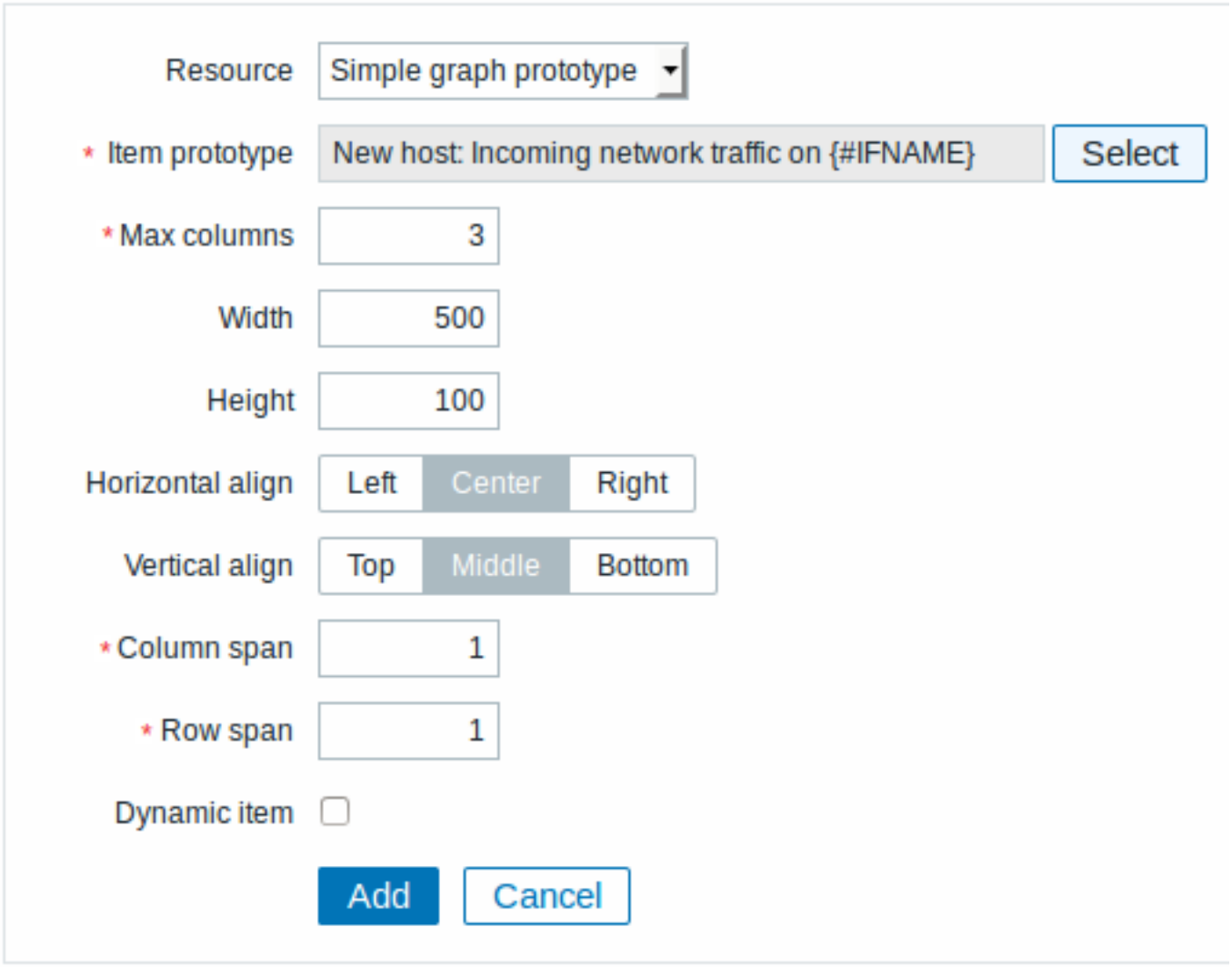
You may set the following specific options:

Item	Select the item for the simple graph.
Width	Select graph width. Note that a line graph may actually take up more space due to legend text.
Height	Select graph height. Note that a line graph may actually take up more space due to legend text.
Dynamic item	Set graph to display different data depending on the selected host.

13 Simple graph prototype

In the simple graph prototype element you can display a simple graph based on an item generated by low-level discovery.

To configure, select *Simple graph prototype* as resource:



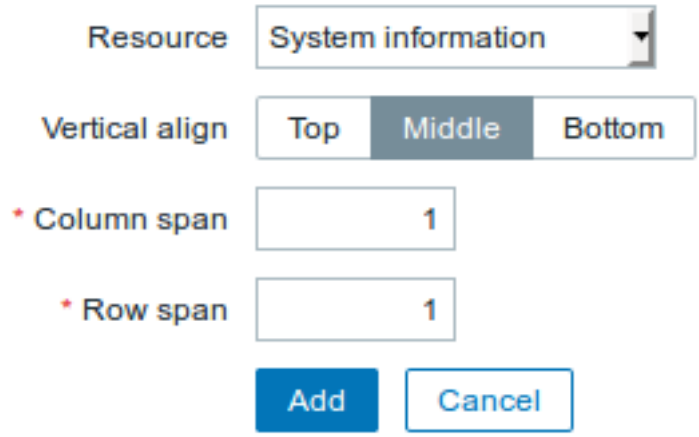
You may set the following specific options:

Item prototype	Select the item prototype for the simple graph.
Max columns	In how many columns generated graphs should be displayed in the screen cell. Useful when there are many LLD-generated graphs.
Width	Select graph width. Note that a line graph may actually take up more space due to legend text.
Height	Select graph height. Note that a line graph may actually take up more space due to legend text.
Dynamic item	Set graph to display different data depending on the selected host.

14 System information

In the system information element you can display high-level Zabbix and Zabbix server information.

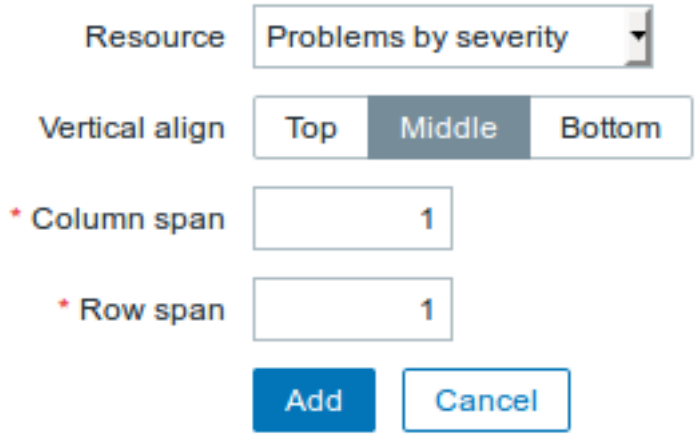
To configure, select *System information* as resource:



15 Problems by severity

In this element you can display problems by severity similarly as in the Dashboard widget.

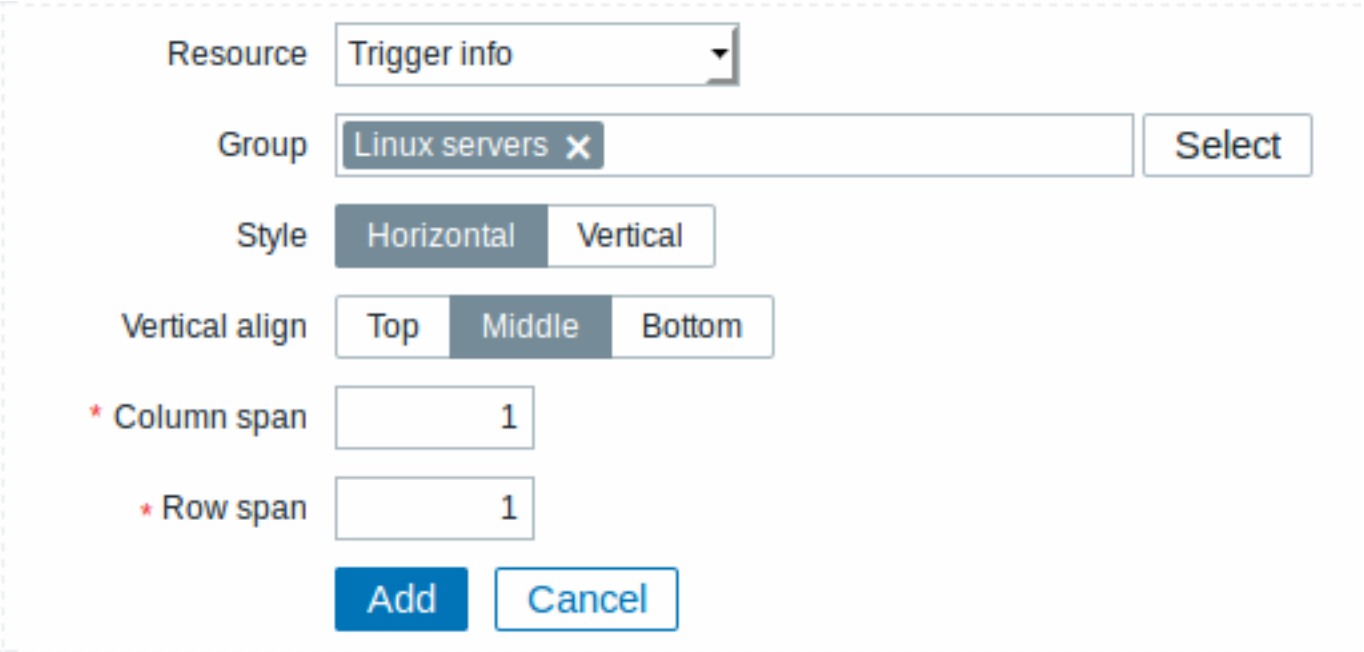
To configure, select *Problems by severity* as resource:



16 Trigger info

In the trigger info element you can display high-level information about trigger states.

To configure, select *Trigger info* as resource:



You may set the following specific options:

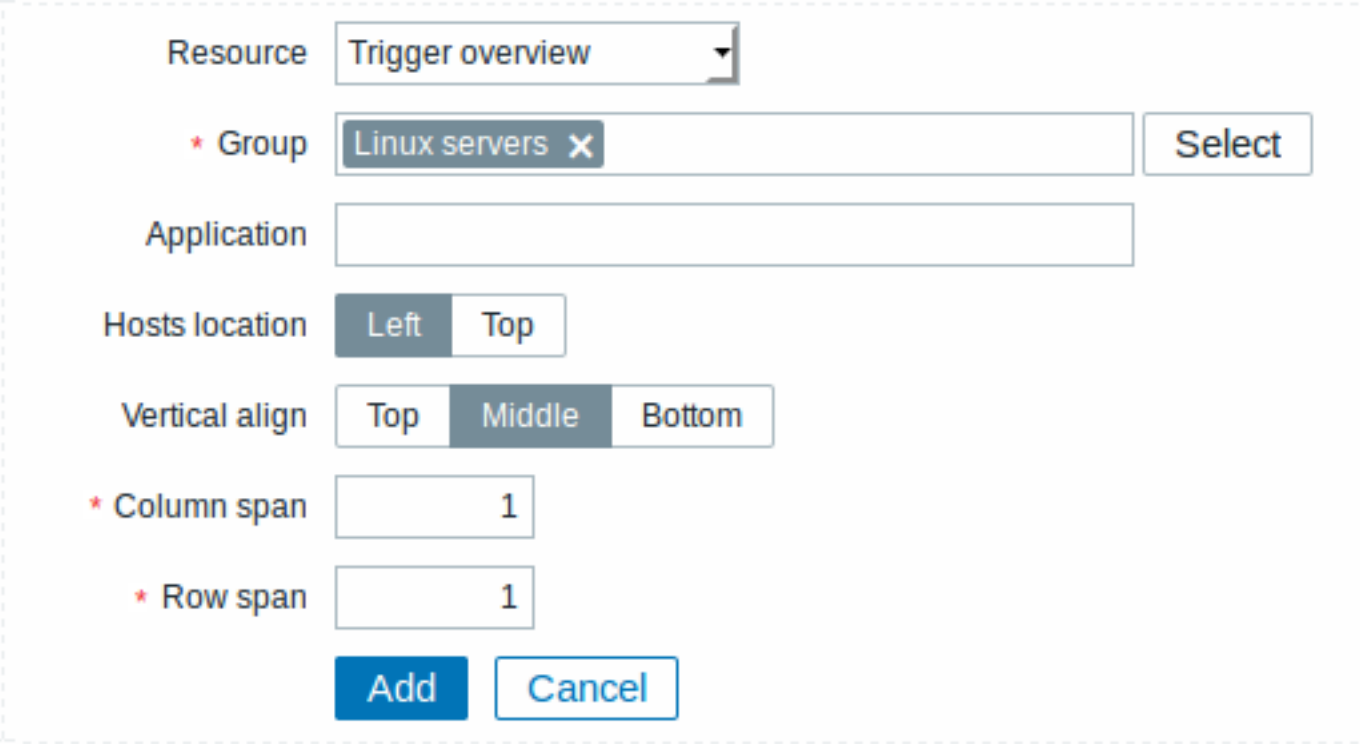
Group	Select the host group(s).

Style	Select vertical or horizontal display.

17 Trigger overview

In the trigger overview element you can display the trigger states for a group of hosts. It replicates information from *Monitoring* → *Overview* (when *Triggers* is selected as Type there).

To configure, select *Trigger overview* as resource:



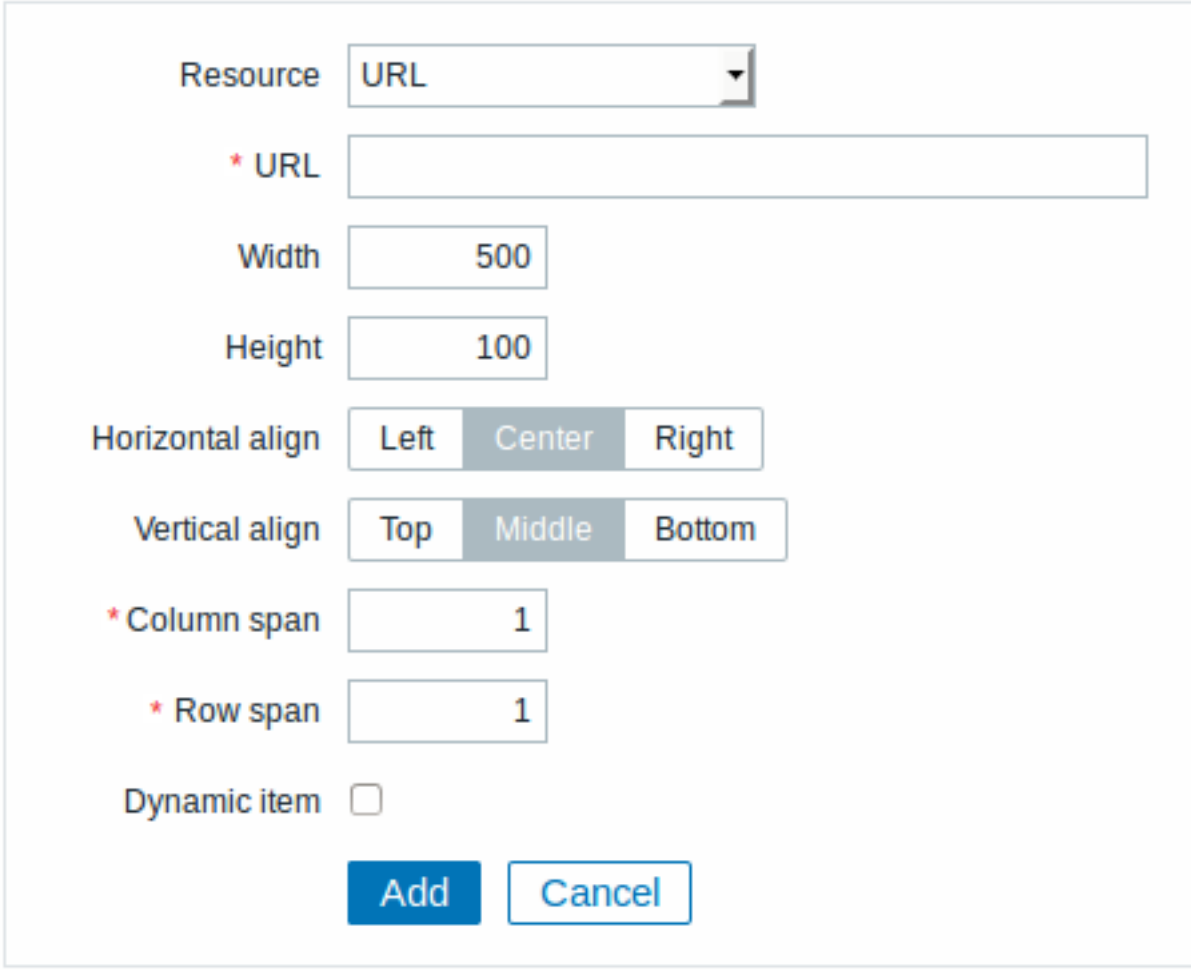
You may set the following specific options:

Group	Select the host group(s).
Application	Enter the application name.
Hosts location	Select host location - left or top.

18 URL

The URL element displays the content retrieved from the specified URL.

To configure, select *URL* as resource:



You may set the following specific options:

URL	Enter the URL to display. Relative paths are allowed since Zabbix 4.4.8.
Width	Select window width.
Height	Select window width.
Dynamic item	Set to display different URL content depending on the selected host.

Attention:
Browsers might not load an HTTP page included in a screen (using URL element), if Zabbix frontend is accessed over HTTPS.

4 Slide shows

Overview

In a slide show you can configure that a number of screens are displayed one after another at set intervals.

Sometimes you might want to switch between some configured screens. While that can be done manually, doing that more than once or twice may become very tedious. This is where the slide show function comes to rescue.

All users in Zabbix (including non-admin users) can create slide shows. Slide shows have an owner - the user who created them.

Slide shows can be made public or private. Public slide shows are visible to all users, however, they must have at least read permissions to all slide show elements (screens) to see it. To add a screen to the slide show the user must also have at least read permission to it.

Private slide shows are visible only to their owner. Private slide shows can be shared by the owner to other users and user groups. Regular (non-Super admin) users can only share with the groups and users they are member of. Private slide shows will be visible to their owner and the users the slide show is shared with as long as they have read permissions to all included screens. Admin

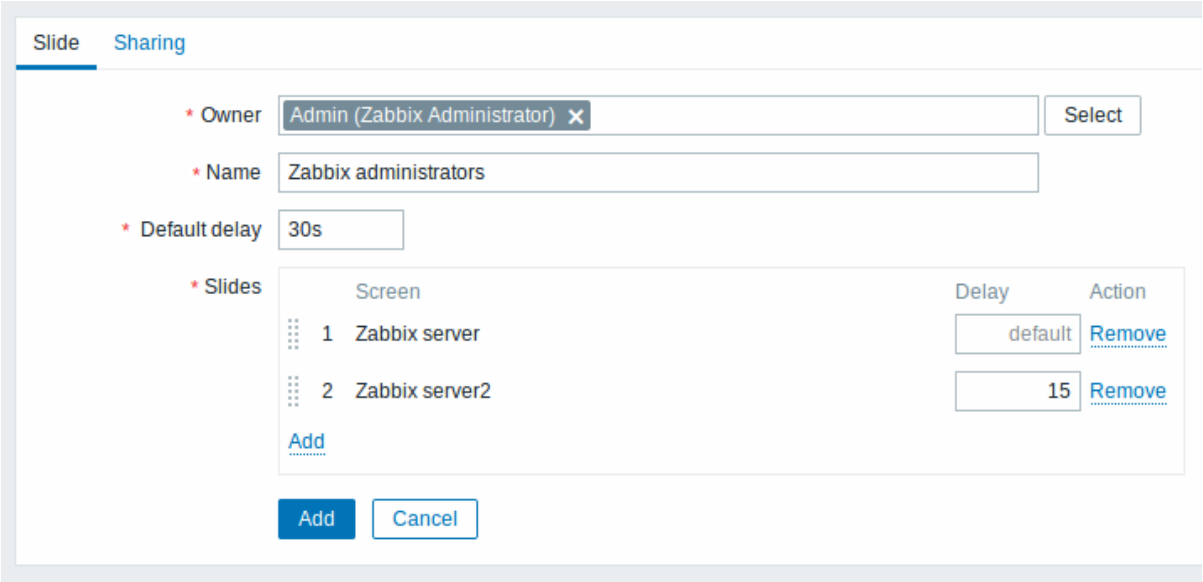
level users, as long as they have read permissions to all included screens, can see and edit private slide shows regardless of being the owner or belonging to the shared user list.

Configuration

To create a slide show, do the following:

- Go to *Monitoring* → *Screens*
- Select *Slide shows* in the dropdown
- Go to the view with all slide shows
- Click on *Create slide show*

The **Slide** tab contains general slide show attributes:



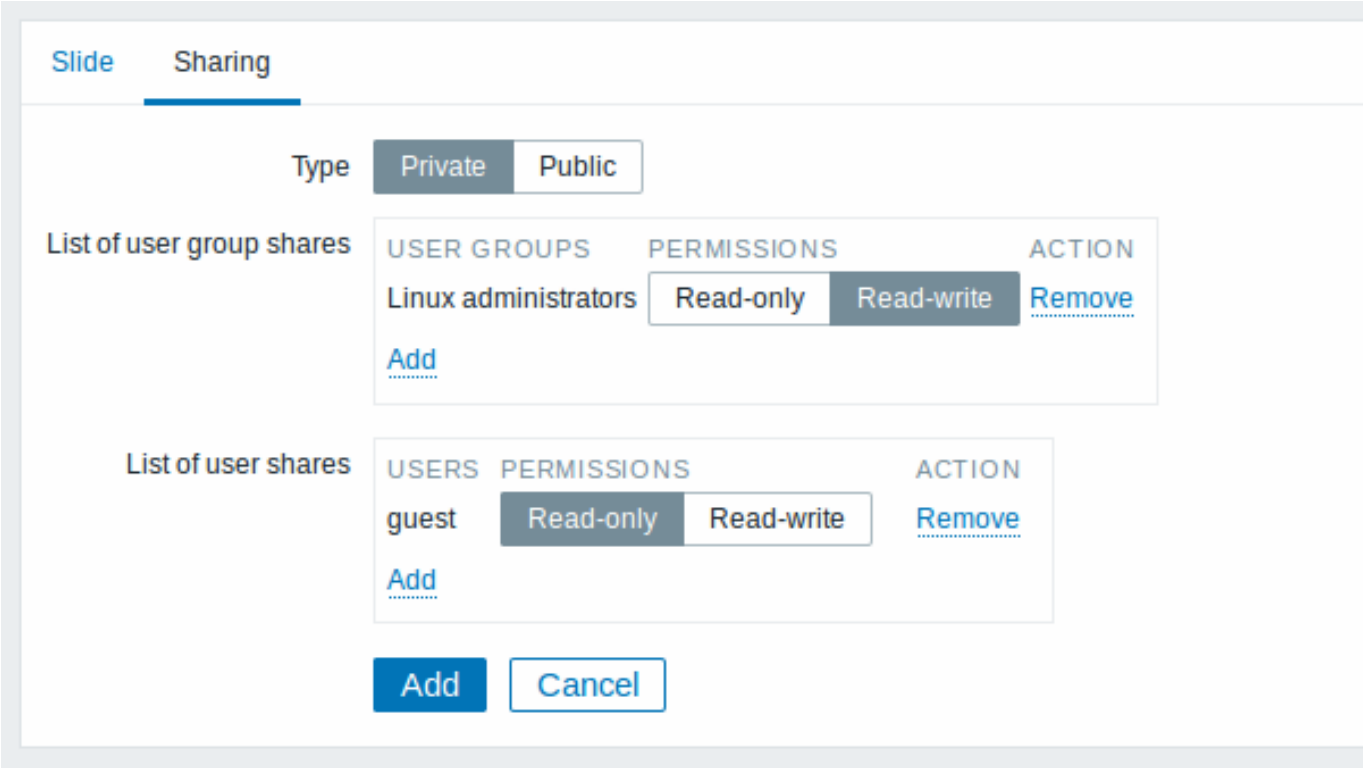
All mandatory input fields are marked with a red asterisk.

Parameter	Description
Owner	Select the slide show owner. Specifying owner is mandatory.
Name	Unique name of the slide show.
Default delay	How long one screen is displayed by default, before rotating to the next. Time suffixes are supported, e.g. 30s, 5m, 2h, 1d.
Slides	List of screens to be rotated. Click on *Add* to select screens. The *Up/Down* arrow before the screen allows to drag a screen up and down in the sort order of display. If you want to display only, say, a single graph in the slide show, create a screen containing just that one graph.
Screen	Screen name.
Delay	A custom value for how long the screen will be displayed, in seconds. If set to 0, the *Default delay* value will be used.
Action	Click on *Remove* to remove a screen from the slide show.

The slide show in this example consists of two screens which will be displayed in the following order:

Zabbix server ⇒ Displayed for 30 seconds ⇒ Zabbix server2 ⇒ Displayed for 15 seconds ⇒ Zabbix server ⇒ Displayed for 30 seconds ⇒ Zabbix server2 ⇒ ...

The **Sharing** tab contains the slide show type as well as sharing options (user groups, users) for private slide shows:



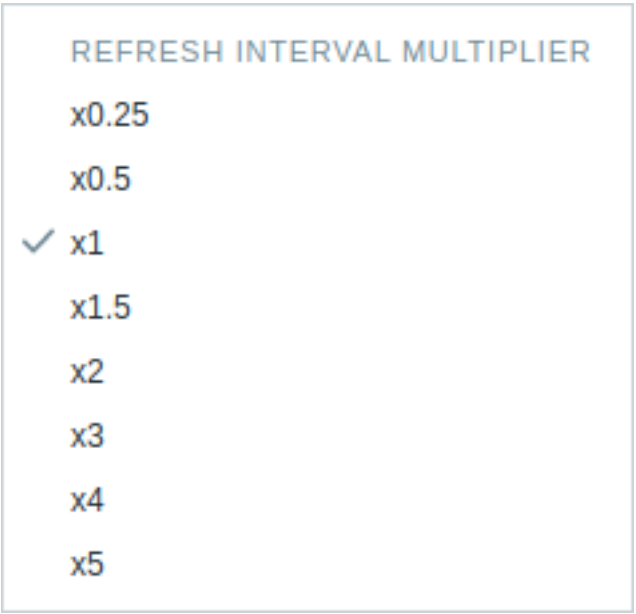
Parameter	Description
Type	Select slide show type: **Private** - slide show is visible only to selected user groups and users **Public** - slide show is visible to all
List of user group shares	Select user groups that the slide show is accessible to. You may allow read-only or read-write access.
List of user shares	Select users that the slide show is accessible to. You may allow read-only or read-write access.

Click on *Add* to save the slide show.

Display

Slide shows that are ready can be viewed in *Monitoring* → *Screens*, then choosing *Slide shows* from the dropdown and clicking on the slide show name.

With the Menu option next to the dropdown, you can accelerate or slow down the display by choosing a slide delay multiplier:



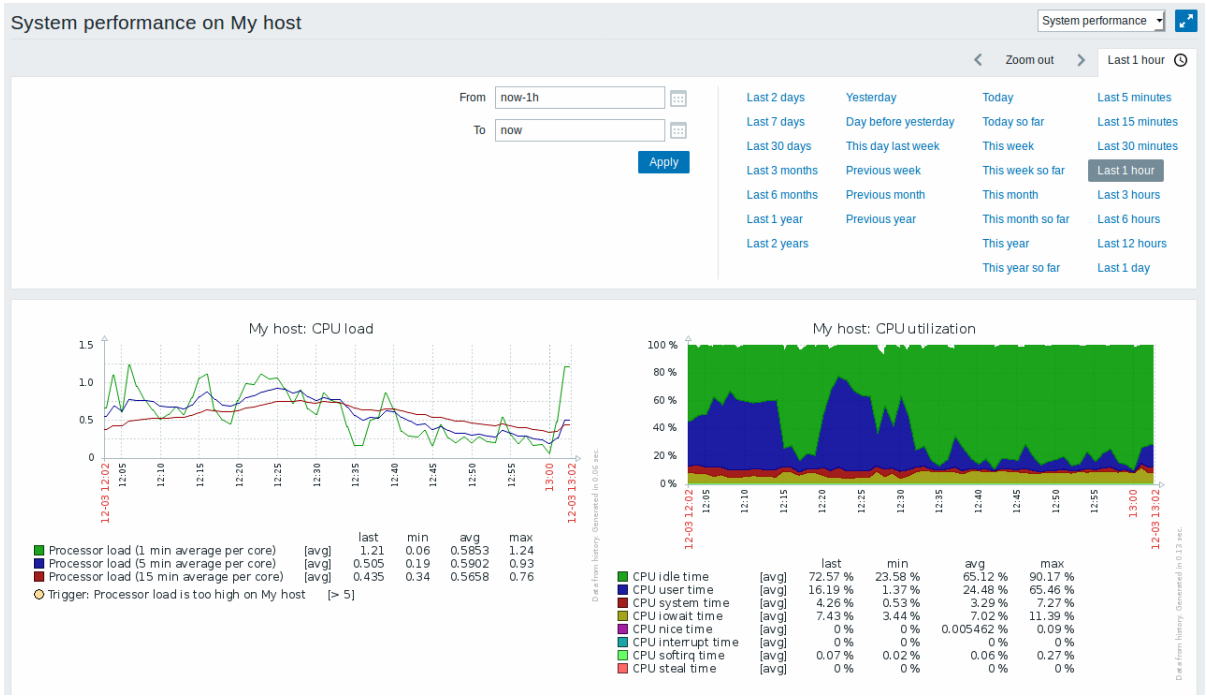
Attention:
If a delay ends up as being less than 5 seconds (either by having entered a delay less than 5 seconds or by using the slide delay multiplier), a 5-second minimum delay will be used.

5 Host screens

Overview

Host screens look similar to global screens, however, host screens display data about the host only. Host screens are configured on the template level and then are generated for a host, once the template is linked to the host.

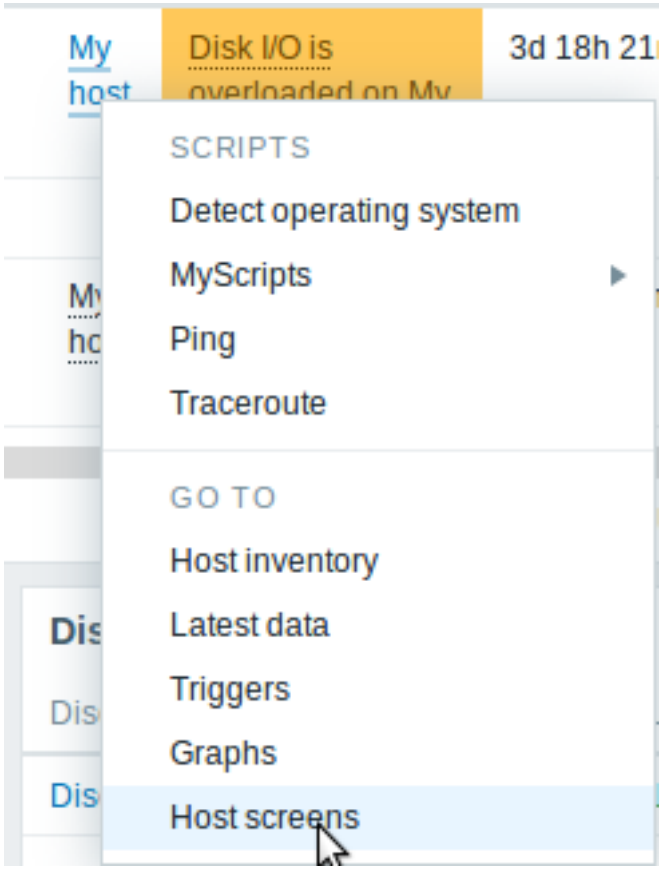
Host screens *cannot* be configured or directly accessed in the *Monitoring* → *Screens* section, which is reserved for global screens. The ways to access host screens are listed below in this section.



Accessing host screens

Access to host screens is provided:

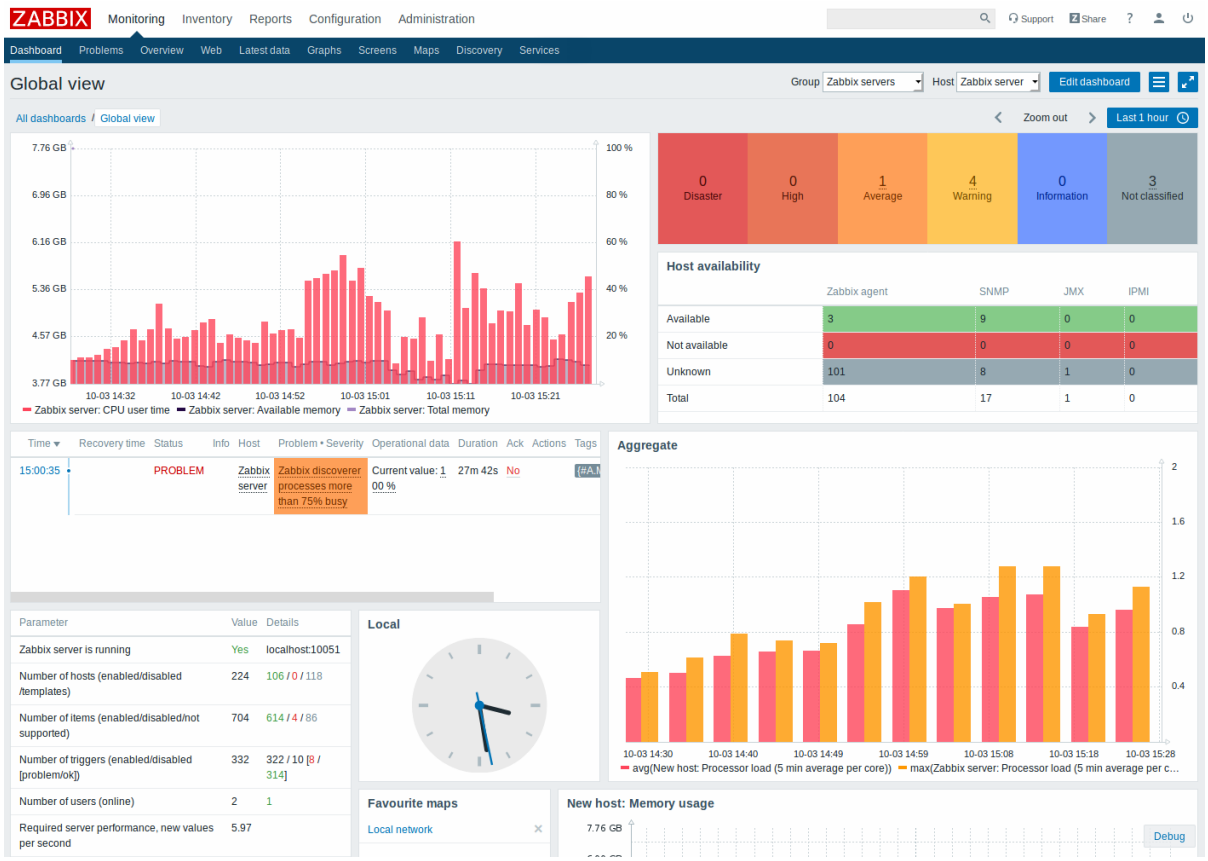
- From the host menu that is available in many frontend locations:
  - click on the host name and then select *Host screens* from the drop-down menu



- When searching for a host name in global search:
  - click on the *Screens* link provided in search results
- When clicking on a host name in *Inventory* → *Hosts*:
  - click on the *Screens* link provided

6 Dashboard

The dashboard and its widgets provide a strong visualization platform with such tools as modern graphs, maps and many more.



7 Templates

Overview

A template is a set of entities that can be conveniently applied to multiple hosts.

The entities may be:

- items
- triggers
- graphs
- applications
- screens (*since Zabbix 2.0*)
- low-level discovery rules (*since Zabbix 2.0*)
- web scenarios (*since Zabbix 2.2*)

As many hosts in real life are identical or fairly similar so it naturally follows that the set of entities (items, triggers, graphs,...) you have created for one host, may be useful for many. Of course, you could copy them to each new host, but that would be a lot of manual work. Instead, with templates you can copy them to one template and then apply the template to as many hosts as needed.

When a template is linked to a host, all entities (items, triggers, graphs,...) of the template are added to the host. Templates are assigned to each individual host directly (and not to a host group).

Templates are often used to group entities for particular services or applications (like Apache, MySQL, PostgreSQL, Postfix...) and then applied to hosts running those services.

Another benefit of using templates is when something has to be changed for all the hosts. Changing something on the template level once will propagate the change to all the linked hosts.

Thus, the use of templates is an excellent way of reducing one's workload and streamlining the Zabbix configuration.

Proceed to creating and configuring a template.

8 Templates out of the box

Overview

Zabbix strives to provide a growing list of useful out-of-the-box templates. Out-of-the-box templates come preconfigured and thus are a useful way for speeding up the deployment of monitoring jobs.

1 Standardized templates for network devices

Overview

In order to provide monitoring for network devices such as switches and routers, we have created two so-called models: for the network device itself (its chassis basically) and for network interface.

Since Zabbix 3.4 templates for many families of network devices are provided. All templates cover (where possible to get these items from the device):

- Chassis fault monitoring (power supplies, fans and temperature, overall status)
- Chassis performance monitoring (CPU and memory items)
- Chassis inventory collection (serial numbers, model name, firmware version)
- Network interface monitoring with IF-MIB and EtherLike-MIB (interface status, interface traffic load, duplex status for Ethernet)

These templates are available:

- In new installations - in *Configuration* → *Templates*;
- If you are upgrading from previous versions, you can find these templates in the `templates` directory of the downloaded latest Zabbix version. While in *Configuration* → *Templates* you can import them manually from this directory.

If you are importing the new out-of-the-box templates, you may want to also update the `@Network interfaces for discovery` global regular expression to:

```
Result is FALSE: ^Software Loopback Interface
Result is FALSE: ^(In)?[lL]oop[bB]ack[0-9._]*$
Result is FALSE: ^NULL[0-9.]*$
Result is FALSE: ^[lL]o[0-9.]*$
Result is FALSE: ^[sS]ystem$
Result is FALSE: ^Nu[0-9.]*$
```

to filter out loopbacks and null interfaces on most systems.

Devices

List of device families for which templates are available:

Template name	Vendor	Device family	Known models	OS	MIBs used	**Tags**
Template Net Alcatel Timetra TiMOS SNMPv2	Alcatel	Alcatel Timetra	ALCATEL SR 7750	TiMOS	TIMETRA-SYSTEM-MIB,TIMETRA-CHASSIS-MIB	Certified
Template Net Brocade FC SNMPv2	Brocade	Brocade FC switches	Brocade 300 SAN Switch-	-	SW-MIB,ENTITY-MIB	Performance, Fault
Template Net Brocade_Foundry Stackable SNMPv2	Brocade	Brocade ICX	Brocade ICX6610, Brocade ICX7250-48, Brocade ICX7450-48F		FOUNDRY-SN-AGENT-MIB, FOUNDRY-SN-STACKING-MIB	Certified

Template name	Vendor	Device family	Known models	OS	MIBs used	Tags
Template Net Brocade_Foundry Nonstackable SNMPv2	Brocade Foundry	Brocade MLX, Foundry	Brocade MLXe, Foundry FLS648, Foundry FWSX424		FOUNDRY-SN-AGENT-MIB	Performance, Fault
Template Net Cisco IOS SNMPv2	Cisco	Cisco IOS ver > 12.2 3.5	Cisco C2950	IOS	CISCO-PROCESS-MIB,CISCO-MEMORY-POOL-MIB,CISCO-ENVMON-MIB	Certified
Template Net Cisco releases later than 12.0_3_T and prior to 12.2_3.5_ SNMPv2	Cisco	Cisco IOS > 12.0 3 T and 12.2 3.5	-	IOS	CISCO-PROCESS-MIB,CISCO-MEMORY-POOL-MIB,CISCO-ENVMON-MIB	Certified
Template Net Cisco releases prior to 12.0_3_T SNMPv2	Cisco	Cisco IOS 12.0 3 T	-	IOS	OLD-CISCO-CPU-MIB,CISCO-MEMORY-POOL-MIB	Certified
Template Net D-Link DES_DGS Switch SNMPv2	D-Link	DES/DGX switches	D-Link DES-xxxx/DGS-xxxx,DLINK DGS-3420-26SC	-	DLINK-AGENT-MIB,EQUIPMENT-MIB,ENTITY-MIB	Certified
Template Net D-Link DES 7200 SNMPv2	D-Link	DES-7xxx	D-Link DES 7206	-	ENTITY-MIB,MY-SYSTEM-MIB,MY-PROCESS-MIB,MY-MEMORY-MIB	Performance Fault Interfaces
Template Net Dell Force S-Series SNMPv2	Dell	Dell Force S-Series	S4810		F10-S-SERIES-CHASSIS-MIB	Certified
Template Net Extreme Exos SNMPv2	Extreme	Extreme EXOS	X670V-48x	EXOS	EXTREME-SYSTEM-MIB,EXTREME-SOFTWARE-MONITOR-MIB	Certified
Template Net Huawei VRP SNMPv2	Huawei	Huawei VRP	S2352P-EI	-	ENTITY-MIB,HUAWEI-ENTITY-EXTENT-MIB	Certified

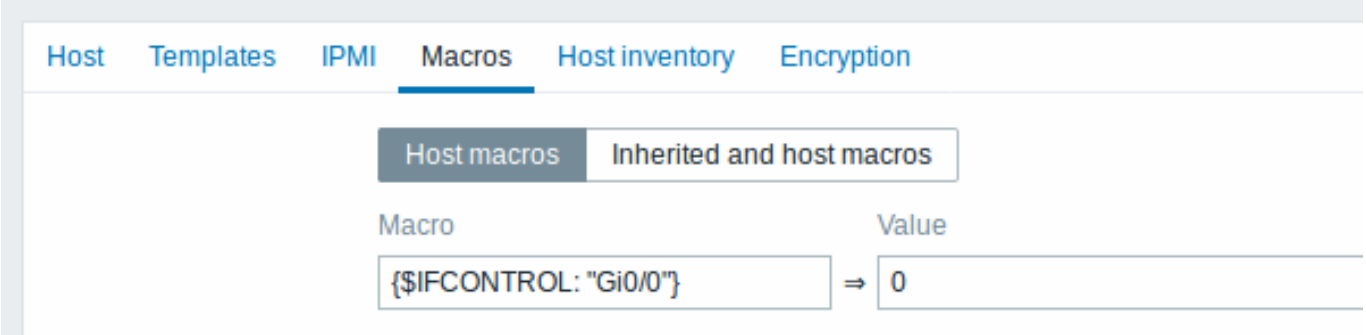
Template name	Vendor	Device family	Known models	OS	MIBs used	Tags
Template Net Intel_Qlogic Infiniband SNMPv2	Intel/QLogic	Intel/QLogic Infiniband devices	Infiniband 12300		ICS-CHASSIS-MIB	Fault Inventory
Template Net Juniper SNMPv2	Juniper	MX,SRX,EX models	Juniper MX240, Juniper EX4200-24F	JunOS	JUNIPER-MIB	Certified
Template Net Mellanox SNMPv2	Mellanox	Mellanox Infiniband devices	SX1036	MLNX-OS	HOST-RESOURCES-MIB,ENTITY-MIB,ENTITY-SENSOR-MIB,MELLANOX-MIB	Certified
Template Net Mikrotik SNMPv2	Mikrotik	Mikrotik RouterOS devices	Mikrotik CCR1016-12G, Mikrotik RB2011UAS-2HnD, Mikrotik 912UAG-5HPnD, Mikrotik 941-2nD, Mikrotik 951G-2HnD, Mikrotik 1100AHx2	RouterOS	MIKROTIK-MIB,HOST-RESOURCES-MIB	Certified
Template Net QTech QSW SNMPv2	QTech	Qtech devices	Qtech QSW-2800-28T	-	QTECH-MIB,ENTITY-MIB	Performance Inventory
Template Net Ubiquiti AirOS SNMPv1	Ubiquiti	Ubiquiti AirOS wireless devices	NanoBridge, NanoStation, Loco	AirOS	SNMPv2-MIB,HOST-RESOURCES-MIB,IEEE802dot11-MIB	Performance
Template Net HP Comware HH3C SNMPv2	HP	HP (H3C) Comware	HP A5500-24G-4SFP HI Switch		HH3C-ENTITY-EXT-MIB,ENTITY-MIB	Certified
Template Net HP Enterprise Switch SNMPv2	HP	HP Enterprise Switch	HP ProCurve J4900B Switch 2626, HP J9728A 2920-48G Switch		STATISTICS-MIB,NETSWITCH-MIB,HP-ICF-CHASSIS,ENTITY-MIB,SEMI-MIB	Certified
Template Net TP-LINK SNMPv2	TP-LINK	TP-LINK	T2600G-28TS v2.0		TPLINK-SYSMONITOR-MIB,TPLINK-SYSINFO-MIB	Performance Inventory

Template name	Vendor	Device family	Known models	OS	MIBs used	Tags
Template Net Netgear Fastpath SNMPv2	Netgear	Netgear Fastpath	M5300-28G		FASTPATH-SWITCHING-MIB,FASTPATH-BOXSERVICES-PRIVATE-MIB	Fault Inventory

Template design

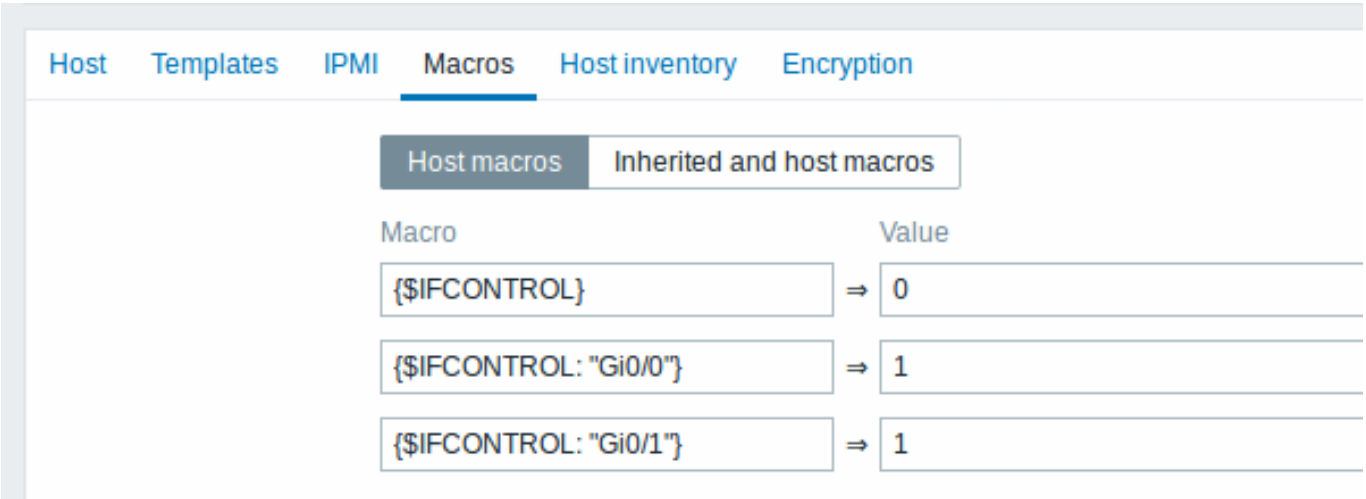
Templates were designed with the following in mind:

- User macros are used as much as possible so triggers can be tuned by the user
- Low-level discovery is used as much as possible to minimize the number of unsuppported items
- Templates are provided for SNMPv2. SNMPv1 is used if it is known that the majority of devices don't support SNMPv2.
- All templates depend on Template ICMP Ping so all devices are also checked by ICMP
- Items don't use any MIBs - SNMP OIDs are used in items and low-level discoveries. So it's not necessary to load any MIBs into Zabbix for templates to work.
- Loopback network interfaces are filtered when discovering as well as interfaces with ifAdminStatus = down(2)
- 64bit counters are used from IF-MIB::ifXTable where possible. If it is not supported, default 32bit counters are used instead.
- All discovered network interfaces have a trigger that controls its operational status(link).
  - If you do no want to monitor this condition for a specific interface create a user macro with context with the value 0. For example:



where Gi0/0 is {#IFNAME}. That way the trigger is not used any more for this specific interface.

```
* You can also change the default behaviour for all triggers not to fire and activate this trigger only
```



Tags

- Performance – device family MIBs provide a way to monitor CPU and memory items;
- Fault - device family MIBs provide a way to monitor at least one temperature sensor;
- Inventory – device family MIBs provide a way to collect at least the device serial number and model name;
- Certified – all three main categories above are covered.

2 Template operation

This section contains requirements for template operation.

Requirements for MySQL by ODBC template

Overview

This section contains the required steps to ensure proper operation of *Template DB MySQL by ODBC*, developed for monitoring DBMS MySQL and its forks (such as MariaDB, etc.) **by ODBC**. (If Zabbix agent is installed on the host and will perform monitoring, see requirements for the MySQL by Zabbix agent template instead.)

> **Attention:**
> The template doesn't support monitoring of the multi-master replications.

Steps

1. Create MySQL user for monitoring (choose your own <password>). For example:

```
CREATE USER 'zbx_monitor'@'%' IDENTIFIED BY '<password>';
GRANT USAGE,REPLICATION CLIENT,PROCESS,SHOW DATABASES,SHOW VIEW ON *.* TO 'zbx_monitor'@'%';
```

For more information, please see MYSQL documentation.

2. Set the user name and password in host macros ({$MYSQL.USER} and {$MYSQL.PASSWORD}).

3. Import `template_db_mysql_odbc.xml` (found in the *templates* directory of the latest Zabbix version or Zabbix Git repository) into Zabbix and link it to the target host.

Requirements for MySQL by Zabbix agent template

Overview

This section contains the required steps to ensure proper operation of *Template DB MySQL by Zabbix agent*, developed for monitoring DBMS MySQL and its forks (such as MariaDB, etc.) by Zabbix agent. For monitoring MySQL by ODBC see requirements for the MySQL by ODBC template.

> **Attention:**
> The template doesn't support monitoring of the multi-master replications.

Steps

1. Install Zabbix agent and MySQL client.

If necessary, add the path to the `mysql` and `mysqladmin` utilities to the global environment variable PATH.

2. Copy the `template_db_mysql.conf` file (can be downloaded from the Zabbix Git repository) into folder with Zabbix agent configuration (/etc/zabbix/zabbix_agentd.d/ by default). Don't forget restart Zabbix agent.

3. Create MySQL user for monitoring (choose your own <password>). For example:

```
CREATE USER 'zbx_monitor'@'%' IDENTIFIED BY '<password>';
GRANT USAGE,REPLICATION CLIENT,PROCESS,SHOW DATABASES,SHOW VIEW ON *.* TO 'zbx_monitor'@'%';
```

For more information, please see MYSQL documentation.

4. Create `.my.cnf` in the home directory of Zabbix agent for Linux (/var/lib/zabbix by default) or `my.cnf` in c:\ for Windows. The file must have three strings:

```
[client]
user='zbx_monitor'
password='<password>'
```

5. Import `template_db_mysql_agent.xml` (`template_db_mysql.xml` in Zabbix versions prior to 4.4.6) into Zabbix and link it to the target host.

Requirements for PostgreSQL template

Overview

This section contains the required steps to ensure proper operation of *Template DB PostgreSQL*.

Steps

1. Install Zabbix agent and create a read-only **zbx_monitor** user with proper access to your PostgreSQL server.

For PostgreSQL version 10 and above:

```
CREATE USER zbx_monitor WITH PASSWORD '<PASSWORD>' INHERIT;
GRANT pg_monitor TO zbx_monitor;
```

For older PostgreSQL versions:

```
CREATE USER zbx_monitor WITH PASSWORD '<PASSWORD>';
GRANT SELECT ON pg_stat_database TO zbx_monitor;
```

2. Copy `postgresql/` to Zabbix agent home directory (/var/lib/zabbix/). The directory contains the files needed to obtain metrics from PostgreSQL.

3. Copy `template_db_postgresql.conf` (found in the *templates* directory of the downloaded latest Zabbix version) to Zabbix agent configuration directory (/etc/zabbix/zabbix_agentd.d/) and restart Zabbix agent service.

4. Edit `pg_hba.conf` to allow connections from Zabbix agent (https://www.postgresql.org/docs/current/auth-pg-hba-conf.html).

Add rows (for example):

```
host all zbx_monitor 127.0.0.1/32 trust
host all zbx_monitor 0.0.0.0/0 md5
host all zbx_monitor ::0/0 md5
```

5. If you need to monitor a remote server then create a `.pgpass` file in Zabbix agent home directory (/var/lib/zabbix/) and add the connection details with the instance, port, database, user and password information in the format below (https://www.postgresql.org/docs/current/libpq-pgpass.html).

Add rows, for example:

```
<REMOTE_HOST1>:5432:postgres:zbx_monitor:<PASSWORD>
<REMOTE_HOST2>:5432:postgres:zbx_monitor:<PASSWORD>
...
<REMOTE_HOSTN>:5432:postgres:zbx_monitor:<PASSWORD>
```

Or, example 2:

```
*:5432:postgres:zbx_monitor:<PASSWORD>
```

6. Import `template_db_postgresql.xml` in to Zabbix and link it to the target host.

9 Notifications upon events

Overview

Assuming that we have configured some items and triggers and now are getting some events happening as a result of triggers changing state, it is time to consider some actions.

To begin with, we would not want to stare at the triggers or events list all the time. It would be much better to receive notification if something significant (such as a problem) has happened. Also, when problems occur, we would like to see that all the people concerned are informed.

That is why sending notifications is one of the primary actions offered by Zabbix. Who and when should be notified upon a certain event can be defined.

To be able to send and receive notifications from Zabbix you have to:

- define some media
- configure an action that sends a message to one of the defined media

Actions consist of *conditions* and *operations*. Basically, when conditions are met, operations are carried out. The two principal operations are sending a message (notification) and executing a remote command.

For discovery and auto-registration created events, some additional operations are available. Those include adding or removing a host, linking a template etc.

1 Media types

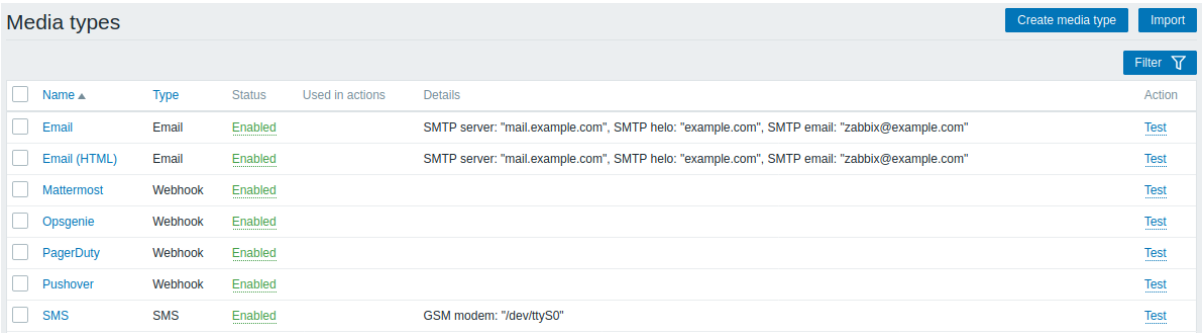
Overview

Media are the delivery channels used for sending notifications and alerts from Zabbix.

You can configure several media types:

- E-mail
- SMS
- Custom alertscripts
- Webhook

Media types are configured in *Administration* → *Media types*.



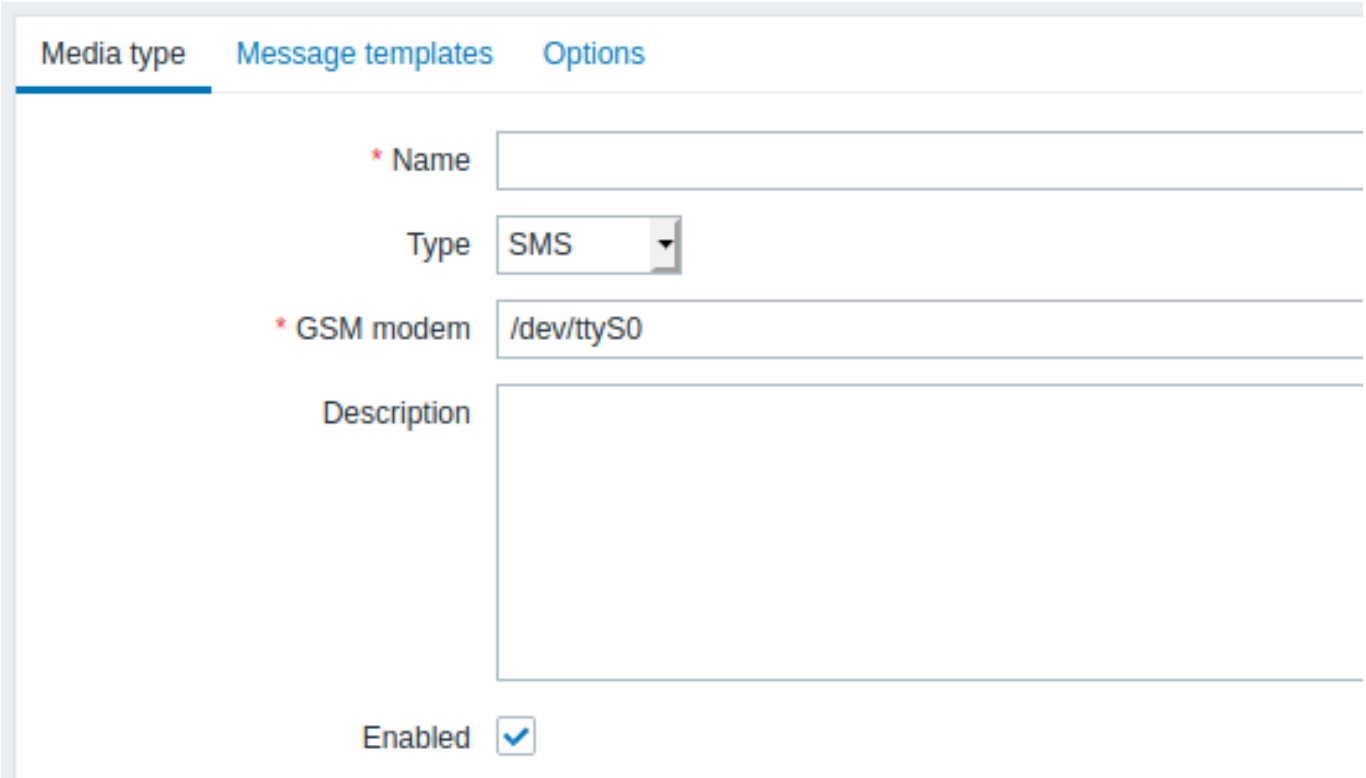
Some media types come pre-defined in the default dataset. You just need to finetune their parameters to get them working.

It is possible to test if a configured media type works, by clicking on *Test* in the last column (see Media type testing for more details).

To create a new media type, click on the *Create media type* button. A media type configuration form is opened.

Common parameters

Some parameters are common for all media types.



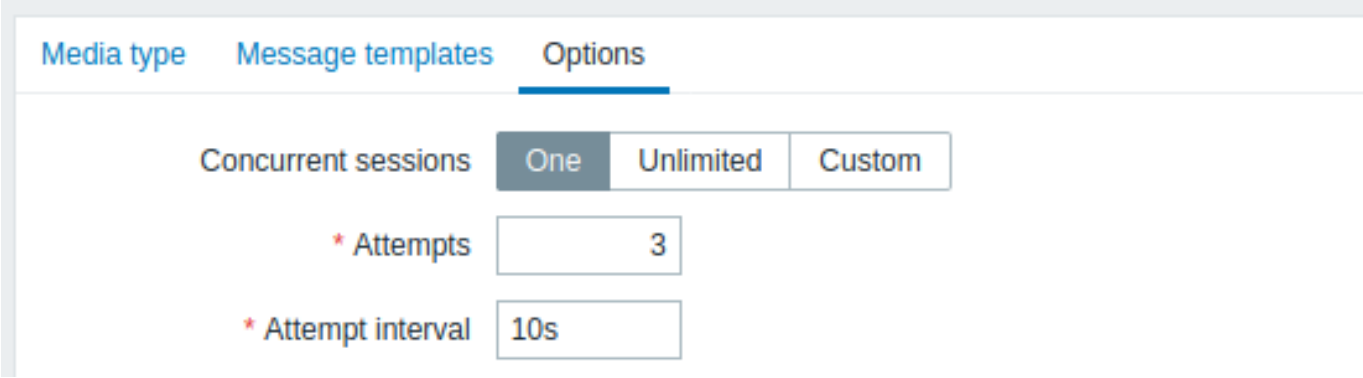
In the **Media type** tab the common general attributes are:

Parameter	Description
Name	Name of the media type.
Type	Select the type of media.
Description	Enter a description.
Enabled	Mark the checkbox to enable the media type.

See the individual pages of media types for media-specific parameters.

The **Options** tab contains alert processing settings. The same set of options is configurable for each media type.

All media types are processed in parallel. While the maximum number of concurrent sessions is configurable per media type, the total number of alerter processes on server can only be limited by the StartAlerters parameter. Alerts generated by one trigger are processed sequentially. So multiple notifications may be processed simultaneously only if they are generated by multiple triggers.



Parameter	Description
Concurrent sessions	Select the number of parallel alerter sessions for the media type: **One** - one session **Unlimited** - unlimited number of sessions **Custom** - select a custom number of sessions Unlimited/high values mean more parallel sessions and increased capacity for sending notifications. Unlimited/high values should be used in large environments where lots of notifications may need to be sent simultaneously.
Attempts	Number of attempts for trying to send a notification. Up to 10 attempts can be specified; default value is '3'. If '1' is specified Zabbix will send the notification only once and will not retry if the sending fails.
Attempt interval	Frequency of trying to resend a notification in case the sending failed, in seconds (0-60). If '0' is specified, Zabbix will retry immediately. Time suffixes are supported, e.g. 5s, 1m.

Media type testing

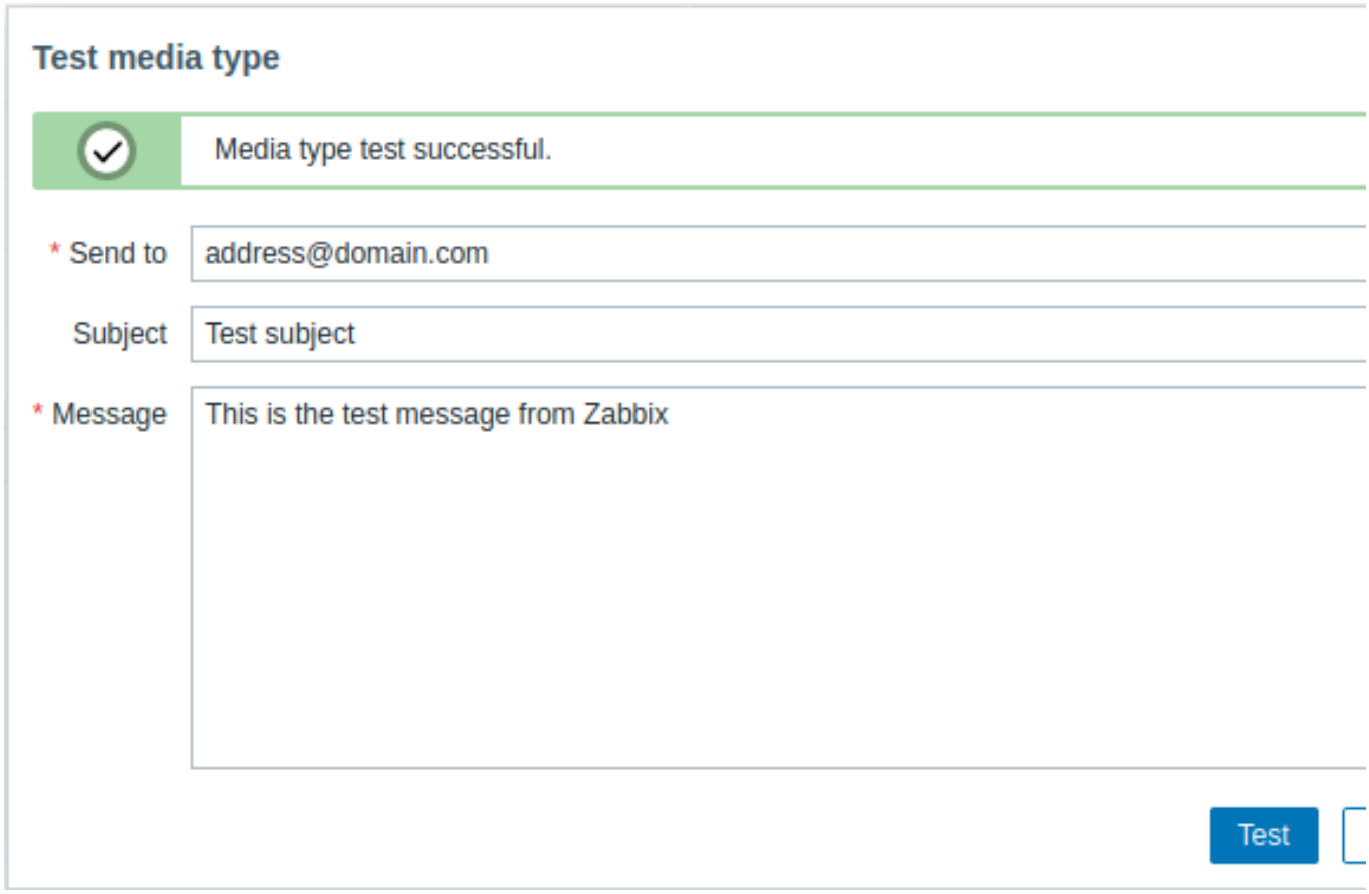
It is possible to test if a configured media type works.

E-mail

For example, to test an e-mail media type:

- Locate the relevant e-mail in the list of media types
- Click on *Test* in the last column of the list (a testing window will open)
- Enter a *Send to* recipient address and with body and optional subject
- Send a test message by clicking on *Test*

Test success or failure message will be displayed in the same window:



**Webhook **

Attention:
Webhook media type testing is supported since Zabbix 4.4.2.

To test a webhook media type:

- Locate the relevant webhook in the list of media types
- Click on *Test* in the last column of the list (a testing window will open)
- Edit the webhook parameter values, if needed
- Click on *Test*

By default, webhook tests are performed with parameters entered during configuration. However, it is possible to change attribute values for testing. Replacing or deleting values in the testing window affects the test procedure only, the actual webhook attribute values will remain unchanged.

If the webhook test is successful

- *"Media type test successful."* message is displayed
- Server response appears in the grey *Response* field
- Response type (JSON or String) is specified below the *Response* field

If the webhook test fails

- *"Media type test failed."* message is displayed, followed by additional failure details.

1 E-mail

Overview

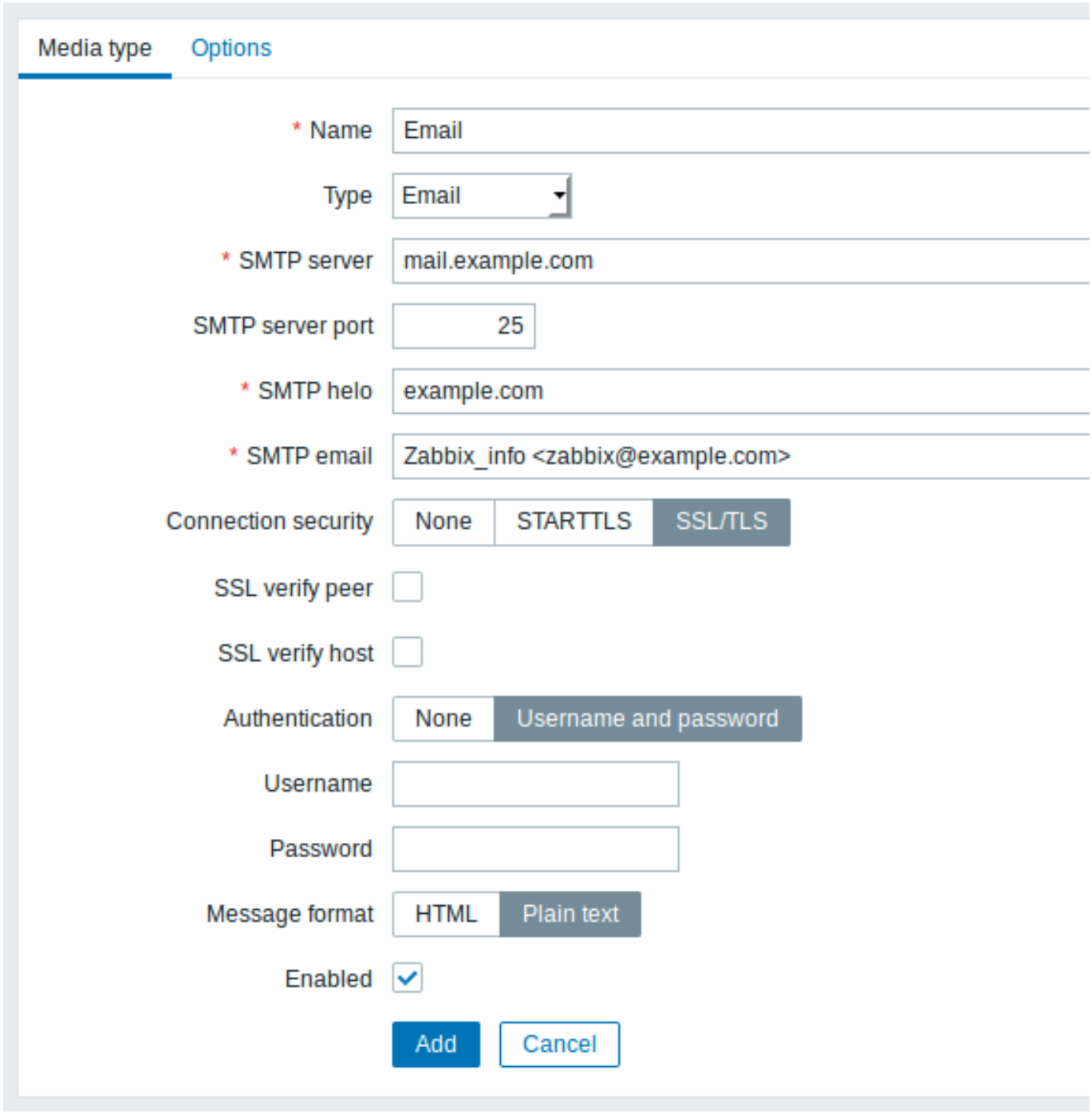
To configure e-mail as the delivery channel for messages, you need to configure e-mail as the media type and assign specific addresses to users.

Configuration

To configure e-mail as the media type:

- Go to *Administration → Media types*
- Click on *Create media type* (or click on *E-mail* in the list of pre-defined media types).

The **Media type** tab contains general media type attributes:



All mandatory input fields are marked with a red asterisk.

The following parameters are specific for the e-mail media type:

Parameter	Description
SMTP server	Set an SMTP server to handle outgoing messages.
SMTP server port	Set the SMTP server port to handle outgoing messages. This option is supported *starting with Zabbix 3.0*.
SMTP helo	Set a correct SMTP helo value, normally a domain name.

Parameter	Description
SMTP email	The address entered here will be used as the **From** address for the messages sent. Adding a sender display name (like ”Zabbix_info” in *Zabbix_info <zabbix@company.com>* in the screenshot above) with the actual e-mail address is supported since Zabbix 2.2 version. There are some restrictions on display names in Zabbix emails in comparison to what is allowed by RFC 5322, as illustrated by examples: Valid examples: *zabbix@company.com* (only email address, no need to use angle brackets) *Zabbix_info <zabbix@company.com>* (display name and email address in angle brackets) *∑Ω-monitoring <zabbix@company.com>* (UTF-8 characters in display name) Invalid examples: *Zabbix HQ zabbix@company.com* (display name present but no angle brackets around email address) *”Zabbix\@\<H(comment)Q\>” <zabbix@company.com>* (although valid by RFC 5322, quoted pairs and comments are not supported in Zabbix emails)
Connection security	Select the level of connection security: **None** - do not use the CURLOPT_USE_SSL option **STARTTLS** - use the CURLOPT_USE_SSL option with CURLUSESSL_ALL value **SSL/TLS** - use of CURLOPT_USE_SSL is optional This option is supported *starting with Zabbix 3.0*.
SSL verify peer	Mark the checkbox to verify the SSL certificate of the SMTP server. The value of ”SSLCALocation” server configuration directive should be put into CURLOPT_CAPATH for certificate validation. This sets cURL option CURLOPT_SSL_VERIFYPEER. This option is supported *starting with Zabbix 3.0*.
SSL verify host	Mark the checkbox to verify that the *Common Name* field or the *Subject Alternate Name* field of the SMTP server certificate matches. This sets cURL option CURLOPT_SSL_VERIFYHOST. This option is supported *starting with Zabbix 3.0*.
Authentication	Select the level of authentication: **None** - no cURL options are set (since 3.4.2) **Username and password** - implies ”AUTH=*” leaving the choice of authentication mechanism to cURL (until 3.4.2) **Normal password** - CURLOPT_LOGIN_OPTIONS is set to ”AUTH=PLAIN” This option is supported *starting with Zabbix 3.0*.
Username	User name to use in authentication. This sets the value of CURLOPT_USERNAME. This option is supported *starting with Zabbix 3.0*.
Password	Password to use in authentication. This sets the value of CURLOPT_PASSWORD. This option is supported *starting with Zabbix 3.0*.
Message format	Select message format: **HTML** - send as HTML **Plain text** - send as plain text

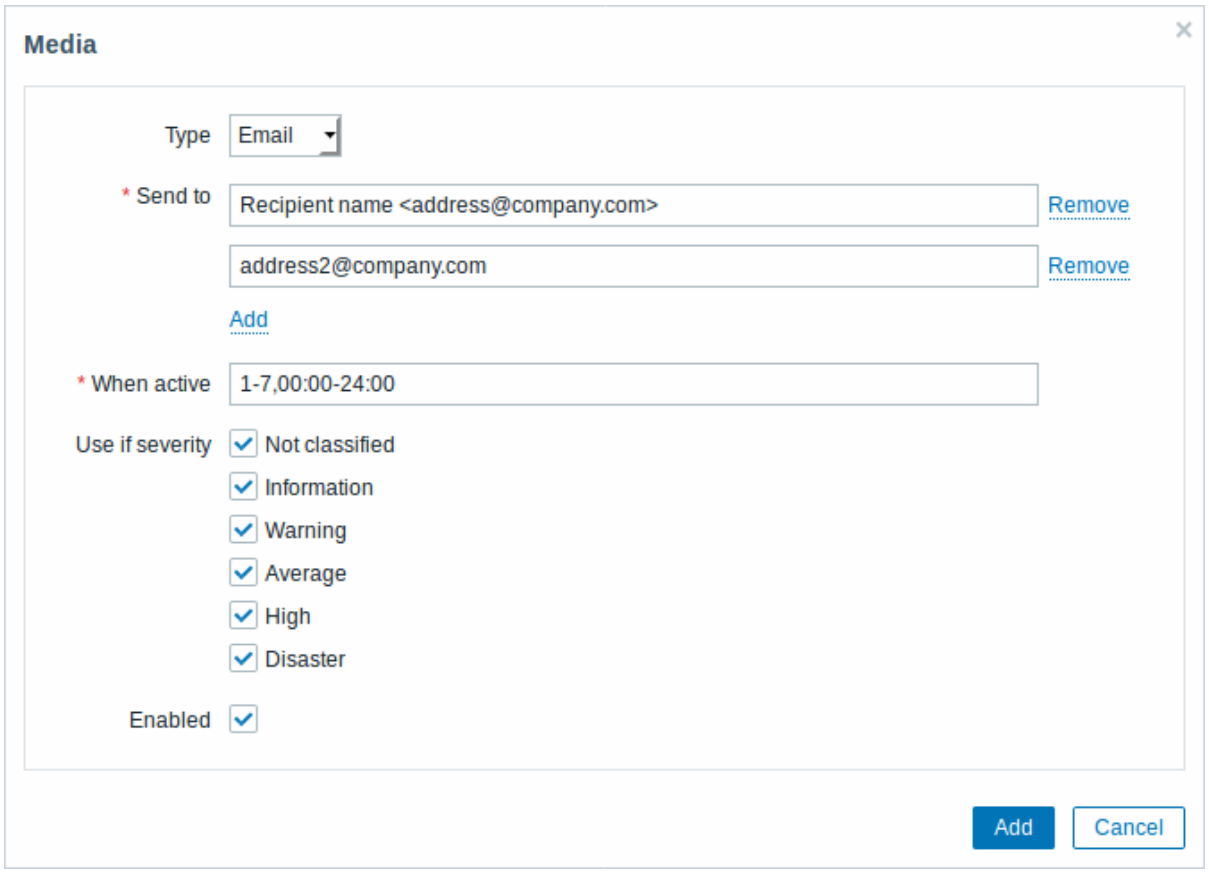
Attention:
To make SMTP authentication options available, Zabbix server should be compiled with the --with-libcurl compilation option with cURL 7.20.0 or higher.

See also common media type parameters for details on how to configure alert processing options.

User media

To assign a specific address to the user:

- Go to *Administration* → *Users*
- Open the user properties form
- In Media tab, click on *Add*



User media attributes:

Parameter	Description
Type	Select *Email* as the type.
Send to	Specify e-mail addresses to send the messages to. To add more than one address click on *Add* below the address field. If multiple e-mail addresses are specified, one e-mail will be sent to all the specified recipients. You may add the recipient display name (like ”Recipient name” in *Recipient name <address1@company.com>* in the screenshot above) with the actual e-mail address. See examples and restrictions on display name and email address in media type attribute SMTP email description.
When active	You can limit the time when messages are sent, for example, the working days only (1-5,09:00-18:00). See the Time period specification page for description of the format. User macros are supported.
Use if severity	Mark the checkboxes of trigger severities that you want to receive notifications for. *Note* that the default severity (’Not classified’) **must be** checked if you want to receive notifications for non-trigger events. After saving, the selected trigger severities will be displayed in the corresponding severity colours while unselected ones will be greyed out.
Status	Status of the user media. **Enabled** - is in use. **Disabled** - is not being used.

2 SMS

Overview

Zabbix supports the sending of SMS messages using a serial GSM modem connected to Zabbix server's serial port.

Make sure that:

- The speed of the serial device (normally /dev/ttyS0 under Linux) matches that of the GSM modem. Zabbix does not set the speed of the serial link. It uses default settings.
- The 'zabbix' user has read/write access to the serial device. Run the command ls –l /dev/ttyS0 to see current permissions of the serial device.
- The GSM modem has PIN entered and it preserves it after power reset. Alternatively you may disable PIN on the SIM card. PIN can be entered by issuing command AT+CPIN="NNNN" (NNNN is your PIN number, the quotes must be present) in a terminal software, such as Unix minicom or Windows HyperTerminal.

Zabbix has been tested with these GSM modems:

- Siemens MC35
- Teltonika ModemCOM/G10

To configure SMS as the delivery channel for messages, you also need to configure SMS as the media type and enter the respective phone numbers for the users.

Configuration

To configure SMS as the media type:

- Go to *Administration* → *Media types*
- Click on *Create media type* (or click on *SMS* in the list of pre-defined media types).

The following parameters are specific for the SMS media type:

Parameter	Description
GSM modem	Set the serial device name of the GSM modem.

See common media type parameters for details on how to configure alert processing options. Note that parallel processing of sending SMS notifications is not possible.

User media

To assign a phone number to the user:

- Go to *Administration* → *Users*
- Open the user properties form
- In Media tab, click on *Add*

User media attributes:

Parameter	Description
Type	Select *SMS* as the type.
Send to	Specify the phone number to send messages to.
When active	You can limit the time when messages are sent, for example, the working days only (1-5,09:00-18:00). See the Time period specification page for description of the format.
Use if severity	Mark the checkboxes of trigger severities that you want to receive notifications for. *Note* that the default severity ('Not classified') **must be** checked if you want to receive notifications for non-trigger events. After saving, the selected trigger severities will be displayed in the corresponding severity colours while unselected ones will be greyed out.
Status	Status of the user media. **Enabled** - is in use. **Disabled** - is not being used.

3 Custom alertscripts

Overview

If you are not satisfied with existing media types for sending alerts there is an alternative way to do that. You can create a script that will handle the notification your way.

Alert scripts are executed on Zabbix server. These scripts are located in the directory defined in the server configuration file **AlertScriptsPath** variable.

Here is an example alert script:

```
#####!/bin/bash

to=$1
subject=$2
body=$3

cat <<EOF | mail -s "$subject" "$to"
$body
EOF
```

Attention:
Starting from version 3.4 Zabbix checks for the exit code of the executed commands and scripts. Any exit code which is different from **0** is considered as a command execution error. In such case Zabbix will try to repeat failed execution.

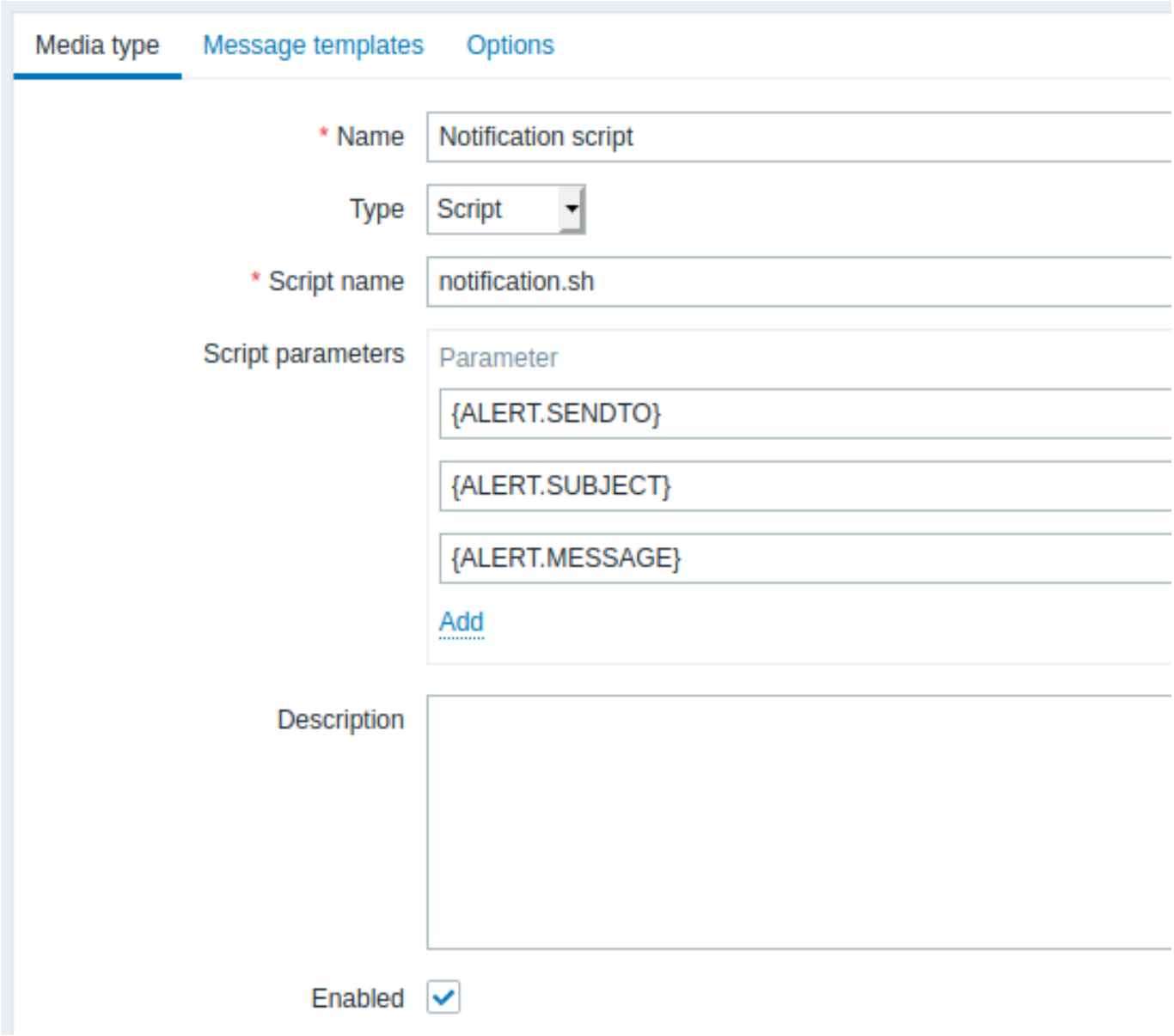
Environment variables are not preserved or created for the script, so they should be handled explicitly.

Configuration

To configure custom alertscripts as the media type:

- Go to *Administration* → *Media types*
- Click on *Create media type*

The **Media type** tab contains general media type attributes:



All mandatory input fields are marked with a red asterisk.

The following parameters are specific for the script media type:

Parameter	Description
Script name	Enter the name of the script.
Script parameters	Add command-line parameters to the script. {ALERT.SENDTO}, {ALERT.SUBJECT} and {ALERT.MESSAGE} macros are supported in script parameters. Customizing script parameters is supported since Zabbix 3.0.

See common media type parameters for details on how to configure alert processing options.

Attention:
As parallel processing of media types is implemented since Zabbix 3.4.0, it is important to note that with more than one script media type configured, these scripts may be processed in parallel by alerter processes. The total number of alerter processes is limited by the StartAlerters parameter.

User media

To assign custom alertscripts to the user:

- Go to *Administration → Users*
- Open the user properties form
- In Media tab, click on *Add*

User media attributes:

Parameter	Description
Type	Select the custom alertscripts media type.
Send to	Specify the recipient to receive the alerts.
When active	You can limit the time when alertscripts are executed, for example, the working days only (1-5,09:00-18:00). See the Time period specification page for description of the format.
Use if severity	Mark the checkboxes of trigger severities that you want to activate the alertscript for. *Note* that the default severity ('Not classified') **must be** checked if you want to receive notifications for non-trigger events. After saving, the selected trigger severities will be displayed in the corresponding severity colours while unselected ones will be greyed out.
Status	Status of the user media. **Enabled** - is in use. **Disabled** - is not being used.

4 Webhook

Overview

This media type is useful for making HTTP calls using custom JavaScript code for straightforward integration with external systems like helpdesk systems, chats or messengers.

To use a webhook as the notification mechanism, you need to first configure a webhook as the media type and then indicate specific addresses for users, before using the media type in action configuration.

You may import a preconfigured webhook media type or as well as create your own.

Integrations

Several integrations are available allowing to use predefined webhook media types for pushing Zabbix notifications to:

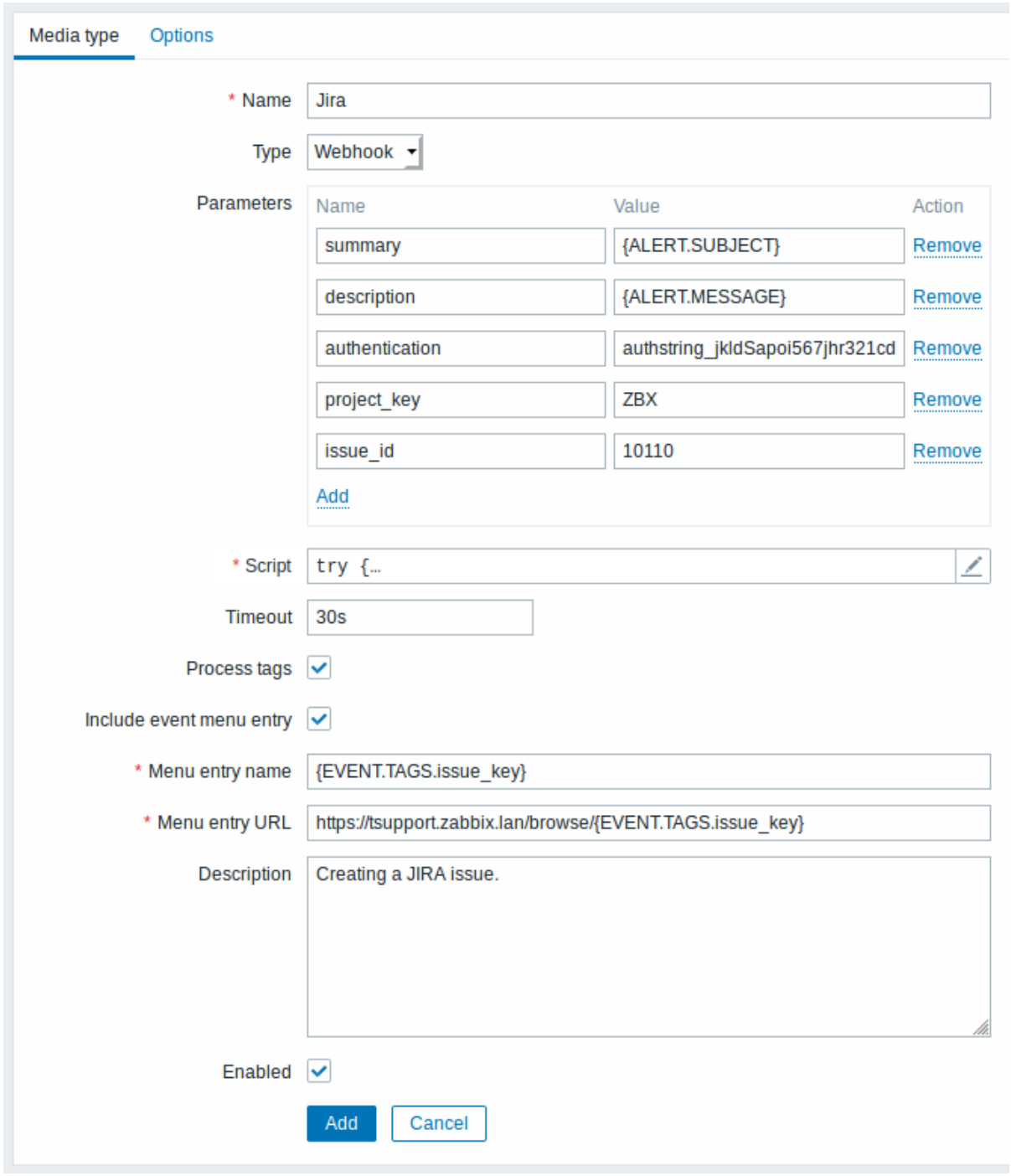
- Since Zabbix 4.4.4:
  - Mattermost
  - Opsgenie
  - Pushover
- Since Zabbix 4.4.5:
  - Pagerduty
  - Slack
- Since Zabbix 4.4.6:
  - Discord
- Since Zabbix 4.4.8:
  - Telegram

Configuration

To configure a webhook as the media type:

- Go to *Administration → Media types*
- Click on *Create media type*

The **Media type** tab contains various attributes specific for this media type:



All mandatory input fields are marked with a red asterisk.

The following parameters are specific for the webhook media type:

Parameter	Description
Parameters	Specify the webhook variables as attribute and value pairs. Some variables are included by default (URL:<empty>, To:{ALERT.SENDTO}, Subject:{ALERT.SUBJECT}, Message:%7BALERT.MESSAGE}), you may keep or remove them. Values are URL-encoded automatically. Values from macros are resolved and then URL-encoded automatically. All macros that are supported in problem notifications are supported in the parameters.

Parameter	Description
Script	Enter JavaScript code in the block that appears when clicking in the parameter field (or on the view/edit button next to it). This code will perform the webhook operation (see examples). The code has access to all parameters, it may perform HTTP GET, POST, PUT and DELETE requests and has control over HTTP headers and request body. It may return OK status along with an optional list of tags and tag values (for example, Jira ID: PROD-1234, Responsible: John Smith, Processed:<no value>, etc) or an error string. See also: Additional Javascript objects. Note that the script is executed only after an alert is created. If the script is configured to return and process tags (see *Process tags* option), these tags will not get resolved in {EVENT.TAGS} and {EVENT.RECOVERY.TAGS} macros in the initial problem message and recovery messages because the script has not had the time to run yet.
Timeout	JavaScript execution timeout (1-60s, default 30s). Time suffixes are supported, e.g. 30s, 1m.
Process tags	Mark the checkbox to process returned JSON property values as tags. These tags are added to the already existing (if any) problem event tags in Zabbix.
Include event menu entry	Mark the checkbox to include an entry in the event menu linking to the created external ticket.
Menu entry name	Specify the menu entry name. {EVENT.TAGS.<tag name>} macro is supported. This field is only mandatory if *Include event menu entry* is selected.
Menu entry URL	Specify the underlying URL of the menu entry. {EVENT.TAGS.<tag name>} macro is supported. This field is only mandatory if *Include event menu entry* is selected.

See common media type parameters for details on how to configure alert processing options.

When the webhook is configured, click on *Add* to add the webhook to the list of media types.

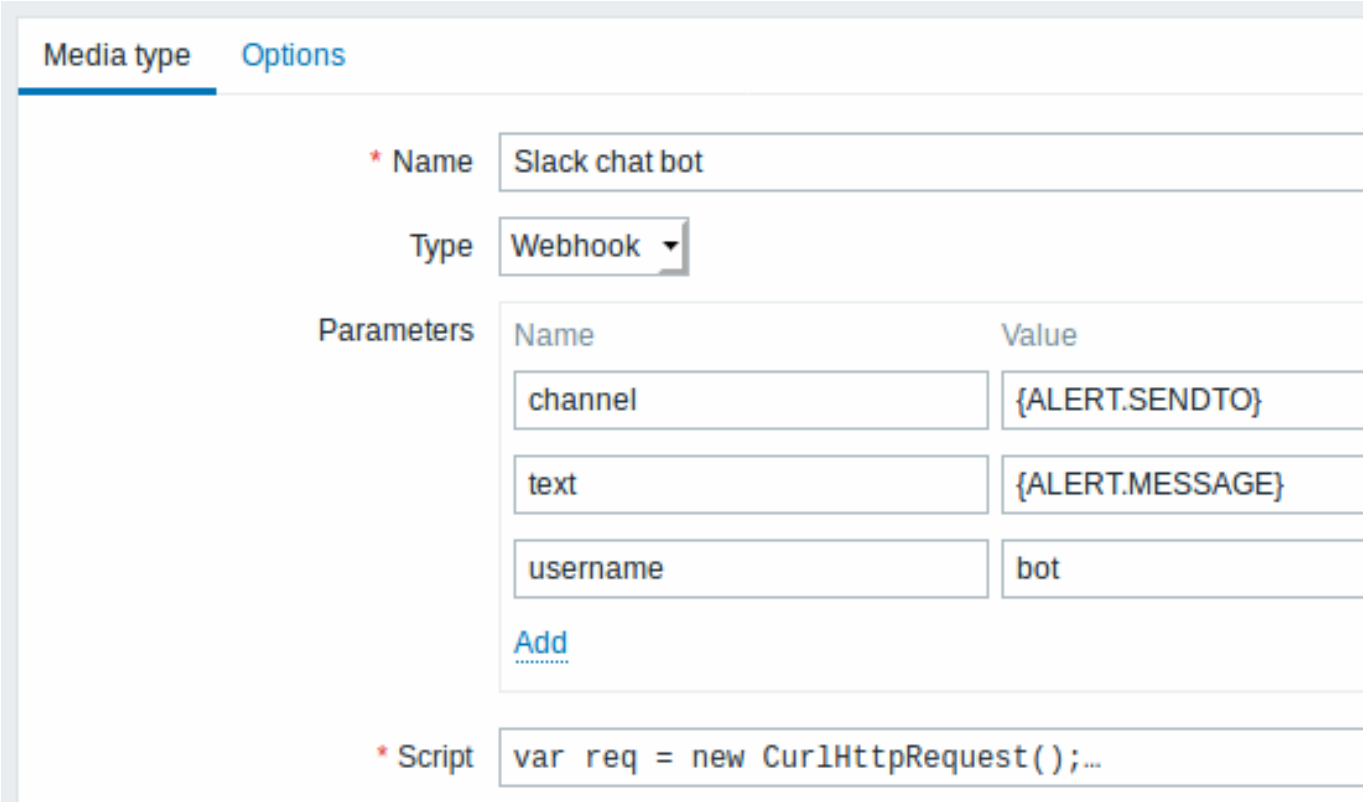
Example scripts

Create a JIRA issue and return some info on the created issue.

```
try {
    Zabbix.Log(4, 'jira webhook script value='+value);

    var result = {
        'tags': {
            'endpoint': 'jira'
        }
    },
    params = JSON.parse(value),
    req = new CurlHttpRequest(),
    fields = {},
    resp;

    req.AddHeader('Content-Type: application/json');
    req.AddHeader('Authorization: Basic '+params.authentication);

    fields.summary = params.summary;
    fields.description = params.description;
    fields.project = {"key": params.project_key};
    fields.issuetype = {"id": params.issue_id};
    resp = req.Post('https://tsupport.zabbix.lan/rest/api/2/issue/',
        JSON.stringify({"fields": fields})
    );

    if (req.Status() != 201) {
```

```
        throw 'Response code: '+req.Status();
    }

    resp = JSON.parse(resp);
    result.tags.issue_id = resp.id;
    result.tags.issue_key = resp.key;
} catch (error) {
    Zabbix.Log(4, 'jira issue creation failed json : '+JSON.stringify({"fields": fields}));
    Zabbix.Log(4, 'jira issue creation failed : '+error);

    result = {};
}

return JSON.stringify(result);
```

Send notification to a Slack channel.



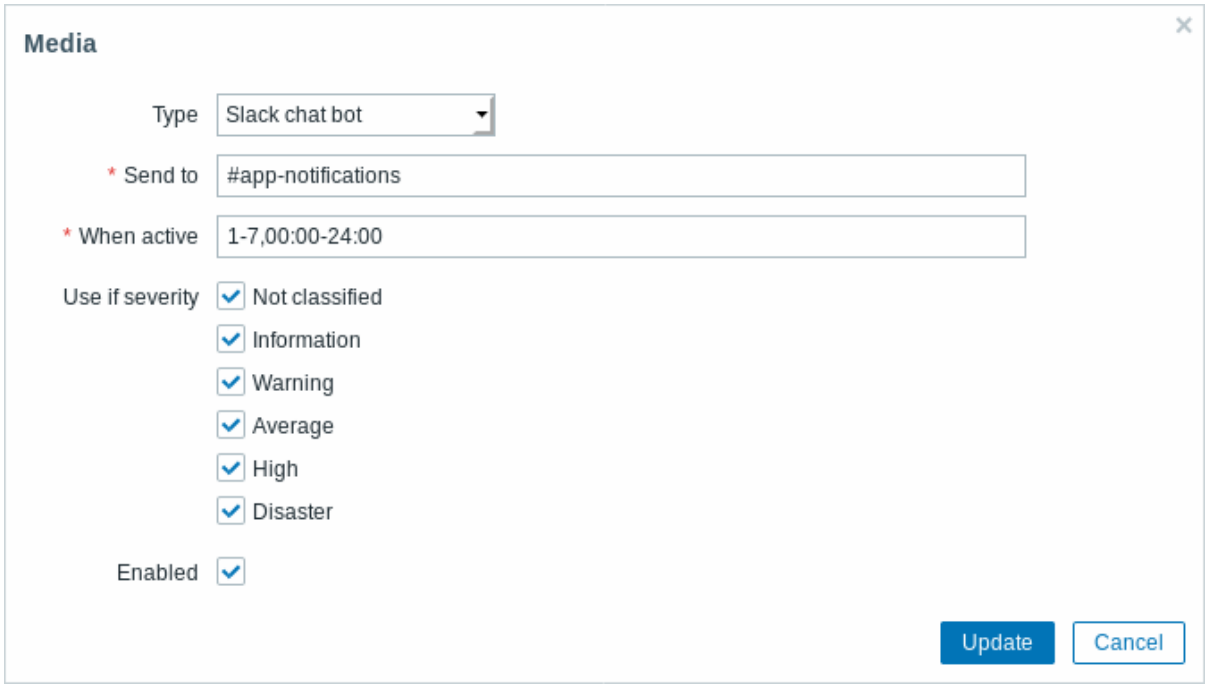

```
var req = new CurlHttpRequest();
req.AddHeader('Content-Type: application/x-www-form-urlencoded');

Zabbix.Log(4, 'webhook request value='+value);

req.Post('https://hooks.slack.com/services/KLFDEI9KNL/ZNA76HGCF/h9MLKJMWoUcEAz8n',
  'payload='+value
);

Zabbix.Log(4, 'response code: '+req.Status());

return JSON.stringify({
  'tags': {
    'endpoint': 'slack'
  }
});
```

User media

To assign a specific address to the user:

- Go to *Administration* → *Users*

- Open the user properties form
- In Media tab, click on *Add*



User media attributes:

Parameter	Description
Type	Select the configured webhook media type.
Send to	Specify the address to send the messages to.
When active	You can limit the time when messages are sent, for example, the working days only (1-5,09:00-18:00). See the Time period specification page for description of the format. User macros are supported.
Use if severity	Mark the checkboxes of trigger severities that you want to receive notifications for. *Note* that the default severity ('Not classified') **must be** checked if you want to receive notifications for non-trigger events. After saving, the selected trigger severities will be displayed in the corresponding severity colours while unselected ones will be greyed out.
Status	Status of the user media: **Enabled** - is in use. **Disabled** - is not being used.

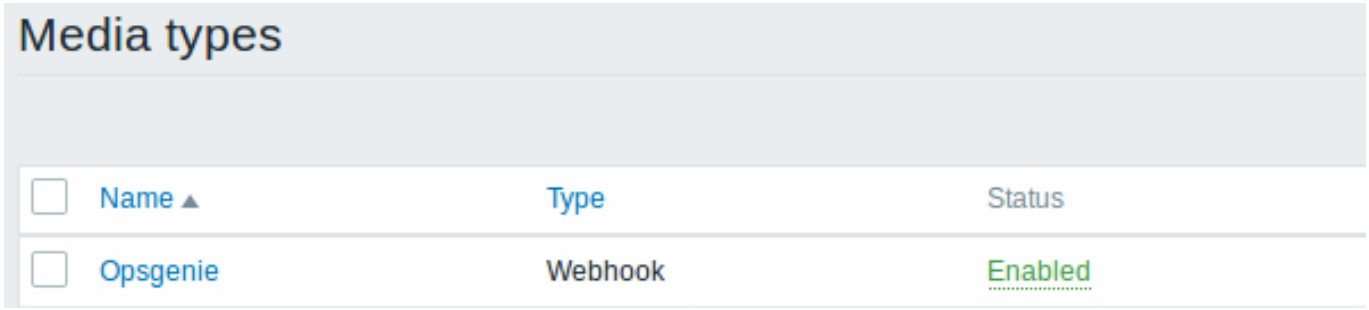
Notifications to Opsgenie

Overview

You may push Zabbix notifications directly to Opsgenie, by using the integrated Opsgenie webhook media type.

Configuration

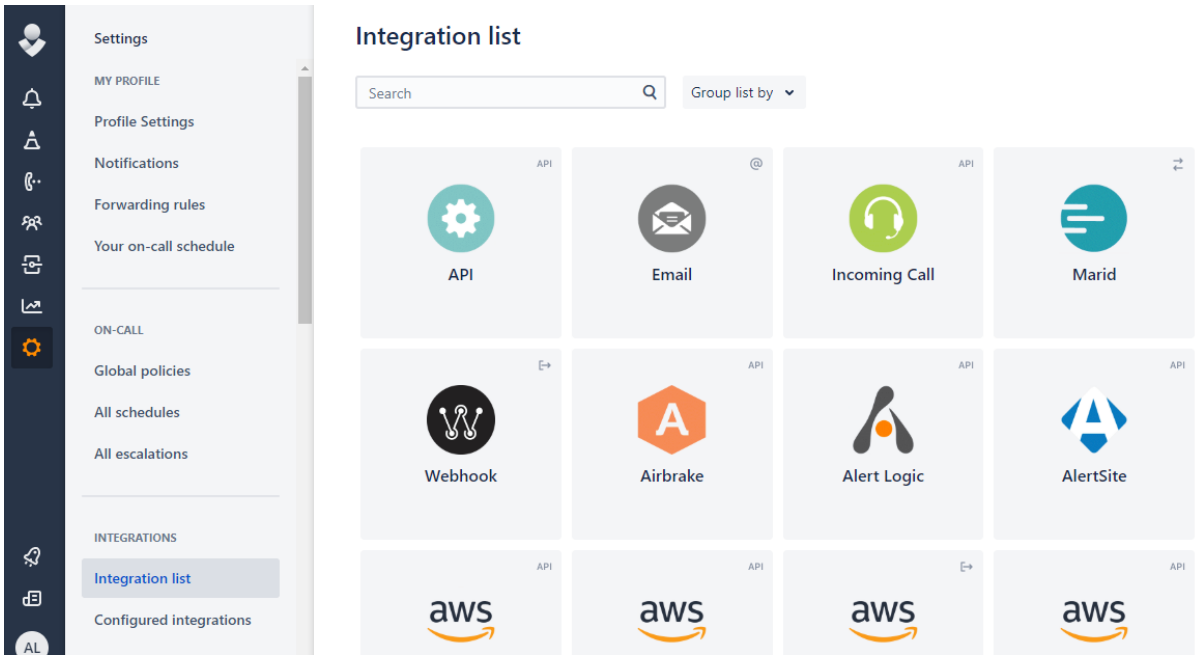
1. Make sure that you have the *Opsgenie* media type in Zabbix.



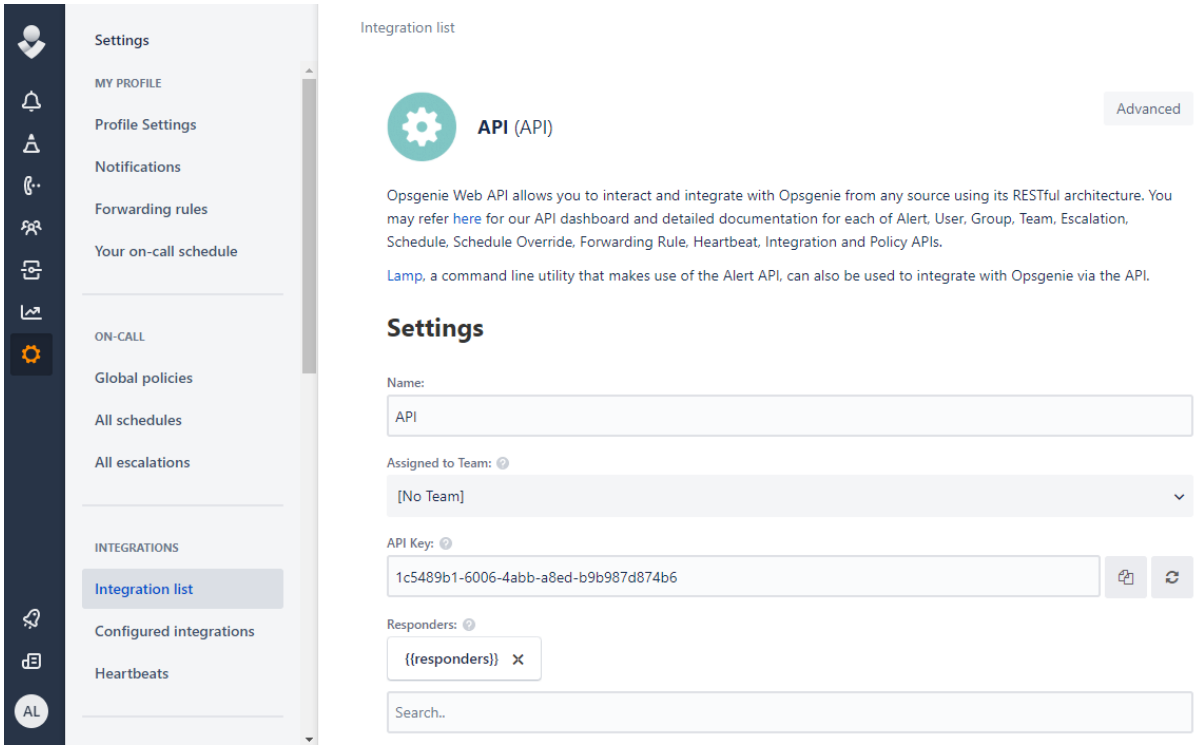
This media type is available in new Zabbix installations starting with Zabbix 4.4.4.

If you have upgraded from an earlier version, you can download this media type from Zabbix Git repository or find it in the `templates` directory of the downloaded latest Zabbix version. Then, while in *Administration* → *Media types* you can import it manually into Zabbix.

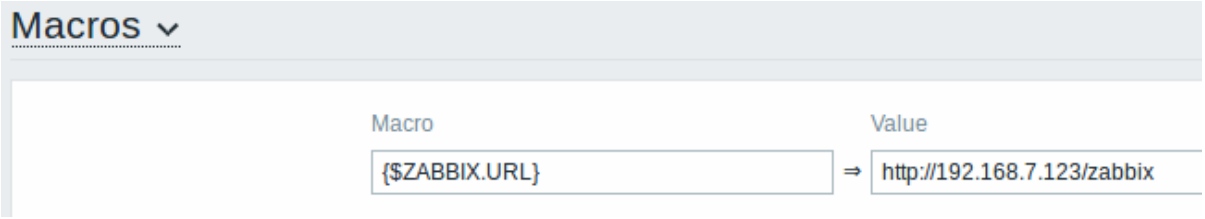
2. In Opsgenie, go to "Integration list" in the Settings menu and click Add on "API" (Rest API HTTPS over JSON).



Copy the **API Key** of your new integration and click *Save Integration* at the bottom of the frame.

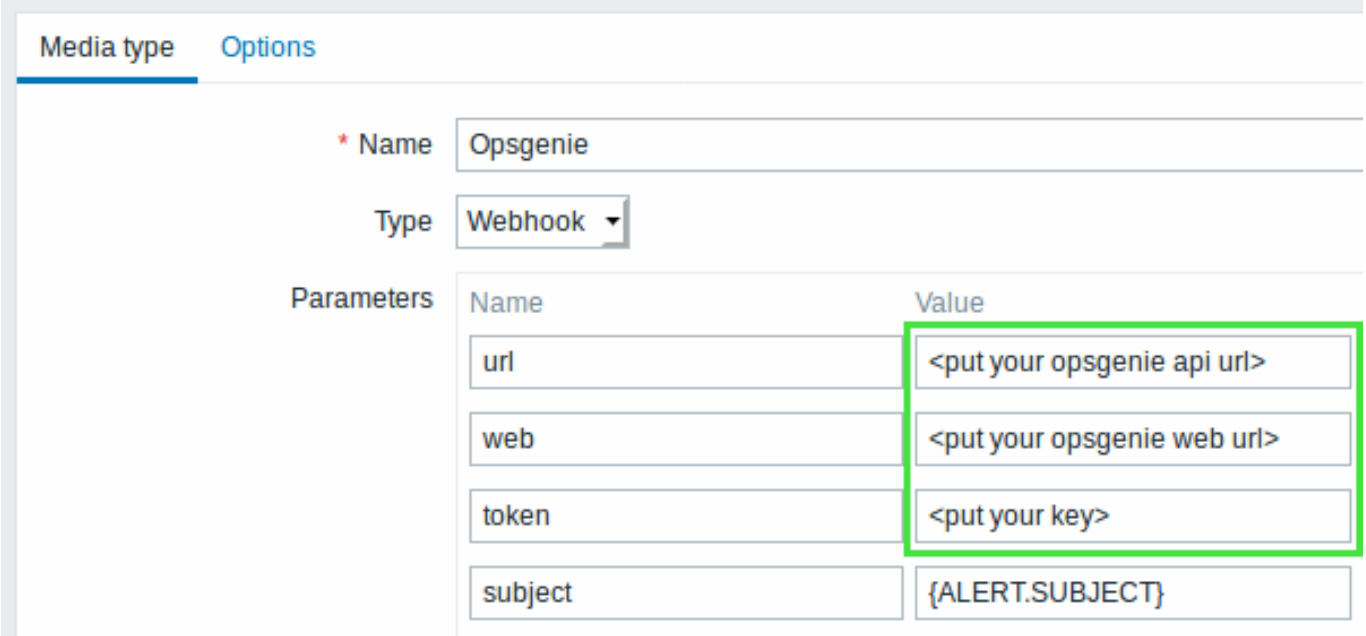


3. In Zabbix, create a global macro with the Zabbix frontend URL.



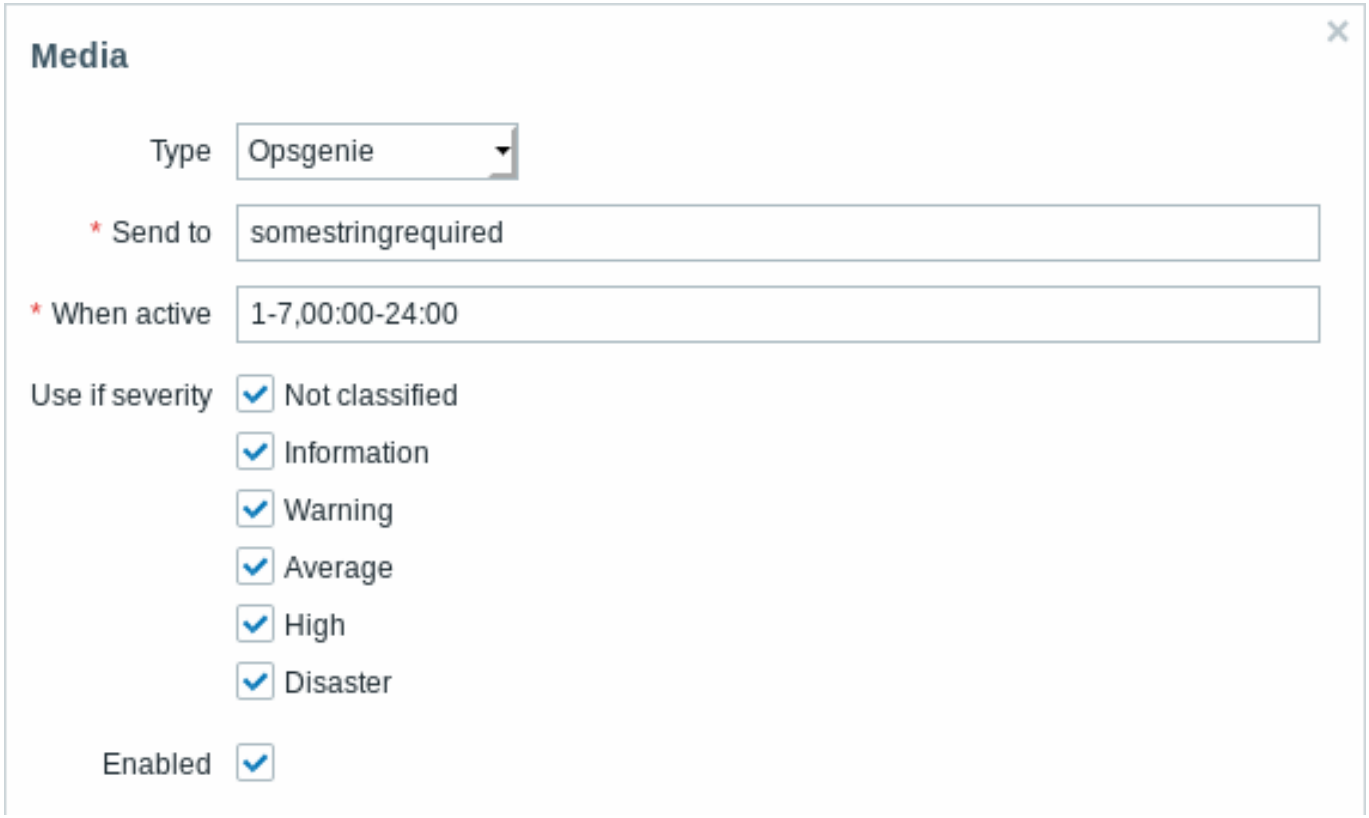
Global macros can be created in *Administration* → *General* → *Macros*.

4. Update the required parameters in the Opsgenie media type configuration in Zabbix:



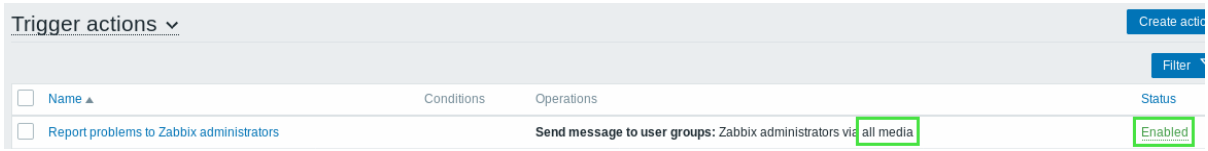
- URL (`https://api.opsgenie.com/v2/alerts` or `https://api.eu.opsgenie.com/v2/alerts` depending on data center region)
- web (for example, `https://myzabbix.app.opsgenie.com`. Substitute 'myzabbix' with your Opsgenie domain name.)
- token (enter the value of **API Key** from Step 2)

5. Configure a new user media setting the type to *Opsgenie*.



Enter an arbitrary string in the *Send to* field (it will not be used, but is required).

6. Make sure there is a configured action in Zabbix that sends notifications. It should be enabled and send notification to the Opsgenie media type (or all media).



That is all the configuration that is necessary. Now you can look forward to receiving Zabbix notifications in Opsgenie.

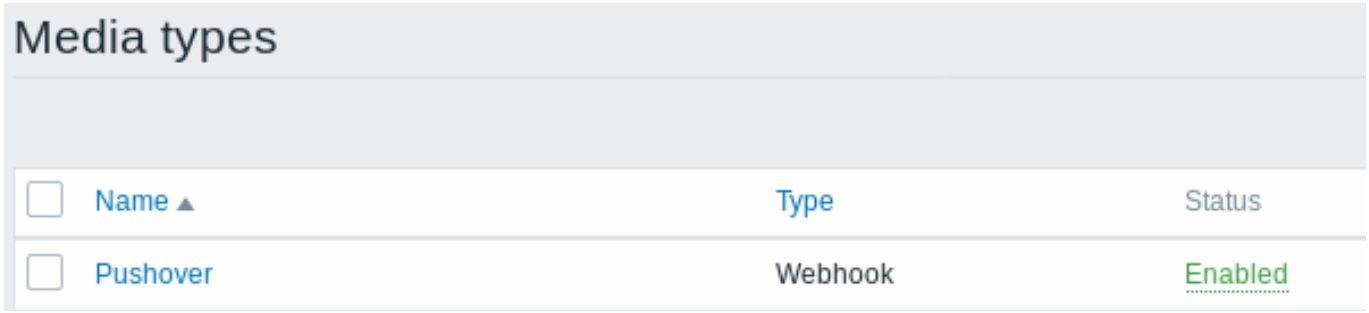
Notifications to Pushover app

Overview

You may receive Zabbix notifications directly to your mobile device in the Pushover app, by using the integrated Pushover webhook media type.

Configuration

1. Make sure that you have the *Pushover* media type in Zabbix.



This media type is available in new Zabbix installations starting with Zabbix 4.4.4.

If you have upgraded from an earlier version, you can download this media type from Zabbix Git repository or find it in the `templates` directory of the downloaded latest Zabbix version. Then, while in *Administration* → *Media types* you can import it manually into Zabbix.

2. Install Pushover app on your iOS or Android device.

3. Register an account in the app or on the Pushover website. You will be asked to provide an e-mail address and a password.

Go to the inbox of the e-mail address you supplied and verify your e-mail address by clicking on the link in the registration e-mail from Pushover.

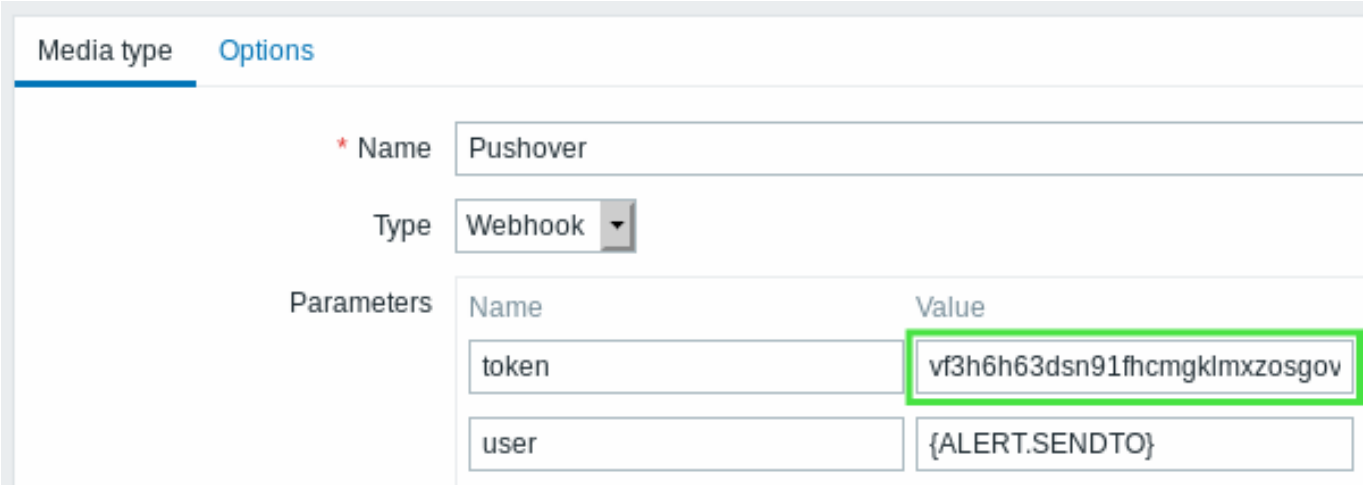
Upon registering you will receive a **user key** that will be required when configuring Zabbix user media.

4. Log into your account on the Pushover website and find the `Create a New Application/API Token` link under Apps&Plugins.

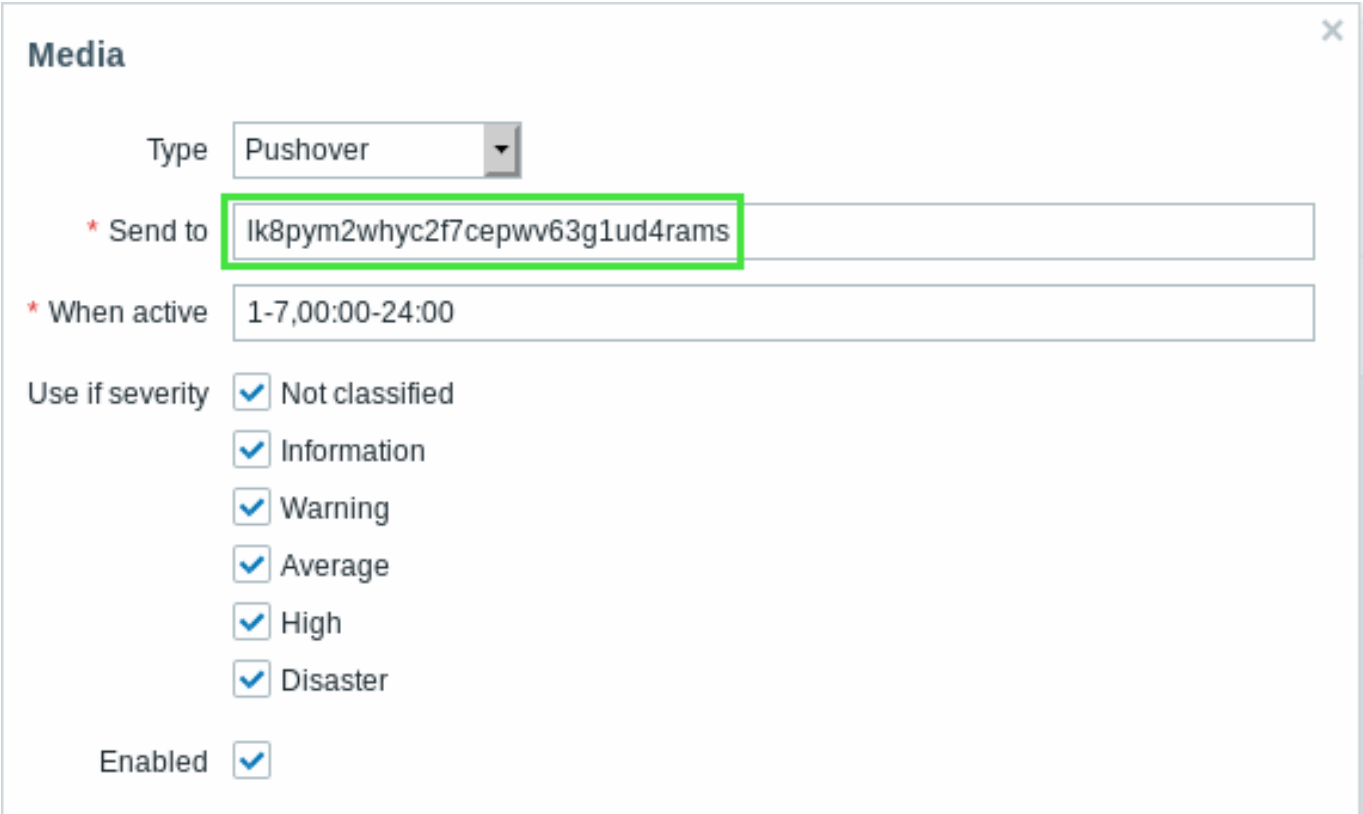
Click on this link and then submit application information to create a Zabbix application in Pushover. The important parameters to submit here are the name and logo.

When the app is created, you will receive its **API token/key**.

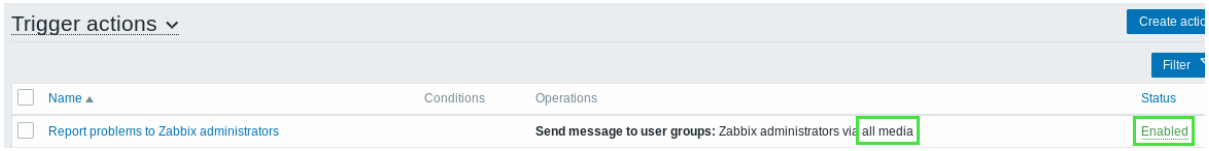
5. Enter the received API token/key in the Pushover media type configuration in Zabbix.



6. Configure a new user media, submitting the received user key (see Step 3) into the *Send to* field.



7. Make sure there is a configured action in Zabbix that sends notifications. It should be enabled and send notification to the Pushover media type (or all media).



That is all the configuration that is necessary. Now you can look forward to receiving Zabbix notifications in the app.

2 Actions

Overview

If you want some operations taking place as a result of events (for example, notifications sent), you need to configure actions.

Actions can be defined in response to events of all supported types:

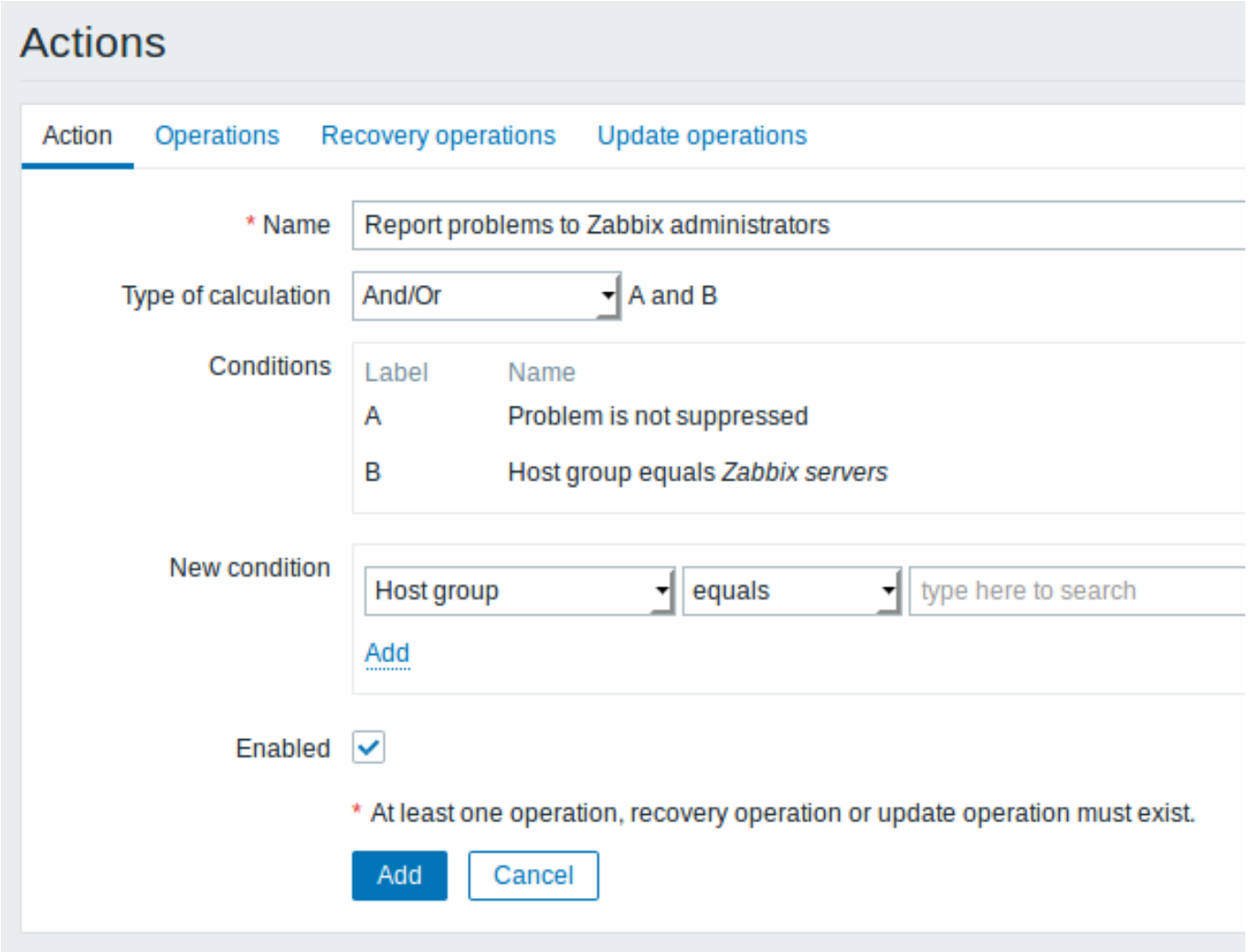
- Trigger events - when trigger status changes from *OK* to *PROBLEM* and back
- Discovery events - when network discovery takes place
- Auto registration events - when new active agents auto-register (or host metadata changes for registered ones)
- Internal events - when items become unsupported or triggers go into an unknown state

Configuring an action

To configure an action, do the following:

- Go to *Configuration* → *Actions*
- From the *Event source* dropdown select the required source
- Click on *Create action*
- Name the action
- Choose conditions upon which operations are carried out
- Choose the operations to carry out
- Choose the recovery operations to carry out

General action attributes:



All mandatory input fields are marked with a red asterisk.

Parameter	Description
Name	Unique action name.
Type of calculation	Select the evaluation option for action conditions (with more than one condition): **And** - all conditions must be met **Or** - enough if one condition is met **And/Or** - combination of the two: AND with different condition types and OR with the same condition type **Custom expression** - a user-defined calculation formula for evaluating action conditions.
Conditions	List of action conditions.
New condition	Select a new action condition and click on *Add*.
Enabled	Mark the checkbox to enable the action. Otherwise it will be disabled.

1 Conditions

Overview

It is possible to define that an action is executed only if the event matches a defined set of conditions. Conditions are set when configuring the action.

Condition matching is case-sensitive.

Trigger actions

The following conditions can be set for trigger-based actions:

Condition type	Supported operators	Description
Application	equals contains does not contain	Specify an application or an application to exclude. **equals** - event belongs to a trigger of the item that is linked to the specified application. **contains** - event belongs to a trigger of the item that is linked to an application containing the string. **does not contain** - event belongs to a trigger of the item that is linked to an application not containing the string.
Host group	equals does not equal	Specify host groups or host groups to exclude. **equals** - event belongs to this host group. **does not equal** - event does not belong to this host group. Specifying a parent host group implicitly selects all nested host groups. To specify the parent group only, all nested groups have to be additionally set with the **does not equal** operator.
Template	equals does not equal	Specify templates or templates to exclude. **equals** - event belongs to a trigger inherited from this template. **does not equal** - event does not belong to a trigger inherited from this template.
Host	equals does not equal	Specify hosts or hosts to exclude. **equals** - event belongs to this host. **does not equal** - event does not belong to this host.
Tag	equals does not equal contains does not contain	Specify event tag or event tag to exclude. **equals** - event has this tag **does not equal** - event does not have this tag **contains** - event has a tag containing this string **does not contain** - event does not have a tag containing this string

Condition type	Supported operators	Description
Tag value	equals does not equal contains does not contain	Specify event tag and value combination or tag and value combination to exclude. **equals** - event has this tag and value **does not equal** - event does not have this tag and value **contains** - event has a tag and value containing these strings **does not contain** - event does not have a tag and value containing these strings
Trigger	equals does not equal	Specify triggers or triggers to exclude. **equals** - event is generated by this trigger. **does not equal** - event is generated by any other trigger, except this one.
Trigger name	contains does not contain	Specify a string in the trigger name or a string to exclude. **contains** - event is generated by a trigger, containing this string in the name. **does not contain** - this string cannot be found in the trigger name. *Note*: Entered value will be compared to trigger name with all macros expanded.
Trigger severity	equals does not equal is greater than or equals is less than or equals	Specify trigger severity. **equals** - equal to trigger severity **does not equal** - not equal to trigger severity **is greater than or equals** - more or equal to trigger severity **is less than or equals** - less or equal to trigger severity
Time period	in not in	Specify a time period or a time period to exclude. **in** - event time is within the time period. **not in** - event time is not within the time period. See the time period specification page for description of the format. User macros are supported, since Zabbix 3.4.0.

Condition type	Supported operators	Description
Problem is suppressed	no yes	Specify if the problem is suppressed (not shown) because of host maintenance. **no** - problem is not suppressed. **yes** - problem is suppressed.

Discovery actions

The following conditions can be set for discovery-based events:

Condition type	Supported operators	Description
Host IP	equals does not equal	Specify an IP address range or a range to exclude for a discovered host. **equals** - host IP is in the range. **does not equal** - host IP is not in the range. It may have the following formats: Single IP: 192.168.1.33 Range of IP addresses: 192.168.1-10.1-254 IP mask: 192.168.4.0/24 List: 192.168.1.1-254, 192.168.2.1-100, 192.168.2.200, 192.168.4.0/24 Support for spaces in the list format is provided since Zabbix 3.0.0.
Service type	equals does not equal	Specify a service type of a discovered service or a service type to exclude. **equals** - matches the discovered service. **does not equal** - does not match the discovered service. Available service types: SSH, LDAP, SMTP, FTP, HTTP, HTTPS *(available since Zabbix 2.2 version)*, POP, NNTP, IMAP, TCP, Zabbix agent, SNMPv1 agent, SNMPv2 agent, SNMPv3 agent, ICMP ping, telnet *(available since Zabbix 2.2 version)*.
Service port	equals does not equal	Specify a TCP port range of a discovered service or a range to exclude. **equals** - service port is in the range. **does not equal** - service port is not in the range.

Condition type	Supported operators	Description
Discovery rule	equals does not equal	Specify a discovery rule or a discovery rule to exclude. **equals** - using this discovery rule. **does not equal** - using any other discovery rule, except this one.
Discovery check	equals does not equal	Specify a discovery check or a discovery check to exclude. **equals** - using this discovery check. **does not equal** - using any other discovery check, except this one.
Discovery object	equals	Specify the discovered object. **equals** - equal to discovered object (a device or a service).
Discovery status	equals	**Up** - matches 'Host Up' and 'Service Up' events **Down** - matches 'Host Down' and 'Service Down' events **Discovered** - matches 'Host Discovered' and 'Service Discovered' events **Lost** - matches 'Host Lost' and 'Service Lost' events
Uptime/Downtime	is greater than or equals is less than or equals	Uptime for 'Host Up' and 'Service Up' events. Downtime for 'Host Down' and 'Service Down' events. **is greater than or equals** - is more or equal to. Parameter is given in seconds. **is less than or equals** - is less or equal to. Parameter is given in seconds.

Condition type	Supported operators	Description
Received value	equals does not equal is greater than or equals is less than or equals contains does not contain	Specify the value received from an agent (Zabbix, SNMP) check in a discovery rule. String comparison. If several Zabbix agent or SNMP checks are configured for a rule, received values for each of them are checked (each check generates a new event which is matched against all conditions). **equals** - equal to the value. **does not equal** - not equal to the value. **is greater than or equals** - more or equal to the value. **is less than or equals** - less or equal to the value. **contains** - contains the substring. Parameter is given as a string. **does not contain** - does not contain the substring. Parameter is given as a string.
Proxy	equals does not equal	Specify a proxy or a proxy to exclude. **equals** - using this proxy. **does not equal** - using any other proxy except this one.

Note:
Service checks in a discovery rule, which result in discovery events, do not take place simultaneously. Therefore, if **multiple** values are configured for `Service type`, `Service port` or `Received value` conditions in the action, they will be compared to one discovery event at a time, but **not** to several events simultaneously. As a result, actions with multiple values for the same check types may not be executed correctly.

Auto-registration actions

The following conditions can be set for actions based on active agent auto-registration:

Condition type	Supported operators	Description
Host metadata	contains does not contain matches does not match	Specify host metadata or host metadata to exclude. **contains** - host metadata contains the string. **does not contain** - host metadata does not contain the string. Host metadata can be specified in an agent configuration file. **matches** - host metadata matches regular expression. **does not match** - host metadata does not match regular expression.

Condition type	Supported operators	Description
Host name	contains does not contain matches does not match	Specify a host name or a host name to exclude. **contains** - host name contains the string. **does not contain** - host name does not contain the string. **matches** - host name matches regular expression. **does not match** - host name does not match regular expression.
Proxy	equals does not equal	Specify a proxy or a proxy to exclude. **equals** - using this proxy. **does not equal** - using any other proxy except this one.

Internal event actions

The following conditions can be set for actions based on internal events:

Condition type	Supported operators	Description
Application	equals contains does not contain	Specify an application or an application to exclude. **equals** - event belongs to an item that is linked to the specified application. **contains** - event belongs to an item that is linked to an application containing the string. **does not contain** - event belongs to an item that is linked to an application not containing the string.
Event type	equals	**Item in "not supported" state** - matches events where an item goes from a 'normal' to 'not supported' state **Low-level discovery rule in "not supported" state** - matches events where a low-level discovery rule goes from a 'normal' to 'not supported' state **Trigger in "unknown" state** - matches events where a trigger goes from a 'normal' to 'unknown' state
Host group	equals does not equal	Specify host groups or host groups to exclude. **equals** - event belongs to this host group. **does not equal** - event does not belong to this host group.

Condition type	Supported operators	Description
Template	equals does not equal	Specify templates or templates to exclude. **equals** - event belongs to an item/trigger/low-level discovery rule inherited from this template. **does not equal** - event does not belong to an item/trigger/low-level discovery rule inherited from this template.
Host	equals does not equal	Specify hosts or hosts to exclude. **equals** - event belongs to this host. **does not equal** - event does not belong to this host.

Type of calculation

The following options of calculating conditions are available:

- **And** - all conditions must be met

Note that using "And" calculation is disallowed between several triggers when they are selected as a `Trigger=` condition. Actions can only be executed based on the event of one trigger.

- **Or** - enough if one condition is met
- **And/Or** - combination of the two: AND with different condition types and OR with the same condition type, for example:

Host group equals Oracle servers
Host group equals MySQL servers
Trigger name contains 'Database is down'
Trigger name contains 'Database is unavailable'

is evaluated as

(Host group equals Oracle servers **or** Host group equals MySQL servers**) and (**Trigger name contains 'Database is down' **or** Trigger name contains 'Database is unavailable'**)**

- **Custom expression** - a user-defined calculation formula for evaluating action conditions. It must include all conditions (represented as uppercase letters A, B, C, ...) and may include spaces, tabs, brackets ( ), **and** (case sensitive), **or** (case sensitive), **not** (case sensitive).

While the previous example with `And/Or` would be represented as (A or B) and (C or D), in a custom expression you may as well have multiple other ways of calculation:

(A and B) and (C or D)
(A and B) or (C and D)
((A or B) and C) or D
(not (A or B) and C) or not D
etc.

Actions disabled due to deleted objects

If a certain object (host, template, trigger, etc) used in an action condition/operation is deleted, the condition/operation is removed and the action is disabled to avoid incorrect execution of the action. The action can be re-enabled by the user.

This behavior takes place when deleting:

- host groups ("host group" condition, "remote command" operation on a specific host group);
- hosts ("host" condition, "remote command" operation on a specific host);
- templates ("template" condition, "link to template" and "unlink from template" operations);
- triggers ("trigger" condition);
- discovery rules (when using "discovery rule" and "discovery check" conditions).

Note: If a remote command has many target hosts, and we delete one of them, only this host will be removed from the target list, the operation itself will remain. But, if it's the only host, the operation will be removed, too. The same goes for "link to template" and "unlink from template" operations.

Actions are not disabled when deleting a user or user group used in a "send message" operation.

2 Operations

Overview

You can define the following operations for all events:

- send a message
- execute a remote command (including IPMI)

> **Attention:**
> Zabbix server does not create alerts if access to the host is explicitly "denied" for the user defined as action operation recipient or if the user has no rights defined to the host at all.

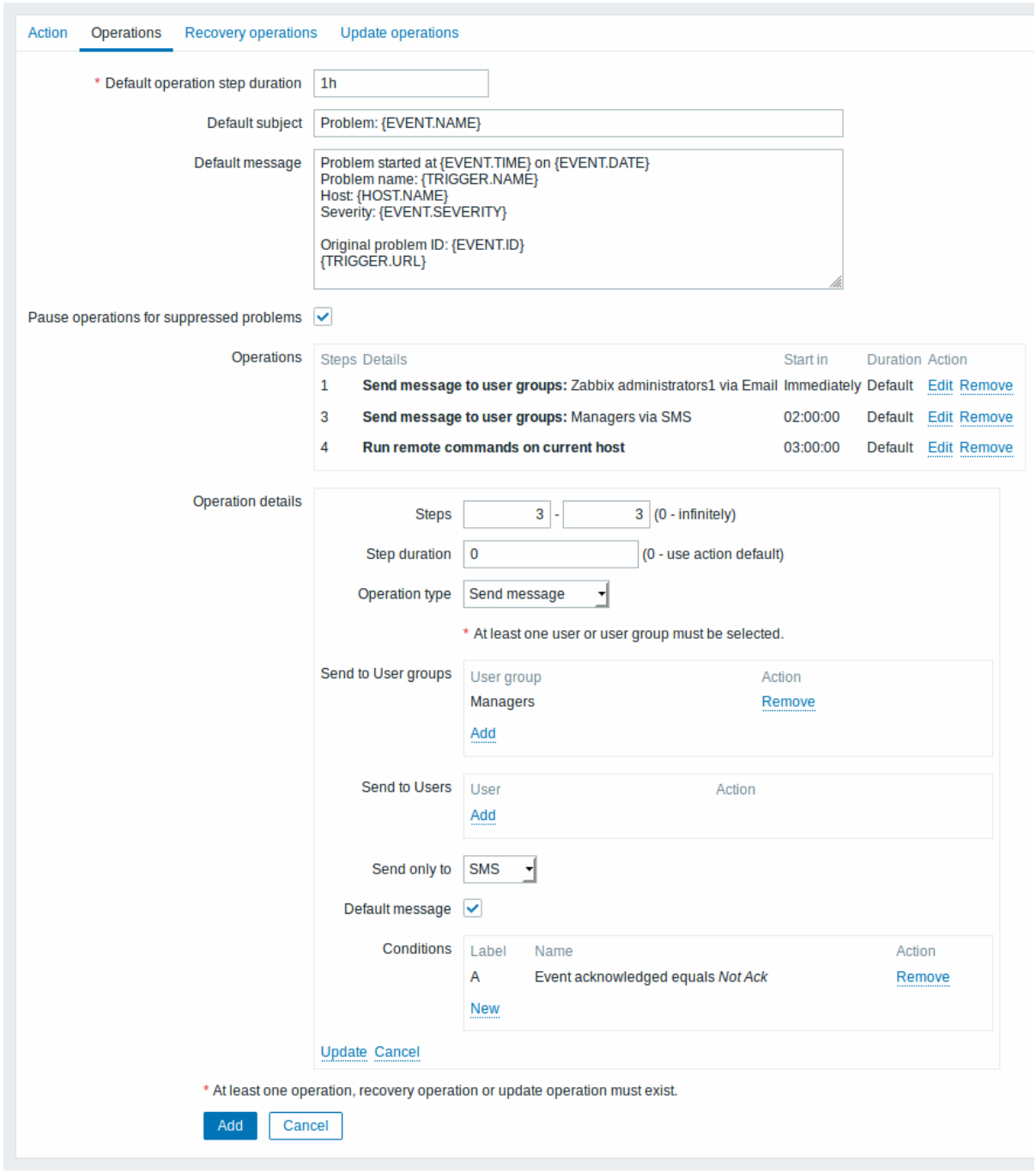
For discovery and auto-registration events, there are additional operations available:

- add host
- remove host
- enable host
- disable host
- add to host group
- remove from host group
- link to template
- unlink from template
- set host inventory mode

Configuring an operation

To configure an operation, go to the *Operations* tab in action configuration and click on *New* in the Operations block. Edit the operation step and click on *Add* to add to the list of *Operations*.

Operation attributes:



All mandatory input fields are marked with a red asterisk.

Parameter	Description
Default operation step duration	Duration of one operation step by default (60 seconds to 1 week). For example, an hour-long step duration means that if an operation is carried out, an hour will pass before the next step. Time suffixes are supported, e.g. 60s, 1m, 2h, 1d, since Zabbix 3.4.0. User macros are supported, since Zabbix 3.4.0.
Default subject	Default message subject for notifications. The subject may contain macros. It is limited to 255 characters.
Default message	Default message for notifications. The message may contain macros. It is limited to certain amount of characters depending on the type of database (see Sending message for more information).

Parameter			Description
Pause operations for suppressed problems			Mark this checkbox to delay the start of operations for the duration of a maintenance period. When operations are started, after the maintenance, all operations are performed including those for the events during the maintenance. If you unmark this checkbox, operations will be executed without delay even during a maintenance period. This option is supported since Zabbix 3.2.0.
Operations			Action operations are displayed, with these details: **Steps** - escalation step(s) to which the operation is assigned **Details** - type of operation and its recipient/target. Since Zabbix 2.2, the operation list also displays the media type (e-mail, SMS or script) used in sending a message as well as the name and surname (in parentheses after the alias) of a notification recipient. **Start in** - how long after an event the operation is performed **Duration (sec)** - step duration is displayed. *Default* is displayed if the step uses default duration, and a time is displayed if custom duration is used. **Action** - links for editing and removing an operation are displayed. To configure a new operation, click on *New*.
Operation details			This block is used to configure the details of an operation.
	Steps		Select the step(s) to assign the operation to in an escalation schedule: **From** - execute starting with this step **To** - execute until this step (0=infinity, execution will not be limited)
	Step duration		Custom duration for these steps (0=use default step duration). Time suffixes are supported, e.g. 60s, 1m, 2h, 1d, since Zabbix 3.4.0. User macros are supported, since Zabbix 3.4.0. Several operations can be assigned to the same step. If these operations have different step duration defined, the shortest one is taken into account and applied to the step.
	Operation type		Two operation types are available for all events: **Send message** - send message to user **Remote command** - execute a remote command More operations are available for discovery and auto-registration based events (see above).
		Operation type: send message	
		Send to user groups	Click on *Add* to select user groups to send the message to. The user group must have at least ”read” permissions to the host in order to be notified.

Parameter		Description
	Send to users	Click on *Add* to select users to send the message to. The user must have at least ”read” permissions to the host in order to be notified.
	Send only to	Send message to all defined media types or a selected one only.
	Default message	If selected, the default message will be used (see above).
	Subject	Subject of the custom message. The subject may contain macros. It is limited to 255 characters.
	Message	The custom message. The message may contain macros. It is limited to certain amount of characters depending on the type of database (see Sending message for more information).
	Operation type: remote command	
	Target list	Select targets to execute the command on: **Current host** - command is executed on the host of the trigger that caused the problem event. This option will not work if there are multiple hosts in the trigger. **Host** - select host(s) to execute the command on. **Host group** - select host group(s) to execute the command on. Specifying a parent host group implicitly selects all nested host groups. Thus the remote command will also be executed on hosts from nested groups. A command on a host is executed only once, even if the host matches more than once (e.g. from several host groups; individually and from a host group). The target list is meaningless if a custom script is executed on Zabbix server. Selecting more targets in this case only results in the script being executed on the server more times. Note that for global scripts, the target selection also depends on the *Host group* setting in global script configuration.
	Type	Select the command type: **IPMI** - execute an IPMI command **Custom script** - execute a custom set of commands **SSH** - execute an SSH command **Telnet** - execute a Telnet command **Global script** - execute one of the global scripts defined in *Administration→Scripts*.

Parameter		Description
	Execute on	Execute a custom script on: **Zabbix agent** - the script will be executed by Zabbix agent on the host **Zabbix server (proxy)** - the script will be executed by Zabbix server or proxy - depending on whether the host is monitored by server or proxy **Zabbix server** - the script will be executed by Zabbix server only To execute scripts on the agent, it must be configured (*EnableRemoteCommands* parameter enabled) to allow remote commands from the server. To execute scripts on proxy, it must be configured (*EnableRemoteCommands* parameter enabled) to allow remote commands from the server. This field is available if 'Custom script' is selected as *Type*.
	Commands	Enter the command(s). Supported macros will be resolved based on the trigger expression that caused the event. For example, host macros will resolve to the hosts of the trigger expression (and not of the target list).
Conditions		Condition for performing the operation: **Not ack** - only when the event is unacknowledged **Ack** - only when the event is acknowledged.

1 Sending message

Overview

Sending a message is one of the best ways of notifying people about a problem. That is why it is one of the primary actions offered by Zabbix.

Configuration

To be able to send and receive notifications from Zabbix you have to:

- define the media to send a message to

Warning:
The default trigger severity ('Not classified') **must be** checked in user media configuration if you want to receive notifications for non-trigger events such as discovery, active agent auto-registration or internal evens.

- configure an action operation that sends a message to one of the defined media

Attention:
Zabbix sends notifications only to those users that have at least 'read' permissions to the host that generated the event. At least one host of a trigger expression must be accessible.

You can configure custom scenarios for sending messages using escalations.

To successfully receive and read e-mails from Zabbix, e-mail servers/clients must support standard 'SMTP/MIME e-mail' format since Zabbix sends UTF-8 data (If the subject contains ASCII characters only, it is not UTF-8 encoded.). The subject and the body of the message are base64-encoded to follow 'SMTP/MIME e-mail' format standard.

Message limit after all macros expansion is the same as message limit for Remote commands.

Tracking messages

You can view the status of messages sent in *Monitoring* → *Problems*.

In the *Actions* column you can see summarized information about actions taken. In there green numbers represent messages sent, red ones - failed messages. *In progress* indicates that an action is initiated. *Failed* informs that no action has executed successfully.

If you click on the event time to view event details, you will also see the *Message actions* block containing details of messages sent (or not sent) due to the event.

In *Reports* → *Action log* you will see details of all actions taken for those events that have an action configured.

2 Remote commands

Overview

With remote commands you can define that a certain pre-defined command is automatically executed on the monitored host upon some condition.

Thus remote commands are a powerful mechanism for smart pro-active monitoring.

In the most obvious uses of the feature you can try to:

- Automatically restart some application (web server, middleware, CRM) if it does not respond
- Use IPMI 'reboot' command to reboot some remote server if it does not answer requests
- Automatically free disk space (removing older files, cleaning /tmp) if running out of disk space
- Migrate a VM from one physical box to another depending on the CPU load
- Add new nodes to a cloud environment upon insufficient CPU (disk, memory, whatever) resources

Configuring an action for remote commands is similar to that for sending a message, the only difference being that Zabbix will execute a command instead of sending a message.

Remote commands can be executed by Zabbix server, proxy or agent. Remote commands on Zabbix agent can be executed directly by Zabbix server or through Zabbix proxy. Both on Zabbix agent and Zabbix proxy remote commands are disabled by default. They can be enabled by setting the EnableRemoteCommands parameter to '1'.

Remote commands executed by Zabbix server are run as described in Command execution including exit code checking.

Remote commands are executed even if the target host is in maintenance.

Remote command limit

Remote command limit after resolving all macros depends on the type of database and character set (non- ASCII characters require more than one byte to be stored):

Database	//Limit in characters //	//Limit in bytes //
MySQL	65535	65535
Oracle Database	2048	4000
PostgreSQL	65535	not limited
IBM DB2	2048	2048
SQLite (only Zabbix proxy)	65535	not limited

The following tutorial provides step-by-step instructions on how to set up remote commands.

Configuration

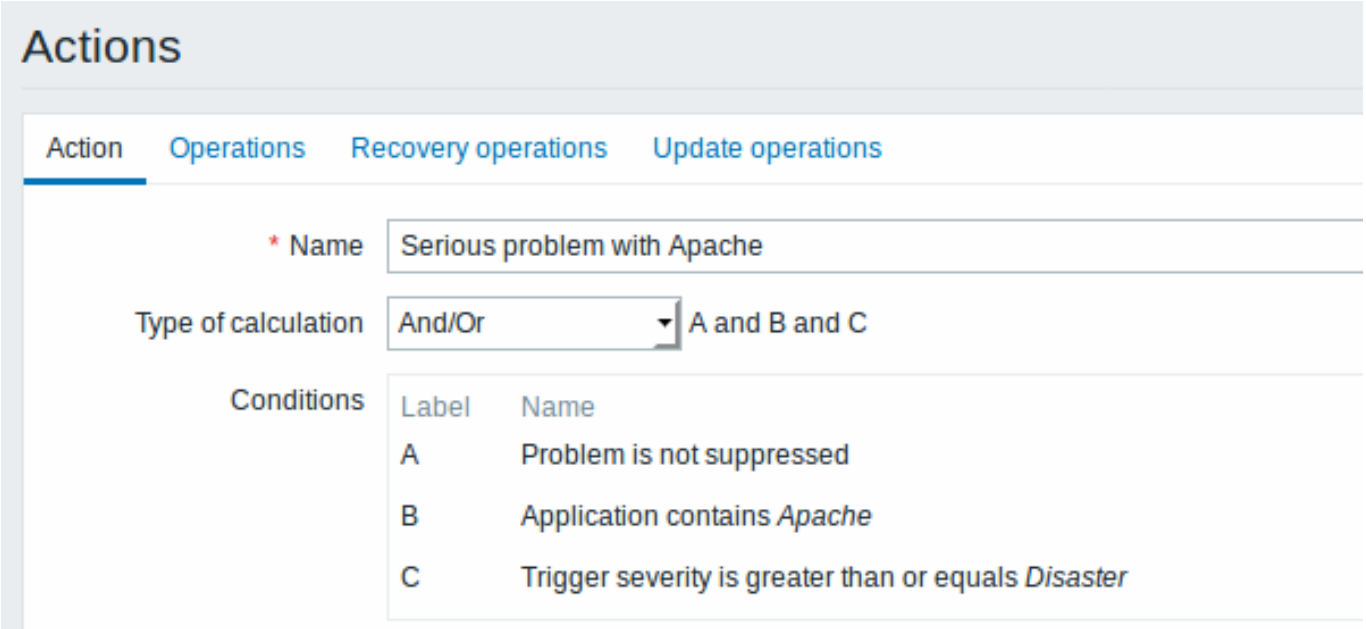
Those remote commands that are executed on Zabbix agent (custom scripts) must be first enabled in the respective zabbix_agentd.conf.

Make sure that the **EnableRemoteCommands** parameter is set to **1** and uncommented. Restart agent daemon if changing this parameter.

> **Attention:**
> Remote commands do not work with active Zabbix agents.

Then, when configuring a new action in *Configuration* → *Actions*:

- Define the appropriate conditions. In this example, set that the action is activated upon any disaster problems with one of Apache applications:



All mandatory input fields are marked with a red asterisk.

- In the *Operations* tab, select the **Remote command** operation type
- Select the remote command type (IPMI, Custom script, SSH, Telnet, Global script)
- If *Custom script* type is selected choose the way how custom script will be executed (by Zabbix agent, Zabbix server (proxy) or Zabbix server only)
- Enter the remote command

For example:

```
sudo /etc/init.d/apache restart
```

In this case, Zabbix will try to restart an Apache process. With this command, make sure that the command is executed on Zabbix agent (click the *Zabbix agent* button against *Execute on*).

Attention:
Note the use of **sudo** - Zabbix user does not have permissions to restart system services by default. See below for hints on how to configure **sudo**.

Note:
Zabbix agent should run on the remote host and accept incoming connections. Zabbix agent executes commands in background.

Remote commands on Zabbix agent are executed without timeout by the system.run[,nowait] key and are not checked for execution results. On Zabbix server and Zabbix proxy, remote commands are executed with timeout as set in the TrapperTimeout parameter of zabbix_server.conf or zabbix_proxy.conf file and are checked for execution results.

Access permissions

Make sure that the 'zabbix' user has execute permissions for configured commands. One may be interested in using **sudo** to give access to privileged commands. To configure access, execute as root:

```
# visudo
```

Example lines that could be used in *sudoers* file:

```
# allows 'zabbix' user to run all commands without password.
zabbix ALL=NOPASSWD: ALL

# allows 'zabbix' user to restart apache without password.
zabbix ALL=NOPASSWD: /etc/init.d/apache restart
```

Note:
On some systems *sudoers* file will prevent non-local users from executing commands. To change this, comment out **requiretty** option in */etc/sudoers*.

Remote commands with multiple interfaces

If the target system has multiple interfaces of the selected type (Zabbix agent or IPMI), remote commands will be executed on the default interface.

It is possible to execute remote commands via SSH and Telnet using another interface than the Zabbix agent one. The available interface to use is selected in the following order:

```
* Zabbix agent default interface
* SNMP default interface
* JMX default interface
* IPMI default interface
```

IPMI remote commands

For IPMI remote commands the following syntax should be used:

```
<command> [<value>]
```

where

- <command> - one of IPMI commands without spaces
- <value> - 'on', 'off' or any unsigned integer. <value> is an optional parameter.

Examples

Example 1

Restart of Windows on certain condition.

In order to automatically restart Windows upon a problem detected by Zabbix, define the following actions:

PARAMETER	Description
Operation type	'Remote command'
Type	'Custom script'
Command	c:\windows\system32\shutdown.exe -r -f

Example 2

Restart the host by using IPMI control.

PARAMETER	Description
Operation type	'Remote command'
Type	'IPMI'
Command	reset

Example 3

Power off the host by using IPMI control.

PARAMETER	Description
Operation type	'Remote command'
Type	'IPMI'
Command	power off

3 Additional operations

Overview

In this section you may find some details of additional operations for discovery/auto-registration events.

Adding host

Hosts are added during the discovery process, as soon as a host is discovered, rather than at the end of the discovery process.

Note:
As network discovery can take some time due to many unavailable hosts/services having patience and using reasonable IP ranges is advisable.

When adding a host, its name is decided by the standard **gethostbyname** function. If the host can be resolved, resolved name is used. If not, the IP address is used. Besides, if IPv6 address must be used for a host name, then all ":" (colons) are replaced by "_" (underscores), since colons are not allowed in host names.

Attention:
If performing discovery by a proxy, currently hostname lookup still takes place on Zabbix server.

Attention:
If a host already exists in Zabbix configuration with the same name as a newly discovered one, versions of Zabbix prior to 1.8 would add another host with the same name. Zabbix 1.8.1 and later adds **_N** to the hostname, where **N** is increasing number, starting with 2.

4 Using macros in messages

Overview

In message subjects and message text you can use macros for more efficient problem reporting.

A full list of macros supported by Zabbix is available.

Examples

Examples here illustrate how you can use macros in messages.

Example 1

Message subject:

```
Problem: {TRIGGER.NAME}
```

When you receive the message, the message subject will be replaced by something like:

```
Problem: Processor load is too high on Zabbix server
```

Example 2

Message:

```
Processor load is: {zabbix.zabbix.com:system.cpu.load[,avg1].last()}
```

When you receive the message, the message will be replaced by something like:

```
Processor load is: 1.45
```

Example 3

Message:

```
Latest value: {{HOST.HOST}:{ITEM.KEY}.last()}
MAX for 15 minutes: {{HOST.HOST}:{ITEM.KEY}.max(900)}
MIN for 15 minutes: {{HOST.HOST}:{ITEM.KEY}.min(900)}
```

When you receive the message, the message will be replaced by something like:

```
Latest value: 1.45
MAX for 15 minutes: 2.33
MIN for 15 minutes: 1.01
```

Example 4

Message:

```
http://<server_ip_or_name>/zabbix/tr_events.php?triggerid={TRIGGER.ID}&eventid={EVENT.ID}
```

When you receive the message, it will contain a link to the *Event details* page, which provides information about the event, its trigger, and a list of latest events generated by the same trigger.

Example 5

Informing about values from several hosts in a trigger expression.

Message:

```
Problem name: {TRIGGER.NAME}
Trigger expression: {TRIGGER.EXPRESSION}

1. Item value on {HOST.NAME1}: {ITEM.VALUE1} ({ITEM.NAME1})
2. Item value on {HOST.NAME2}: {ITEM.VALUE2} ({ITEM.NAME2})
```

When you receive the message, the message will be replaced by something like:

```
Problem name: Processor load is too high on a local host
Trigger expression: {Myhost:system.cpu.load[percpu,avg1].last()}>5 or {Myotherhost:system.cpu.load[percpu,

1. Item value on Myhost: 0.83 (Processor load (1 min average per core))
2. Item value on Myotherhost: 5.125 (Processor load (1 min average per core))
```

Example 6

Receiving details of both the problem event and recovery event in a recovery message:

Message:

```
Problem:

Event ID: {EVENT.ID}
Event value: {EVENT.VALUE}
Event status: {EVENT.STATUS}
Event time: {EVENT.TIME}
Event date: {EVENT.DATE}
Event age: {EVENT.AGE}
Event acknowledgement: {EVENT.ACK.STATUS}
Event update history: {EVENT.UPDATE.HISTORY}

Recovery:

Event ID: {EVENT.RECOVERY.ID}
Event value: {EVENT.RECOVERY.VALUE}
Event status: {EVENT.RECOVERY.STATUS}
Event time: {EVENT.RECOVERY.TIME}
Event date: {EVENT.RECOVERY.DATE}
Operational data: {EVENT.OPDATA}
```

When you receive the message, the macros will be replaced by something like:

```
Problem:

Event ID: 21874
Event value: 1
Event status: PROBLEM
Event time: 13:04:30
Event date: 2018.01.02
Event age: 5m
Event acknowledgement: Yes
Event update history: 2018.01.02 13:05:51 "John Smith (Admin)"
Actions: acknowledged.

Recovery:

Event ID: 21896
Event value: 0
Event status: OK
Event time: 13:10:07
```

```
Event date: 2018.01.02
Operational data: Current value is 0.83
```

Attention:
Separate notification macros for the original problem event and recovery event are supported since Zabbix 2.2.0.

3 Recovery operations

Overview

Recovery operations allow you to be notified when problems are resolved.

Both messages and remote commands are supported in recovery operations. Recovery operations do not support escalating - all operations are assigned to a single step.

Use cases

Some use cases for recovery operations are as follows:

1. Notify all users that were notified on the problem

```
   * Select 'Send recovery message' as operation type
- Have multiple operations upon recovery: send a notification and execute a remote command
   * Add operation types for sending a message and executing a command
- Open a ticket in external helpdesk/ticketing system and close it when the problem is resolved
   * Create an external script that communicates with the helpdesk system
   * Create an action having operation that executes this script and thus opens a ticket
   * Have a recovery operation that executes this script with other parameters and closes the ticket
   * Use the {EVENT.ID} macro to reference the original problem
```

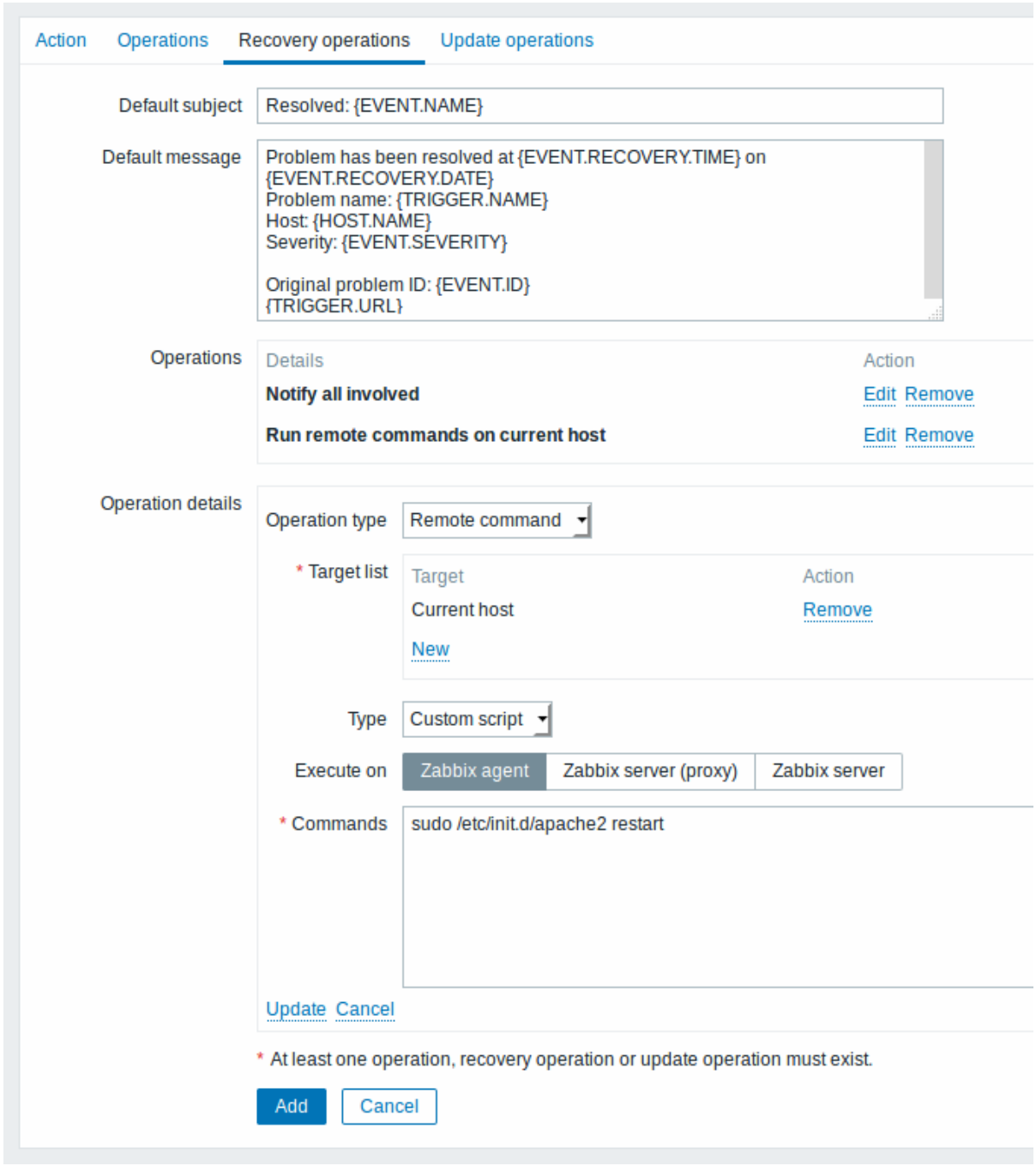
Configuring a recovery operation

To configure a recovery operation:

- Go to the *Recovery operations* tab in action configuration
- Click on *New* in the Operations block
- Edit the operation details and click on *Add*

Several operations can be added.

Recovery operation attributes:



All mandatory input fields are marked with a red asterisk.

Parameter	Description
Default subject	Default message subject for recovery notifications. The subject may contain macros.
Default message	Default message for recovery notifications. The message may contain macros.
Operations	Recovery operation details are displayed. To configure a new recovery operation, click on *New*.
Operation details	This block is used to configure the details of a recovery operation.

Parameter			Description
	Operation type		Three operation types are available for recovery events: **Send message** - send recovery message to specified user **Remote command** - execute a remote command **Notify all involved** - send recovery message to all users who were notified on the problem event Note that if the same recipient with unchanged default subject/message is defined in several operation types, duplicate notifications are not sent.
		Operation type: send message	
		Send to user groups	Click on *Add* to select user groups to send the recovery message to. The user group must have at least ”read” permissions to the host in order to be notified.
		Send to users	Click on *Add* to select users to send the recovery message to. The user must have at least ”read” permissions to the host in order to be notified.
		Send only to	Send recovery message to all defined media types or a selected one only.
		Default message	If selected, the default message will be used (see above).
		Subject	Subject of the custom message. The subject may contain macros.
		Message	The custom message. The message may contain macros.
		Operation type: remote command	

Parameter		Description
	Target list	Select targets to execute the command on: **Current host** - command is executed on the host of the trigger that caused the problem event. This option will not work if there are multiple hosts in the trigger. **Host** - select host(s) to execute the command on. **Host group** - select host group(s) to execute the command on. Specifying a parent host group implicitly selects all nested host groups. Thus the remote command will also be executed on hosts from nested groups. A command on a host is executed only once, even if the host matches more than once (e.g. from several host groups; individually and from a host group). The target list is meaningless if the command is executed on Zabbix server. Selecting more targets in this case only results in the command being executed on the server more times. Note that for global scripts, the target selection also depends on the *Host group* setting in global script configuration.
	Type	Select the command type: **IPMI** - execute an IPMI command **Custom script** - execute a custom set of commands **SSH** - execute an SSH command **Telnet** - execute a Telnet command **Global script** - execute one of the global scripts defined in *Administration→Scripts*.
	Execute on	Execute a custom script on: **Zabbix agent** - the script will be executed by Zabbix agent on the host **Zabbix server (proxy)** - the script will be executed by Zabbix server or proxy - depending on whether the host is monitored by server or proxy **Zabbix server** - the script will be executed by Zabbix server only To execute scripts on the agent, it must be configured to allow remote commands from the server. This field is available if 'Custom script' is selected as *Type*.
	Commands	Enter the command(s). Supported macros will be resolved based on the trigger expression that caused the event. For example, host macros will resolve to the hosts of the trigger expression (and not of the target list).
	Operation type: notify all involved	
	Default message	If selected, the default message will be used (see above).
	Subject	Subject of the custom message. The subject may contain macros.

Parameter		Description
	Message	The custom message. The message may contain macros.

4 Update operations

Overview

Update operations allow you to be notified when problems are updated by other users, i.e.:

- commented upon
- acknowledged
- severity changed
- closed (manually)

Update operations are available in actions with the event source as *Triggers*.

Both messages and remote commands are supported in update operations. While several operations can be added, escalation is not supported - all operations are assigned to a single step and therefore will be performed simultaneously.

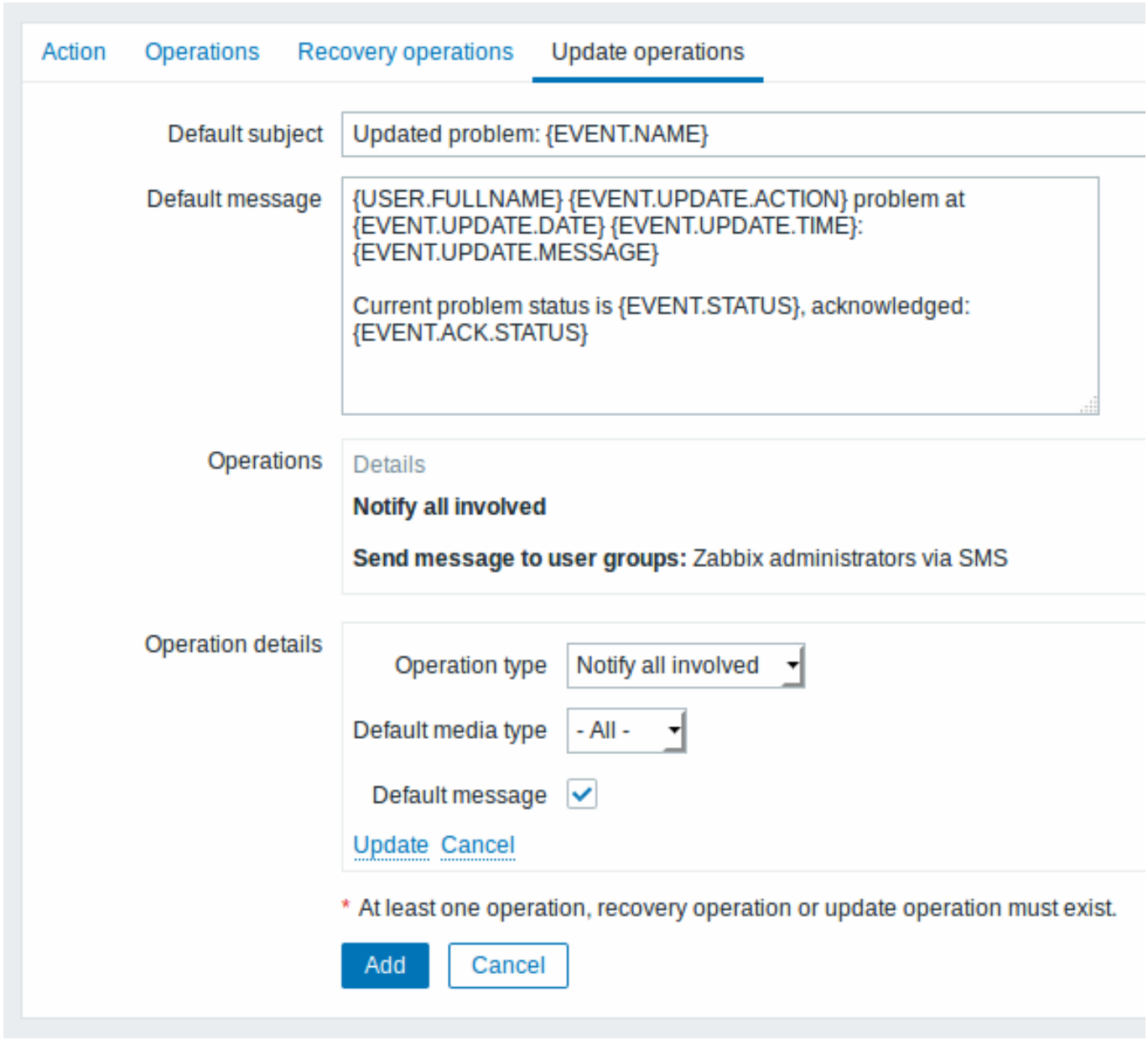
Configuring an update operation

To configure an update operation:

- Go to the *Update operations* tab in action configuration
- Click on *New* in the Operations block
- Edit the operation details and click on *Add*

Several operations can be added.

Update operation attributes:



Parameter	Description
Default subject	Default message subject for update notifications. The subject may contain macros.
Default message	Default message for update notifications. The message may contain macros.
Operations	Update operation details are displayed. To configure a new update operation, click on *New*.
Operation details	This block is used to configure the details of an update operation.

Parameter		Description
	Operation type	Three operation types are available for update operations: **Send message** - send update message to specified user when event is updated, for example, acknowledged **Remote command** - execute a remote command when event is updated, for example, acknowledged **Notify all involved** - send notification message to all users who received notification about the problem appearing and/or have updated the problem event. If the same recipient with unchanged default subject/message is defined in several operation types, duplicate notifications are not sent. The person who updates a problem does not receive notification about their own update.
	Operation type: send message	
	Send to user groups	Click on *Add* to select user groups to send the update message to. The user group must have at least ”read” permissions to the host in order to be notified.
	Send to users	Click on *Add* to select users to send the update message to. The user must have at least ”read” permissions to the host in order to be notified.
	Send only to	Send update message to all defined media types or a selected one only.
	Default message	If selected, the default message will be used (see above).
	Subject	Subject of the custom message. The subject may contain macros.
	Message	The custom message. The message may contain macros.
	Operation type: remote command	

Parameter		Description
	Target list	Select targets to execute the command on: **Current host** - command is executed on the host of the trigger that caused the problem event. This option will not work if there are multiple hosts in the trigger. **Host** - select host(s) to execute the command on. **Host group** - select host group(s) to execute the command on. Specifying a parent host group implicitly selects all nested host groups. Thus the remote command will also be executed on hosts from nested groups. A command on a host is executed only once, even if the host matches more than once (e.g. from several host groups; individually and from a host group). The target list is meaningless if the command is executed on Zabbix server. Selecting more targets in this case only results in the command being executed on the server more times. Note that for global scripts, the target selection also depends on the *Host group* setting in global script configuration.
	Type	Select the command type: **IPMI** - execute an IPMI command **Custom script** - execute a custom set of commands **SSH** - execute an SSH command **Telnet** - execute a Telnet command **Global script** - execute one of the global scripts defined in *Administration→Scripts*.
	Execute on	Execute a custom script on: **Zabbix agent** - the script will be executed by Zabbix agent on the host **Zabbix server (proxy)** - the script will be executed by Zabbix server or proxy - depending on whether the host is monitored by server or proxy **Zabbix server** - the script will be executed by Zabbix server only To execute scripts on the agent, it must be configured to allow remote commands from the server. This field is available if 'Custom script' is selected as *Type*.
	Commands	Enter the command(s). Supported macros will be resolved based on the trigger expression that caused the event. For example, host macros will resolve to the hosts of the trigger expression (and not of the target list).
	Operation type: notify all involved	

Parameter		Description
	Default media type	Users who update a problem but have not received notifications about the problem appearing will receive notifications about further updates on the selected default media type - Email or SMS. This field is available since Zabbix 3.4.2.
	Default message	If selected, the default message will be used (see above).
	Subject	Subject of the custom message. The subject may contain macros.
	Message	The custom message. The message may contain macros.

5 Escalations

Overview

With escalations you can create custom scenarios for sending notifications or executing remote commands.

In practical terms it means that:

- Users can be informed about new problems immediately
- Notifications can be repeated until the problem is resolved
- Sending a notification can be delayed
- Notifications can be escalated to another ”higher” user group
- Remote commands can be executed immediately or when a problem is not resolved for a lengthy period

Actions are escalated based on the **escalation step**. Each step has a duration in time.

You can define both the default duration and a custom duration of an individual step. The minimum duration of one escalation step is 60 seconds.

You can start actions, such as sending notifications or executing commands, from any step. Step one is for immediate actions. If you want to delay an action, you can assign it to a later step. For each step, several actions can be defined.

The number of escalation steps is not limited.

Escalations are defined when configuring an operation. Escalations are supported for problem operations only, not recovery.

Miscellaneous aspects of escalation behaviour

Let’s consider what happens in different circumstances if an action contains several escalation steps.

Situation	Behaviour
The host in question goes into maintenance after the initial problem notification is sent	Depending on the *Pause operations for suppressed problems* setting in action configuration, all remaining escalation steps are executed either with a delay caused by the maintenance period or without delay. A maintenance period does not cancel operations.
*The time period defined in the **Time period** action condition ends after the initial notification is sent*	All remaining escalation steps are executed. The *Time period* condition cannot stop operations; it has effect with regard to when actions are started/not started, not operations.
A problem starts during maintenance and continues (is not resolved) after maintenance ends	Depending on the *Pause operations for suppressed problems* setting in action configuration, all escalation steps are executed either from the moment maintenance ends or immediately.
A problem starts during a no-data maintenance and continues (is not resolved) after maintenance ends	It must wait for the trigger to fire, before all escalation steps are executed.
Different escalations follow in close succession and overlap	The execution of each new escalation supersedes the previous escalation, but for at least one escalation step that is always executed on the previous escalation. This behavior is relevant in actions upon events that are created with EVERY problem evaluation of the trigger.

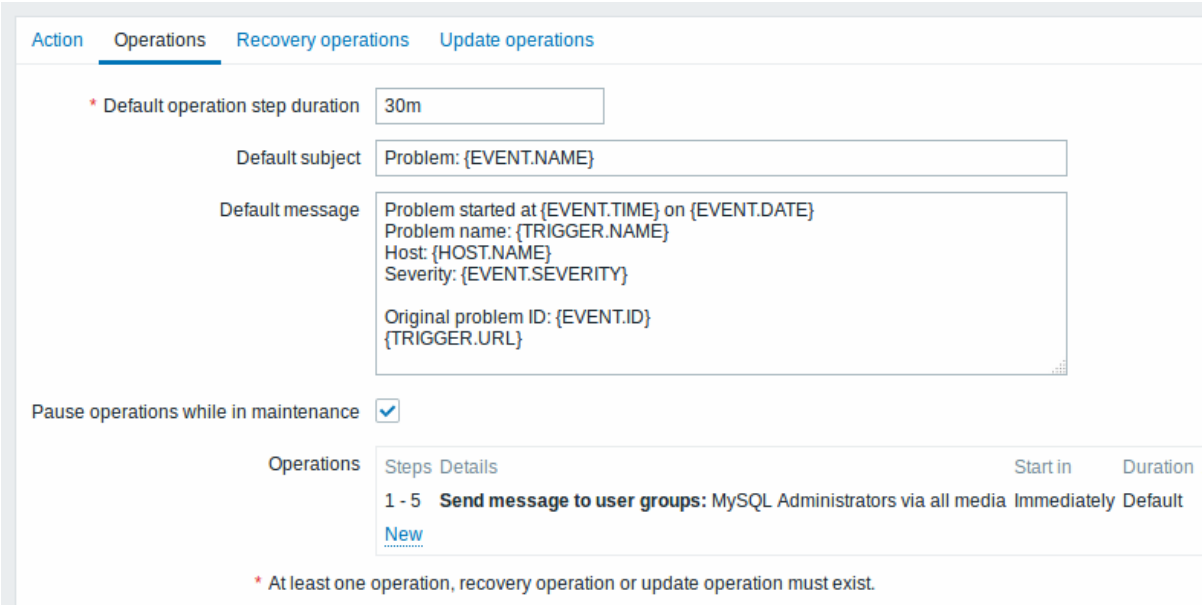
Situation	Behaviour
During an escalation in progress (like a message being sent), based on any type of event: - the action is disabled - the event is deleted Based on trigger event: - the trigger is disabled or deleted - the host or item is disabled Based on internal event about triggers: - the trigger is disabled or deleted Based on internal event about items/low-level discovery rules: - the item is disabled or deleted - the host is disabled	The message in progress is sent and then one more message on the escalation is sent. The follow-up message will have the cancellation text at the beginning of the message body (*NOTE: Escalation cancelled*) naming the reason (for example, *NOTE: Escalation cancelled: action '<Action name>' disabled*). This way the recipient is informed that the escalation is cancelled and no more steps will be executed. This message is sent to all who received the notifications before. The reason of cancellation is also logged to the server log file (starting from Debug Level 3=Warning). Note that the *Escalation cancelled* message is also sent if operations are finished, but recovery operations are configured and are not executed yet.
During an escalation in progress (like a message being sent) the action is deleted	No more messages are sent. The information is logged to the server log file (starting from Debug Level 3=Warning), for example: `escalation cancelled: action id:334 deleted`

Escalation examples

Example 1

Sending a repeated notification once every 30 minutes (5 times in total) to a 'MySQL Administrators' group. To configure:

- in Operations tab, set the *Default operation step duration* to '30m' (30 minutes)
- Set the escalation steps to be *From* '1' *To* '5'
- Select the 'MySQL Administrators' group as recipients of the message



All mandatory input fields are marked with a red asterisk.

Notifications will be sent at 0:00, 0:30, 1:00, 1:30, 2:00 hours after the problem starts (unless, of course, the problem is resolved sooner).

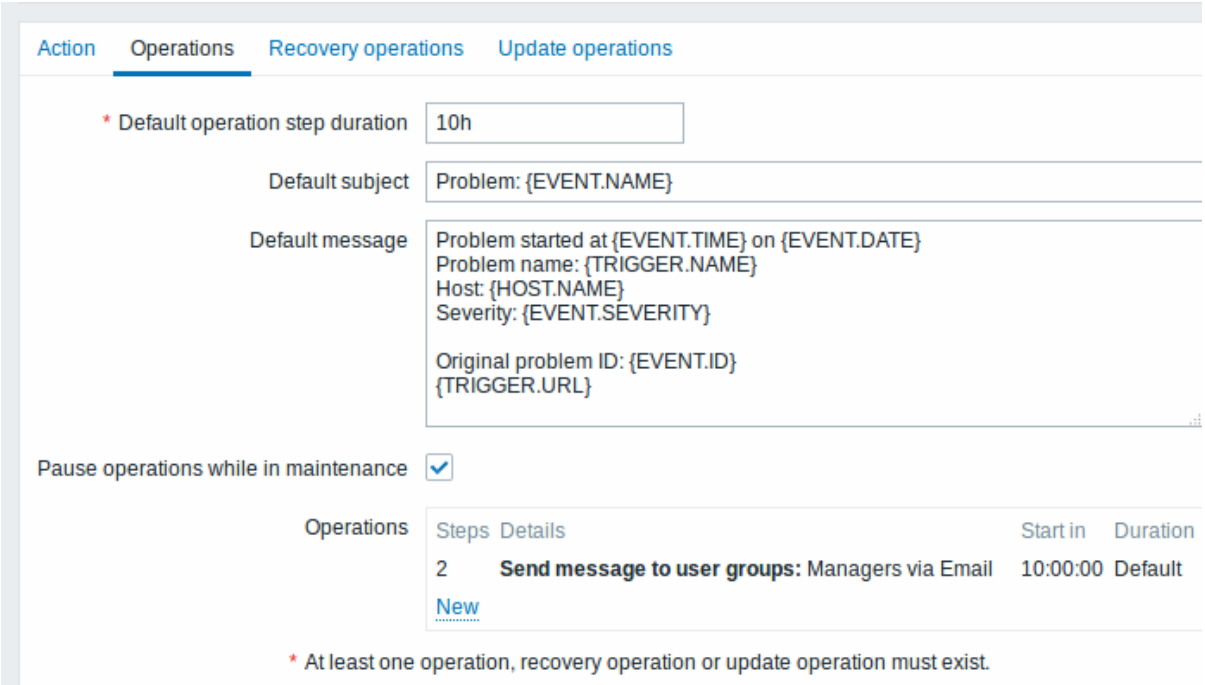
If the problem is resolved and a recovery message is configured, it will be sent to those who received at least one problem message within this escalation scenario.

Note:
If the trigger that generated an active escalation is disabled, Zabbix sends an informative message about it to all those that have already received notifications.

Example 2

Sending a delayed notification about a long-standing problem. To configure:

- In Operations tab, set the *Default operation step duration* to '10h' seconds (10 hours)
- Set the escalation steps to be *From* '2' *To* '2'



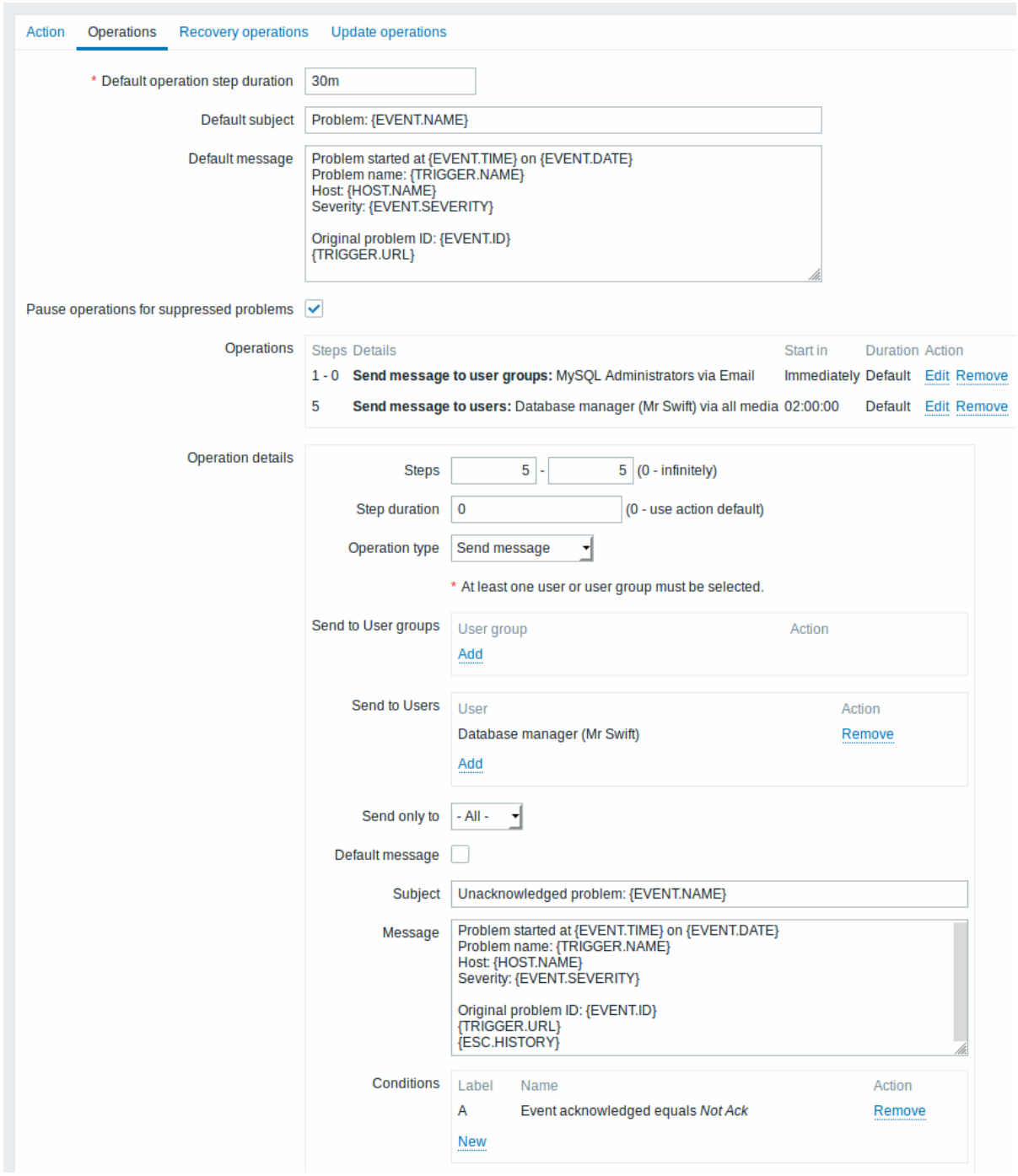
A notification will only be sent at Step 2 of the escalation scenario, or 10 hours after the problem starts.

You can customize the message text to something like 'The problem is more than 10 hours old'.

Example 3

Escalating the problem to the Boss.

In the first example above we configured periodical sending of messages to MySQL administrators. In this case, the administrators will get four messages before the problem will be escalated to the Database manager. Note that the manager will get a message only in case the problem is not acknowledged yet, supposedly no one is working on it.



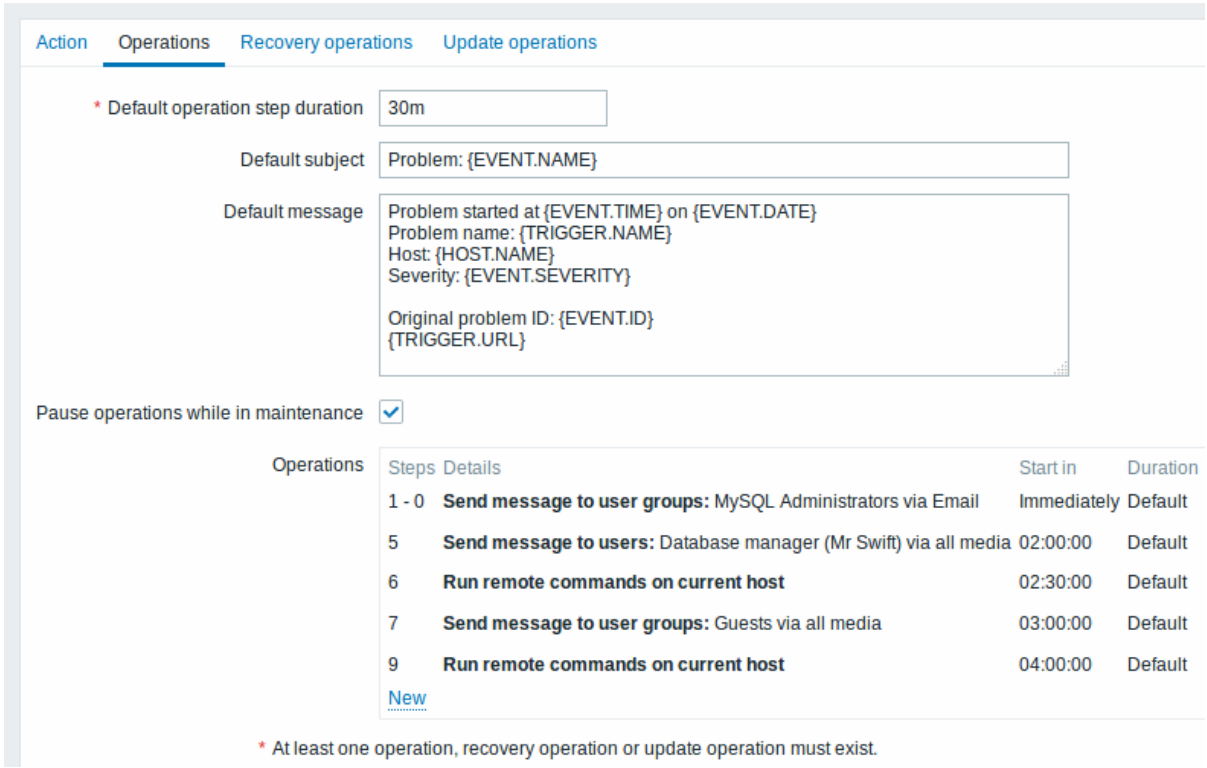
Note the use of {ESC.HISTORY} macro in the message. The macro will contain information about all previously executed steps on this escalation, such as notifications sent and commands executed.

Example 4

A more complex scenario. After multiple messages to MySQL administrators and escalation to the manager, Zabbix will try to restart the MySQL database. It will happen if the problem exists for 2:30 hours and it hasn't been acknowledged.

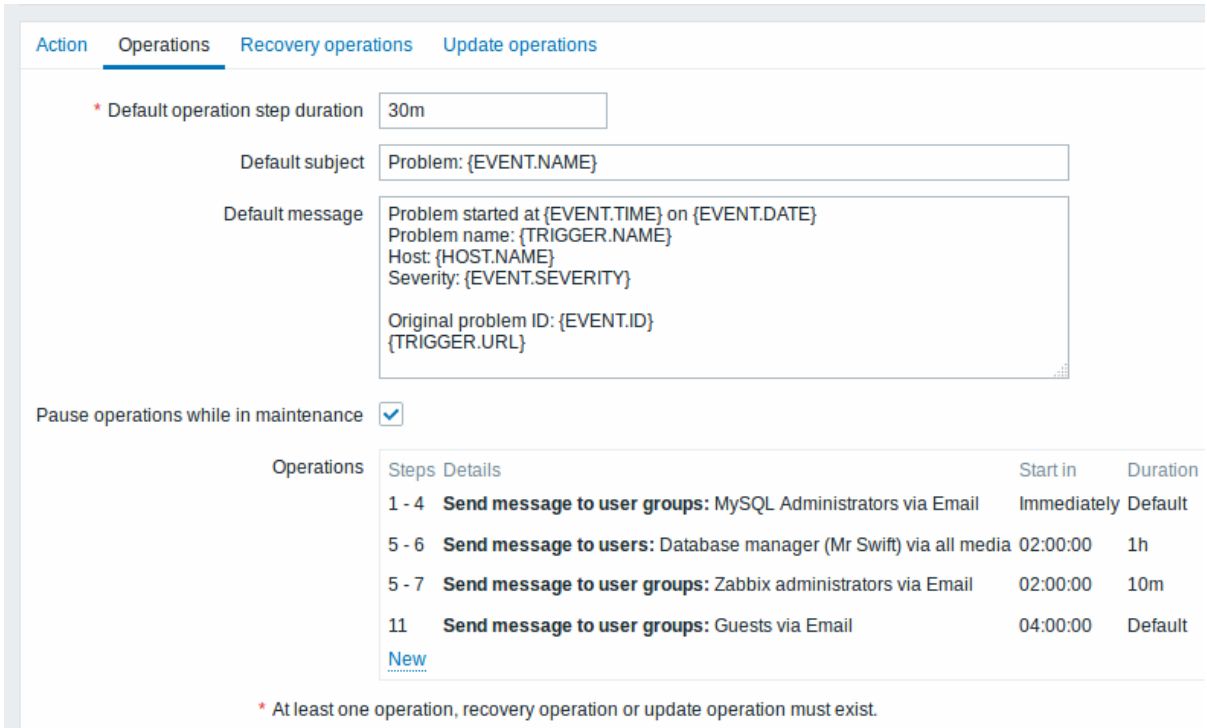
If the problem still exists, after another 30 minutes Zabbix will send a message to all guest users.

If this does not help, after another hour Zabbix will reboot server with the MySQL database (second remote command) using IPMI commands.



Example 5

An escalation with several operations assigned to one step and custom intervals used. The default operation step duration is 30 minutes.



Notifications will be sent as follows:

- to MySQL administrators at 0:00, 0:30, 1:00, 1:30 after the problem starts
- to Database manager at 2:00 and 2:10 (and not at 3:00; seeing that steps 5 and 6 overlap with the next operation, the shorter custom step duration of 10 minutes in the next operation overrides the longer step duration of 1 hour tried to set here)
- to Zabbix administrators at 2:00, 2:10, 2:20 after the problem starts (the custom step duration of 10 minutes working)
- to guest users at 4:00 hours after the problem start (the default step duration of 30 minutes returning between steps 8 and 11)

3 Receiving notification on unsupported items

Overview

Receiving notifications on unsupported items is supported since Zabbix 2.2.

It is part of the concept of internal events in Zabbix, allowing users to be notified on these occasions. Internal events reflect a change of state:

- when items go from 'normal' to 'unsupported' (and back)
- when triggers go from 'normal' to 'unknown' (and back)
- when low-level discovery rules go from 'normal' to 'unsupported' (and back)

This section presents a how-to for **receiving notification** when an item turns unsupported.

Configuration

Overall, the process of setting up the notification should feel familiar to those who have set up alerts in Zabbix before.

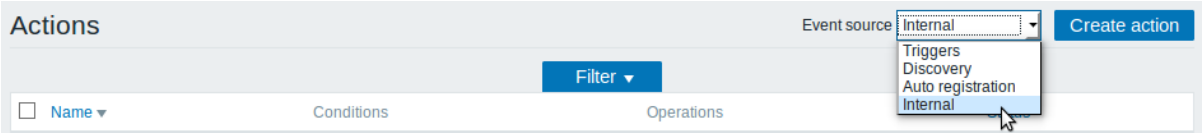
Step 1

Configure some media, such as e-mail, SMS, or script to use for the notifications. Refer to the corresponding sections of the manual to perform this task.

Attention:
For notifying on internal events the default severity ('Not classified') is used, so leave it checked when configuring user media if you want to receive notifications for internal events.

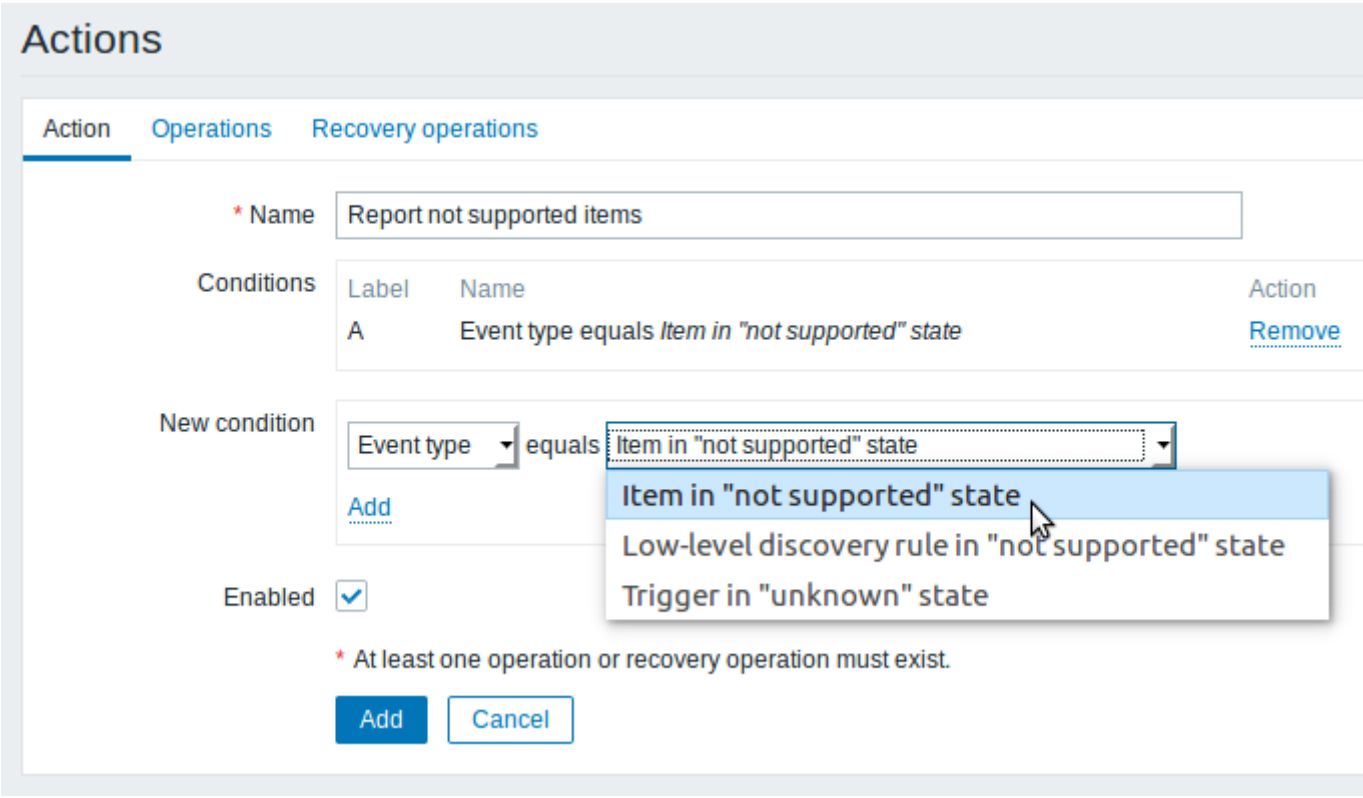
Step 2

Go to *Configuration→Actions* and select *Internal* as the event source. Click on *Create action* on the upper right to open an action configuration form.



Step 3

In the **Action** tab enter a name for the action. Then select *Event type* in the New condition block and select *Item in "not supported" state* as the value.

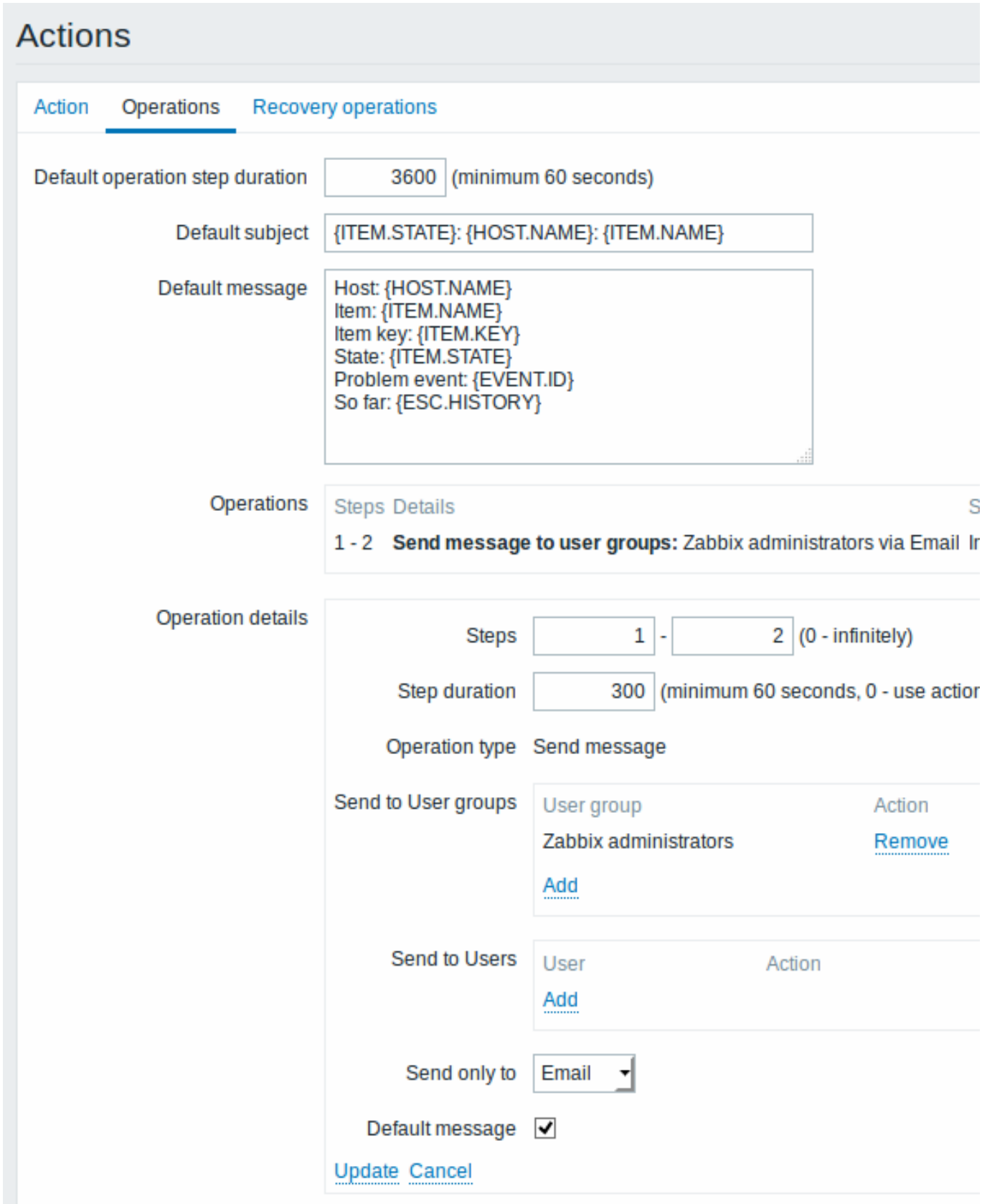


Don’t forget to click on *Add* to actually list the condition in the *Conditions* block.

Step 4

In the **Operations** tab, enter the subject/content of the problem message.

Click on *New* in the *Operations* block and select some recipients of the message (user groups/users) and the media types (or ’All’) to use for delivery.



Click on *Add* in the *Operation details* block to actually list the operation in the *Operations* block.

If you wish to receive more than one notification, set the operation step duration (interval between messages sent) and add another

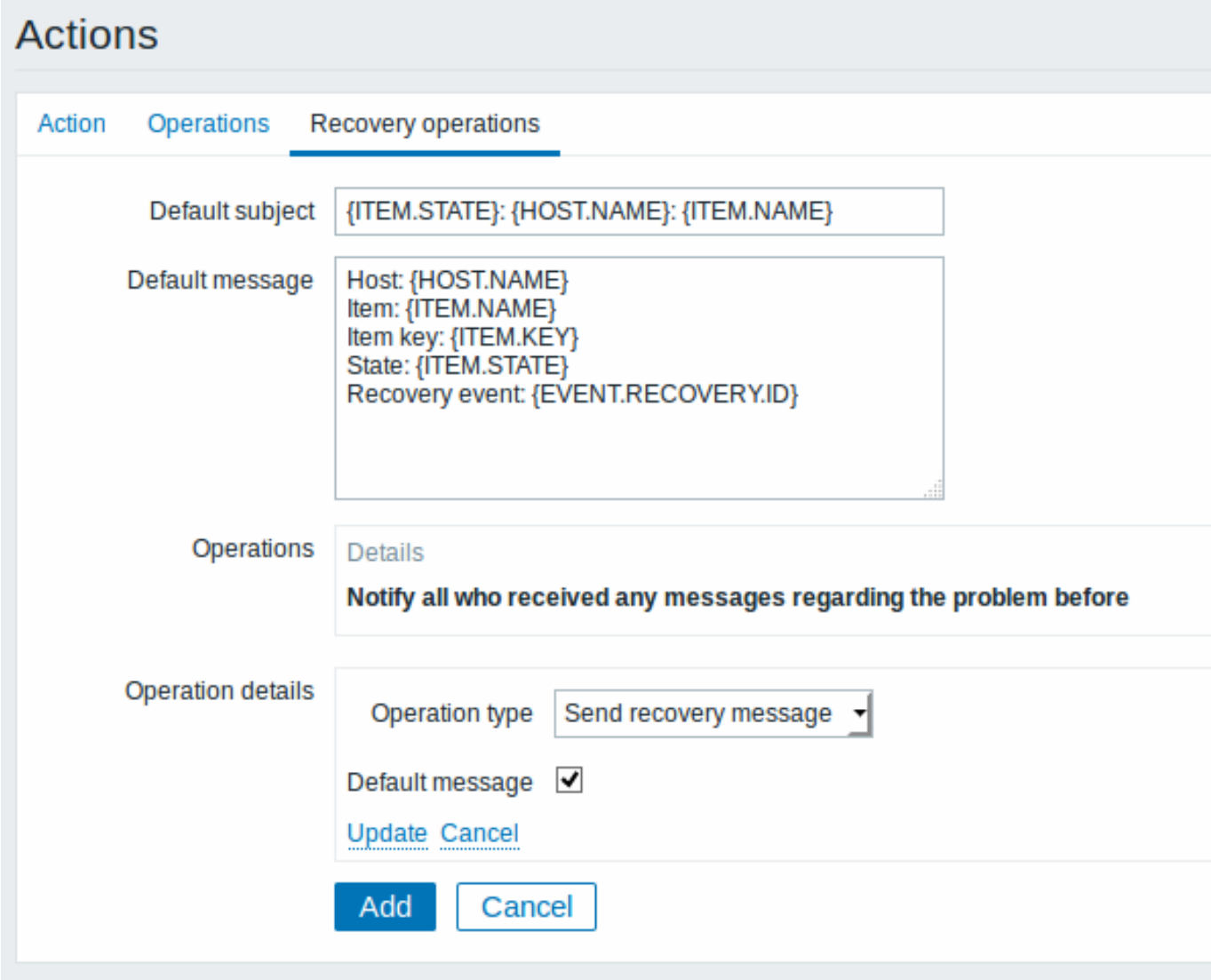
operation.

Step 5

The **Recovery operations** tab allows to configure a recovery notification when an item goes back to the normal state.

Enter the subject/content of the recovery message.

Click on *New* in the *Operations* block and select some recipients of the message (user groups/users) and the media types (or 'All') to use for delivery.



Click on *Add* in the *Operation details* block to actually list the operation in the *Operations* block.

Step 6

When finished, click on the **Add** button underneath the form.

And that's it, you're done! Now you can look forward to receiving your first notification from Zabbix if some item turns unsupported.

10 Macros

Overview

Zabbix supports a number of macros which may be used in various situations. Macros are variables, identified by a specific syntax:

`{MACRO}`

Macros resolve to a specific value depending on the context.

Effective use of macros allows to save time and make Zabbix configuration more transparent.

In one of typical uses, a macro may be used in a template. Thus a trigger on a template may be named "Processor load is too high on {HOST.NAME}". When the template is applied to the host, such as Zabbix server, the name will resolve to "Processor load is too high on Zabbix server" when the trigger is displayed in the Monitoring section.

Macros may be used in item key parameters. A macro may be used for only a part of the parameter, for example `item.key[server_{HOST.HOST}_local]`. Double-quoting the parameter is not necessary as Zabbix will take care of any ambiguous special symbols, if present in the resolved macro.

See also:

- full list of supported macros
- macro functions
- how to configure user macros

1 Macro functions

Overview

Macro functions offer the ability to customize macro values.

Sometimes a macro may resolve to a value that is not necessarily easy to work with. It may be long or contain a specific substring of interest that you would like to extract. This is where macro functions can be useful.

The syntax of a macro function is:

`{<macro>.<func>(<params>)}`

where:

- <macro> - the macro to customize (for example {ITEM.VALUE} or {#LLDMACRO})
- <func> - the function to apply
- <params> - a comma-delimited list of function parameters. Parameters must be quoted if they start with " " (space), " or contain), ,.

For example:

```
{{ITEM.VALUE}.regsub(pattern, output)}
{{#LLDMACRO}.regsub(pattern, output)}
```

Supported macro functions

FUNCTION	Description	Parameters	Supported for
regsub (<pattern>,<output>)	Substring extraction by a regular expression match (case sensitive).	**pattern** - the regular expression to match **output** - the output options. **\1 - \9** placeholders are supported to capture groups. **\0** returns the matched text.	{ITEM.VALUE} {ITEM.LASTVALUE} Low-level discovery macros (except in low-level discovery rule filter)

FUNCTION			
iregsub (<pattern>,<output>)	Substring extraction by a regular expression match (case insensitive).	**pattern** - the regular expression to match **output** - the output options. **\1 - \9** placeholders are supported to capture groups. **\0** returns the matched text.	{ITEM.VALUE} {ITEM.LASTVALUE} Low-level discovery macros (except in low-level discovery rule filter)

If a function is used in a supported location, but applied to a macro not supporting macro functions, then the macro evaluates to 'UNKNOWN'.

If pattern is not a correct regular expression then the macro evaluates to 'UNKNOWN' (excluding low-level discovery macros where the function will be ignored in that case and macro will remain unexpanded)

If a macro function is applied to the macro in locations not supporting macro functions then the function is ignored.

Examples

The ways in which macro functions can be used to customize macro values is illustrated in the following examples containing log lines as received value:

Received value	Macro	Output
123Log line	{{ITEM.VALUE}.regsub("^[0-9]+, Problem)}	Problem
123 Log line	{{ITEM.VALUE}.regsub("^([0-9]+)", "Problem")}	Problem
123 Log line	{{ITEM.VALUE}.regsub("^([0-9]+)", Problem ID: \1)}	Problem ID: 123
Log line	{{ITEM.VALUE}.regsub("Problem", "Problem ID: \1")}	Problem ID: Log line
MySQL crashed errno 123	{{ITEM.VALUE}.regsub("(Problem) ([0-9]+)", " Problem ID: \1_\2 ")}	Problem ID: MySQL crashed errno 123
123 Log line	{{ITEM.VALUE}.regsub("^[0-9]+", "Problem ID: \1")}	UNKNOWN (invalid regular expression)
customername_1	{{#IFALIAS}.regsub("(.*)_([0-9]+)", \1)}	customername
customername_1	{{#IFALIAS}.regsub("(.*)_([0-9]+)", \2)}	1
customername_1	{{#IFALIAS}.regsub("(.*)_([0-9]+", \1)}	{{#IFALIAS}.regsub("(.*)_([0-9]+", \1)} (invalid regular expression)

Received value	Macro	Output
customername_1	{$MACRO:"{{#IFALIAS}{$MACRO:\"{{#IFALIAS}.regsub(\"(.*)_([0-9]+)\", \1)}\"}	{$MACRO:"{{#IFALIAS}.regsub("(.*)_([0-9]+)", \1)}"}
customername_1	{$MACRO:"{{#IFALIAS}{$MACRO:\"{{#IFALIAS}.regsub(\"(.*)_([0-9]+)\", \2)}\"}	{$MACRO:"{{#IFALIAS}.regsub("(.*)_([0-9]+)", \2)}"}
customername_1	{$MACRO:"{{#IFALIAS}{$MACRO:\"{{#IFALIAS}.regsub(\"(.*)_([0-9]+)\", \1)}\"}	{$MACRO:"{{#IFALIAS}.regsub("(.*)_([0-9]+)", \1)}"} (invalid regular expression)
customername_1	"{$MACRO:\"{{#IFALIAS}{$MACRO:\\\"{{#IFALIAS}.regsub(\\\"(.*)_([0-9]+)\\\", \1)}\"}"	"{$MACRO:\"{{#IFALIAS}.regsub(\"(.*)_([0-9]+)\", \1)}\"}"
customername_1	"{$MACRO:\"{{#IFALIAS}{$MACRO:\\\"{{#IFALIAS}.regsub(\\\"(.*)_([0-9]+)\\\", \2)}\"}"	"{$MACRO:\"{{#IFALIAS}.regsub(\"(.*)_([0-9]+)\", \2)}\"}"
customername_1	"{$MACRO:\"{{#IFALIAS}{$MACRO:\\\"{{#IFALIAS}.regsub(\\\"(.*)_([0-9]+)\\\", \1)}\"}"	"{$MACRO:\"{{#IFALIAS}.regsub(\"(.*)_([0-9]+)\", \1)}\"}") (invalid regular expression)

2 User macros

Overview

User macros are supported in Zabbix for greater flexibility, in addition to the macros supported out-of-the-box.

User macros can be defined on global, template and host level. These macros have a special syntax:

{$MACRO}

Zabbix resolves macros according to the following precedence:

1. host level macros (checked first)
2. macros defined for first level templates of the host (i.e., templates linked directly to the host), sorted by template ID
3. macros defined for second level templates of the host, sorted by template ID
4. macros defined for third level templates of the host, sorted by template ID, etc.
5. global macros (checked last)

In other words, if a macro does not exist for a host, Zabbix will try to find it in the host templates of increasing depth. If still not found, a global macro will be used, if exists.

If Zabbix is unable to find a macro, the macro will not be resolved.

Attention:
Macros (including user macros) are left unresolved in the Configuration section (for example, in the trigger list) by design to make complex configuration more transparent.

User macros can be used in:

- item name
- item key parameter
- item update intervals and flexible intervals
- trigger name and description
- trigger expression parameters and constants (see examples)
- many other locations - see the full list

Common use cases of global and host macros

- use a global macro in several locations; then change the macro value and apply configuration changes to all locations with one click
- take advantage of templates with host-specific attributes: passwords, port numbers, file names, regular expressions, etc.

Configuration

To define user macros, go to the corresponding locations in the frontend:

- for global macros, visit *Administration → General → Macros*
- for host and template level macros, open host or template properties and look for the *Macros* tab

Note:
If a user macro is used in items or triggers in a template, it is suggested to add that macro to the template even if it is defined on a global level. That way, exporting the template to XML and importing it in another system will still allow it to work as expected.

The following characters are allowed in the macro names: **A-Z** , **0-9** , **_** , **.**

Examples

Example 1

Use of host-level macro in the "Status of SSH daemon" item key:

```
net.tcp.service[ssh,,{$SSH_PORT}]
```

This item can be assigned to multiple hosts, providing that the value of **{$SSH_PORT}** is defined on those hosts.

Example 2

Use of host-level macro in the "CPU load is too high" trigger:

```
{ca_001:system.cpu.load[,avg1].last()}>{$MAX_CPULOAD}
```

Such a trigger would be created on the template, not edited in individual hosts.

Note:
If you want to use amount of values as the function parameter (for example, **max(#3)**), include hash mark in the macro definition like this: SOME_PERIOD => #3

Example 3

Use of two macros in the "CPU load is too high" trigger:

```
{ca_001:system.cpu.load[,avg1].min({$CPULOAD_PERIOD})}>{$MAX_CPULOAD}
```

Note that a macro can be used as a parameter of trigger function, in this example function **min()**.

Attention:
In trigger expressions user macros will resolve if referencing a parameter or constant. They will NOT resolve if referencing the host, item key, function, operator or another trigger expression.

Example 4

Synchronize the agent unavailability condition with the item update interval:

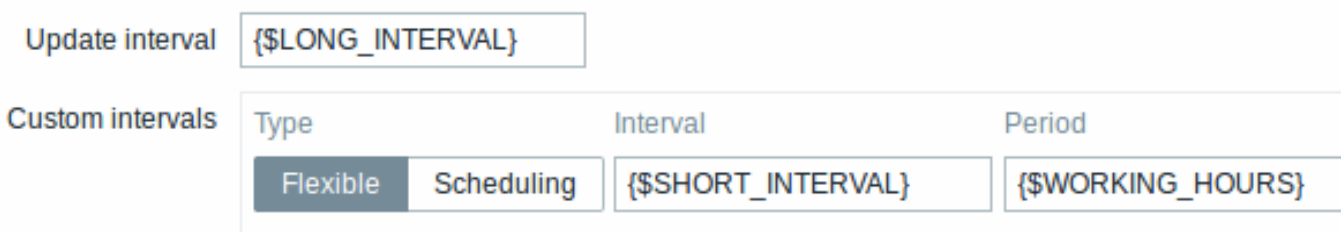
- define {$INTERVAL} macro and use it in the item update interval;
- use {$INTERVAL} as parameter of the agent unavailability trigger:

```
{ca_001:agent.ping.nodata({$INTERVAL})}=1
```

Example 5

Centralize configuration of working hours:

- create a global {$WORKING_HOURS} macro equal to 1-5,09:00-18:00;
- use it in *Administration → General → Working time*;
- use it in *User → Media → When active*;
- use it to set up more frequent item polling during working hours:



- use it in the *Time period* action condition;
- adjust the working time in *Administration → General → Macros*, if needed.

User macro context

An optional context can be used in user macros, allowing to override the default value with context-specific one.

User macros with context have a similar syntax:

`{$MACRO:context}`

Macro context is a simple text value. The common use case for macro contexts would be using a low-level discovery macro value as a user macro context. For example, a trigger prototype could be defined for mounted file system discovery to use a different low space limit depending on the mount points or file system types.

Only low-level discovery macros are supported in macro contexts. Any other macros are ignored and treated as plain text.

Technically, macro context is specified using rules similar to item key parameters, except macro context is not parsed as several parameters if there is a `,` character:

- Macro context must be quoted with " if the context contains a `}` character or starts with a " character. Quotes inside quoted context must be escaped with the `\` character. The `\` character itself is not escaped, which means it's impossible to have a quoted context ending with the `\` character - the macro `{$MACRO:"a:\b\c\"}` is invalid.
- The leading spaces in context are ignored, the trailing spaces are not. For example `{$MACRO:A}` is the same as `{$MACRO: A}`, but not `{$MACRO:A }`.
- All spaces before leading quotes and after trailing quotes are ignored, but all spaces inside quotes are not. Macros `{$MACRO:"A"}`, `{$MACRO: "A"}`, `{$MACRO:"A" }` and `{$MACRO: "A" }` are the same, but macros `{$MACRO:"A"}` and `{$MACRO:" A "}` are not.

The following macros are all equivalent, because they have the same context: `{$MACRO:A}`, `{$MACRO: A}` and `{$MACRO:"A"}`. This is in contrast with item keys, where `key[a]`, `key[ a]` and `key["a"]` are the same semantically, but different for uniqueness purposes.

When context macros are processed, Zabbix looks up the macro with its context. If a macro with this context is not defined by host or linked templates, and it is not a defined as a global macro with context, then the macro without context is searched for.

See usage example of macro context in a disk space trigger prototype and take limitation clause into consideration.

3 Low-level discovery macros

Overview

There is a type of macro used within the low-level discovery (LLD) function:

`{#MACRO}`

It is a macro that is used in an LLD rule and returns real values of file system names, network interfaces, SNMP OIDs, etc.

These macros can be used for creating item, trigger and graph *prototypes*. Then, when discovering real file systems, network interfaces etc., these macros are substituted with real values and are the basis for creating real items, triggers and graphs.

These macros are also used in creating host and host group *prototypes* in virtual machine discovery.

Some low-level discovery macros come "pre-packaged" with the LLD function in Zabbix - {#FSNAME}, {#FSTYPE}, {#IFNAME}, {#SNMPINDEX}, {#SNMPVALUE}. However, adhering to these names is not compulsory when creating a custom low-level discovery rule. Then you may use any other LLD macro name and refer to that name.

Supported locations

LLD macros can be used:

- in the low-level discovery rule filter
- for item prototypes in
  - name
  - key parameters
  - unit
  - update interval[1]
  - history storage period[1]
  - trend storage period[1]
  - item value preprocessing steps
  - SNMP OID
  - IPMI sensor field
  - calculated item formula
  - SSH script and Telnet script
  - database monitoring SQL query

    - JMX item endpoint field
    - description
    - HTTP agent URL field
    - HTTP agent HTTP query fields field
    - HTTP agent request body field
    - HTTP agent required status codes field
    - HTTP agent headers field key and value
    - HTTP agent HTTP authentication username field
    - HTTP agent HTTP authentication password field
    - HTTP agent HTTP proxy field
    - HTTP agent HTTP SSL certificate file field
    - HTTP agent HTTP SSL key file field
    - HTTP agent HTTP SSL key password field
    - HTTP agent HTTP timeout[1] field
- for trigger prototypes in
    - name
    - operational data
    - expression (only in constants and function parameters)
    - URL
    - description
    - event tag name and value
- for graph prototypes in
    - name
- for host prototypes in
    - name
    - visible name
    - host group prototype name
    - (see the full list)

In all those places LLD macros can be used inside user macro context.

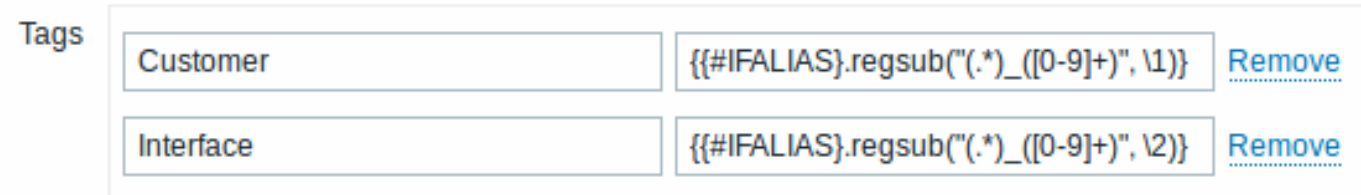
Using macro functions

Macro functions are supported with low-level discovery macros (except in low-level discovery rule filter), allowing to extract a certain part of the macro value using a regular expression.

For example, you may want to extract the customer name and interface number from the following LLD macro for the purposes of event tagging:

```
{#IFALIAS}=customername_1
```

To do so, the `regsub` macro function can be used with the macro in the event tag value field of a trigger prototype:



Note, that commas are not allowed in unquoted item key parameters, so the parameter containing a macro function has to be quoted. The backslash (\) character should be used to escape double quotes inside the parameter. Example:

```
net.if.in["{{#IFALIAS}.regsub(\"(.*)_([0-9]+)\", \1)}",bytes]
```

For more information on macro function syntax, see: Macro functions

Macro functions are supported in low-level discovery macros since Zabbix 4.0.

Footnotes

[1] In the fields marked with [1] a single macro has to fill the whole field. Multiple macros in a field or macros mixed with text are not supported.

11 Users and user groups

Overview

All users in Zabbix access the Zabbix application through the web-based frontend. Each user is assigned a unique login name and a password.

All user passwords are encrypted and stored in the Zabbix database. Users cannot use their user id and password to log directly into the UNIX server unless they have also been set up accordingly to UNIX. Communication between the web server and the user browser can be protected using SSL.

With a flexible user permission schema you can restrict and differentiate access to:

- administrative Zabbix frontend functions
- monitored hosts in hostgroups

1 Configuring a user

Overview

The initial Zabbix installation has two predefined users:

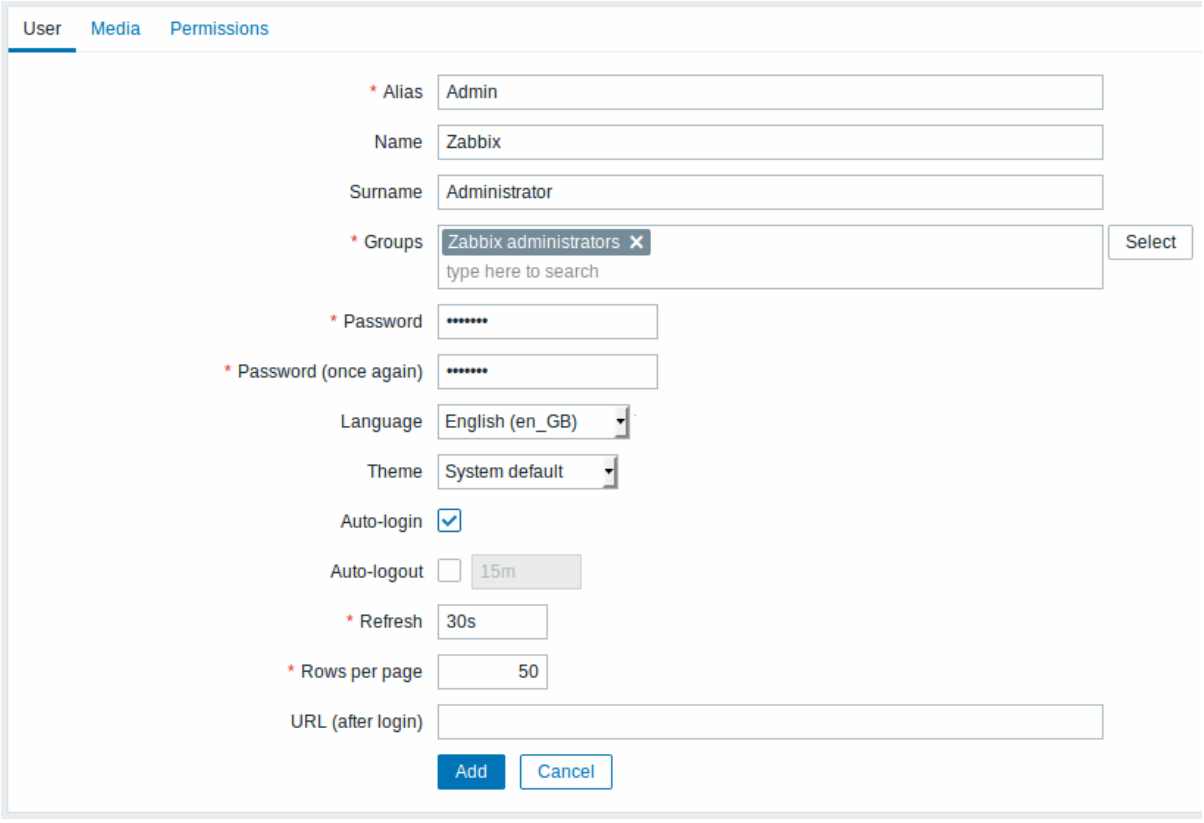
- *Admin* - a Zabbix superuser with full permissions;
- *guest* - a special Zabbix user. As a guest, you may access monitoring pages in Zabbix without being logged in. Note that by default, 'guest' has no permissions on Zabbix objects. (Starting with Zabbix 4.4.2, the 'guest' user is disabled by default. To re-enable it, add it to the Guests user group.)

To configure a new user:

- Go to *Administration* → *Users*
- Click on *Create user* (or on the user name to edit an existing user)
- Edit user attributes in the form

General attributes

The *User* tab contains general user attributes:



All mandatory input fields are marked with a red asterisk.

Parameter	Description
Alias	Unique username, used as the login name.
Name	User first name (optional). If not empty, visible in acknowledgement information and notification recipient information.

Parameter	Description
Surname	User second name (optional). If not empty, visible in acknowledgement information and notification recipient information.
Groups	Select user groups the user belongs to. Starting with Zabbix 3.4.3 this field is auto-complete so starting to type the name of a user group will offer a dropdown of matching groups. Scroll down to select. Alternatively, click on *Select* to add groups. Click on 'x' to remove the selected. Adherence to user groups determines what host groups and hosts the user will have access to.
Password	Two fields for entering the user password. With an existing password, contains a *Password* button, clicking on which opens the password fields.
Language	Language of the Zabbix frontend. The php gettext extension is required for the translations to work.
Theme	Defines how the frontend looks like: **System default** - use default system settings **Blue** - standard blue theme **Dark** - alternative dark theme **High-contrast light** - light theme with high contrast **High-contrast dark** - dark theme with high contrast
Auto-login	Mark this checkbox to make Zabbix remember the user and log the user in automatically for 30 days. Browser cookies are used for this.
Auto-logout	With this checkbox marked the user will be logged out automatically, after the set amount of seconds (minimum 90 seconds, maximum 1 day). Time suffixes are supported, e.g. 90s, 5m, 2h, 1d. Note that this option will not work: * If the "Show warning if Zabbix server is down" global configuration option is enabled and Zabbix frontend is kept open; * When Monitoring menu pages perform background information refreshes; * If logging in with the *Remember me for 30 days* option checked.
Refresh	Set the refresh rate used for graphs, screens, plain text data, etc. Can be set to 0 to disable.
Rows per page	You can determine how many rows per page will be displayed in lists.
URL (after login)	You can make Zabbix transfer the user to a specific URL after successful login, for example, to Problems page.

User media

The *Media* tab contains a listing of all media defined for the user. Media are used for sending notifications. Click on *Add* to assign media to the user.

See the Media types section for details on configuring media types.

Permissions

The *Permissions* tab contains information on:

- the user type (Zabbix User, Zabbix Admin, Zabbix Super Admin). Users cannot change their own type.
- host groups the user has access to. 'Zabbix User' and 'Zabbix Admin' users do not have access to any host groups and hosts by default. To get access they need to be included in user groups that have access to respective host groups and hosts.

See the User permissions page for details.

2 Permissions

Overview

You can differentiate user permissions in Zabbix by defining the respective user type and then by including the unprivileged users in user groups that have access to host group data.

User type

The user type defines the level of access to administrative menus and the default access to host group data.

User type	Description
Zabbix User	The user has access to the Monitoring menu. The user has no access to any resources by default. Any permissions to host groups must be explicitly assigned.
Zabbix Admin	The user has access to the Monitoring and Configuration menus. The user has no access to any host groups by default. Any permissions to host groups must be explicitly given.
Zabbix Super Admin	The user has access to everything: Monitoring, Configuration and Administration menus. The user has a read-write access to all host groups. Permissions cannot be revoked by denying access to specific host groups.

Permissions to host groups

Access to any host data in Zabbix are granted to user groups on host group level only.

That means that an individual user cannot be directly granted access to a host (or host group). It can only be granted access to a host by being part of a user group that is granted access to the host group that contains the host.

3 User groups

Overview

User groups allow to group users both for organizational purposes and for assigning permissions to data. Permissions to monitoring data of host groups are assigned to user groups, not individual users.

It may often make sense to separate what information is available for one group of users and what - for another. This can be accomplished by grouping users and then assigning varied permissions to host groups.

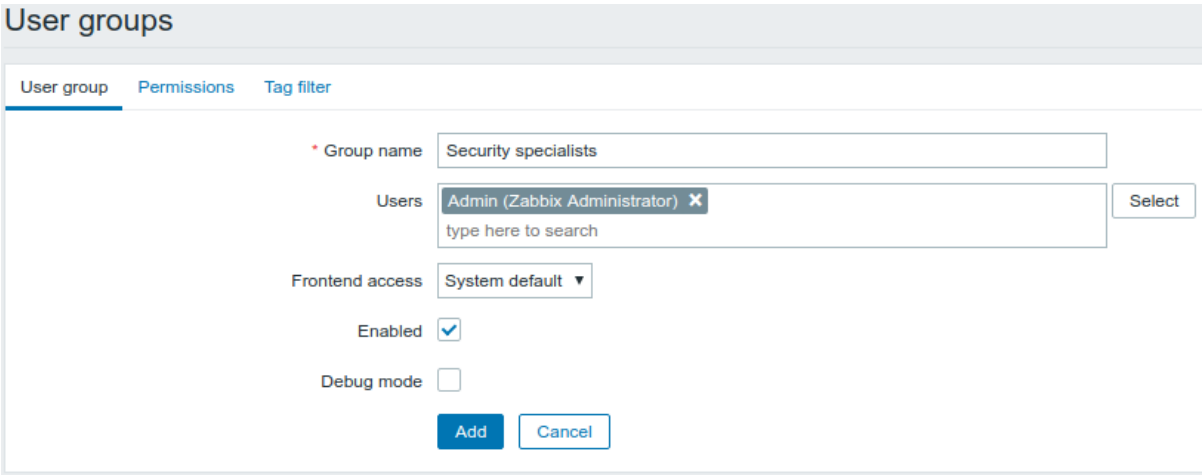
A user can belong to any number of groups.

Configuration

To configure a user group:

- Go to *Administration* → *User groups*
- Click on *Create user group* (or on the group name to edit an existing group)
- Edit group attributes in the form

The **User group** tab contains general group attributes:

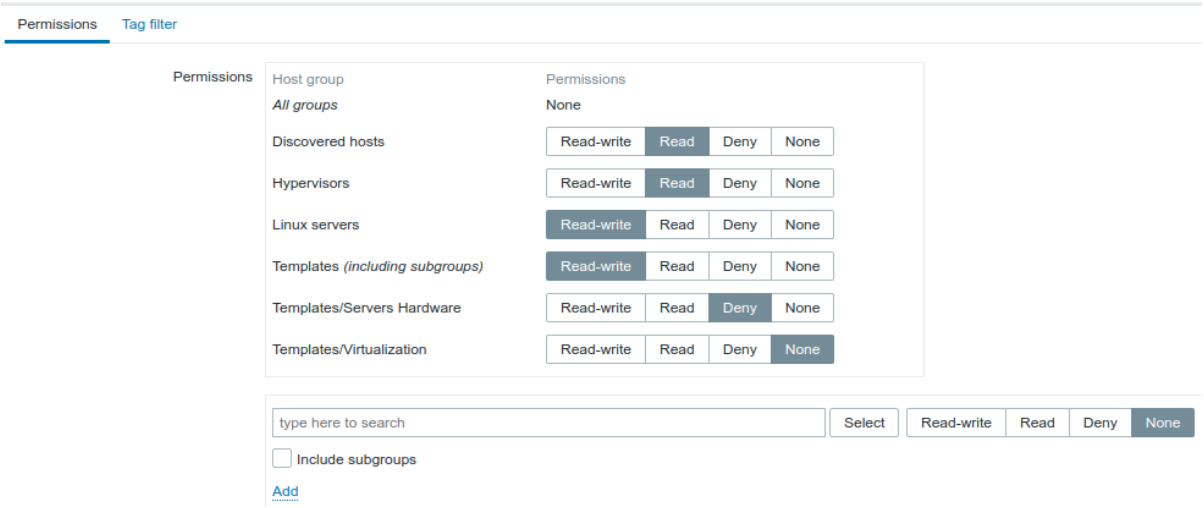


All mandatory input fields are marked with a red asterisk.

Parameter	Description
Group name	Unique group name.
Users	To add users to the group click *Select* button.

Parameter	Description
Frontend access	How the users of the group are authenticated. **System default** - use default authentication method (set globally) **Internal** - use Zabbix internal authentication (even if LDAP authentication is used globally). Ignored if HTTP authentication is the global default. **LDAP** - use LDAP authentication (even if internal authentication is used globally). Ignored if HTTP authentication is the global default. **Disabled** - access to Zabbix frontend is forbidden for this group
Enabled	Status of user group and group members. *Checked* - user group and users are enabled *Unchecked* - user group and users are disabled
Debug mode	Mark this checkbox to activate debug mode for the users.

The **Permissions** tab allows you to specify user group access to host group (and thereby host) data:



Current permissions to host groups are displayed in the *Permissions* block.

If current permissions of the host group are inherited by all nested host groups, that is indicated by the *including subgroups* text in the parenthesis after the host group name.

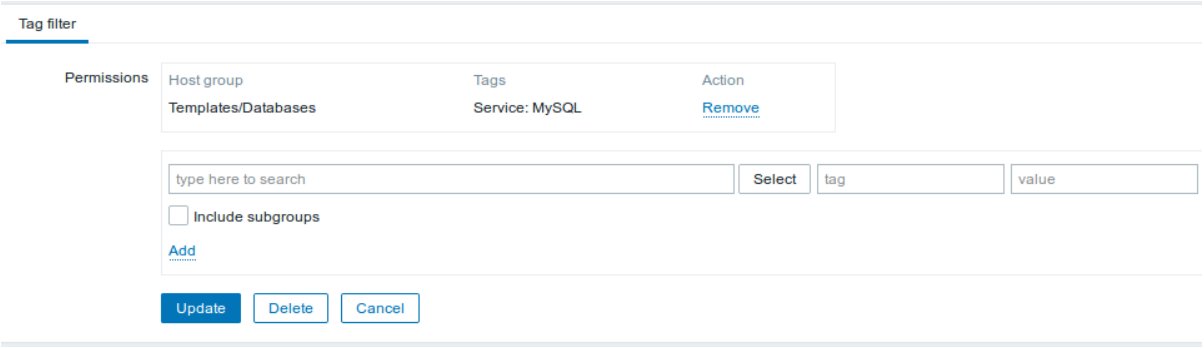
You may change the level of access to a host group:

- **Read-write** - read-write access to a host group;
- **Read** - read-only access to a host group;
- **Deny** - access to a host group denied;
- **None** - no permissions are set.

Use the selection field below to select host groups and the level of access to them (note that selecting *None* will remove host group from the list if the group is already in the list). If you wish to include nested host groups, mark the *Include subgroups* checkbox. This field is auto-complete so starting to type the name of a host group will offer a dropdown of matching groups. If you wish to see all host groups, click on *Select*.

Note that it is possible for Zabbix Super Admin users in host group configuration to enforce the same level of permissions to the nested host groups as the parent host group.

The **Tag filter** tab allows you to set tag based permissions for user groups to see problems filtered by tag name and its value:



To select a host group to apply a tag filter for, click *Select* to get the complete list of existing host groups or start to type the name of a host group to get a dropdown of matching groups. If you want to apply tag filters to nested host groups, mark the *Include subgroups* checkbox.

Tag filter allows to separate the access to host group from the possibility to see problems.

For example, if a database administrator needs to see only "MySQL" database problems, it is required to create a user group for database administrators first, than specify "Service" tag name and "MySQL" value.

If "Service" tag name is specified and value field is left blank, corresponding user group will see all problems for selected host group with tag name "Service". If both tag name and value fields are left blank but host group selected, corresponding user group will see all problems for selected host group. Make sure a tag name and tag value are correctly specified otherwise a corresponding user group will not see any problems.

Let's review an example when a user is a member of several user groups selected. Filtering in this case will use OR condition for tags.

User group A			**User group B**			**Visible result for a user (member) of both groups**
Tag filter						
Host group	*Tag name*	*Tag value*	*Host group*	*Tag name*	*Tag value*	
Templates/Databases	Service	MySQL	Templates/Databases	Service	Oracle	Service: MySQL or Oracle problems visible
Templates/Databases	*blank*	*blank*	Templates/Databases	Service	Oracle	All problems visible
not selected	*blank*	*blank*	Templates/Databases	Service	Oracle	Service:Oracle problems visible

Attention:
Adding a filter (for example, all tags in a certain host group "Templates/Databases") results in not being able to see the problems of other host groups.

Host access from several user groups

A user may belong to any number of user groups. These groups may have different access permissions to hosts.

Therefore, it is important to know what hosts an unprivileged user will be able to access as a result. For example, let us consider how access to host **X** (in Hostgroup 1) will be affected in various situations for a user who is in user groups A and B.

- If Group A has only *Read* access to Hostgroup 1, but Group B *Read-write* access to Hostgroup 1, the user will get **Read-write** access to 'X'.

Attention:
"Read-write" permissions have precedence over "Read" permissions starting with Zabbix 2.2.

- In the same scenario as above, if 'X' is simultaneously also in Hostgroup 2 that is **denied** to Group A or B, access to 'X' will be **unavailable**, despite a *Read-write* access to Hostgroup 1.
- If Group A has no permissions defined and Group B has a *Read-write* access to Hostgroup 1, the user will get **Read-write** access to 'X'.
- If Group A has *Deny* access to Hostgroup 1 and Group B has a *Read-write* access to Hostgroup 1, the user will get access to 'X' **denied**.

Other details

- An Admin level user with *Read-write* access to a host will not be able to link/unlink templates, if he has no access to the *Templates* group. With *Read* access to *Templates* group he will be able to link/unlink templates to the host, however, will not see any templates in the template list and will not be able to operate with templates in other places.
- An Admin level user with *Read* access to a host will not see the host in the configuration section host list; however, the host triggers will be accessible in IT service configuration.
- Any non-Zabbix Super Admin user (including 'guest') can see network maps as long as the map is empty or has only images. When hosts, host groups or triggers are added to the map, permissions are respected. The same applies to screens and slideshows as well. The users, regardless of permissions, will see any objects that are not directly or indirectly linked to hosts.
- Zabbix server will not send notifications to users defined as action operation recipients if access to the concerned host is explicitly "denied".

8. Service monitoring

Overview Service monitoring functionality is intended for those who want to get a high-level (business) view of monitored infrastructure. In many cases, we are not interested in low-level details, like the lack of disk space, high processor load, etc. What we are interested in is the availability of service provided by our IT department. We can also be interested in identifying weak places of IT infrastructure, SLA of various IT services, the structure of existing IT infrastructure, and other information of a higher level.

Zabbix service monitoring provides answers to all mentioned questions.

Services is a hierarchy representation of monitored data.

A very simple service structure may look like:

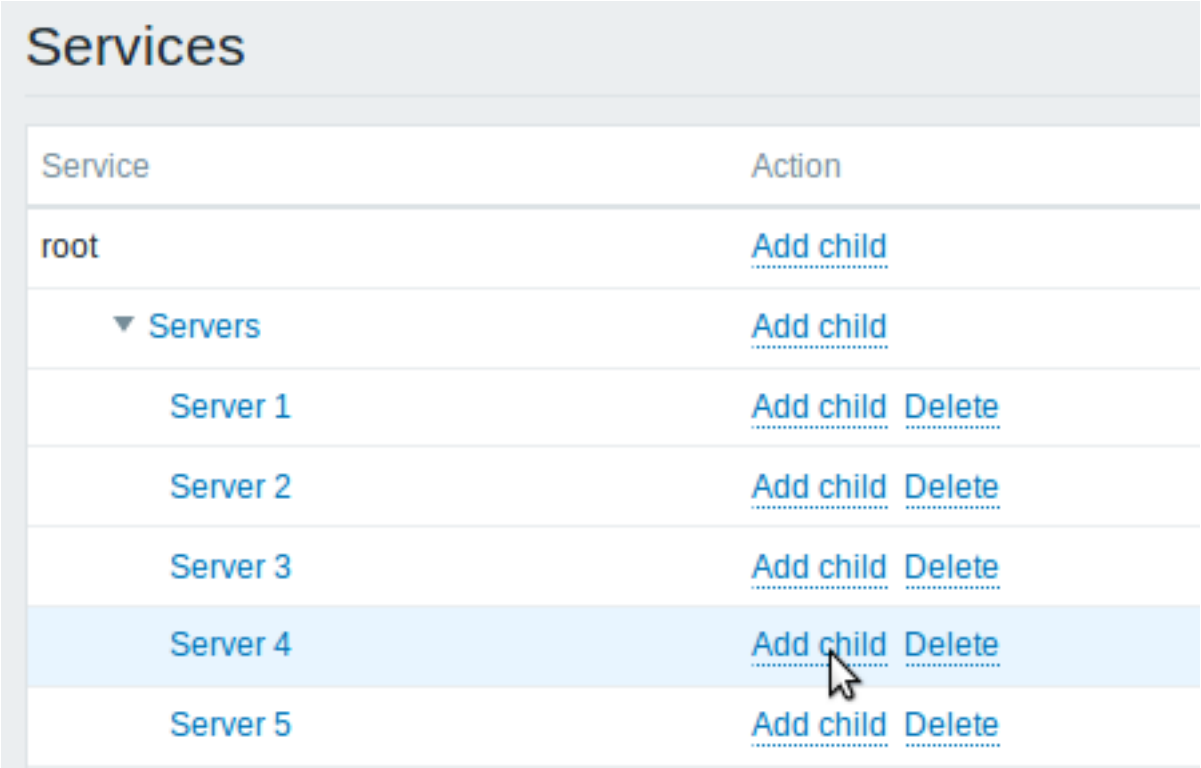
```
Service
|
|-Workstations
| |
| |-Workstation1
| |
| |-Workstation2
|
|-Servers
```

Each node of the structure has attribute status. The status is calculated and propagated to upper levels according to the selected algorithm. At the lowest level of services are triggers. The status of individual nodes is affected by the status of their triggers.

> **Note:**
> Note that triggers with a *Not classified* or *Information* severity do not impact SLA calculation.

Configuration To configure services, go to: *Configuration* → *Services*.

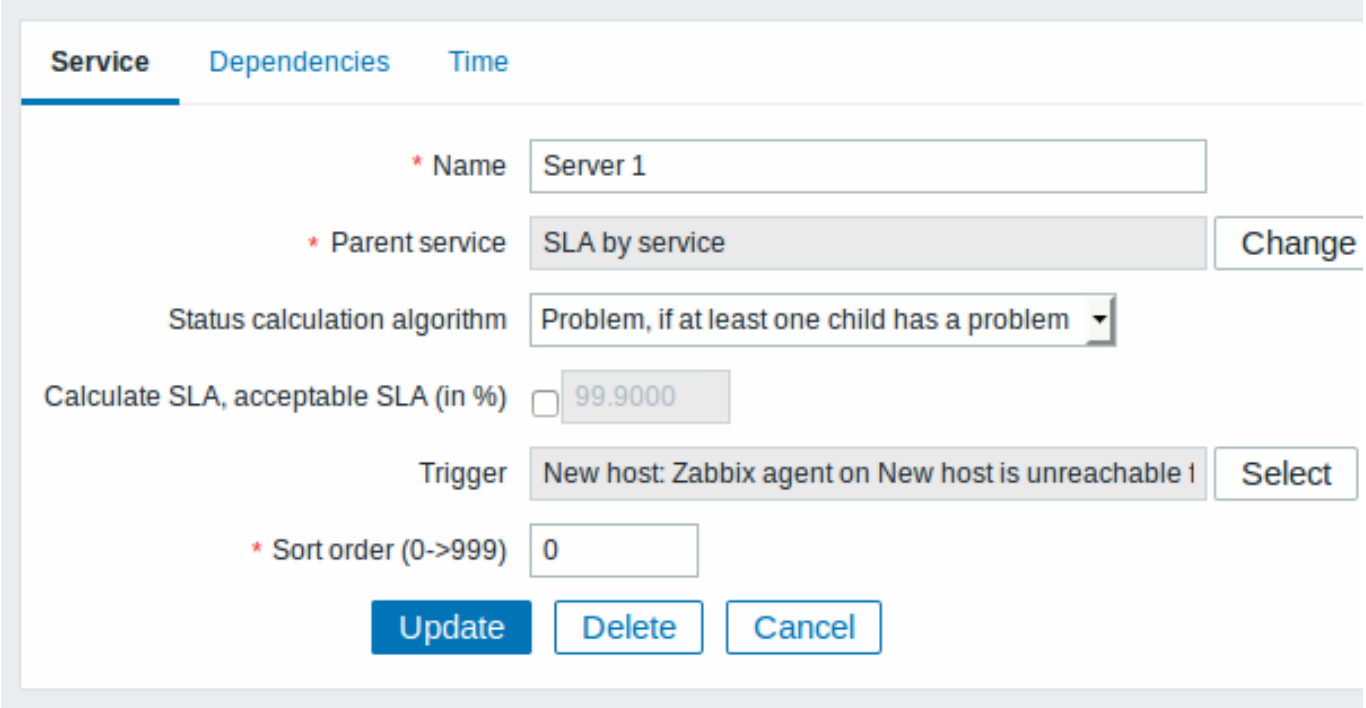
On this screen you can build a hierarchy of your monitored infrastructure. The highest-level parent service is 'root'. You can build your hierarchy downward by adding lower-level parent services and then individual nodes to them.



Click on *Add child* to add services. To edit an existing service, click on its name. A form is displayed where you can edit the service attributes.

Configuring a service

The **Service** tab contains general service attributes:

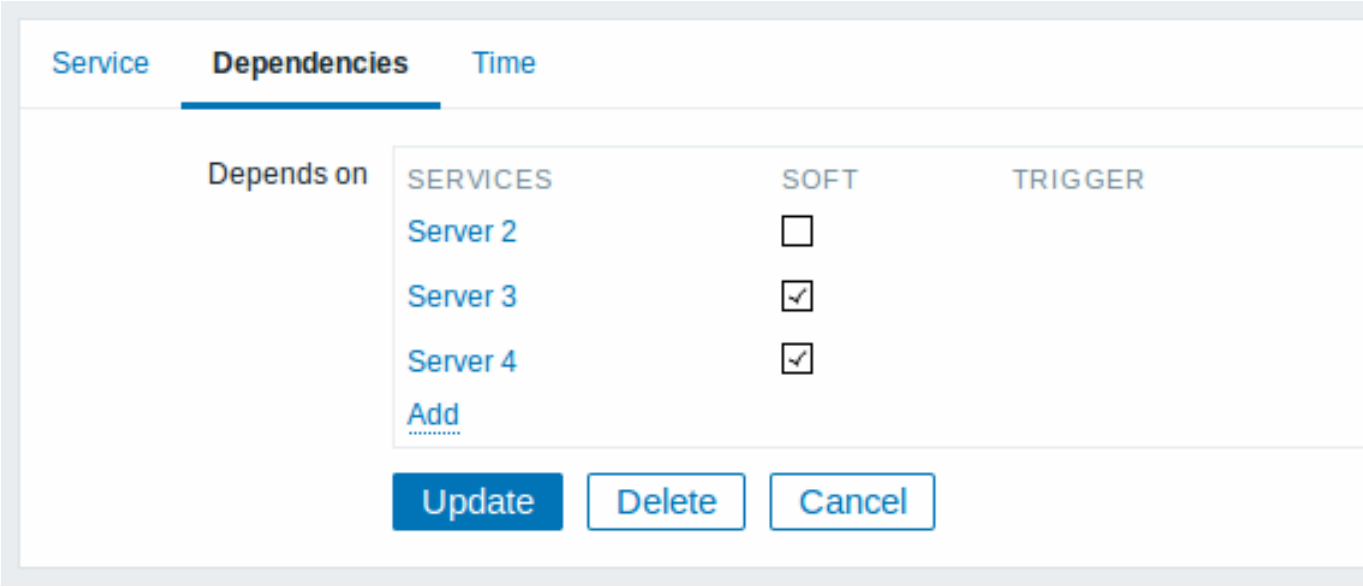


All mandatory input fields are marked with a red asterisk.

Parameter	Description
Name	Service name.
Parent service	Parent service the service belongs to.

Parameter	Description
Status calculation algorithm	Method of calculating service status: **Do not calculate** - do not calculate service status **Problem, if at least one child has a problem** - problem status, if at least one child service has a problem **Problem, if all children have problems** - problem status, if all child services are having problems
Calculate SLA	Enable SLA calculation and display.
Acceptable SLA (in %)	SLA percentage that is acceptable for this service. Used for reporting.
Trigger	Linkage to trigger: **None** - no linkage **trigger name** - linked to the trigger, thus depends on the trigger status Services of the lowest level must be linked to triggers. (Otherwise their state will not be represented accurately.) When triggers are linked, their state prior to linking is not counted.
Sort order	Sort order for display, lowest comes first.

The **Dependencies** tab contains services the service depends on. Click on *Add* to add a service from those that are configured.

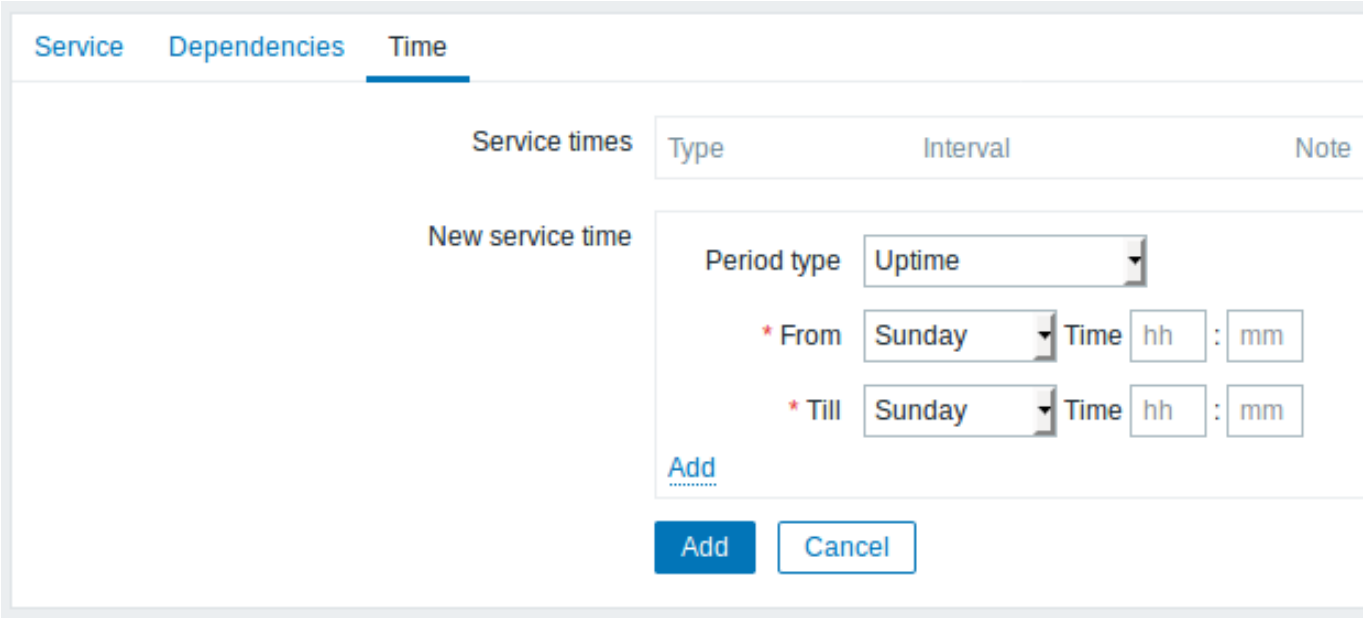


Hard and soft dependency

Availability of a service may depend on several other services, not just one. The first option is to add all those directly as child services.

However, if some service is already added somewhere else in the services tree, it cannot be simply moved out of there to a child service here. How to create a dependency on it? The answer is ”soft” linking. Add the service and mark the *Soft* check box. That way the service can remain in its original location in the tree, yet be depended upon from several other services. Services that are ”soft-linked” are displayed in grey in the tree. Additionally, if a service has only ”soft” dependencies, it can be deleted directly, without deleting child services first.

The **Time** tab contains the service time specification.



Parameter	Description
Service times	By default, all services are expected to operate 24x7x365. If exceptions needed, add new service times.
New service time	Service times: **Uptime** - service uptime **Downtime** - service state within this period does not affect SLA. **One-time downtime** - a single downtime. Service state within this period does not affect SLA. Add the respective hours. *Note*: Service times affect only the service they are configured for. Thus, a parent service will not take into account the service time configured on a child service (unless a corresponding service time is configured on the parent service as well). Service times are taken into account when calculating service status and SLA by the frontend. However, information on service availability is being inserted into database continuously, regardless of service times.

Display To monitor services, go to *Monitoring → Services*.

9. Web monitoring

Overview With Zabbix you can check several availability aspects of web sites.

Attention:
To perform web monitoring Zabbix server must be initially configured with cURL (libcurl) support.

To activate web monitoring you need to define web scenarios. A web scenario consists of one or several HTTP requests or "steps". The steps are periodically executed by Zabbix server in a pre-defined order. If a host is monitored by proxy, the steps are executed by the proxy.

Since Zabbix 2.2 web scenarios are attached to hosts/templates in the same way as items, triggers, etc. That means that web scenarios can also be created on a template level and then applied to multiple hosts in one move.

The following information is collected in any web scenario:

- average download speed per second for all steps of whole scenario
- number of the step that failed
- last error message

The following information is collected in any web scenario step:

- download speed per second
- response time
- response code

For more details, see web monitoring items.

Data collected from executing web scenarios is kept in the database. The data is automatically used for graphs, triggers and notifications.

Zabbix can also check if a retrieved HTML page contains a pre-defined string. It can execute a simulated login and follow a path of simulated mouse clicks on the page.

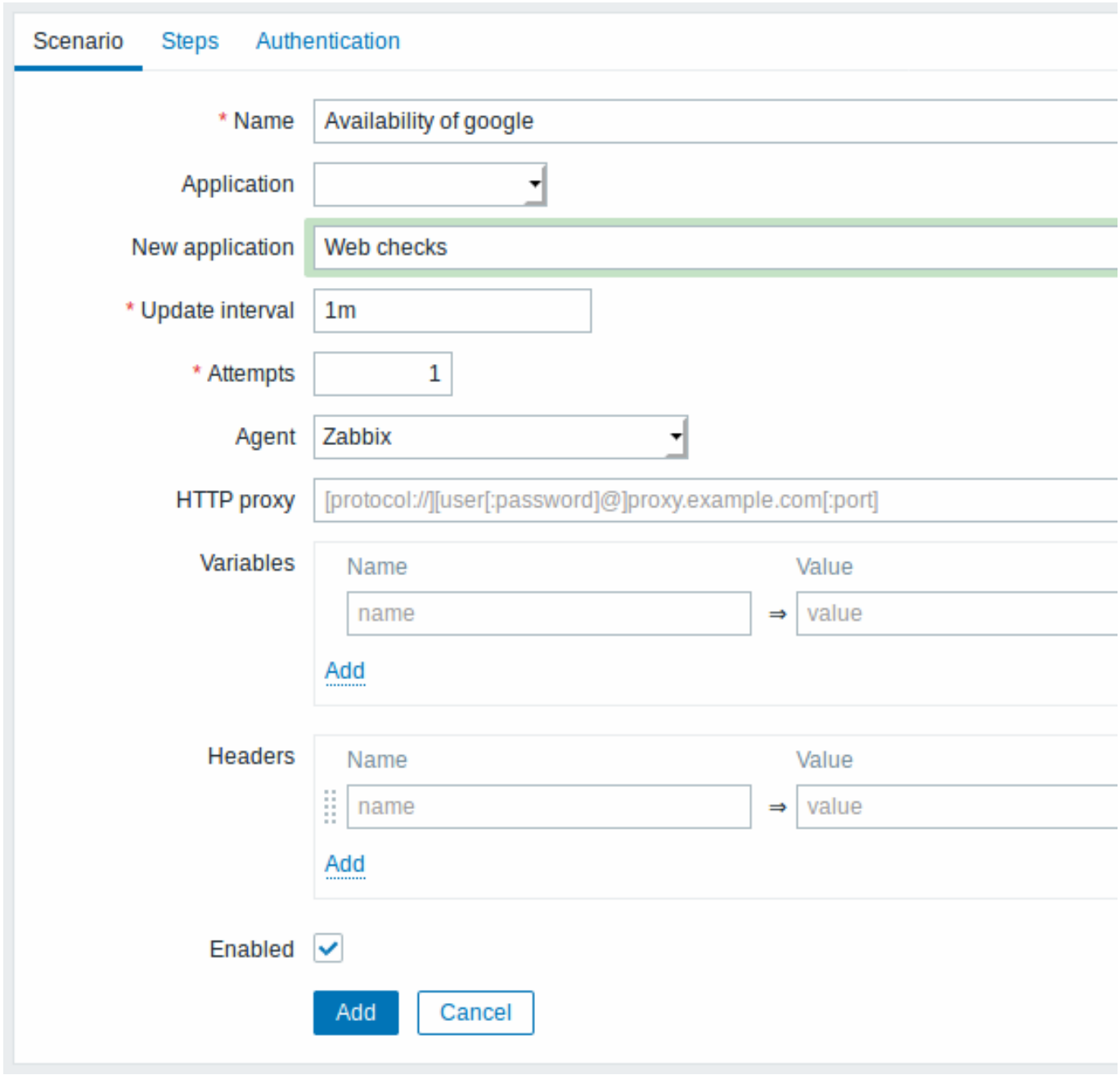
Zabbix web monitoring supports both HTTP and HTTPS. When running a web scenario, Zabbix will optionally follow redirects (see option *Follow redirects* below). Maximum number of redirects is hard-coded to 10 (using cURL option CURLOPT_MAXREDIRS). All cookies are preserved during the execution of a single scenario.

See also known issues for web monitoring using HTTPS protocol.

Configuring a web scenario To configure a web scenario:

- Go to: *Configuration* → *Hosts* (or *Templates*)
- Click on *Web* in the row of the host/template
- Click on *Create scenario* to the right (or on the scenario name to edit an existing scenario)
- Enter parameters of the scenario in the form

The **Scenario** tab allows you to configure the general parameters of a web scenario.



All mandatory input fields are marked with a red asterisk.

Scenario parameters:

Parameter	Description
Host	Name of the host/template that the scenario belongs to.
Name	Unique scenario name. User macros and {HOST.*} macros are supported, since Zabbix 2.2.
Application	Select an application the scenario will belong to. Web scenario items will be grouped under the selected application in *Monitoring* → *Latest data*.
New application	Enter the name of a new application for the scenario.
Update interval	How often the scenario will be executed. Time suffixes are supported, e.g. 30s, 1m, 2h, 1d, since Zabbix 3.4.0. User macros are supported, since Zabbix 3.4.0. *Note* that if a user macro is used and its value is changed (e.g. 5m → 30s), the next check will be executed according to the previous value (farther in the future with the example values).

Parameter	Description
Attempts	The number of attempts for executing web scenario steps. In case of network problems (timeout, no connectivity, etc) Zabbix can repeat executing a step several times. The figure set will equally affect each step of the scenario. Up to 10 attempts can be specified, default value is 1. *Note*: Zabbix will not repeat a step because of a wrong response code or the mismatch of a required string. This parameter is supported starting with *Zabbix 2.2*.
Agent	Select a client agent. Zabbix will pretend to be the selected browser. This is useful when a website returns different content for different browsers. User macros can be used in this field, *starting with Zabbix 2.2*.
HTTP proxy	You can specify an HTTP proxy to use, using the format `[protocol://][username[:password]@]proxy.mycompany.com[:port]` This sets the CURLOPT_PROXY cURL option. The optional `protocol://` prefix may be used to specify alternative proxy protocols (the protocol prefix support was added in cURL 7.21.7). With no protocol specified, the proxy will be treated as an HTTP proxy. By default, 1080 port will be used. If specified, the proxy will overwrite proxy related environment variables like http_proxy, HTTPS_PROXY. If not specified, the proxy will not overwrite proxy-related environment variables. The entered value is passed on "as is", no sanity checking takes place. You may also enter a SOCKS proxy address. If you specify the wrong protocol, the connection will fail and the item will become unsupported. *Note* that only simple authentication is supported with HTTP proxy. User macros can be used in this field. This parameter is supported starting with *Zabbix 2.2*.
Variables	Variables that may be used in scenario steps (URL, post variables). They have the following format: **{macro1}**=value1 **{macro2}**=value2 **{macro3}**=regex:<regular expression> For example: {username}=Alexei {password}=kj3h5kJ34bd {hostid}=regex:hostid is ([0-9]+) The macros can then be referenced in the steps as {username}, {password} and {hostid}. Zabbix will automatically replace them with actual values. Note that variables with `regex:` need one step to get the value of the regular expression so the extracted value can only be applied to the step after. If the value part starts with `regex:` then the part after it is treated as a regular expression that searches the web page and, if found, stores the match in the variable. At least one subgroup must be present so that the matched value can be extracted. Regular expression match in variables is supported *since Zabbix 2.2*. User macros and {HOST.*} macros are supported, since Zabbix 2.2. Variables are automatically URL-encoded when used in query fields or form data for post variables, but must be URL-encoded manually when used in raw post or directly in URL.

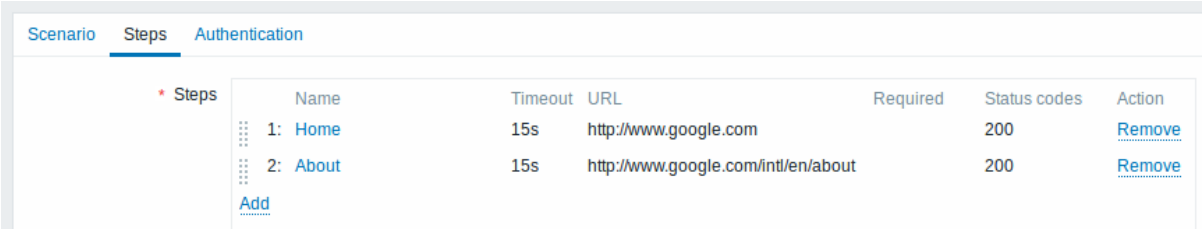
Parameter	Description
Headers	Custom HTTP headers that will be sent when performing a request. Headers should be listed using the same syntax as they would appear in the HTTP protocol, optionally using some additional features supported by the CURLOPT_HTTPHEADER cURL option. For example: Accept-Charset=utf-8 Accept-Language=en-US Content-Type=application/xml; charset=utf-8 User macros and {HOST.*} macros are supported. Specifying custom headers is supported *starting with Zabbix 2.4*.
Enabled	The scenario is active if this box is checked, otherwise - disabled.

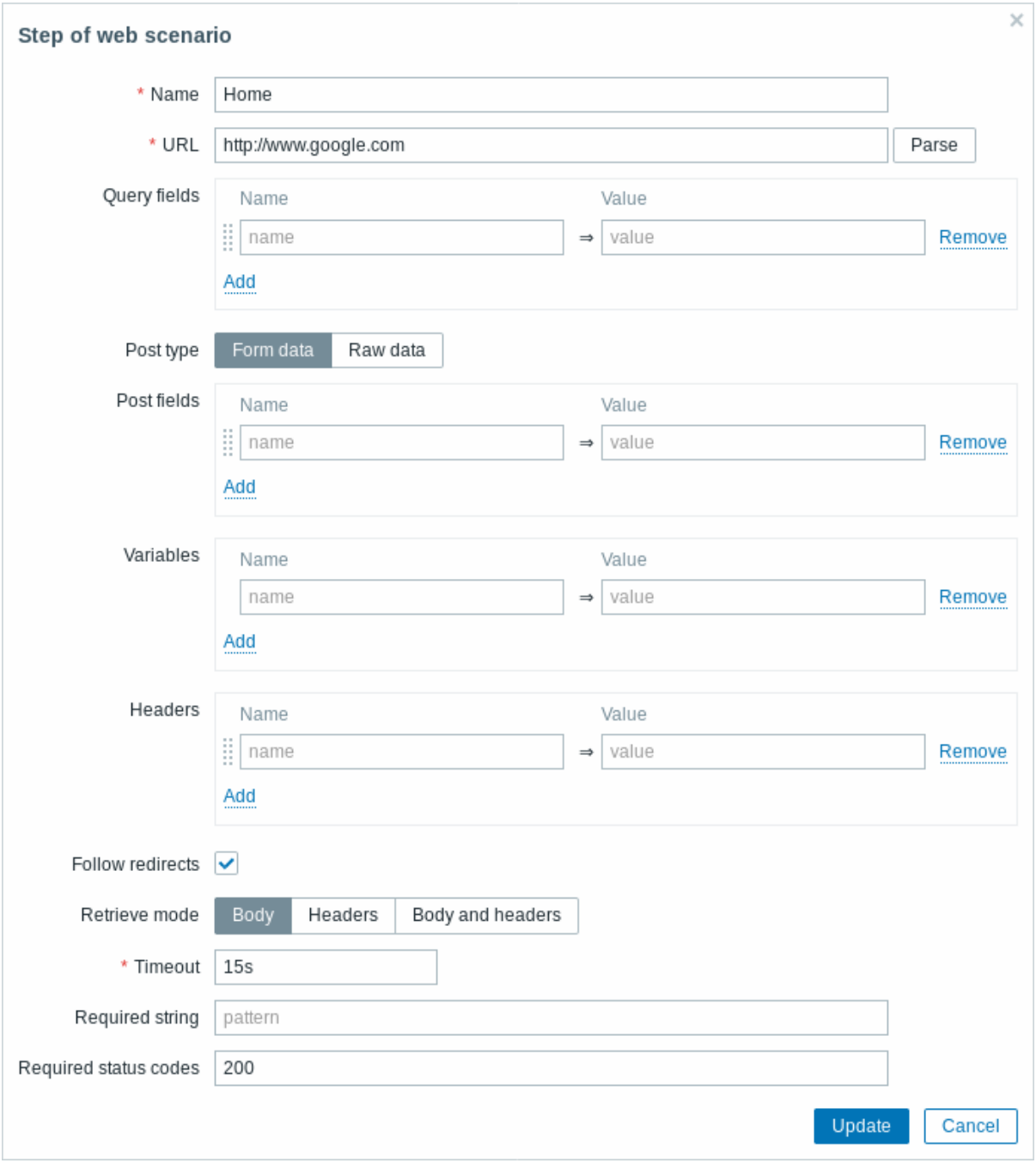
Note that when editing an existing scenario, two extra buttons are available in the form:

Clone	Create another scenario based on the properties of the existing one.
Clear history and trends	Delete history and trend data for the scenario. This will make the server perform the scenario immediately after deleting the data.

Note:
If *HTTP proxy* field is left empty, another way for using an HTTP proxy is to set proxy related environment variables. For HTTP checks - set the **http_proxy** environment variable for the Zabbix server user. For example, //http_proxy=http:%%//%%proxy_ip:proxy_port//.
For HTTPS checks - set the **HTTPS_PROXY** environment variable. For example, //HTTPS_PROXY=http:%%//%%proxy_ip:proxy_port//. More details are available by running a shell command: *# man curl*.

The **Steps** tab allows you to configure the web scenario steps. To add a web scenario step, click on *Add* in the *Steps* block.





Configuring steps

Step parameters:

Parameter	Description
Name	Unique step name. User macros and {HOST.*} macros are supported, since Zabbix 2.2.
URL	URL to connect to and retrieve data. For example: https://www.google.com http://www.zabbix.com/download Domain names can be specified in Unicode characters since Zabbix 3.4. They are automatically punycode-converted to ASCII when executing the web scenario step. The *Parse* button can be used to separate optional query fields (like ?name=Admin&password=mypassword) from the URL, moving the attributes and values into *Query fields* for automatic URL-encoding. Variables can be used in the URL, using the {macro} syntax. Variables can be URL-encoded manually using a {{macro}.urlencode()} syntax. User macros and {HOST.*} macros are supported, since Zabbix 2.2. Limited to 2048 characters *starting with Zabbix 2.4*.

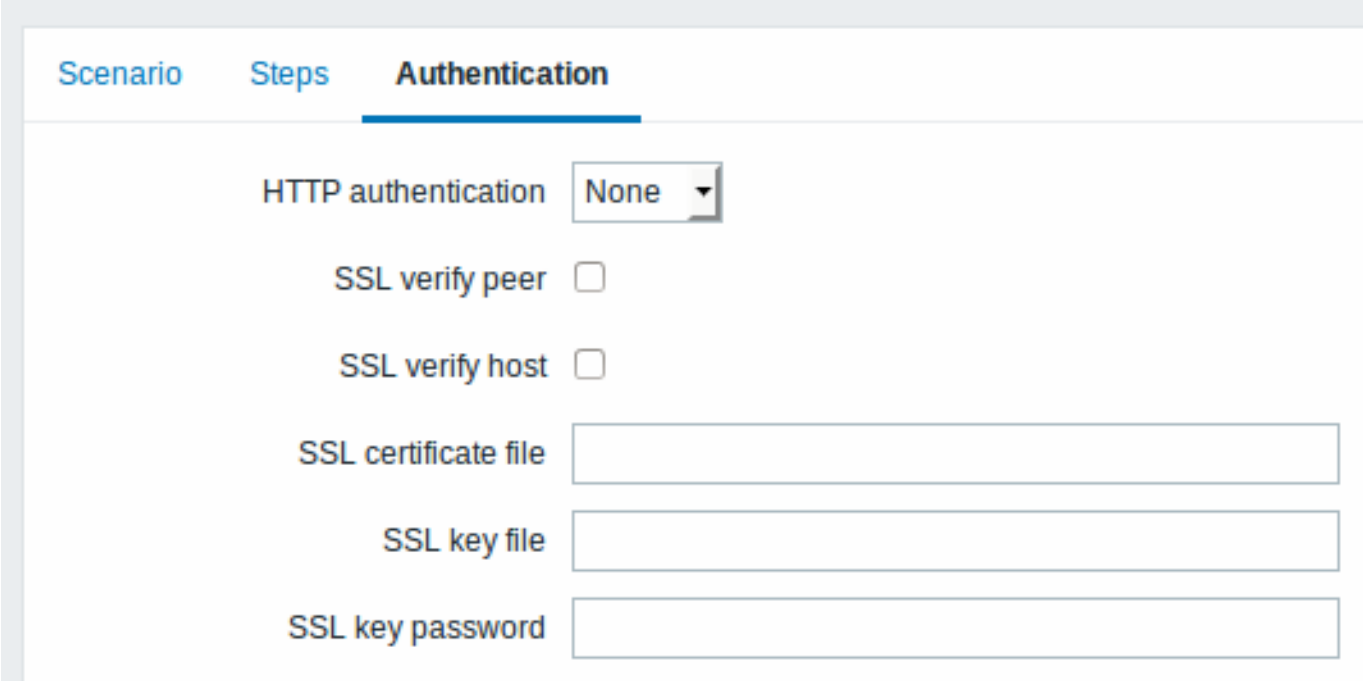
Parameter	Description
Query fields	HTTP GET variables for the URL. Specified as attribute and value pairs. Values are URL-encoded automatically. Values from scenario variables, user macros or {HOST.*} macros are resolved and then URL-encoded automatically. Using a {{macro}.urlencode()} syntax will double URL-encode them. User macros and {HOST.*} macros are supported since Zabbix 2.2.
Post	HTTP POST variables. In **Form data** mode, specified as attribute and value pairs. Values are URL-encoded automatically. Values from scenario variables, user macros or {HOST.*} macros are resolved and then URL-encoded automatically. In **Raw data** mode, attributes/values are displayed on a single line and concatenated with a **&** symbol. Raw values can be URL-encoded/decoded manually using a {{macro}.urlencode()} or {{macro}.urldecode()} syntax. For example: id=2345&userid={user} If {user} is defined as a variable of the web scenario, it will be replaced by its value when the step is executed. If you wish to URL-encode the variable, substitute {user} with {{user}.urlencode()}. User macros and {HOST.*} macros are supported, since Zabbix 2.2.
Variables	Step-level variables that may be used for GET and POST functions. Specified as attribute and value pairs. Step-level variables override scenario-level variables or variables from the previous step. However, the value of a step-level variable only affects the step after (and not the current step). They have the following format: **{macro}**=value **{macro}**=regex:<regular expression> For more information see variable description on the scenario level. Having step-level variables is supported since Zabbix 2.2. Variables are automatically URL-encoded when used in query fields or form data for post variables, but must be URL-encoded manually when used in raw post or directly in URL.
Headers	Custom HTTP headers that will be sent when performing a request. Specified as attribute and value pairs. Headers on the step level will overwrite the headers specified for the scenario. For example, setting a 'User-Agent' attribute with no value will remove the User-Agent value set on scenario level. User macros and {HOST.*} macros are supported. This sets the CURLOPT_HTTPHEADER cURL option. Specifying custom headers is supported *starting with Zabbix 2.4*.
Follow redirects	Mark the checkbox to follow HTTP redirects. This sets the CURLOPT_FOLLOWLOCATION cURL option. This option is supported *starting with Zabbix 2.4*.
Retrieve mode	Select the retrieve mode: **Body** - retrieve only body from the HTTP response **Headers** - retrieve only headers from the HTTP response **Body and headers** - retrieve body and headers from the HTTP response This option is supported *since Zabbix 4.2*.
Timeout	Zabbix will not spend more than the set amount of time on processing the URL (from one second to maximum of 1 hour). Actually this parameter defines the maximum time for making connection to the URL and maximum time for performing an HTTP request. Therefore, Zabbix will not spend more than **2 x Timeout** seconds on the step. Time suffixes are supported, e.g. 30s, 1m, 1h. User macros are supported.

Parameter	Description
Required string	Required regular expression pattern. Unless retrieved content (HTML) matches the required pattern the step will fail. If empty, no check on required string is performed. For example: Homepage of Zabbix Welcome.*admin *Note*: Referencing regular expressions created in the Zabbix frontend is not supported in this field. User macros and {HOST.*} macros are supported, since Zabbix 2.2.
Required status codes	List of expected HTTP status codes. If Zabbix gets a code which is not in the list, the step will fail. If empty, no check on status codes is performed. For example: 200,201,210-299 User macros are supported since Zabbix 2.2.

Note:
Any changes in web scenario steps will only be saved when the whole scenario is saved.

See also a real-life example of how web monitoring steps can be configured.

Configuring authentication The **Authentication** tab allows you to configure scenario authentication options.



Authentication parameters:

Parameter	Description
Authentication	Authentication options. **None** - no authentication used. **Basic** - basic authentication is used. **NTLM** - NTLM (Windows NT LAN Manager) authentication is used. **Kerberos** - Kerberos authentication is used. See also: Configuring Kerberos with Zabbix. Selecting an authentication method will provide two additional fields for entering a user name and password. User macros can be used in user and password fields, *starting with Zabbix 2.2*.

Parameter	Description
SSL verify peer	Mark the checkbox to verify the SSL certificate of the web server. The server certificate will be automatically taken from system-wide certificate authority (CA) location. You can override the location of CA files using Zabbix server or proxy configuration parameter SSLCALocation. This sets the CURLOPT_SSL_VERIFYPEER cURL option. This option is supported *starting with Zabbix 2.4*.
SSL verify host	Mark the checkbox to verify that the *Common Name* field or the *Subject Alternate Name* field of the web server certificate matches. This sets the CURLOPT_SSL_VERIFYHOST cURL option. This option is supported *starting with Zabbix 2.4*.
SSL certificate file	Name of the SSL certificate file used for client authentication. The certificate file must be in PEM[1] format. If the certificate file contains also the private key, leave the *SSL key file* field empty. If the key is encrypted, specify the password in *SSL key password* field. The directory containing this file is specified by Zabbix server or proxy configuration parameter SSLCertLocation. `HOST.*` macros and user macros can be used in this field. This sets the CURLOPT_SSLCERT cURL option. This option is supported *starting with Zabbix 2.4*.
SSL key file	Name of the SSL private key file used for client authentication. The private key file must be in PEM[1] format. The directory containing this file is specified by Zabbix server or proxy configuration parameter SSLKeyLocation. `HOST.*` macros and user macros can be used in this field. This sets the CURLOPT_SSLKEY cURL option. This option is supported *starting with Zabbix 2.4*.
SSL key password	SSL private key file password. User macros can be used in this field. This sets the CURLOPT_KEYPASSWD cURL option. This option is supported *starting with Zabbix 2.4*.

Attention:
[1] Zabbix supports certificate and private key files in PEM format only. In case you have your certificate and private key data in PKCS #12 format file (usually with extension *.p12 or *.pfx) you may generate the PEM file from it using the following commands:

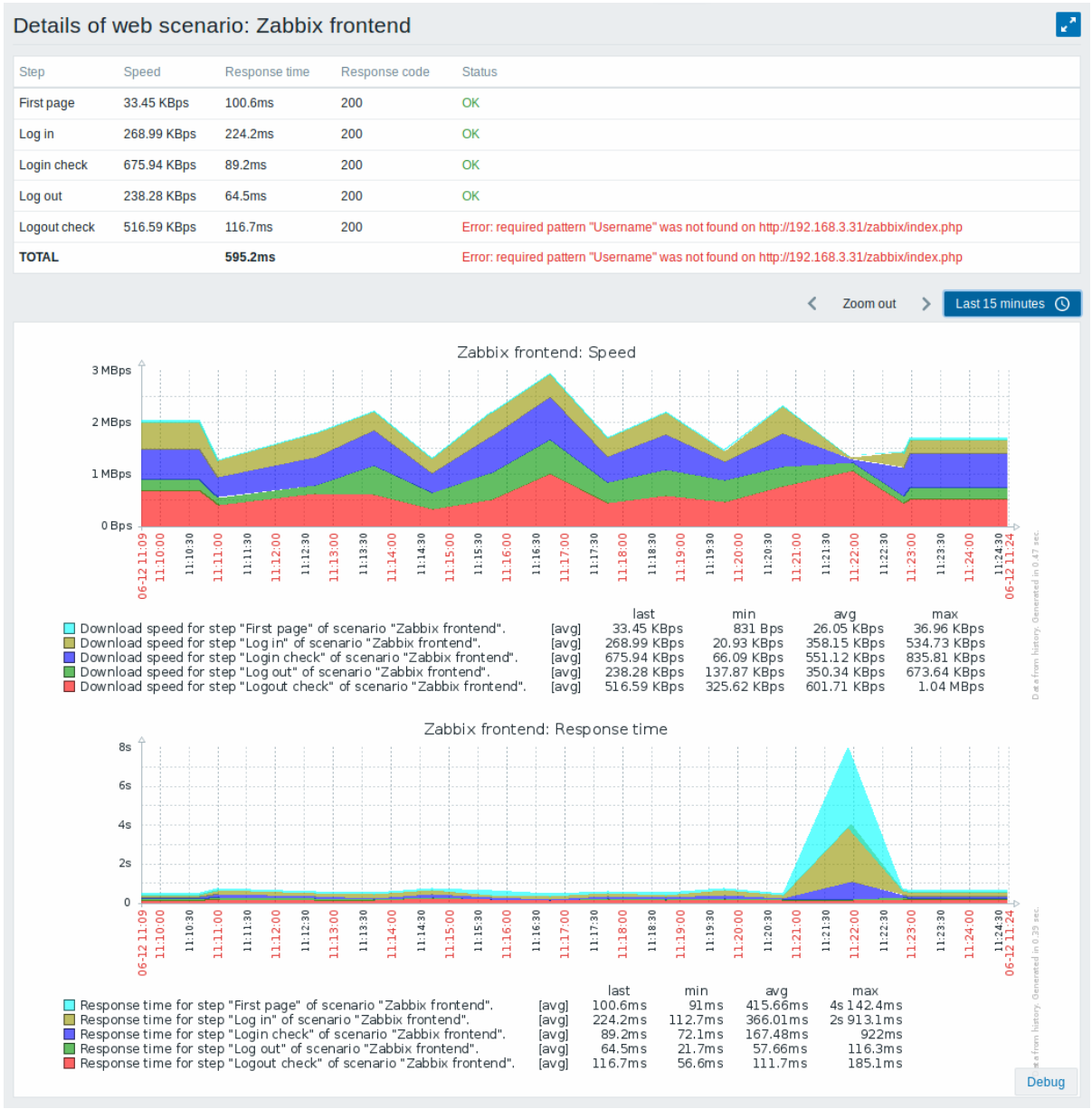
```
openssl pkcs12 -in ssl-cert.p12 -clcerts -nokeys -out ssl-cert.pem
openssl pkcs12 -in ssl-cert.p12 -nocerts -nodes  -out ssl-cert.key
```

Note:
Zabbix server picks up changes in certificates without a restart.

Note:
If you have client certificate and private key in a single file just specify it in a "SSL certificate file" field and leave "SSL key file" field empty. The certificate and key must still be in PEM format. Combining certificate and key is easy:

```
cat client.crt client.key > client.pem
```

Display To view detailed data of defined web scenarios, go to *Monitoring* → *Web* or *Latest data*. Click on the scenario name to see more detailed statistics.



An overview of web monitoring scenarios can be viewed in *Monitoring → Dashboard*.

Extended monitoring Sometimes it is necessary to log received HTML page content. This is especially useful if some web scenario step fails. Debug level 5 (trace) serves that purpose. This level can be set in server and proxy configuration files or using a runtime control option (`-R log_level_increase="http poller,N"`, where N is the process number). The following examples demonstrate how extended monitoring can be started provided debug level 4 is already set:

```
Increase log level of all http pollers:
shell> zabbix_server -R log_level_increase="http poller"

Increase log level of second http poller:
shell> zabbix_server -R log_level_increase="http poller,2"
```

If extended web monitoring is not required it can be stopped using the `-R log_level_decrease` option.

1 Web monitoring items

Overview

Some new items are automatically added for monitoring when web scenarios are created.

Scenario items

As soon as a scenario is created, Zabbix automatically adds the following items for monitoring, linking them to the selected application.

Item	Description
Download speed for scenario <Scenario>	This item will collect information about the download speed (bytes per second) of the whole scenario, i.e. average for all steps. Item key: web.test.in[Scenario„bps] Type: *Numeric(float)*
Failed step of scenario <Scenario>	This item will display the number of the step that failed on the scenario. If all steps are executed successfully, 0 is returned. Item key: web.test.fail[Scenario] Type: *Numeric(unsigned)*
Last error message of scenario <Scenario>	This item returns the last error message text of the scenario. A new value is stored only if the scenario has a failed step. If all steps are ok, no new value is collected. Item key: web.test.error[Scenario] Type: *Character*

The actual scenario name will be used instead of ”Scenario”.

Note:
Web monitoring items are added with a 30 day history and a 90 day trend retention period.

Note:
If scenario name starts with a doublequote or contains comma or square bracket, it will be properly quoted in item keys. In other cases no additional quoting will be performed.

These items can be used to create triggers and define notification conditions.

Example 1

To create a ”Web scenario failed” trigger, you can define a trigger expression:

```
{host:web.test.fail[Scenario].last()}<>0
```

Make sure to replace ’Scenario’ with the real name of your scenario.

Example 2

To create a ”Web scenario failed” trigger with a useful problem description in the trigger name, you can define a trigger with name:

```
Web scenario "Scenario" failed: {ITEM.VALUE}
```

and trigger expression:

```
{host:web.test.error[Scenario].strlen()}>0 and {host:web.test.fail[Scenario].last()}>0
```

Make sure to replace ’Scenario’ with the real name of your scenario.

Example 3

To create a ”Web application is slow” trigger, you can define a trigger expression:

```
{host:web.test.in[Scenario,,bps].last()}<10000
```

Make sure to replace ’Scenario’ with the real name of your scenario.

Scenario step items

As soon as a step is created, Zabbix automatically adds the following items for monitoring, linking them to the selected application.

Item	Description
Download speed for step <Step> of scenario <Scenario>	This item will collect information about the download speed (bytes per second) of the step. Item key: web.test.in[Scenario,Step,bps] Type: *Numeric(float)*

Item	Description
Response time for step <Step> of scenario <Scenario>	This item will collect information about the response time of the step in seconds. Response time is counted from the beginning of the request until all information has been transferred. Item key: web.test.time[Scenario,Step,resp] Type: *Numeric(float)*
Response code for step <Step> of scenario <Scenario>	This item will collect response codes of the step. Item key: web.test.rspcode[Scenario,Step] Type: *Numeric(unsigned)*

Actual scenario and step names will be used instead of "Scenario" and "Step" respectively.

Note:
Web monitoring items are added with a 30 day history and a 90 day trend retention period.

Note:
If scenario name starts with a doublequote or contains comma or square bracket, it will be properly quoted in item keys. In other cases no additional quoting will be performed.

These items can be used to create triggers and define notification conditions. For example, to create a "Zabbix GUI login is too slow" trigger, you can define a trigger expression:

```
{zabbix:web.test.time[ZABBIX GUI,Login,resp].last()}>3
```

2 Real life scenario

Overview

This section presents a step-by-step real-life example of how web monitoring can be used.

Let's use Zabbix web monitoring to monitor the web interface of Zabbix. We want to know if it is available, provides the right content and how quickly it works. To do that we also must log in with our user name and password.

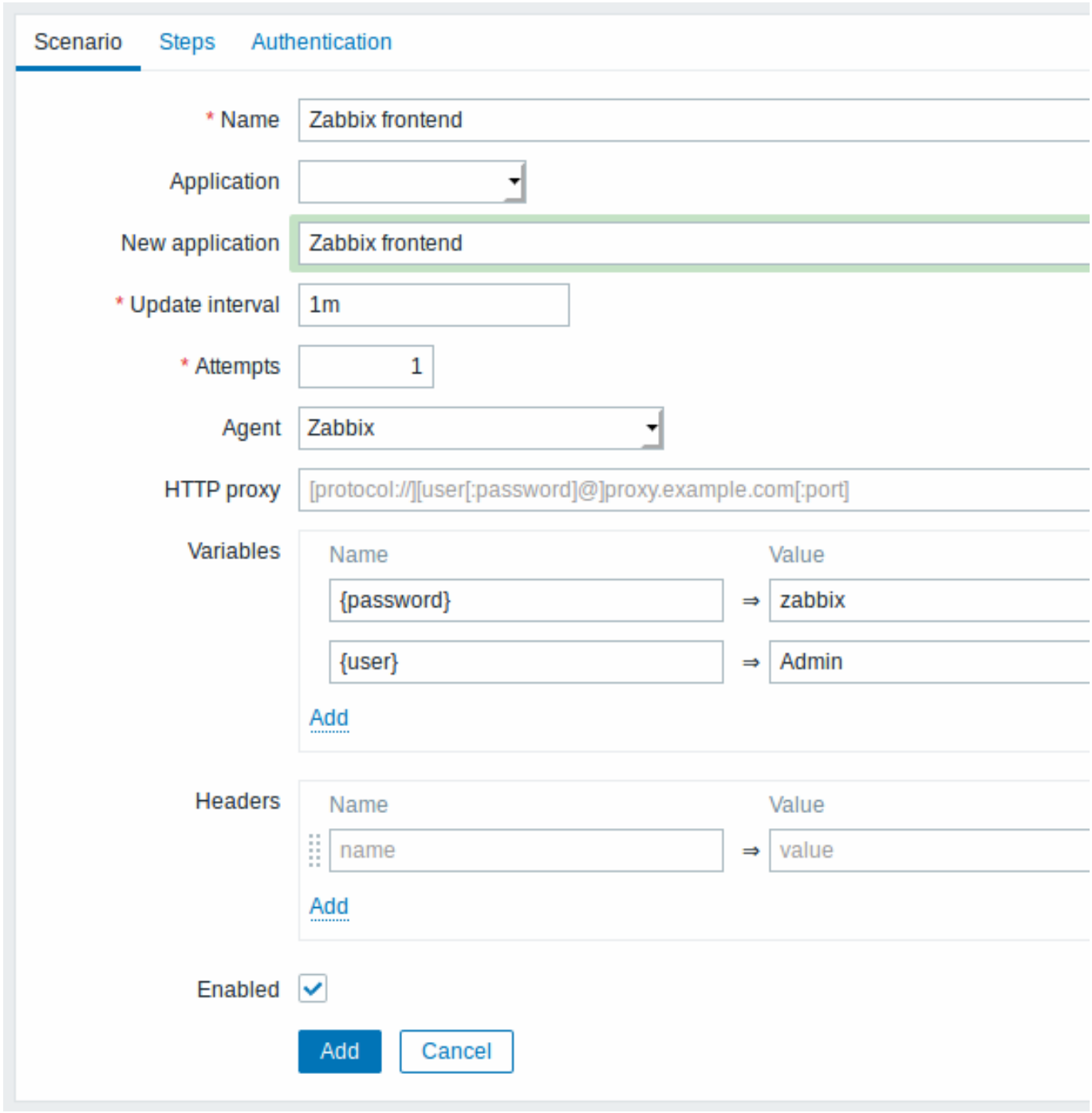
Scenario

Step 1

Add a new web scenario.

We will add a scenario to monitor the web interface of Zabbix. The scenario will execute a number of steps.

Go to *Configuration* → *Hosts*, pick a host and click on *Web* in the row of that host. Then click on *Create web scenario*.



All mandatory input fields are marked with a red asterisk.

In the new scenario form we will name the scenario as *Zabbix frontend* and create a new *Zabbix frontend* application for it.

Note that we will also create two variables: {user} and {password}.

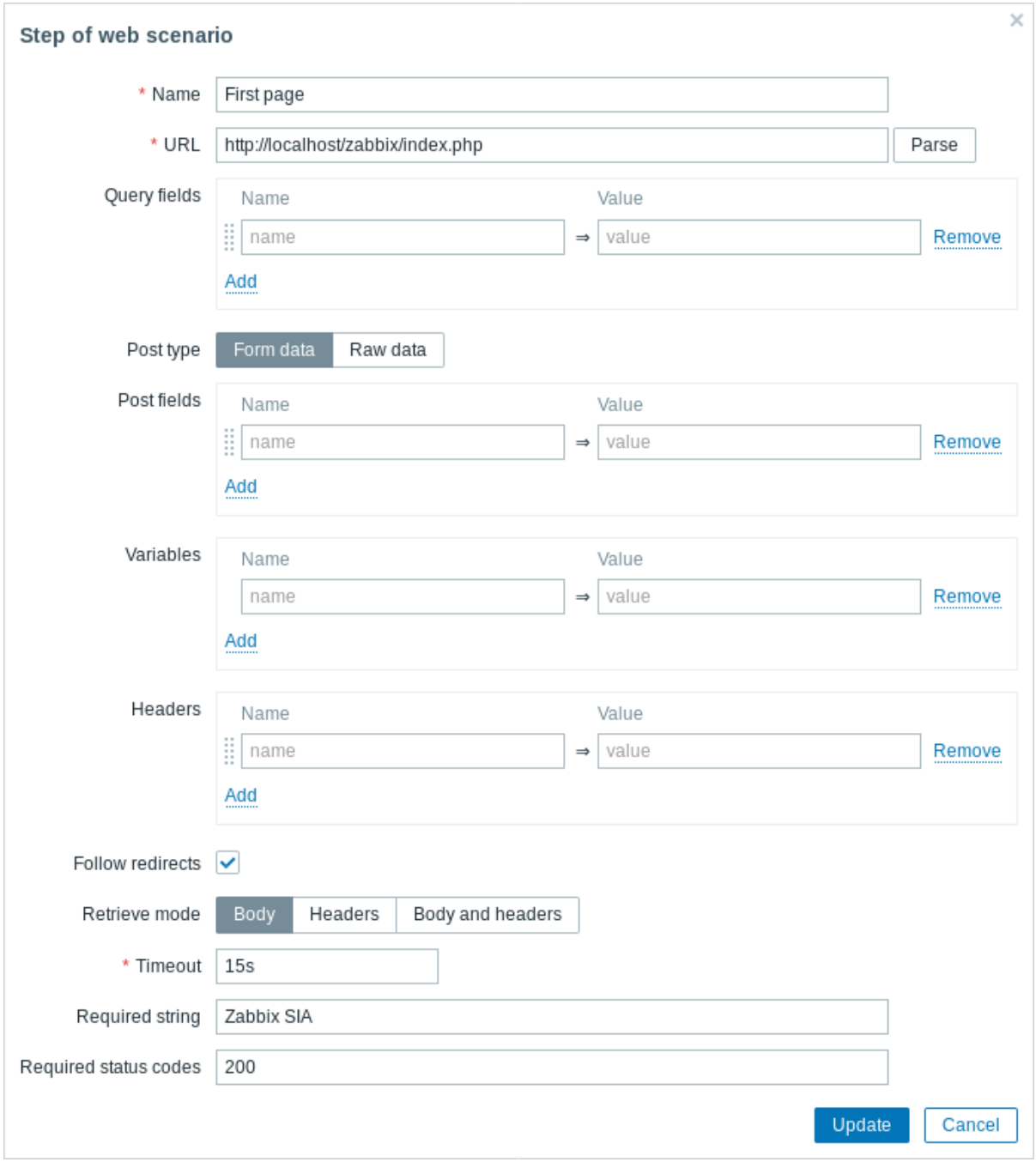
Step 2

Define steps for the scenario.

Click on *Add* button in the *Steps* tab to add individual steps.

Web scenario step 1

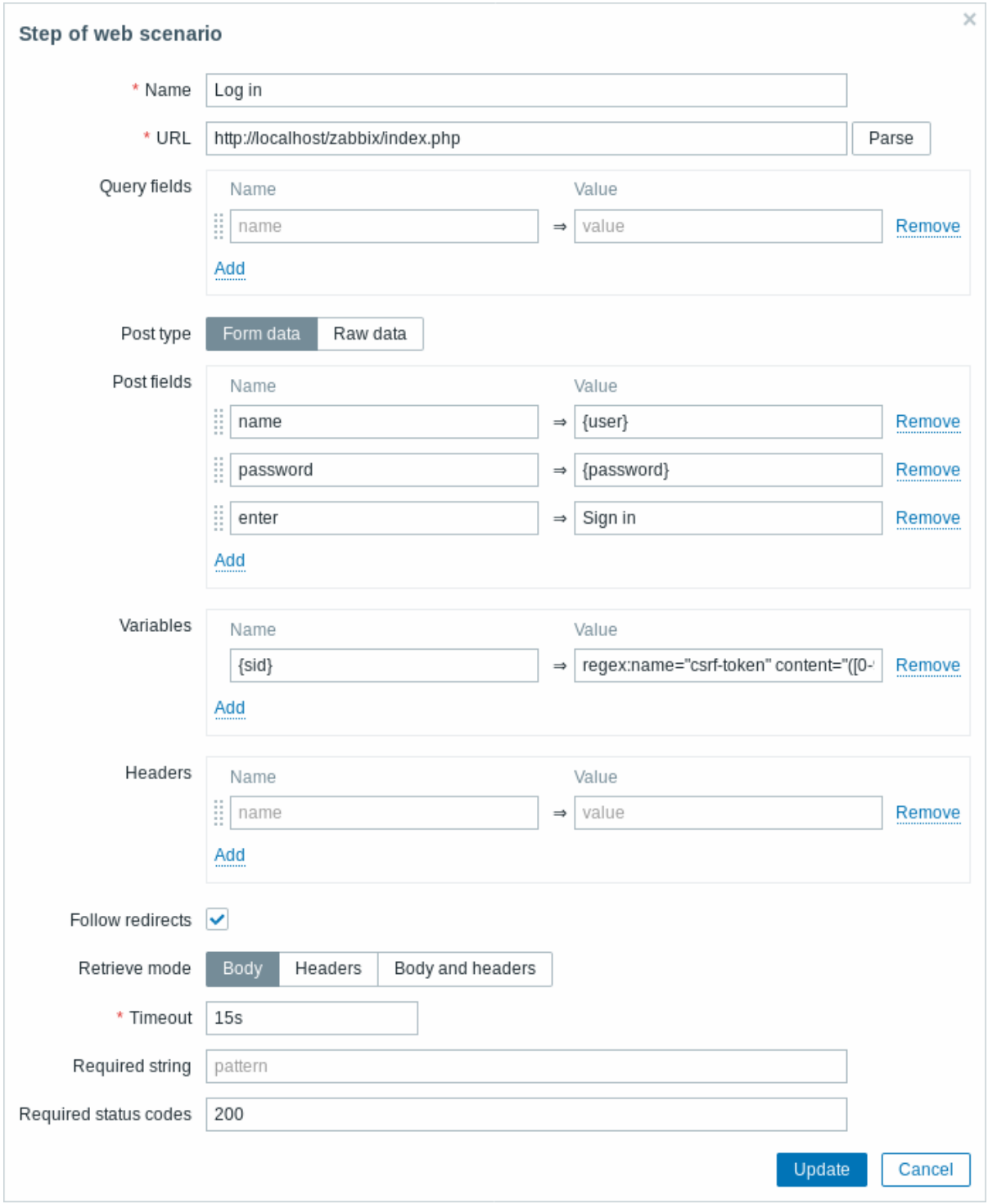
We start by checking that the first page responds correctly, returns with HTTP response code 200 and contains text ”Zabbix SIA”.



When done configuring the step, click on *Add*.

Web scenario step 2

We continue by logging in to the Zabbix frontend, and we do so by reusing the macros (variables) we defined on the scenario level - {user} and {password}.

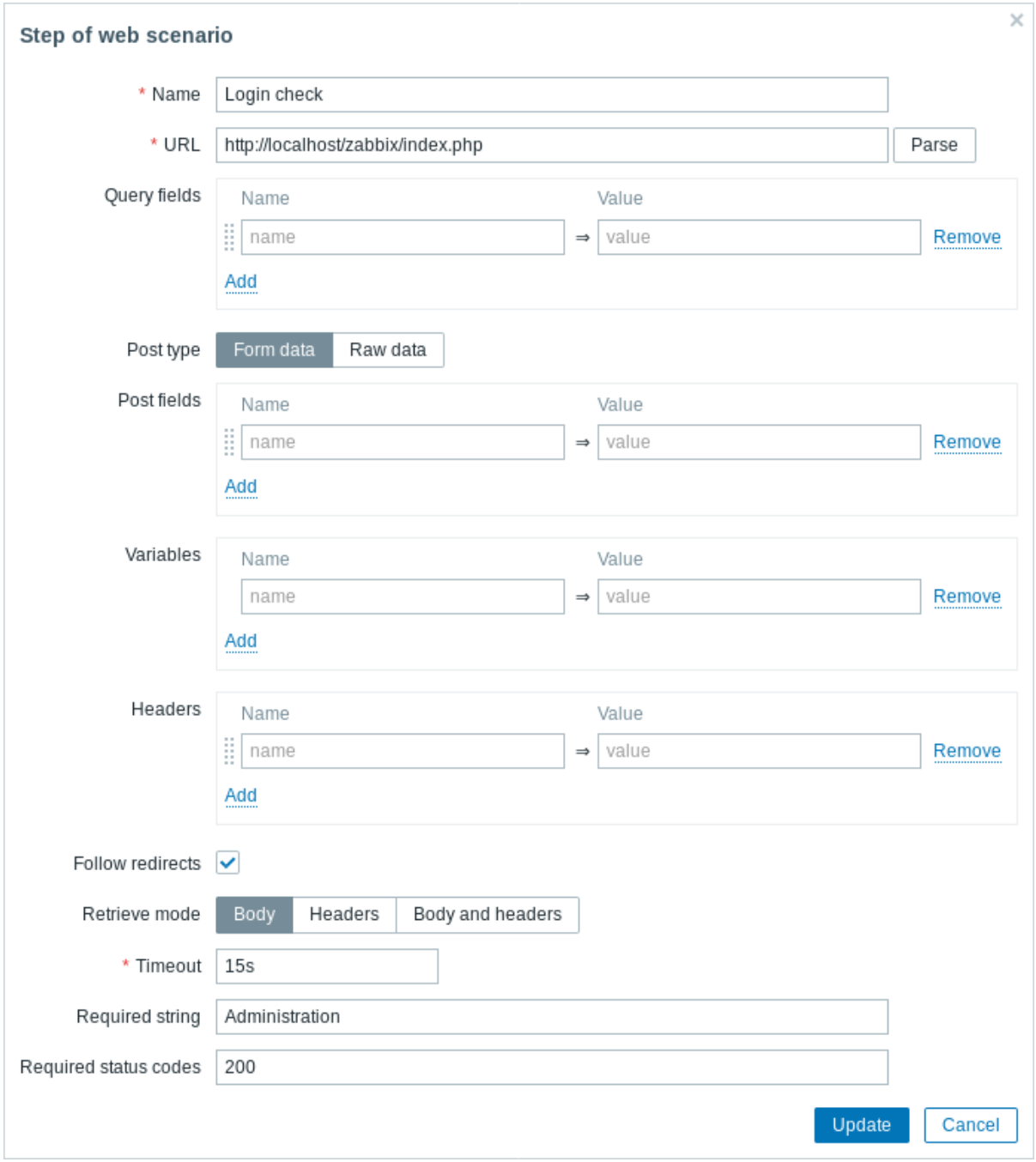


Attention:
Note that Zabbix frontend uses JavaScript redirect when logging in, thus first we must log in, and only in further steps we may check for logged-in features. Additionally, the login step must use full URL to **index.php** file.

Take note also of how we are getting the content of the `{sid}` variable (session ID) using a variable syntax with regular expression: `regex:name="csrf-token" content="([0-9a-z]{16})"`. This variable will be required in step 4.

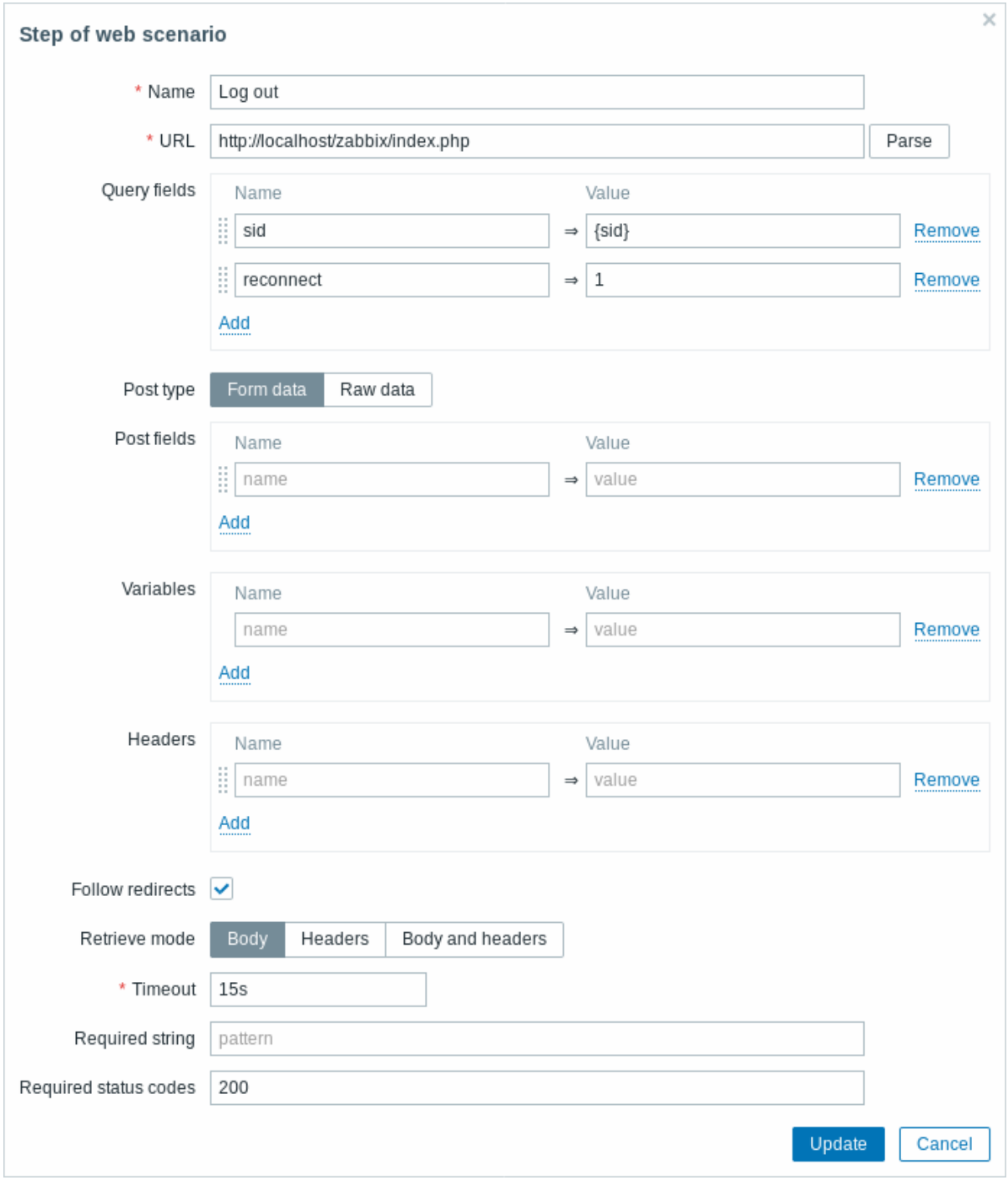
Web scenario step 3

Being logged in, we should now verify the fact. To do so, we check for a string that is only visible when logged in - for example, **Administration**.



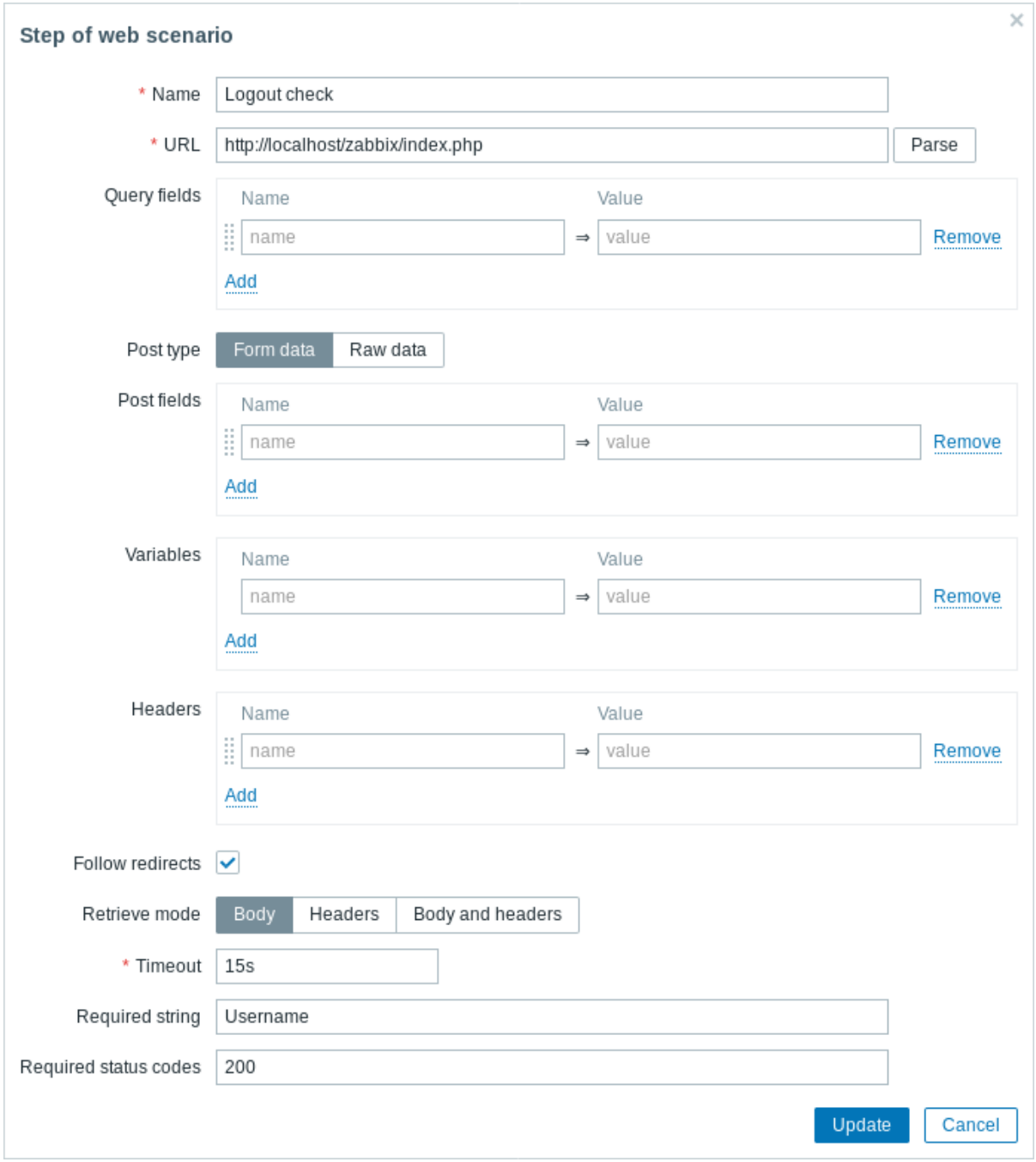
Web scenario step 4

Now that we have verified that frontend is accessible and we can log in and retrieve logged-in content, we should also log out - otherwise Zabbix database will become polluted with lots and lots of open session records.



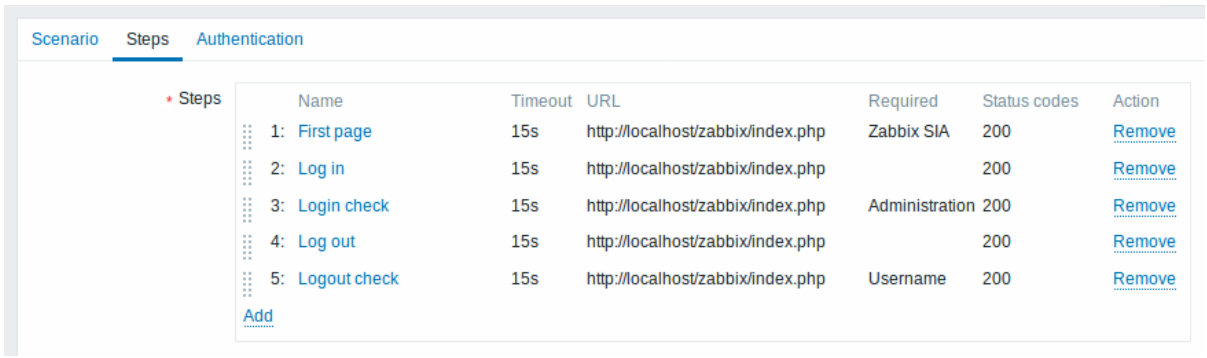
Web scenario step 5

We can also check that we have logged out by looking for the **Username** string.



Complete configuration of steps

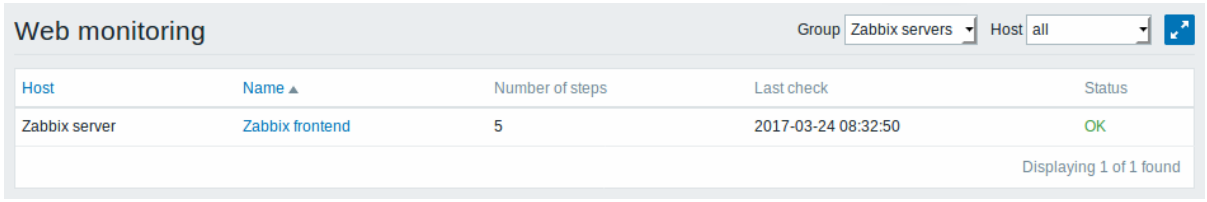
A complete configuration of web scenario steps should look like this:



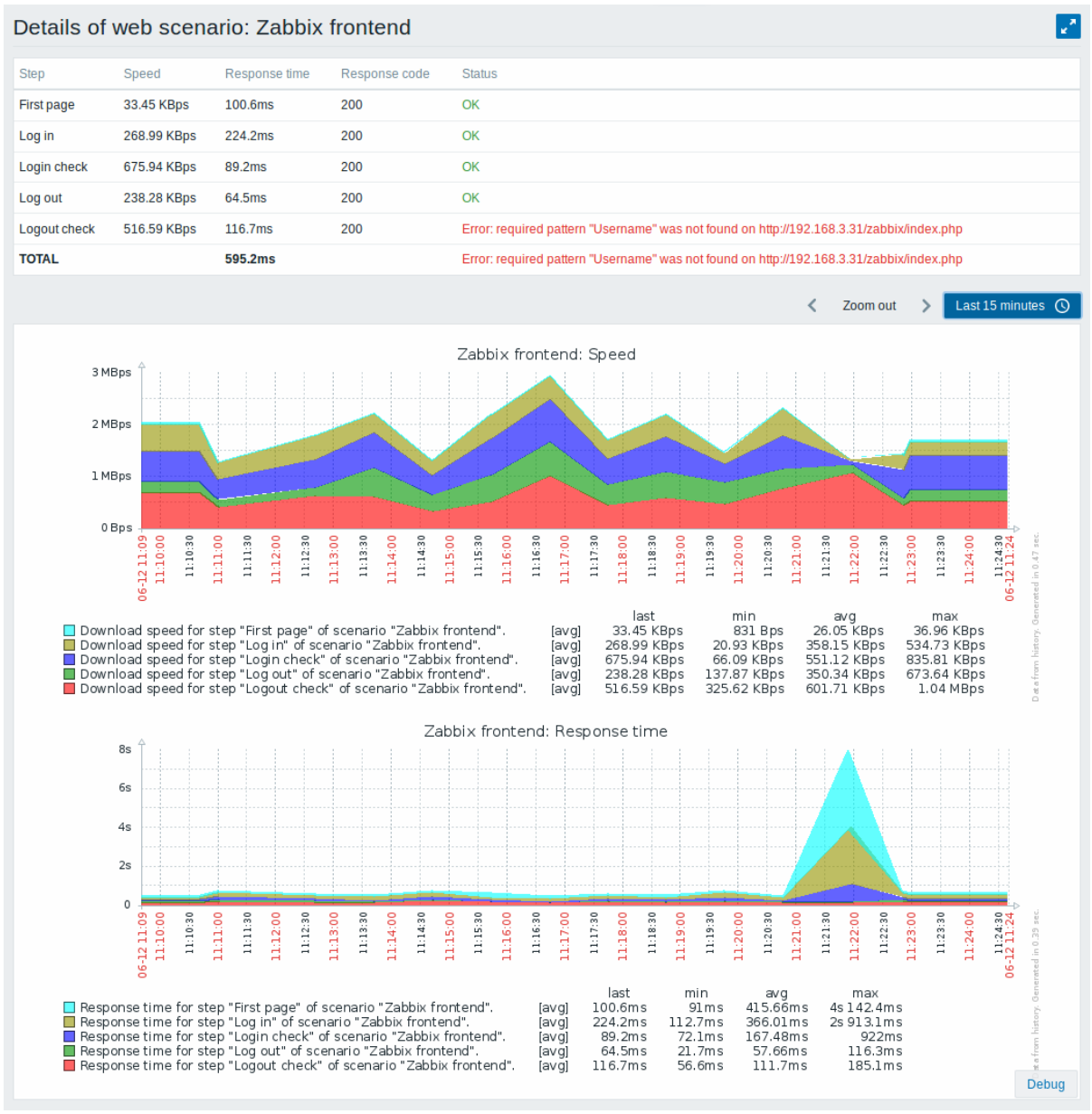
Step 3

Save the finished web monitoring scenario.

The scenario will appear in *Monitoring* → *Web*:



Click on the scenario name to see more detailed statistics:



10. Virtual machine monitoring

Overview Support of monitoring VMware environments is available in Zabbix starting with version 2.2.0.

Zabbix can use low-level discovery rules to automatically discover VMware hypervisors and virtual machines and create hosts to monitor them, based on pre-defined host prototypes.

The default dataset in Zabbix offers several ready-to-use templates for monitoring VMware vCenter or ESX hypervisor.

The minimum required VMware vCenter or vSphere version is 4.1.

Details The virtual machine monitoring is done in two steps. First, virtual machine data is gathered by *vmware collector* Zabbix processes. Those processes obtain necessary information from VMware web services over the SOAP protocol, pre-process it and store into Zabbix server shared memory. Then, this data is retrieved by pollers using Zabbix simple check VMware keys.

Starting with Zabbix version 2.4.4 the collected data is divided into 2 types: VMware configuration data and VMware performance counter data. Both types are collected independently by *vmware collectors*. Because of this it is recommended to enable more collectors than the monitored VMware services. Otherwise retrieval of VMware performance counter statistics might be delayed by the retrieval of VMware configuration data (which takes a while for large installations).

Currently only datastore, network interface and disk device statistics and custom performance counter items are based on the VMware performance counter information.

Configuration For virtual machine monitoring to work, Zabbix should be compiled with the --with-libxml2 and --with-libcurl compilation options.

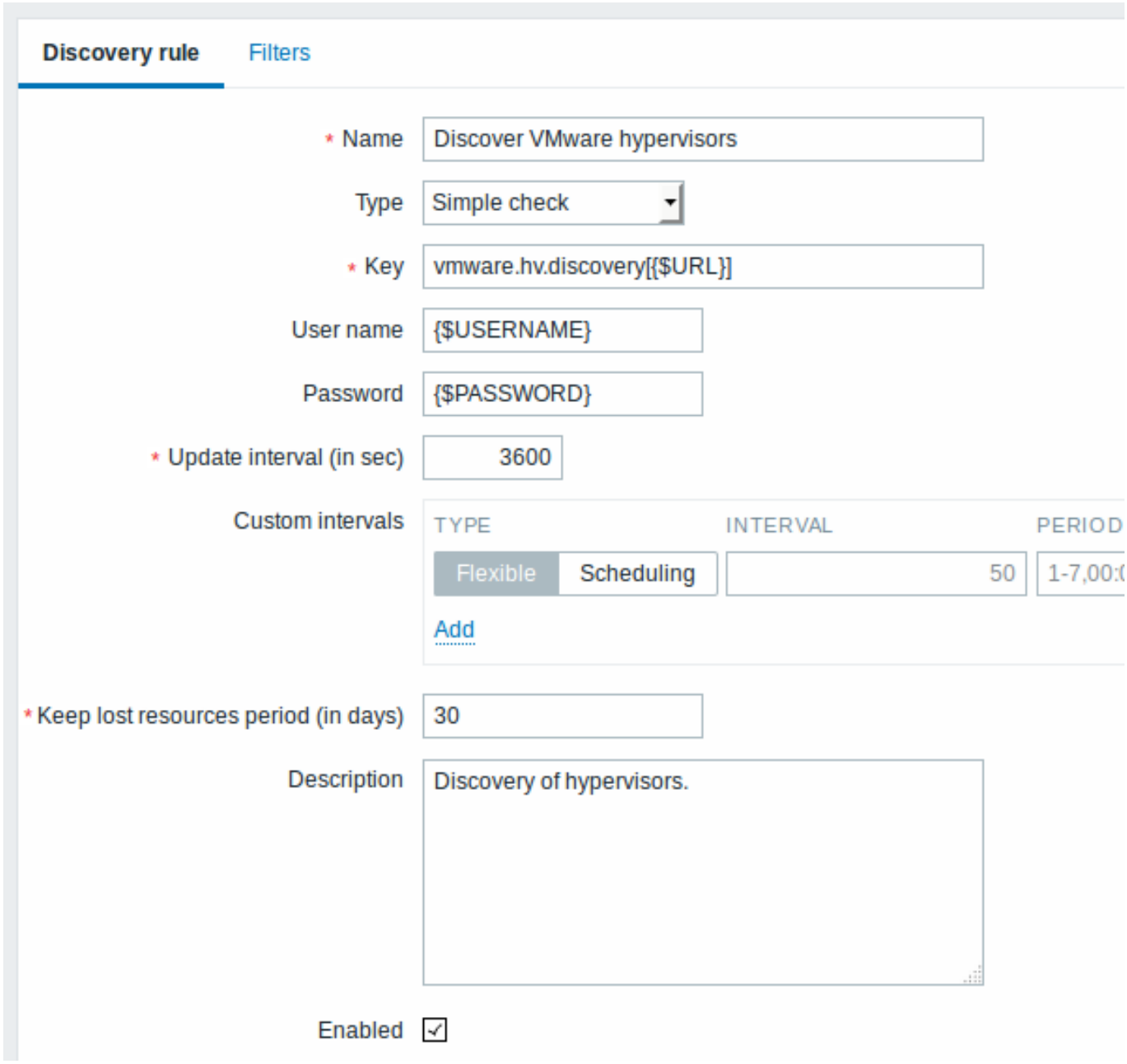
The following configuration file options can be used to tune the Virtual machine monitoring:

- **StartVMwareCollectors** - the number of pre-forked vmware collector instances.
  This value depends on the number of VMware services you are going to monitor. For the most cases this should be:
  *servicenum < StartVMwareCollectors < (servicenum * 2)*
  where *servicenum* is the number of VMware services. E. g. if you have 1 VMware service to monitor set StartVMwareCollectors to 2, if you have 3 VMware services, set it to 5. Note that in most cases this value should not be less than 2 and should not be 2 times greater than the number of VMware services that you monitor. Also keep in mind that this value also depends on your VMware environment size and *VMwareFrequency* and *VMwarePerfFrequency* configuration parameters (see below).
- **VMwareCacheSize**
- **VMwareFrequency**
- **VMwarePerfFrequency**
- **VMwareTimeout**

For more details, see the configuration file pages for Zabbix server and proxy.

> **Attention:**
> To support datastore capacity metrics Zabbix requires VMware configuration vpxd.stats.maxQueryMetrics parameter to be at least 64. See also the VMware knowledge base article.

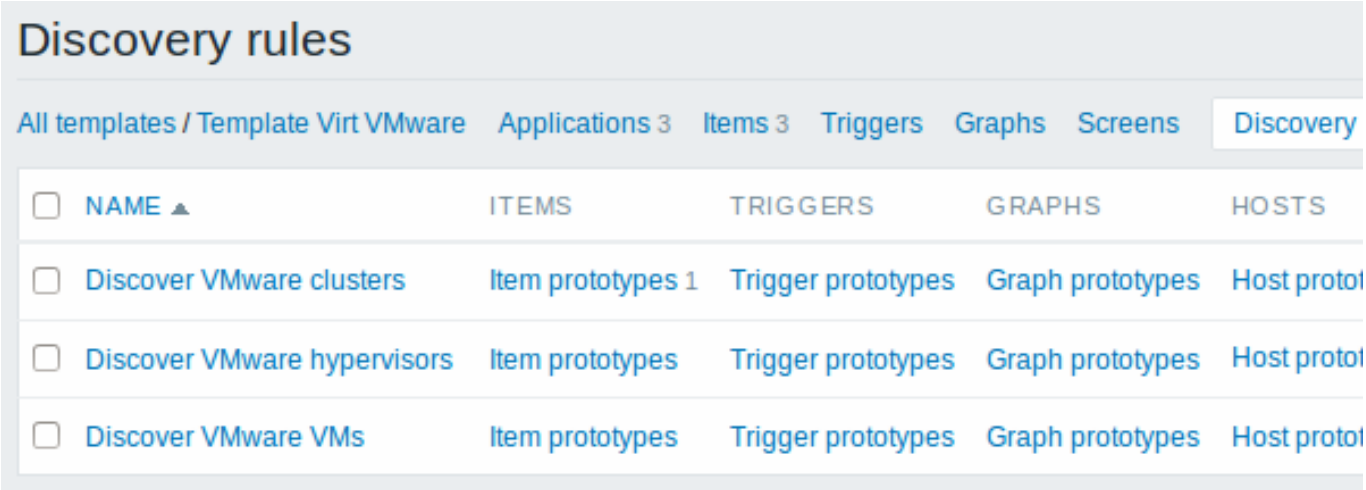
Discovery Zabbix can use a low-level discovery rule to automatically discover VMware hypervisors and virtual machines.



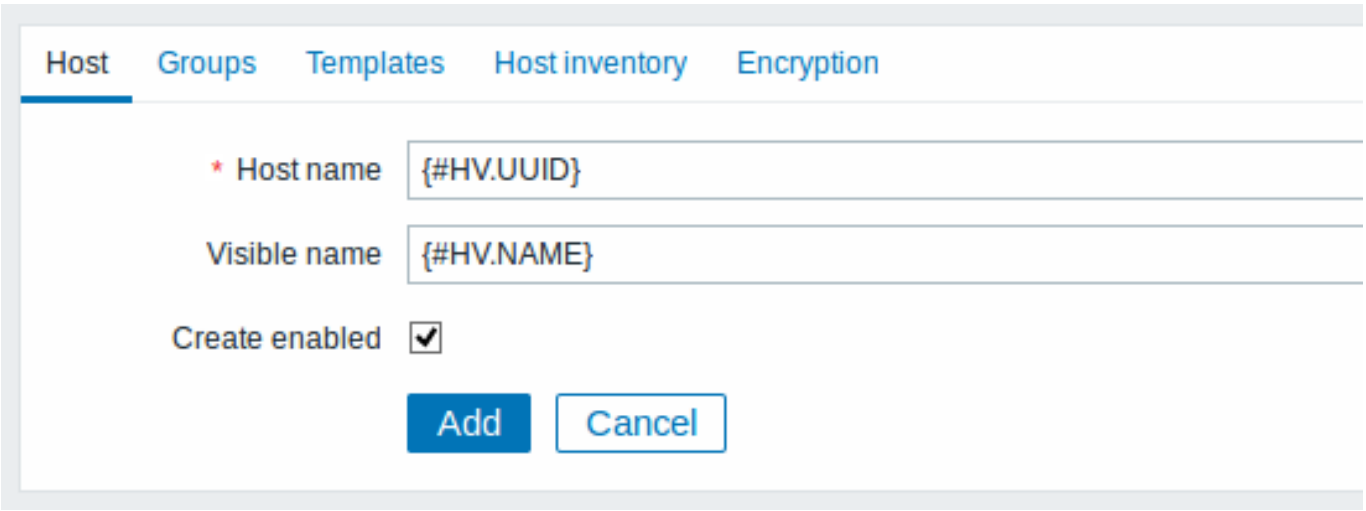
All mandatory input fields are marked with a red asterisk.

Discovery rule key in the above screenshot is *vmware.hv.discovery[{$URL}]*.

Host prototypes Host prototypes can be created with the low-level discovery rule. When virtual machines are discovered, these prototypes become real hosts. Prototypes, before becoming discovered, cannot have their own items and triggers, other than those from the linked templates. Discovered hosts will belong to an existing host and will take the IP of the existing host for the host configuration.



In a host prototype configuration, LLD macros are used for the host name, visible name and host group prototype fields. Linkage to existing host groups, template linkage and encryption are other options that can be set.



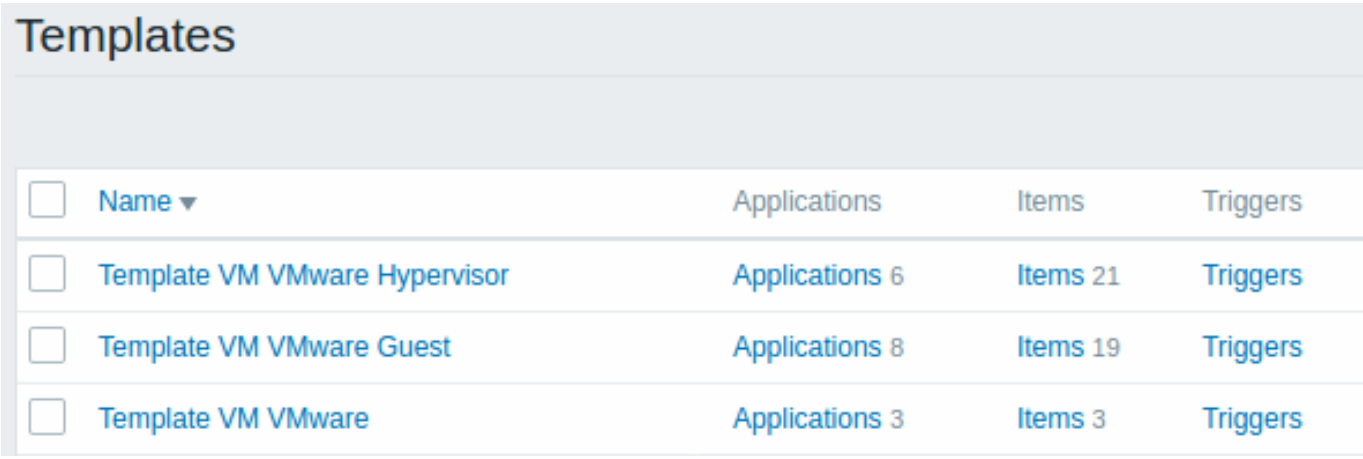
If *Create enabled* is checked, the host will be added in an enabled state. If unchecked, the host will be added, but in disabled state.

Discovered hosts are prefixed with the name of the discovery rule that created them, in the host list. Discovered hosts can be manually deleted. Discovered hosts will also be automatically deleted, based on the *Keep lost resources period (in days)* value of the discovery rule. Most of the configuration options are read-only, except for enabling/disabling the host and host inventory. Discovered hosts cannot have host prototypes of their own.

Ready-to-use templates The default dataset in Zabbix offers several ready-to-use templates for monitoring VMware vCenter or directly ESX hypervisor.

These templates contain pre-configured LLD rules as well as a number of built-in checks for monitoring virtual installations.

Note that "*Template VM VMware*" template should be used for VMware vCenter and ESX hypervisor monitoring. The "*Template VM VMware Hypervisor*" and "*Template VM VMware Guest*" templates are used by discovery and normally should not be manually linked to a host.



Note:
If your server has been upgraded from a pre-2.2 version and has no such templates, you can import them manually, downloading from the community page with official templates. However, these templates have dependencies from the *VMware VirtualMachinePowerState* and *VMware status* value maps, so it is necessary to create these value maps first (using an SQL script, manually or importing from an XML) before importing the templates.

Host configuration To use VMware simple checks the host must have the following user macros defined:

- **{$URL}** - VMware service (vCenter or ESX hypervisor) SDK URL (https://servername/sdk)
- **{$USERNAME}** - VMware service user name
- **{$PASSWORD}** - VMware service {$USERNAME} user password

Example The following example demonstrates how to quickly setup VMware monitoring on Zabbix:

- compile zabbix server with required options (--with-libxml2 and --with-libcurl)
- set the StartVMwareCollectors option in Zabbix server configuration file to 1 or more
- create a new host
- set the host macros required for VMware authentication:

```
    {{..:..:assets:en:manual:vm_monitoring:vm_host_macros.png|}}
* Link the host to the VMware service template:
    {{..:..:assets:en:manual:vm_monitoring:vm_host_templates.png|}}
* Click on the //Add// button to save the host
```

Extended logging The data gathered by VMware collector can be logged for detailed debugging using debug level 5. This level can be set in server and proxy configuration files or using a runtime control option (`-R log_level_increase="vmware collector,N"`, where N is a process number). The following examples demonstrate how extended logging can be started provided debug level 4 is already set:

```
Increase log level of all vmware collectors:
shell> zabbix_server -R log_level_increase="vmware collector"

Increase log level of second vmware collector:
shell> zabbix_server -R log_level_increase="vmware collector,2"
```

If extended logging of VMware collector data is not required it can be stopped using the `-R log_level_decrease` option.

Troubleshooting

- In case of unavailable metrics, please make sure if they are not made unavailable or turned off by default in recent VMware vSphere versions or if some limits are not placed on performance-metric database queries. See ZBX-12094 for additional details.
- In case of *'config.vpxd.stats.maxQueryMetrics' is invalid or exceeds the maximum number of characters permitted*** error, add a `config.vpxd.stats.maxQueryMetrics` parameter to the vCenter Server settings. The value of this parameter should be the same as the value of `maxQuerysize` in VMware's *web.xml*. See this VMware knowledge base article for details.

1 Virtual machine discovery key fields

The following table lists fields returned by virtual machine related discovery keys.

Item key		
Description	**Field**	**Retrieved content**
vmware.cluster.discovery		
Performs cluster discovery.	{#CLUSTER.ID}	Cluster identifier.
	{#CLUSTER.NAME}	Cluster name.
vmware.datastore.discovery		

Item key		
Performs datastore discovery. vmware.hv.discovery	{#DATASTORE}	Datastore name.
Performs hypervisor discovery.	{#HV.UUID}	Unique hypervisor identifier.
	{#HV.ID}	Hypervisor identifier (HostSystem managed object name).
	{#HV.NAME}	Hypervisor name.
	{#CLUSTER.NAME}	Cluster name, might be empty.
	{#DATACENTER.NAME}	Datacenter name.
	{#PARENT.NAME}	Name of container that stores the hypervisor. Supported since Zabbix 4.0.3.
	{#PARENT.TYPE}	Type of container in which the hypervisor is stored. The values could be `Datacenter`, `Folder`, `ClusterComputeRes` `VMware`, where 'VMware' stands for unknown container type. Supported since Zabbix 4.0.3.

Item key		
vmware.hv.datastore.discovery Performs hypervisor datastore discovery. Note that multiple hypervisors can use the same datastore.	{#DATASTORE}	Datastore name.
vmware.vm.discovery Performs virtual machine discovery.	{#VM.UUID}	Unique virtual machine identifier.
	{#VM.ID}	Virtual machine identifier (VirtualMachine managed object name).
	{#VM.NAME}	Virtual machine name.
	{#HV.NAME}	Hypervisor name.
	{#CLUSTER.NAME}	Cluster name, might be empty.
	{#DATACENTER.NAME}	Datacenter name.
vmware.vm.net.if.discovery Performs virtual machine network interface discovery.	{#IFNAME}	Network interface name.
vmware.vm.vfs.dev.discovery Performs virtual machine disk device discovery.	{#DISKNAME}	Disk device name.
vmware.vm.vfs.fs.discovery Performs virtual machine file system discovery.	{#FSNAME}	File system name.

11. Maintenance

Overview You can define maintenance periods for host groups, hosts and specific triggers/services in Zabbix.

There are two maintenance types - with data collection and with no data collection.

During a maintenance "with data collection" triggers are processed as usual and events are created when required. However, problem escalations are paused for hosts/triggers in maintenance, if the *Pause operations for suppressed problems* option is checked in action configuration. In this case, escalation steps that may include sending notifications or remote commands will be ignored for as long as the maintenance period lasts. Note that problem recovery and update operations are not suppressed during maintenance, only escalations.

For example, if escalation steps are scheduled at 0, 30 and 60 minutes after a problem start, and there is a half-hour long maintenance lasting from 10 minutes to 40 minutes after a real problem arises, steps two and three will be executed a half-hour later, or at 60 minutes and 90 minutes (providing the problem still exists). Similarly, if a problem arises during the maintenance, the escalation will start after the maintenance.

To receive problem notifications during the maintenance normally (without delay), you have to uncheck the *Pause operations for suppressed problems* option in action configuration.

Note:
If at least one host (used in the trigger expression) is not in maintenance mode, Zabbix will send a problem notification.

Zabbix server must be running during maintenance. Timer processes are responsible for switching host status to/from maintenance at 0 seconds of every minute. Note that when a host enters maintenance, Zabbix server timer processes will read all open problems to check if it is required to suppress those. This may have a performance impact if there are many open problems. Zabbix server will also read all open problems upon startup, even if there are no maintenances configured at the time.

A proxy will always collect data regardless of the maintenance type (including "no data" maintenance). The data is later ignored by the server if 'no data collection' is set.

When "no data" maintenance ends, triggers using nodata() function will not fire before the next check during the period they are checking.

If a log item is added while a host is in maintenance and the maintenance ends, only new logfile entries since the end of the maintenance will be gathered.

If a timestamped value is sent for a host that is in a "no data" maintenance type (e.g. using Zabbix sender) then this value will be dropped however it is possible to send a timestamped value in for an expired maintenance period and it will be accepted.

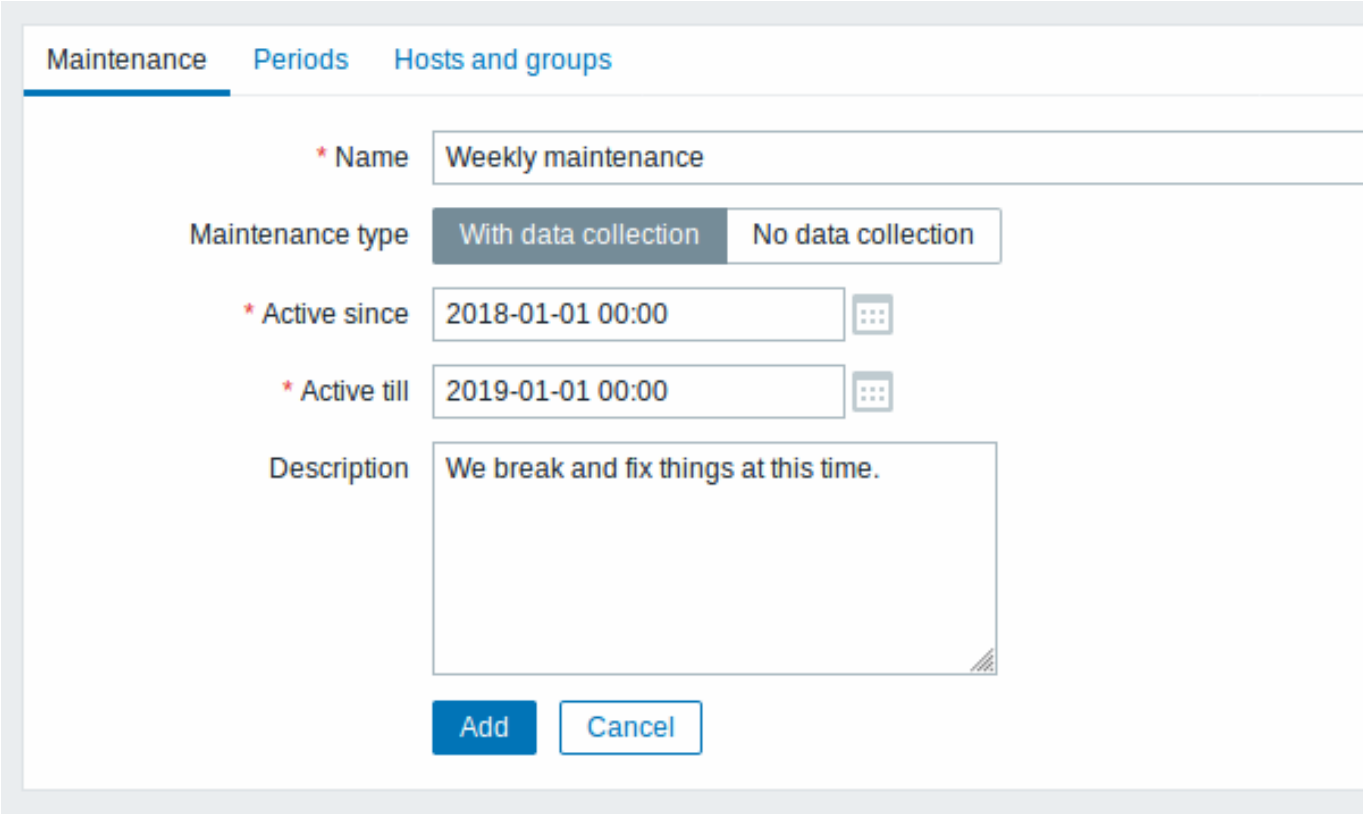
Attention:
To ensure predictable behaviour of recurring maintenance periods (daily, weekly, monthly), it is required to use a common timezone for all parts of Zabbix.

If maintenance period, hosts, groups or tags are changed by user, the changes will only take effect after configuration cache synchronization.

Configuration To configure a maintenance period:

- Go to: *Configuration* → *Maintenance*
- Click on *Create maintenance period* (or on the name of an existing maintenance period)

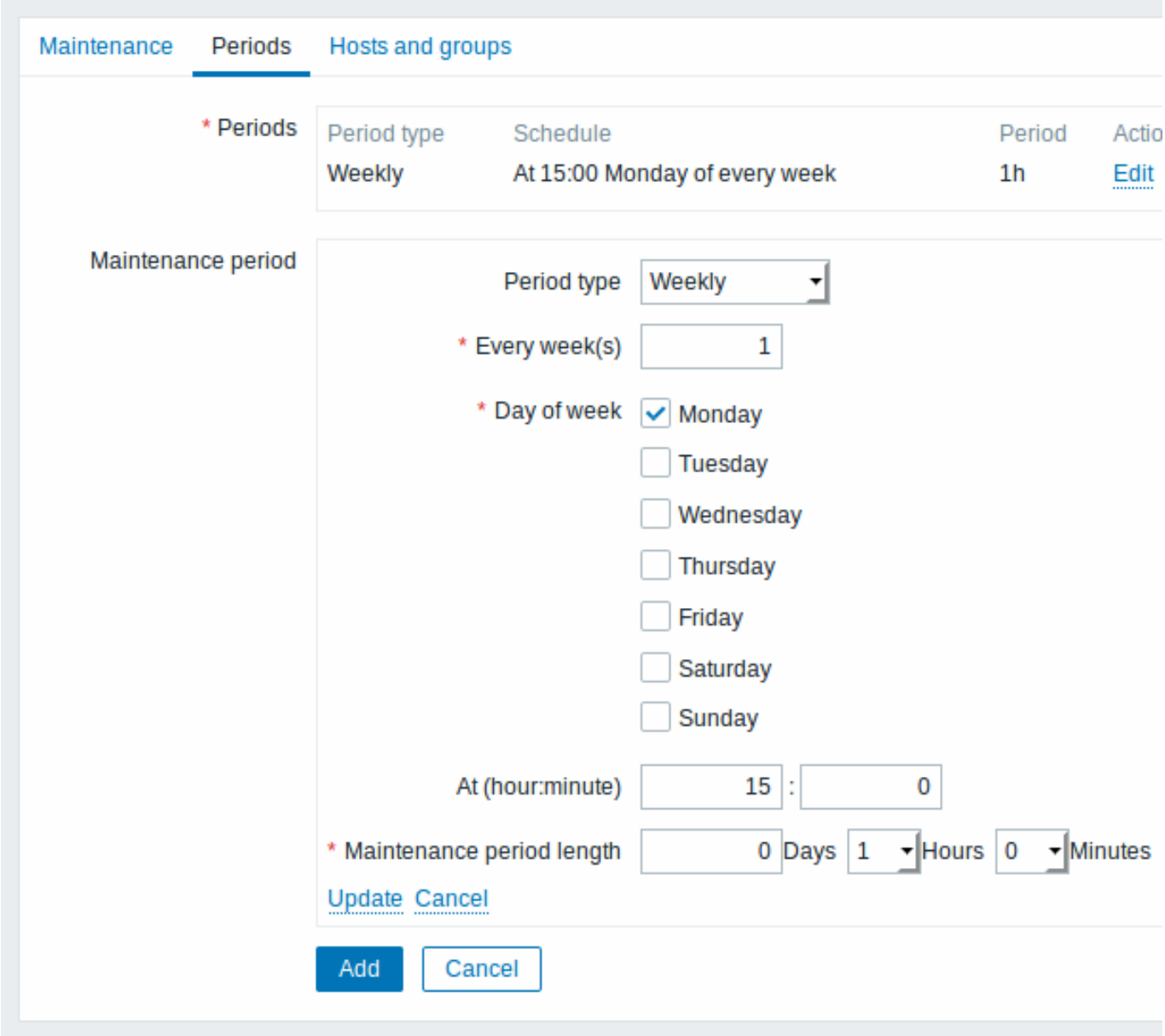
The **Maintenance** tab contains general maintenance period attributes:



All mandatory input fields are marked with a red asterisk.

Parameter	Description
Name	Name of the maintenance period.
Maintenance type	Two types of maintenance can be set: **With data collection** - data will be collected by the server during maintenance, triggers will be processed **No data collection** - data will not be collected by the server during maintenance
Active since	The date and time when executing maintenance periods becomes active. *Note*: Setting this time alone does not activate a maintenance period; for that go to the *Periods* tab.
Active till	The date and time when executing maintenance periods stops being active.
Description	Description of maintenance period.

The **Periods** tab allows you to define the exact days and hours when the maintenance takes place. Clicking on *New* opens a flexible *Maintenance period* form where you can define the times - for daily, weekly, monthly or one-time maintenance.



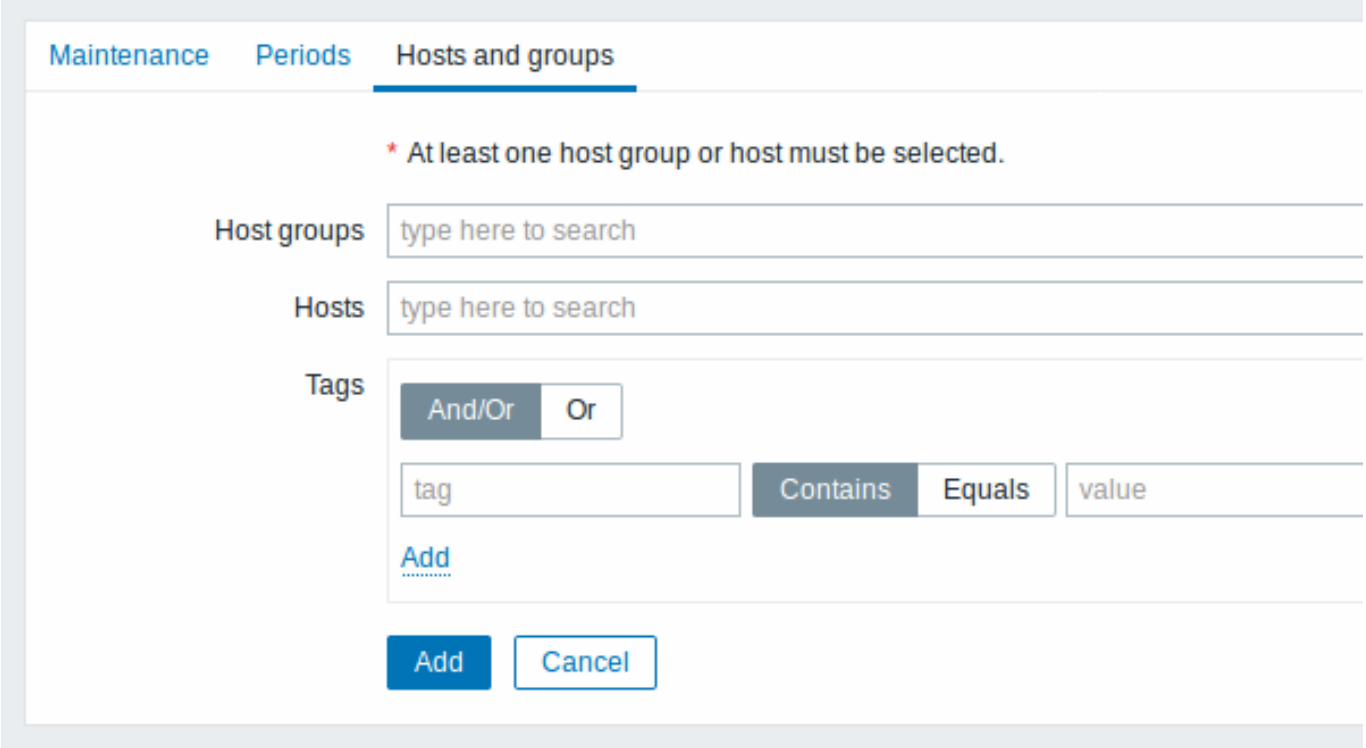
Notes:

- Daily and weekly periods have an *Every day/Every week* parameter, which defaults to '1'. Setting it to '2' would make the maintenance take place every two days or every two weeks and so on. In this case the starting day or week is the day/week that the *Active since* time falls on. For example:

- with *Active since* set to January 1st at 12:00 and a one-hour maintenance set for every two days at 11pm will result in the first maintenance period starting on January 1st at 11pm, while the second maintenance period will start on January 3rd at 11pm;
- with the same *Active since* time and a one-hour maintenance set for every two days at 1am, the first maintenance period will start on January 3rd at 1am, while the second maintenance period will start on January 5th at 1am.

- Since Zabbix 4.4.8, Daylight Saving Time (**DST**) changes do not affect how long the maintenance will be. Let's say we have a two-hour maintenance that usually starts at 1am and finishes at 3am:
  - If after one hour of maintenance (at 2am) a DST change happens and current time changes from 2:00 to 3:00, the maintenance will continue for one more hour till 4:00;
  - If after two hours of maintenance (at 3am) a DST change happens and current time changes from 3:00 to 2:00, the maintenance will stop because two hours have passed.

The **Hosts and groups** tab allows you to select the host groups, hosts and problem tags for maintenance.

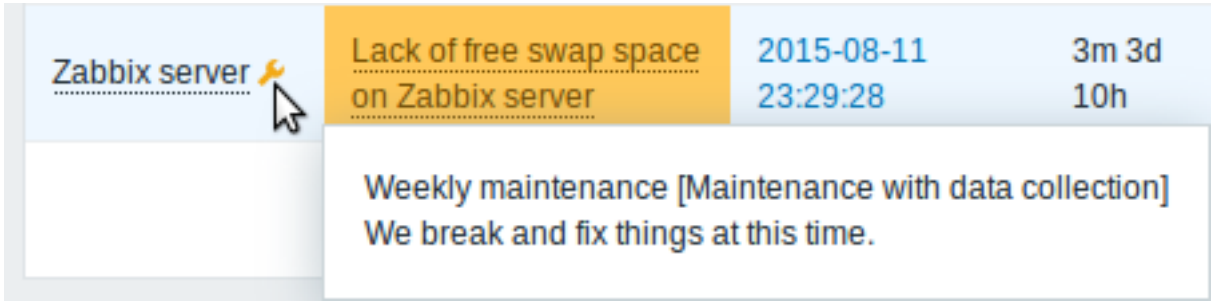


Parameter	Description
Host groups	Select host groups that the maintenance will be activated for. The maintenance will be activated for all hosts from the specified host group(s). This field is auto-complete, so starting to type in it will display a dropdown of all available host groups. Specifying a parent host group implicitly selects all nested host groups. Thus the maintenance will also be activated on hosts from nested groups.
Hosts	Select hosts that the maintenance will be activated for. This field is auto-complete, so starting to type in it will display a dropdown of all available hosts.
Tags	If maintenance tags are specified, maintenance for the selected hosts will still be activated, but problems will only be suppressed (i.e. no actions will be taken) if their tags are a match. In case of multiple tags, they are calculated as follows: **And/Or** - all tags must correspond; however tags with the same tag name are calculated by the Or condition **Or** - enough if one tag corresponds There are two ways of matching the tag value: **Contains** - case-sensitive substring match (tag value contains the entered string) **Equals** - case-sensitive string match (tag value equals the entered string)

Display Displaying hosts in maintenance

An orange wrench icon next to the host name indicates that this host is in maintenance in:

- *Monitoring* → *Dashboard*
- *Monitoring* → *Problems*
- *Inventory* → *Hosts* → *Host inventory details*
- *Configuration* → *Hosts* (See 'Status' column)



Maintenance details are displayed when the mouse pointer is positioned over the icon.

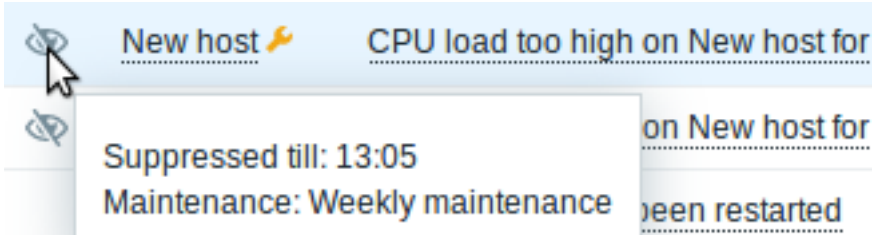
Additionally, hosts in maintenance get an orange background in *Monitoring* → *Maps*.

Displaying suppressed problems

Normally problems for hosts in maintenance are suppressed, i.e. not displayed in the frontend. However, it is also possible to configure that suppressed problems are shown, by selecting the *Show suppressed problems* option in these locations:

- *Monitoring* → *Dashboard* (in *Problem hosts*, *Problems*, *Problems by severity*, *Trigger overview* widget configuration)
- *Monitoring* → *Problems* (in the filter)
- *Monitoring* → *Overview* (in the filter; with 'Triggers' as *Type*)
- *Monitoring* → *Maps* (in map configuration)
- Global notifications (in user profile configuration)

When suppressed problems are displayed, the following icon is displayed: . Rolling a mouse over the icon displays more details:



12. Regular expressions

Overview Perl Compatible Regular Expressions (PCRE) are supported in Zabbix.

There are two ways of using regular expressions in Zabbix:

- manually entering a regular expression
- using a global regular expression created in Zabbix

Regular expressions You may manually enter a regular expression in supported places. Note that the expression may not start with @ because that symbol is used in Zabbix for referencing global regular expressions.

Warning:
It's possible to run out of stack when using regular expressions. See the pcrestack man page for more information.

Note that in multi-line matching, the ^ and $ anchors match at the beginning/end of each line respectively, instead of the beginning/end of the entire string.

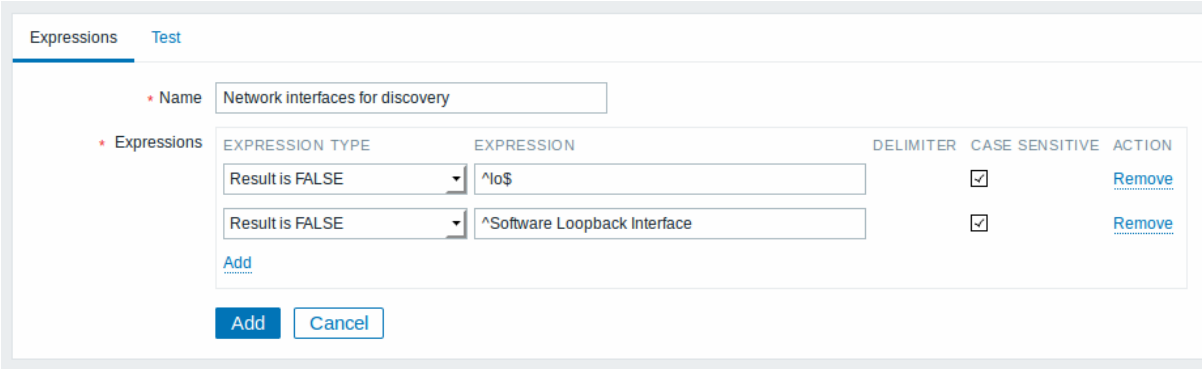
Global regular expressions There is an advanced editor for creating and testing complex regular expressions in Zabbix frontend.

Once a regular expression has been created this way, it can be used in several places in the frontend by referring to its name, prefixed with @, for example, *@mycustomregexp*.

To create a global regular expression:

- Go to: *Administration* → *General*
- Select *Regular expressions* from the dropdown
- Click on *New regular expression*

The **Expressions** tab allows to set the regular expression name and add subexpressions.



All mandatory input fields are marked with a red asterisk.

Parameter		Description
Name		Set the regular expression name. Any Unicode characters are allowed.
Expressions		Click on *Add* in the Expressions block to add a new subexpression.
	Expression type	Select expression type: **Character string included** - match the substring **Any character string included** - match any substring from a delimited list. The delimited list includes a comma (,), a dot (.) or a forward slash (/). **Character string not included** - match any string except the substring **Result is TRUE** - match the regular expression **Result is FALSE** - do not match the regular expression
	Expression	Enter substring/regular expression.
Delimiter		A comma (,), a dot (.) or a forward slash (/) to separate text strings in a regular expression. This parameter is active only when *"Any character string included"* expression type is selected.
Case sensitive		A checkbox to specify whether a regular expression is sensitive to capitalization of letters.

Since Zabbix 2.4.0, a forward slash (/) in the expression is treated literally, rather than a delimiter. This way it is possible to save expressions containing a slash, whereas previously it would produce an error.

Attention:
A custom regular expression name in Zabbix may contain commas, spaces, etc. In those cases where that may lead to misinterpretation when referencing (for example, a comma in the parameter of an item key) the whole reference may be put in quotes like this: *"@My custom regexp for purpose1, purpose2"*.
Regular expression names must not be quoted in other locations (for example, in LLD rule properties).

Default global regular expressions

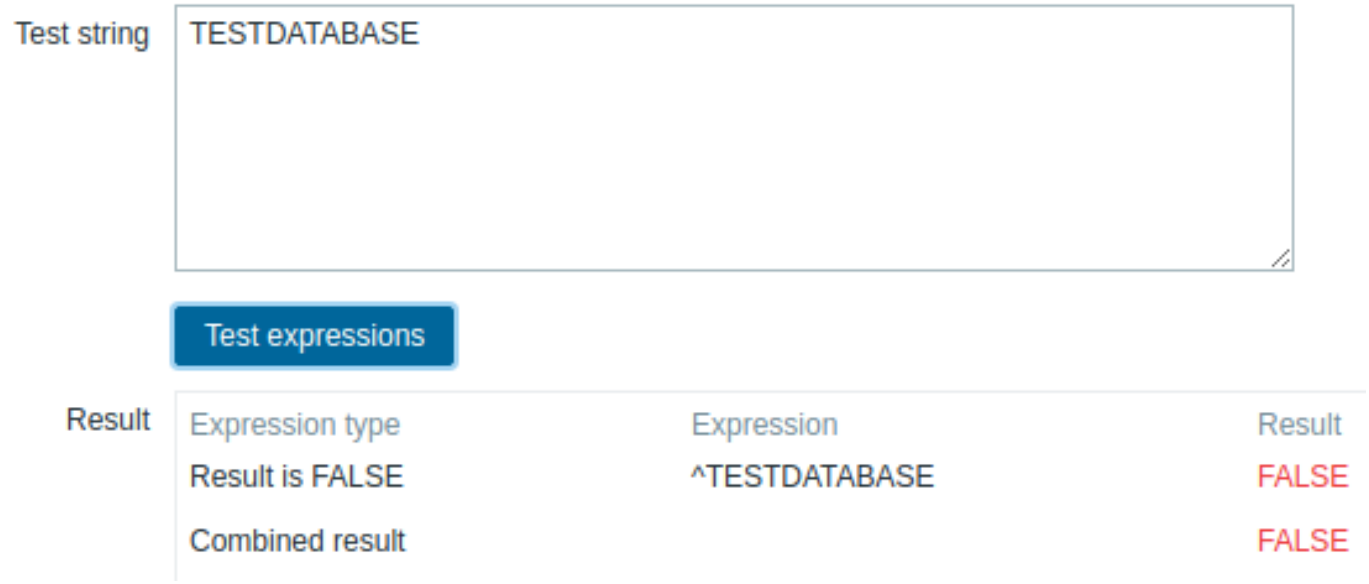
Zabbix comes with several global regular expression in its default dataset.

Name	Expression	Matches
File systems for discovery	^(btrfs|ext2|ext3|ext4|jfs|reiser|xfs|ffs|ufs|jfs|jfs2|vxfs|hfs|refs|apfs|ntfs|fat32|zfs)	"btrfs" or "ext2" or "ext3" or "ext4" or "jfs" or "reiser" or "xfs" or "ffs" or "ufs" or "jfs" or "jfs2" or "vxfs" or "hfs" or "refs" or "apfs" or "ntfs" or "fat32" or "zfs"
Network interfaces for discovery	^Software Loopback Interface	Strings starting with "Software Loopback Interface".
	^lo$	"lo"
	^(In)?[Ll]oop[Bb]ack[0-9._]*$	Strings that optionally start with "In", then have "L" or "l", then "oop", then "B" or "b", then "ack", which can be optionally followed by any number of digits, dots or underscores.
	^NULL[0-9.]*$	Strings starting with "NULL" optionally followed by any number of digits or dots.
	^[Ll]o[0-9.]*$	Strings starting with "Lo" or "lo" and optionally followed by any number of digits or dots.
	^[Ss]ystem$	"System" or "system"
	^Nu[0-9.]*$	Strings starting with "Nu" optionally followed by any number of digits or dots.
Storage devices for SNMP discovery	^(Physical memory|Virtual memory|Memory buffers|Cached memory|Swap space)$	"Physical memory" or "Virtual memory" or "Memory buffers" or "Cached memory" or "Swap space"
Windows service names for discovery	^(MMCSS|gupdate|SysmonLog|clr_optimization_v2.0.50727_32|clr_optimization_v4.0.30319_32)$	"MMCSS" or "gupdate" or "SysmonLog" or strings like "clr_optimization_v2.0.50727_32" and "clr_optimization_v4.0.30319_32" where instead of dots you can put any character except newline.
Windows service startup states for discovery	^(automatic|automatic delayed)$	"automatic" or "automatic delayed"

Examples Example 1

Use of the following expression in low-level discovery to discover databases except a database with a specific name:

^TESTDATABASE$

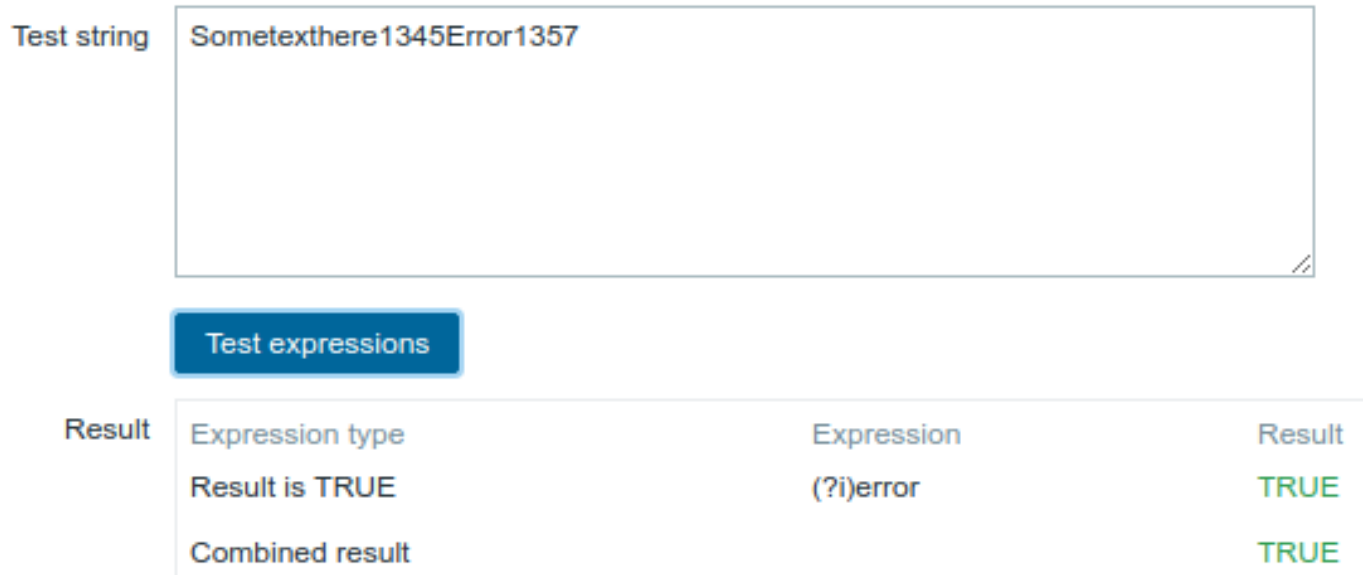


Chosen *Expression type*: "Result is FALSE". Doesn't match name, containing string "*TESTDATABASE*".

Example with an inline regex modifier

Use of the following regular expression including an inline modifier (?i) to match the characters ”error”:

```
(?i)error
```



Chosen *Expression type*: ”Result is TRUE”. Characters ”error” are matched.

Another example with an inline regex modifier

Use of the following regular expression including multiple inline modifiers to match the characters after a specific line:

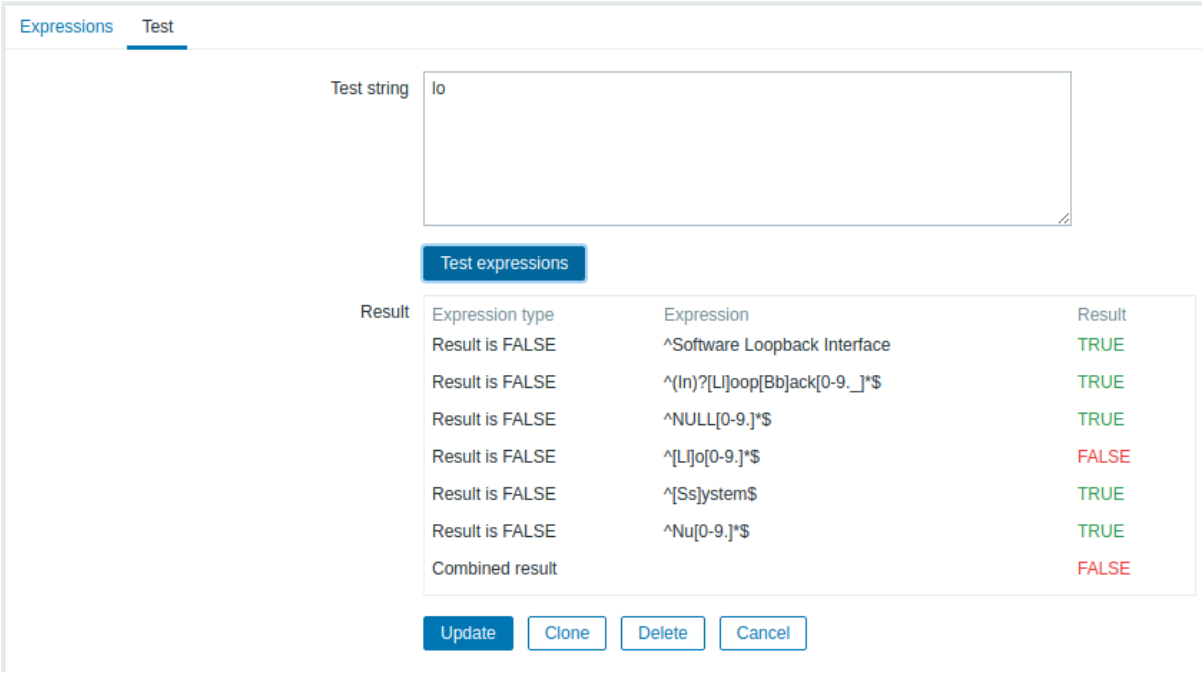
```
(?<=match (?i)everything(?-i) after this line\n)(?sx).*# we add s modifier to allow . match newline charac
```

Chosen Expression type: ”Result is TRUE”. Characters after a specific line are matched.

> **Attention:**
> **g** modifier can’t be specified in line. The list of available modifiers can be found in pcresyntax man page. For more information about PCRE syntax please refer to PCRE HTML documentation.

More complex example

A custom regular expression may consist of multiple subexpressions, and it can be tested in the **Test** tab by providing a test string.



Results show the status of each subexpression and total custom expression status.

Total custom expression status is defined as *Combined result*. If several sub expressions are defined Zabbix uses AND logical operator to calculate *Combined result*. It means that if at least one Result is False *Combined result* has also False status.

Regular expression support by location

Location	Regular expression	Global regular expression	Comments
Agent items			
	eventlog[]	Yes	`regexp`, `severity`, `source`, `eventid` parameters
	log[]		`regexp` parameter
	log.count[]		
	logrt[]	Yes/No	`regexp` parameter supports both, `file_regexp` parameter supports non-global expressions only
	logrt.count[]		
	proc.cpu.util[]	No	`cmdline` parameter
	proc.mem[]		
	proc.num[]		
	sensor[]		`device` and `sensor` parameters on Linux 2.4
	system.hw.macaddr[]		`interface` parameter
	system.sw.packages[]		`package` parameter

Location	Regular expression	Global regular expression	Comments
	vfs.dir.count[]		`regex_incl`, `regex_excl`, `regex_excl_dir` parameters
	vfs.dir.size[]		`regex_incl`, `regex_excl`, `regex_excl_dir` parameters
	vfs.file.regexp[]		`regexp` parameter
	vfs.file.regmatch[]		
	web.page.regexp[]		
SNMP traps			
	snmptrap[]	Yes	`regexp` parameter
Item value preprocessing	Yes	No	`pattern` parameter
Trigger functions			
	count()	Yes	`pattern` parameter if `operator` parameter is *regexp* or *iregexp*
	logeventid()		`pattern` parameter
	logsource()		
	iregexp()		
	regexp()		
Low-level discovery	Yes	Yes	*Filter* field
Action conditions	Yes	No	In *matches*, *does not match* options for *Host name* and *Host metadata* auto-registration conditions
Web monitoring	Yes	No	*Variables* with a **regex:** prefix *Required string* field
Macro functions			
	regsub()	No	`pattern` parameter
	iregsub()		
Icon mapping	Yes	Yes	*Expression* field

13. Problem acknowledgement

Overview Problem events in Zabbix can be acknowledged by users.

If a user gets notified about a problem event, they can go to Zabbix frontend, navigate from the problem list to the problem update screen and acknowledge the problem. When acknowledging, they can enter their comment for it, saying that they are working on it or whatever else they may feel like saying about it.

This way, if another system user spots the same problem, they immediately see if it has been acknowledged and the comments so far.

This way the workflow of resolving problems with more than one system user can take place in a more coordinated way.

Acknowledgement status is also used when defining action operations. You can define, for example, that a notification is sent to a higher level manager only if an event is not acknowledged for some time.

To acknowledge events and comment on them, a user must have at least read permissions to the corresponding triggers. To change problem severity or close problem, a user must have read-write permissions to the corresponding triggers.

There are **several** ways to access the problem update screen, which allows to acknowledge a problem.

- You may select problems in *Monitoring* → *Problems* and then click on *Mass update* below the list
- You can click in the *Ack* column showing the acknowledgement status of problems in:
  - *Monitoring* → *Dashboard* (*Problems* and *Problems by severity* widgets)
  - *Monitoring* → *Problems*
  - *Monitoring* → *Problems* → *Event details*
  - *Monitoring* → *Screens* (*Host group issues*, *Host issues*, *Problems by severity* elements)

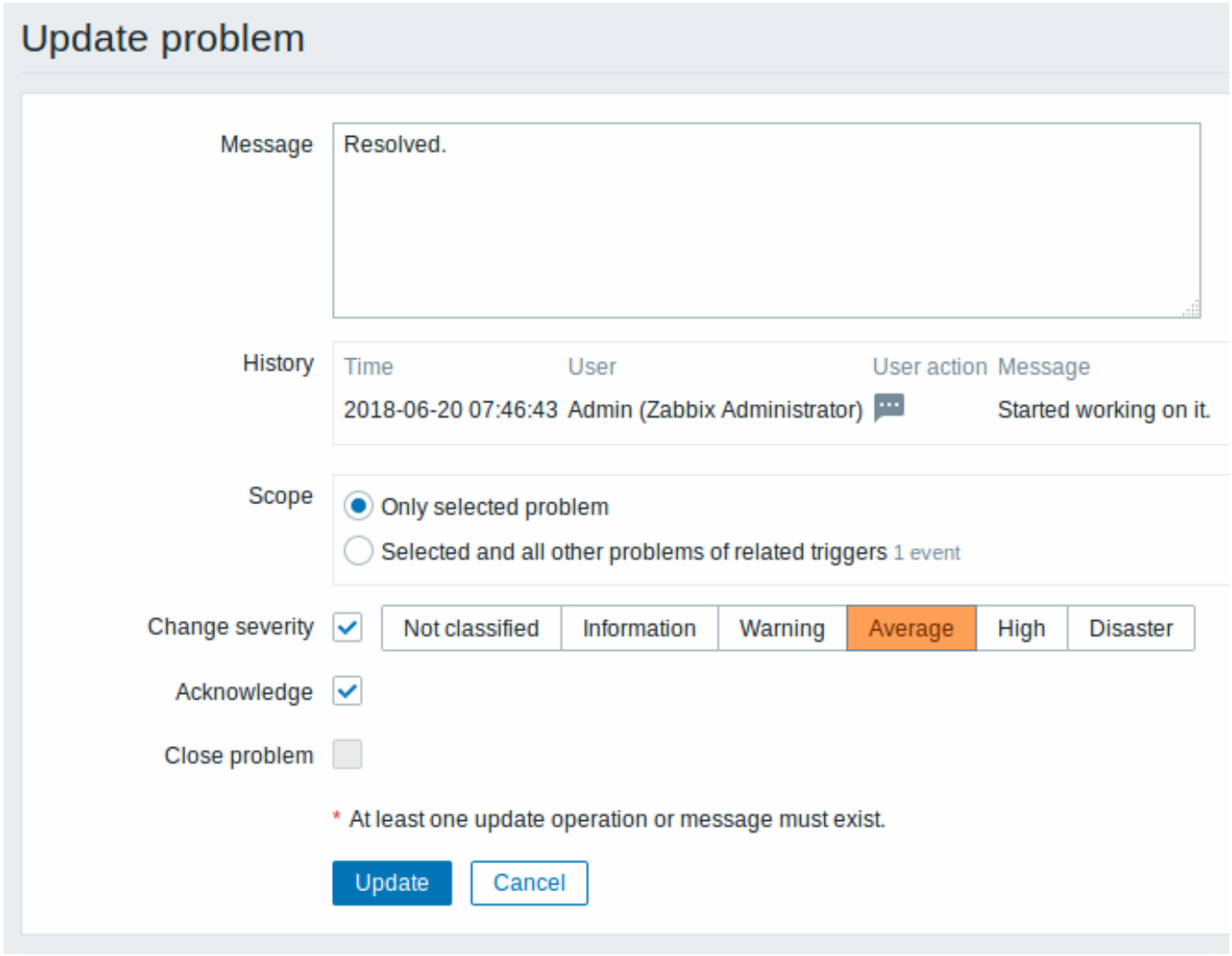
The *Ack* column contains either a 'Yes' or a 'No' link, indicating an acknowledged or an unacknowledged problem respectively. Clicking on the links will take you to the problem update screen.

- You can click on an unresolved problem cell in:
  - *Monitoring* → *Dashboard* (*Trigger overview* widget)
  - *Monitoring* → *Overview*
  - *Monitoring* → *Screens* (*Trigger overview* element)

The popup menu contains an *Acknowledge* option that will take you to the problem update screen.

Updating problems The problem update screen allows to:

- comment on the problem
- view comments and actions so far
- change problem severity
- acknowledge problem
- manually close problem



All mandatory input fields are marked with a red asterisk.

Parameter	Description
Message	Enter text to comment on the problem (maximum 256 characters).
History	Previous activities and comments on the problem are listed, along with the time and user details. For the meaning of icons used to denote user actions see the event detail page.
Scope	Define the scope of such actions as changing severity, acknowledging or manually closing problems: **Only selected problem** - will affect this event only **Selected and all other problems of related triggers** - in case of acknowledgement/closing problem, will affect this event and all other problems that are not acknowledged/closed so far. If the scope contains problems already acknowledged or closed, these problems will not be acknowledged/closed repeatedly. On the other hand, the number of message and severity change operations are not limited.
Change severity	Mark the checkbox and click on the severity button to update problem severity. The checkbox for changing severity is available if read-write permissions exist for at least one of the selected problems. Only those problems that are read-writable will be updated when clicking on *Update*. If read-write permissions exist for none of the selected triggers, the checkbox is disabled.

Parameter	Description
Acknowledge	Mark the checkbox to acknowledge the problem. This option is disabled if all selected problems are already acknowledged. If at least one is unacknowledged, the option is available and in this case it will be possible to acknowledge only the unacknowledged problem(s). It is not possible to add another acknowledgement for an already acknowledged problem (it is possible to add another comment though).
Close problem	Mark the checkbox to manually close the selected problem(s). The checkbox for closing a problem is available if the *Allow manual close* option is checked in trigger configuration for at least one of the selected problems. Only those problems will be closed that are allowed to be closed when clicking on *Update*. If no problem is manually closeable, the checkbox is disabled. Already closed problems will not be closed repeatedly.

Display Based on acknowledgement information it is possible to configure how the problem count is displayed in the dashboard or maps. To do that, you have to make selections in the *Problem display* option, available in both map configuration and the *Problems by severity* dashboard widget. It is possible to display all problem count, unacknowledged problem count as separated from the total or unacknowledged problem count only.

Based on problem update information (acknowledgement, etc.) it is possible to configure update operations - send message or execute remote commands.

14. Configuration export/import

Overview Zabbix export/import functionality makes it possible to exchange various configuration entities between one Zabbix system and another.

Typical use cases for this functionality:

- share templates or network maps - Zabbix users may share their configuration parameters
- share web scenarios on *share.zabbix.com* - export a template with the web scenarios and upload to *share.zabbix.com*. Then others can download the template and import the XML into Zabbix.
- integrate with third-party tools - the universal XML format makes integration and data import/export possible with third party tools and applications

What can be exported/imported

Objects that can be exported/imported are:

- host groups (*through Zabbix API only*)
- templates
- hosts
- network maps
- screens
- media types
- images
- value maps

Export format

Data can be exported using the Zabbix web frontend or Zabbix API. Supported export formats are:

- XML - in the frontend
- XML or JSON - in Zabbix API

Details about export

- All supported elements are exported in one file.
- Host and template entities (items, triggers, graphs, discovery rules) that are inherited from linked templates are not exported. Any changes made to those entities on a host level (such as changed item interval, modified regular expression or added

prototypes to the low-level discovery rule) will be lost when exporting; when importing, all entities from linked templates are re-created as on the original linked template.
- Entities created by low-level discovery and any entities depending on them are not exported. For example, a trigger created for an LLD-rule generated item will not be exported.

Details about import

- Import stops at the first error.
- When updating existing images during image import, "imagetype" field is ignored, i.e. it is impossible to change image type via import.
- When importing hosts/templates using the "Delete missing" option, host/template macros not present in the imported XML file will be deleted too.
- Empty tags for items, triggers, graphs, host/template applications, discoveryRules, itemPrototypes, triggerPrototypes, graphPrototypes are meaningless i.e. it's the same as if it was missing. Other tags, for example, item applications, are meaningful i.e. empty tag means no applications for item, missing tag means don't update applications.
- Import supports both XML and JSON, the import file must have a correct file extension: .xml for XML and .json for JSON.
- See compatibility information about supported XML versions.

```
<?xml version="1.0" encoding="UTF-8"?>
<zabbix_export>
    <version>4.0</version>
    <date>2016-10-04T06:20:11Z</date>
</zabbix_export>
```

XML base format

`<?xml version="1.0" encoding="UTF-8"?>`

Default header for XML documents.

`<zabbix_export>`

Root element for Zabbix XML export.

`<version>4.0</version>`

Export version.

`<date>2016-10-04T06:20:11Z</date>`

Date when export was created in ISO 8601 long format.

Other tags are dependent on exported objects.

1 Host groups

In the frontend host groups can be exported only with host or template export. When a host or template is exported all groups it belongs to are exported with it automatically.

API allows to export host groups independently from hosts or templates.

```
<groups>
    <group>
        <name>Zabbix servers</name>
    </group>
</groups>
```

groups/group

Parameter	Type	Description	Details
name	*string*	Group name.	

2 Templates

Overview

Templates are exported with many related objects and object relations.

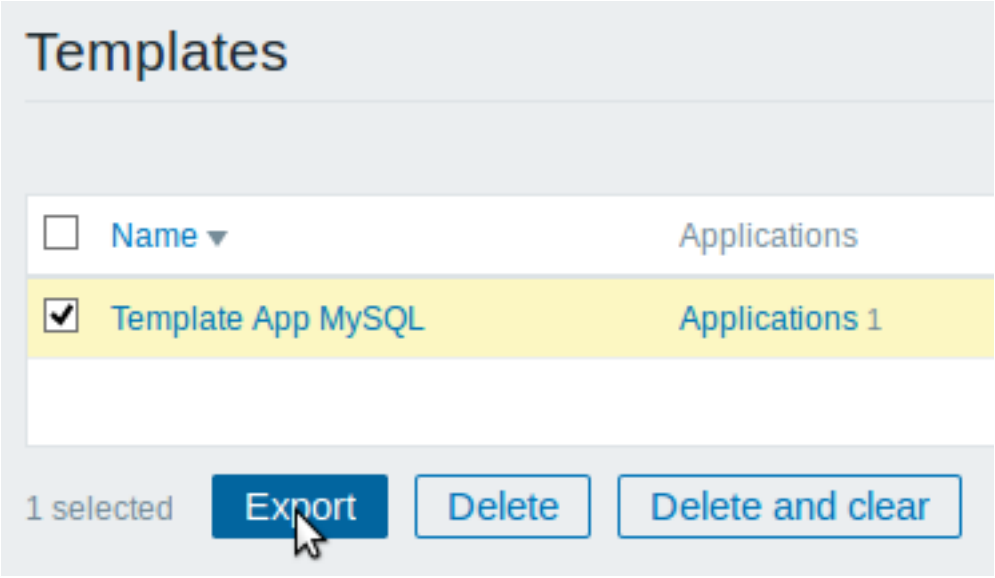
Template export contains:

- linked host groups
- template data
- linkage to other templates
- linkage to host groups
- directly linked applications
- directly linked items
- directly linked triggers
- directly linked graphs
- directly linked screens
- directly linked discovery rules with all prototypes
- directly linked web scenarios
- value maps

Exporting

To export templates, do the following:

- Go to: *Configuration* → *Templates*
- Mark the checkboxes of the templates to export
- Click on *Export* below the list

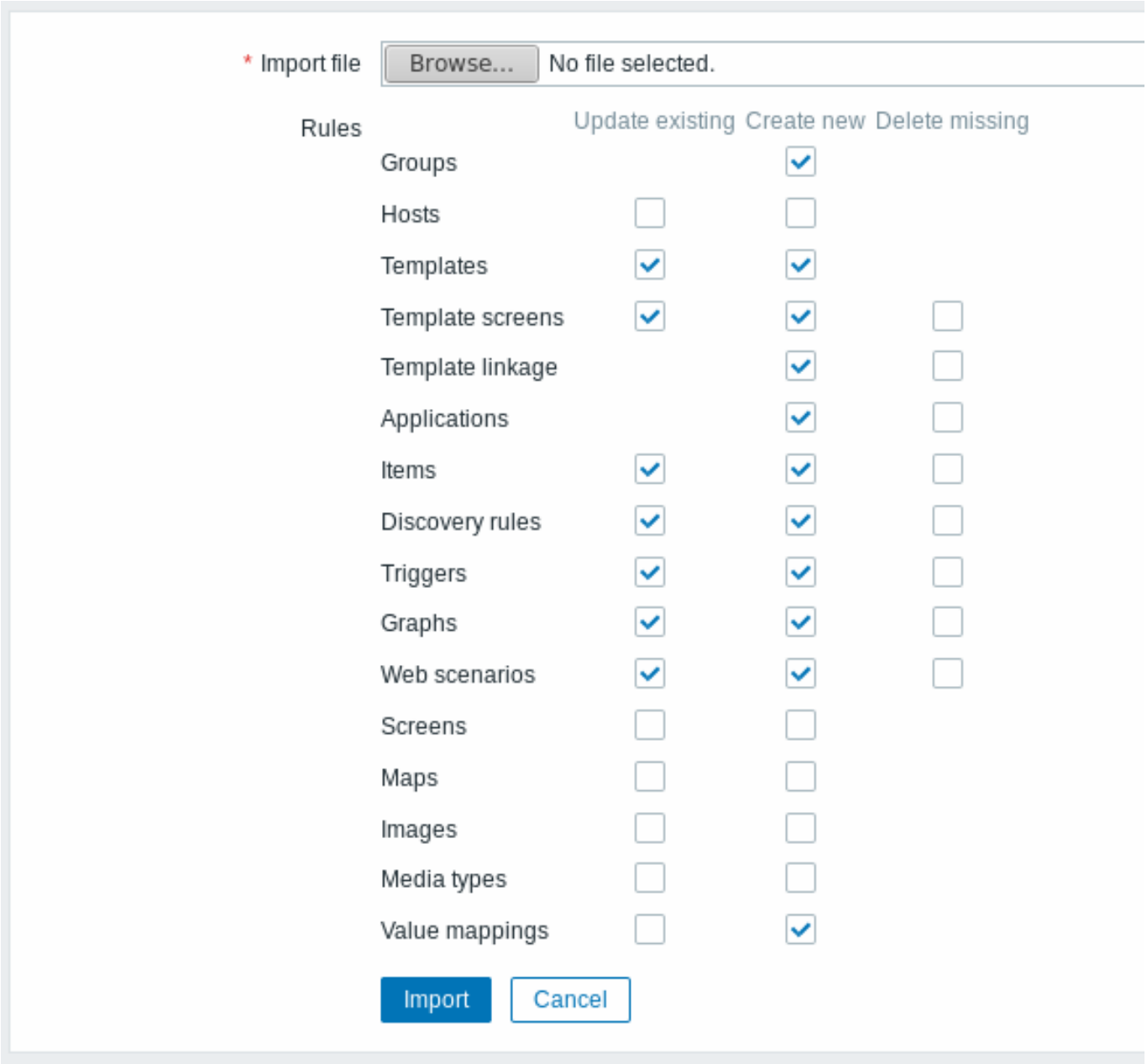


Selected templates are exported to a local XML file with default name *zabbix_export_templates.xml*.

Importing

To import templates, do the following:

- Go to: *Configuration* → *Templates*
- Click on *Import* to the right
- Select the import file
- Mark the required options in import rules
- Click on *Import*



Note that before Zabbix 4.4.4, when a template is imported and updated, it can only be linked to additional templates and never be unlinked from any.

A success or failure message of the import will be displayed in the frontend.

Import rules:

Rule	Description
Update existing	Existing elements will be updated with data taken from the import file. Otherwise they will not be updated.
Create new	The import will add new elements using data from the import file. Otherwise it will not add them.
Delete missing	The import will remove existing elements not present in the import file. Otherwise it will not remove them. If *Delete missing* is marked for template linkage (only available since 4.4.4), existing template linkage not present in the import file will be removed from the template along with all entities inherited from the potentially unlinked templates (items, triggers, etc).

Export format

```
<?xml version="1.0" encoding="UTF-8"?>
<zabbix_export>
    <version>4.4</version>
```

```
    <date>2019-10-22T10:03:11Z</date>
    <groups>
        <group>
            <name>Templates/Modules</name>
        </group>
    </groups>
    <templates>
        <template>
            <template>Template Module Linux filesystems by Zabbix agent</template>
            <name>Template Module Linux filesystems by Zabbix agent</name>
            <description>Template tooling version used: 0.30</description>
            <groups>
                <group>
                    <name>Templates/Modules</name>
                </group>
            </groups>
            <applications>
                <application>
                    <name>Filesystems</name>
                </application>
            </applications>
            <discovery_rules>
                <discovery_rule>
                    <name>Mounted filesystem discovery</name>
                    <key>vfs.fs.discovery</key>
                    <delay>1h</delay>
                    <filter>
                        <evaltype>AND</evaltype>
                        <conditions>
                            <condition>
                                <macro>{#FSTYPE}</macro>
                                <value>{$VFS.FS.FSTYPE.MATCHES}</value>
                                <formulaid>C</formulaid>
                            </condition>
                            <condition>
                                <macro>{#FSTYPE}</macro>
                                <value>{$VFS.FS.FSTYPE.NOT_MATCHES}</value>
                                <operator>NOT_MATCHES_REGEX</operator>
                                <formulaid>D</formulaid>
                            </condition>
                            <condition>
                                <macro>{#FSNAME}</macro>
                                <value>{$VFS.FS.FSNAME.MATCHES}</value>
                                <formulaid>A</formulaid>
                            </condition>
                            <condition>
                                <macro>{#FSNAME}</macro>
                                <value>{$VFS.FS.FSNAME.NOT_MATCHES}</value>
                                <operator>NOT_MATCHES_REGEX</operator>
                                <formulaid>B</formulaid>
                            </condition>
                        </conditions>
                    </filter>
                    <description>Discovery of file systems of different types.</description>
                    <item_prototypes>
                        <item_prototype>
                            <name>{#FSNAME}: Free inodes in %</name>
                            <key>vfs.fs.inode[{#FSNAME},pfree]</key>
                            <history>7d</history>
                            <value_type>FLOAT</value_type>
                            <units>%</units>
                            <application_prototypes>
```

```
                                <application_prototype>
                                    <name>Filesystem {#FSNAME}</name>
                                </application_prototype>
                            </application_prototypes>
                            <trigger_prototypes>
                                <trigger_prototype>
                                    <expression>{min(5m)}<{$VFS.FS.INODE.PFREE.MIN.CRIT:"{#FSNAME}"}</expr
                                    <name>{#FSNAME}: Running out of free inodes (free < {$VFS.FS.INODE.PFR
                                    <priority>AVERAGE</priority>
                                    <description>Last value: {ITEM.LASTVALUE1}.
It may become impossible to write to disk if there are no index nodes left.
As symptoms, 'No space left on device' or 'Disk is full' errors may be seen even though free space is avai
                                </trigger_prototype>
                                <trigger_prototype>
                                    <expression>{min(5m)}<{$VFS.FS.INODE.PFREE.MIN.WARN:"{#FSNAME}"}</expr
                                    <name>{#FSNAME}: Running out of free inodes (free < {$VFS.FS.INODE.PFR
                                    <priority>WARNING</priority>
                                    <description>Last value: {ITEM.LASTVALUE1}.
It may become impossible to write to disk if there are no index nodes left.
As symptoms, 'No space left on device' or 'Disk is full' errors may be seen even though free space is avai
                                    <dependencies>
                                        <dependency>
                                            <name>{#FSNAME}: Running out of free inodes (free < {$VFS.FS.I
                                            <expression>{Template Module Linux filesystems by Zabbix agent
                                        </dependency>
                                    </dependencies>
                                </trigger_prototype>
                            </trigger_prototypes>
                        </item_prototype>
                        <item_prototype>
                            <name>{#FSNAME}: Space utilization</name>
                            <key>vfs.fs.size[{#FSNAME},pused]</key>
                            <history>7d</history>
                            <value_type>FLOAT</value_type>
                            <units>%</units>
                            <description>Space utilization in % for {#FSNAME}</description>
                            <application_prototypes>
                                <application_prototype>
                                    <name>Filesystem {#FSNAME}</name>
                                </application_prototype>
                            </application_prototypes>
                        </item_prototype>
                        <item_prototype>
                            <name>{#FSNAME}: Total space</name>
                            <key>vfs.fs.size[{#FSNAME},total]</key>
                            <history>7d</history>
                            <units>B</units>
                            <description>Total space in Bytes</description>
                            <application_prototypes>
                                <application_prototype>
                                    <name>Filesystem {#FSNAME}</name>
                                </application_prototype>
                            </application_prototypes>
                        </item_prototype>
                        <item_prototype>
                            <name>{#FSNAME}: Used space</name>
                            <key>vfs.fs.size[{#FSNAME},used]</key>
                            <history>7d</history>
                            <units>B</units>
                            <description>Used storage in Bytes</description>
                            <application_prototypes>
                                <application_prototype>
```

```
                                <name>Filesystem {#FSNAME}</name>
                            </application_prototype>
                        </application_prototypes>
                    </item_prototype>
                </item_prototypes>
                <trigger_prototypes>
                    <trigger_prototype>
                        <expression>{Template Module Linux filesystems by Zabbix agent:vfs.fs.size[{#F
(({Template Module Linux filesystems by Zabbix agent:vfs.fs.size[{#FSNAME},total].last()}-{Template Module
                        <name>{#FSNAME}: Disk space is critically low (used > {$VFS.FS.PUSED.MAX.CRIT:
                        <priority>AVERAGE</priority>
                        <description>Last value: {ITEM.LASTVALUE1}.
Space used: {ITEM.VALUE3} of {ITEM.VALUE2} ({ITEM.VALUE1}), time left till full: < 24h.
Two conditions should match: First, space utilization should be above {$VFS.FS.PUSED.MAX.CRIT:"{#FSNAME}"}
 Second condition should be one of the following:
 - The disk free space is less than 5G.
 - The disk will be full in less than 24hours.</description>
                        <manual_close>YES</manual_close>
                    </trigger_prototype>
                    <trigger_prototype>
                        <expression>{Template Module Linux filesystems by Zabbix agent:vfs.fs.size[{#F
(({Template Module Linux filesystems by Zabbix agent:vfs.fs.size[{#FSNAME},total].last()}-{Template Module
                        <name>{#FSNAME}: Disk space is low (used > {$VFS.FS.PUSED.MAX.WARN:"{#FSNAME}"
                        <priority>WARNING</priority>
                        <description>Last value: {ITEM.LASTVALUE1}.
Space used: {ITEM.VALUE3} of {ITEM.VALUE2} ({ITEM.VALUE1}), time left till full: < 24h.
Two conditions should match: First, space utilization should be above {$VFS.FS.PUSED.MAX.CRIT:"{#FSNAME}"}
 Second condition should be one of the following:
 - The disk free space is less than 10G.
 - The disk will be full in less than 24hours.</description>
                        <manual_close>YES</manual_close>
                        <dependencies>
                            <dependency>
                                <name>{#FSNAME}: Disk space is critically low (used > {$VFS.FS.PUSED.M
                                <expression>{Template Module Linux filesystems by Zabbix agent:vfs.fs.
(({Template Module Linux filesystems by Zabbix agent:vfs.fs.size[{#FSNAME},total].last()}-{Template Module
                            </dependency>
                        </dependencies>
                    </trigger_prototype>
                </trigger_prototypes>
                <graph_prototypes>
                    <graph_prototype>
                        <name>{#FSNAME}: Disk space usage</name>
                        <width>600</width>
                        <height>340</height>
                        <type>PIE</type>
                        <show_3d>YES</show_3d>
                        <graph_items>
                            <graph_item>
                                <color>969696</color>
                                <calc_fnc>LAST</calc_fnc>
                                <type>GRAPH_SUM</type>
                                <item>
                                    <host>Template Module Linux filesystems by Zabbix agent</host>
                                    <key>vfs.fs.size[{#FSNAME},total]</key>
                                </item>
                            </graph_item>
                            <graph_item>
                                <sortorder>1</sortorder>
                                <color>C80000</color>
                                <calc_fnc>LAST</calc_fnc>
                                <item>
```

```
                                    <host>Template Module Linux filesystems by Zabbix agent</host>
                                    <key>vfs.fs.size[{#FSNAME},used]</key>
                                </item>
                            </graph_item>
                        </graph_items>
                    </graph_prototype>
                </graph_prototypes>
            </discovery_rule>
        </discovery_rules>
        <macros>
            <macro>
                <macro>{$VFS.FS.FSNAME.MATCHES}</macro>
                <value>.+</value>
            </macro>
            <macro>
                <macro>{$VFS.FS.FSNAME.NOT_MATCHES}</macro>
                <value>^(/dev|/sys|/run|/proc|.+/shm$)</value>
            </macro>
            <macro>
                <macro>{$VFS.FS.FSTYPE.MATCHES}</macro>
                <value>^(btrfs|ext2|ext3|ext4|reiser|xfs|ffs|ufs|jfs|jfs2|vxfs|hfs|apfs|refs|ntfs|fat3
            </macro>
            <macro>
                <macro>{$VFS.FS.FSTYPE.NOT_MATCHES}</macro>
                <value>^\s$</value>
            </macro>
            <macro>
                <macro>{$VFS.FS.INODE.PFREE.MIN.CRIT}</macro>
                <value>10</value>
            </macro>
            <macro>
                <macro>{$VFS.FS.INODE.PFREE.MIN.WARN}</macro>
                <value>20</value>
            </macro>
            <macro>
                <macro>{$VFS.FS.PUSED.MAX.CRIT}</macro>
                <value>90</value>
            </macro>
            <macro>
                <macro>{$VFS.FS.PUSED.MAX.WARN}</macro>
                <value>80</value>
            </macro>
        </macros>
    </template>
</templates>
</zabbix_export>
```

Element tags

Element tag values are explained in the table below.

Template tags

Element	Element property	Required	Type	Range	Description
templates		-			Root element for templates.
template		-			Individual template.
	template	x	string		Unique template name.
	name	-	string		Visible template name.
	description	-	text		Template description.
groups		x			Root element for template host groups.
group		x			Individual template host group.
	name	x	string		Host group name.
applications		-			Root element for template applications.

Element	Element property	Required	Type	Range	Description
application		-			Individual template application.
	name	x	`string`		Application name.
macros		-			Root element for template user macros.
macro		-			Individual template user macro.
	macro	x	`string`		User macro name.
	value	-	`string`		User macro value.
tags		-			Root element for template tags.
tag		-			Individual template tag.
	tag	x	`string`		Tag name.
	value	-	`string`		Tag value.
templates		-			Root element for linked templates.
template		-			Individual linked template.
	name	x	`string`		Template name.

Template item tags

Element	Element property	Required	Type	Range[1]	Description
items		-			Root element for items.
item		-			Individual item.
	name	x	`string`		Item name.
	type	-	`string`	0 - ZABBIX_PASSIVE (default) 1 - SNMPV1 2 - TRAP 3 - SIMPLE 4 - SNMPV2 5 - INTERNAL 6 - SNMPV3 7 - ZABBIX_ACTIVE 8 - AGGREGATE 10 - EXTERNAL 11 - ODBC 12 - IPMI 13 - SSH 14 - TELNET 15 - CALCULATED 16 - JMX 17 - SNMP_TRAP 18 - DEPENDENT 19 - HTTP_AGENT	Item type.
	snmp_community	-	`string`		SNMP community. Required by SNMPv1 and SNMPv2 items.
	snmp_oid	-	`string`		SNMP object ID. Required by SNMP items.
	key	x	`string`		Item key.

Element	Element property	Required	Type	Range[1]	Description
	delay	-	`string`	Default: 1m	Update interval of the item. Accepts seconds or a time unit with suffix (30s, 1m, 2h, 1d). Optionally one or more custom intervals can be specified either as flexible intervals or scheduling. Multiple intervals are separated by a semicolon. User macros may be used. A single macro has to fill the whole field. Multiple macros in a field or macros mixed with text are not supported. Flexible intervals may be written as two macros separated by a forward slash (e.g. `{$FLEX_INTERVAL}/{$FLEX`
	history	-	`string`	Default: 90d	A time unit of how long the history data should be stored. Time unit with suffix, user macro or LLD macro.
	trends	-	`string`	Default: 365d	A time unit of how long the trends data should be stored. Time unit with suffix, user macro or LLD macro.
	status	-	`string`	0 - ENABLED (default) 1 - DISABLED	Item status.
	value_type	-	`string`	0 - FLOAT 1 - CHAR 2 - LOG 3 - UNSIGNED (default) 4 - TEXT	Received value type.

Element	Element property	Required	Type	Range[1]	Description
	allowed_hosts	-	`string`		List of IP addresses (comma delimited) of hosts allowed sending data for the item. Used by trapper and HTTP agent items.
	units	-	`string`		Units of returned values (bps, B, etc).
	snmpv3_contextname	-	`string`		SNMPv3 context name. Used only by SNMPv3 items.
	snmpv3_securityname	-	`string`		SNMPv3 security name. Used only by SNMPv3 items.
	snmpv3_securitylevel	-	`string`	0 - NOAUTHNOPRIV (default) 1 - AUTHNOPRIV 2 - AUTHPRIV	SNMPv3 security level. Used only by SNMPv3 items.
	snmpv3_authprotocol	-	`string`	0 - MD5 (default) 1 - SHA	SNMPv3 authentication protocol. Used only by SNMPv3 items.
	snmpv3_authpassphrase	-	`string`		SNMPv3 authentication passphrase. Used only by SNMPv3 items.
	snmpv3_privprotocol	-	`string`	0 - DES (default) 1 - AES	SNMPv3 privacy protocol. Used only by SNMPv3 items.
	snmpv3_privpassphrase	-	`string`		SNMPv3 privacy passphrase. Used only by SNMPv3 items.

Element	Element property	Required	Type	Range[1]	Description
	params	-	`text`		Additional parameters depending on the type of the item: - executed script for SSH and Telnet items; - SQL query for database monitor items; - formula for calculated items.
	ipmi_sensor	-	`string`		IPMI sensor. Used only by IPMI items.
	authtype	-	`string`	Authentication type for SSH agent items: 0 - PASSWORD (default) 1 - PUBLIC_KEY Authentication type for HTTP agent items: 0 - NONE (default) 1 - BASIC 2 - NTLM	Authentication type. Used only by SSH and HTTP agent items.
	username	-	`string`		Username for authentication. Used by simple check, SSH, Telnet, database monitor, JMX and HTTP agent items. Required by SSH and Telnet items. When used by JMX agent, password should also be specified together with the username or both properties should be left blank.

Element	Element property	Required	Type	Range[1]	Description
	password	-	`string`		Password for authentication. Used by simple check, SSH, Telnet, database monitor, JMX and HTTP agent items. When used by JMX agent, username should also be specified together with the password or both properties should be left blank.
	publickey	-	`string`		Name of the public key file. Required for SSH agent items.
	privatekey	-	`string`		Name of the private key file. Required for SSH agent items.
	port	-	`string`		Custom port monitored by the item. Can contain user macros. Used only by SNMP items.
	description	-	`text`		Item description.
	inventory_link	-	`string`	0 - NONE Capitalized host inventory field name. For example: 4 - ALIAS 6 - OS_FULL 14 - HARDWARE etc.	Host inventory field that is populated by the item. Refer to the host inventory page for a list of supported host inventory fields and their IDs.
	logtimefmt	-	`string`		Format of the time in log entries. Used only by log items.
	jmx_endpoint	-	`string`		JMX endpoint. Used only by JMX agent items.

Element	Element property	Required	Type	Range[1]	Description
	url	-	string		URL string. Required only for HTTP agent items.
	allow_traps	-	string	0 - NO (default) 1 - YES	Allow to populate value as in a trapper item. Used only by HTTP agent items.
	follow_redirects	-	string	0 - NO 1 - YES (default)	Follow HTTP response redirects while pooling data. Used only by HTTP agent items.
headers		-			Root element for HTTP(S) request headers, where header name is used as key and header value as value. Used only by HTTP agent items.
header		-			Individual header.
	name	x	string		Header name.
	value	x	string		Header value.
	http_proxy	-	string		HTTP(S) proxy connection string. Used only by HTTP agent items.
	output_format	-	string	0 - RAW (default) 1 - JSON	How to process response. Used only by HTTP agent items.
	post_type	-	string	0 - RAW (default) 2 - JSON 3 - XML	Type of post data body. Used only by HTTP agent items.
	posts	-	string		HTTP(S) request body data. Used only by HTTP agent items.

Element	Element property	Required	Type	Range[1]	Description
query_fields		-			Root element for query parameters. Used only by HTTP agent items.
query_field		-			Individual query parameter.
	name	x	`string`		Parameter name.
	value	-	`string`		Parameter value.
	request_method	-	`string`	0 - GET (default) 1 - POST 2 - PUT 3 - HEAD	Request method. Used only by HTTP agent items.
	retrieve_mode	-	`string`	0 - BODY (default) 1 - HEADERS 2 - BOTH	What part of response should be stored. Used only by HTTP agent items.
	ssl_cert_file	-	`string`		Public SSL Key file path. Used only by HTTP agent items.
	ssl_key_file	-	`string`		Private SSL Key file path. Used only by HTTP agent items.
	ssl_key_password	-	`string`		Password for SSL Key file. Used only by HTTP agent items.
	status_codes	-	`string`		Ranges of required HTTP status codes separated by commas. Supports user macros. Example: 200,200-{$M},{$M},200-400 Used only by HTTP agent items.

Element	Element property	Required	Type	Range[1]	Description
	timeout	-	`string`		Item data polling request timeout. Supports user macros. Used only by HTTP agent items.
	verify_host	-	`string`	0 - NO (default) 1 - YES	Validate if host name in URL is in Common Name field or a Subject Alternate Name field of host certificate. Used only by HTTP agent items.
	verify_peer	-	`string`	0 - NO (default) 1 - YES	Validate if host certificate is authentic. Used only by HTTP agent items.
value map		-			Value map.
	name	x	`string`		Name of the value map to use for the item.
applications		-			Root element for applications.
application		-			Individual application.
	name	x	`string`		Application name.
preprocessing		-			Root element for item value preprocessing.
step		-			Individual item value preprocessing step.

Element	Element property	Required	Type	Range[1]	Description
	type	x	`string`	1 - MULTIPLIER 2 - RTRIM 3 - LTRIM 4 - TRIM 5 - REGEX 6 - BOOL_TO_DECIMAL 7 - OCTAL_TO_DECIMAL 8 - HEX_TO_DECIMAL 9 - SIMPLE_CHANGE (calculated as (received value-previous value)) 10 - CHANGE_PER_SECOND (calculated as (received value-previous value)/(time now-time of last check)) 11 - XMLPATH 12 - JSONPATH 13 - IN_RANGE 14 - MATCHES_REGEX 15 - NOT_MATCHES_REGEX 16 - CHECK_JSON_ERROR 17 - CHECK_XML_ERROR 18 - CHECK_REGEX_ERROR 19 - DISCARD_UNCHANGED 20 - DISCARD_UNCHANGED_HEARTBEAT 21 - JAVASCRIPT 22 - PROMETHEUS_PATTERN 23 - PROMETHEUS_TO_JSON 24 - CSV_TO_JSON	Type of the item value preprocessing step.
	params	x	`string`		Parameters of the item value preprocessing step. Multiple parameters are separated by LF (\n) character.
	error_handler	-	`string`	0 - ORIGINAL_ERROR (default) 1 - DISCARD_VALUE 2 - CUSTOM_VALUE 3 - CUSTOM_ERROR	Action type used in case of preprocessing step failure.
	error_handler_params	-	`string`		Error handler parameters used with 'error_handler'.
master_item		-			Individual item master item. Required by dependent items.

Element	Element property	Required	Type	Range[1]	Description
	key	x	`string`		Dependent item master item key value. Recursion up to 3 dependent items and maximum count of dependent items equal to 29999 are allowed.
triggers		-			Root element for simple triggers.
trigger		-			Individual simple trigger.
	For trigger element tag values, see template trigger tags.				

Template low-level discovery rule tags

Element	Element property	Required	Type	Range	Description
discovery_rules		-			Root element for low-level discovery rules.
discovery_rule		-			Individual low-level discovery rule.
	For most of the element tag values, see element tag values for a regular item. Only the tags that are specific to low-level discovery rules, are described below.				

Element	Element property	Required	Type	Range	Description
	type	-	`string`	0 - ZABBIX_PASSIVE (default) 1 - SNMPV1 2 - TRAP 3 - SIMPLE 4 - SNMPV2 5 - INTERNAL 6 - SNMPV3 7 - ZABBIX_ACTIVE 10 - EXTERNAL 11 - ODBC 12 - IPMI 13 - SSH 14 - TELNET 16 - JMX 18 - DEPENDENT 19 - HTTP_AGENT	Item type.
	lifetime	-	`string`	Default: 30d	Time period after which items that are no longer discovered will be deleted. Seconds, time unit with suffix or user macro.
filter					Individual filter.
	evaltype	-	`string`	0 - AND_OR (default) 1 - AND 2 - OR 3 - FORMULA	Logic to use for checking low-level discovery rule filter conditions.
	formula	-	`string`		Custom calculation formula for filter conditions.
conditions		-			Root element for filter conditions.
condition		-			Individual filter condition.
	macro	x	`string`		Low-level discovery macro name.
	value	-	`string`		Filter value: regular expression or global regular expression.
	operator	-	`string`	8 - MATCHES_REGEX (default) 9 - NOT_MATCHES_REGEX	Condition operator.

Element	Element property	Required	Type	Range	Description
	formulaid	x	`character`		Arbitrary unique ID that is used to reference a condition from the custom expression. Can only contain capital-case letters. The ID must be defined by the user when modifying filter conditions, but will be generated anew when requesting them afterward.
lld_macro_paths		-			Root element for LLD macro paths.
lld_macro_path		-			Individual LLD macro path.
	lld_macro	x	`string`		Low-level discovery macro name.
	path	x	`string`		Selector for value which will be assigned to the corresponding macro.
preprocessing		-			LLD rule value preprocessing.
step		-			Individual LLD rule value preprocessing step.
	For most of the element tag values, see element tag values for a template item value preprocessing. Only the tags that are specific to template low-level discovery value preprocessing, are described below.				
	type	x	`string`	5 - REGEX 11 - XMLPATH 12 - JSONPATH 15 - NOT_MATCHES_REGEX 16 - CHECK_JSON_ERROR 17 - CHECK_XML_ERROR 20 - DISCARD_UNCHANGED_HEARTBEAT 21 - JAVASCRIPT 23 - PROMETHEUS_TO_JSON 24 - CSV_TO_JSON	Type of the item value preprocessing step.
trigger_prototypes		-			Root element for trigger prototypes.
trigger_prototype		-			Individual trigger prototype.
	For trigger prototype element tag values, see regular template trigger tags.				

Element	Element property	Required	Type	Range	Description
graph_prototypes		-			Root element for graph prototypes.
graph_prototype		-			Individual graph prototype.
	For graph prototype element tag values, see regular template graph tags.				
host_prototypes		-			Root element for host prototypes.
host_prototype		-			Individual host prototype.
	For host prototype element tag values, see regular host tags.				
item_prototypes		-			Root element for item prototypes.
item_prototype		-			Individual item prototype.
	For item prototype element tag values, see regular template item tags.				
application_prototypes		-			Root element for application prototypes.
application_prototype		-			Individual application prototype.
	name	x	`string`		Application prototype name.
master_item		-			Individual item prototype master item/item prototype data.
	key	x	`string`		Dependent item prototype master item/item prototype key value. Required for a dependent item.

Template trigger tags

Element	Element property	Required	Type	Range[1]	Description
triggers		-			Root element for triggers.
trigger		-			Individual trigger.
	expression	x	`string`		Trigger expression.
	recovery_mode	-	`string`	0 - EXPRESSION (default) 1 - RECOVERY_EXPRESSION 2 - NONE	Basis for generating OK events.
	recovery_expression	-	`string`		Trigger recovery expression.
	name	x	`string`		Trigger name.
	correlation_mode	-	`string`	0 - DISABLED (default) 1 - TAG_VALUE	Correlation mode (no event correlation or event correlation by tag).

Element	Element property	Required	Type	Range[1]	Description
	correlation_tag	-	string		The tag name to be used for event correlation.
	url	-	string		URL associated with the trigger.
	status	-	string	0 - ENABLED (default) 1 - DISABLED	Trigger status.
	priority	-	string	0 - NOT_CLASSIFIED (default) 1 - INFO 2 - WARNING 3 - AVERAGE 4 - HIGH 5 - DISASTER	Trigger severity.
	description	-	text		Trigger description.
	type	-	string	0 - SINGLE (default) 1 - MULTIPLE	Event generation type (single problem event or multiple problem events).
	manual_close	-	string	0 - NO (default) 1 - YES	Manual closing of problem events.
dependencies		-			Root element for dependencies.
dependency		-			Individual trigger dependency.
	name	x	string		Dependency trigger name.
	expression	x	string		Dependency trigger expression.
	recovery_expression	-	string		Dependency trigger recovery expression.
tags		-			Root element for event tags.
tag		-			Individual event tag.
	tag	x	string		Tag name.
	value	-	string		Tag value.

Template graph tags

Element	Element property	Required	Type	Range[1]	Description
graphs		-			Root element for graphs.
graph		-			Individual graph.
	name	x	string		Graph name.
	width	-	integer	20-65535 (default: 900)	Graph width, in pixels. Used for preview and for pie/exploded graphs.

Element	Element property	Required	Type	Range[1]	Description
	height	-	integer	20-65535 (default: 200)	Graph height, in pixels. Used for preview and for pie/exploded graphs.
	yaxismin	-	double	Default: 0	Value of Y axis minimum. Used if 'ymin_type_1' is FIXED.
	yaxismax	-	double	Default: 0	Value of Y axis maximum. Used if 'ymax_type_1' is FIXED.
	show_work_period	-	string	0 - NO 1 - YES (default)	Highlight non-working hours. Used by normal and stacked graphs.
	show_triggers	-	string	0 - NO 1 - YES (default)	Display simple trigger values as a line. Used by normal and stacked graphs.
	type	-	string	0 - NORMAL (default) 1 - STACKED 2 - PIE 3 - EXPLODED	Graph type.
	show_legend	-	string	0 - NO 1 - YES (default)	Display graph legend.
	show_3d	-	string	0 - NO (default) 1 - YES	Enable 3D style. Used by pie and exploded pie graphs.
	percent_left	-	double	Default:0	Show the percentile line for left axis. Used only for normal graphs.
	percent_right	-	double	Default:0	Show the percentile line for right axis. Used only for normal graphs.
	ymin_type_1	-	string	0 - CALCULATED (default) 1 - FIXED 2 - ITEM	Minimum value of Y axis. Used by normal and stacked graphs.

Element	Element property	Required	Type	Range[1]	Description
	ymax_type_1	-	string	0 - CALCULATED (default) 1 - FIXED 2 - ITEM	Maximum value of Y axis. Used by normal and stacked graphs.
ymin_item_1		-			Individual item details. Required if 'ymin_type_1' is ITEM.
	host	x	string		Item host.
	key	x	string		Item key.
ymax_item_1		-			Individual item details. Required if 'ymax_type_1' is ITEM.
	host	x	string		Item host.
	key	x	string		Item key.
graph_items		x			Root element for graph items.
graph_item		x			Individual graph item.
	sortorder	-	integer		Draw order. The smaller value is drawn first. Can be used to draw lines or regions behind (or in front of) another.
	drawtype	-	string	0 - SINGLE_LINE (default) 1 - FILLED_REGION 2 - BOLD_LINE 3 - DOTTED_LINE 4 - DASHED_LINE 5 - GRADIENT_LINE	Draw style of the graph item. Used only by normal graphs.
	color	-	string		Element colour (6 symbols, hex).
	yaxisside	-	string	0 - LEFT (default) 1 - RIGHT	Side of the graph where the graph item's Y scale will be drawn. Used by normal and stacked graphs.
	calc_fnc	-	string	1 - MIN 2 - AVG (default) 4 - MAX 7 - ALL (minimum, average and maximum; used only by simple graphs) 9 - LAST (used only by pie and exploded pie graphs)	Data to draw if more than one value exists for an item.

Element	Element property	Required	Type	Range[1]	Description
	type	-	`string`	0 - SIMPLE (default) 2 - GRAPH_SUM (value of the item represents the whole pie; used only by pie and exploded pie graphs)	Graph item type.
item		x			Individual item.
	host	x	`string`		Item host.
	key	x	`string`		Item key.

Template web scenario tags

Element	Element property	Required	Type	Range[1]	Description
httptests		-			Root element for web scenarios.
httptest		-			Individual web scenario.
	name	x	`string`		Web scenario name.
	delay	-	`string`	Default: 1m	Frequency of executing the web scenario. Seconds, time unit with suffix or user macro.
	attempts	-	`integer`	1-10 (default: 1)	The number of attempts for executing web scenario steps.
	agent	-	`string`	Default: Zabbix	Client agent. Zabbix will pretend to be the selected browser. This is useful when a website returns different content for different browsers.
	http_proxy	-	`string`		Specify an HTTP proxy to use, using the format: `http://[username[:passw`
variables		-			Root element for scenario-level variables (macros) that may be used in scenario steps.
variable		-			Individual variable.
	name	x	`text`		Variable name.
	value	x	`text`		Variable value.

Element	Element property	Required	Type	Range[1]	Description
headers		-			Root element for HTTP headers that will be sent when performing a request. Headers should be listed using the same syntax as they would appear in the HTTP protocol.
header		-			Individual header.
	name	x	`text`		Header name.
	value	x	`text`		Header value.
	status	-	`string`	0 - ENABLED (default) 1 - DISABLED	Web scenario status.
	authentication	-	`string`	0 - NONE (default) 1 - BASIC 2 - NTLM	Authentication method.
	http_user	-	`string`		User name used for basic, HTTP or NTLM authentication.
	http_password	-	`string`		Password used for basic, HTTP or NTLM authentication.
	verify_peer	-	`string`	0 - NO (default) 1 - YES	Verify the SSL certificate of the web server.
	verify_host	-	`string`	0 - NO (default) 1 - YES	Verify that the Common Name field or the Subject Alternate Name field of the web server certificate matches.
	ssl_cert_file	-	`string`		Name of the SSL certificate file used for client authentication (must be in PEM format).
	ssl_key_file	-	`string`		Name of the SSL private key file used for client authentication (must be in PEM format).
	ssl_key_password	-	`string`		SSL private key file password.
steps		x			Root element for web scenario steps.
step		x			Individual web scenario step.
	name	x	`string`		Web scenario step name.

Element	Element property	Required	Type	Range[1]	Description
	url	x	`string`		URL for monitoring.
query_fields		-			Root element for query fields - an array of HTTP fields that will be added to the URL when performing a request.
query_field		-			Individual query field.
	name	x	`string`		Query field name.
	value	-	`string`		Query field value.
posts		-			HTTP POST variables as a string (raw post data) or as an array of HTTP fields (form field data).
post_field		-			Individual post field.
	name	x	`string`		Post field name.
	value	x	`string`		Post field value.
variables		-			Root element of step-level variables (macros) that should be applied after this step. If the variable value has a 'regex:' prefix, then its value is extracted from the data returned by this step according to the regular expression pattern following the 'regex:' prefix
variable		-			Individual variable.
	name	x	`string`		Variable name.
	value	x	`string`		Variable value.

Element	Element property	Required	Type	Range[1]	Description
headers		-			Root element for HTTP headers that will be sent when performing a request. Headers should be listed using the same syntax as they would appear in the HTTP protocol.
header		-			Individual header.
	name	x	`string`		Header name.
	value	x	`string`		Header value.
	follow_redirects	-	`string`	0 - NO 1 - YES (default)	Follow HTTP redirects.
	retrieve_mode	-	`string`	0 - BODY (default) 1 - HEADERS 2 - BOTH	HTTP response retrieve mode.
	timeout	-	`string`	Default: 15s	Timeout of step execution. Seconds, time unit with suffix or user macro.
	required	-	`string`		Text that must be present in the response. Ignored if empty.
	status_codes	-	`string`		A comma delimited list of accepted HTTP status codes. Ignored if empty. For example: 200-201,210-299

Template screen tags

Element	Element property	Required	Type	Range[1]	Description
screens		-			Root element for template screens.
screen		-			Individual template screen.
screen_items		-			Root element for template screen items.
screen_item		-			Individual template screen item.

Footnotes

[1] For string values, only the string will be exported (e.g. ”ZABBIX_ACTIVE”) without the numbering used in this table. The numbers for range values (corresponding to the API values) in this table is used for ordering only.

3 Hosts

Overview

Hosts are exported with many related objects and object relations.

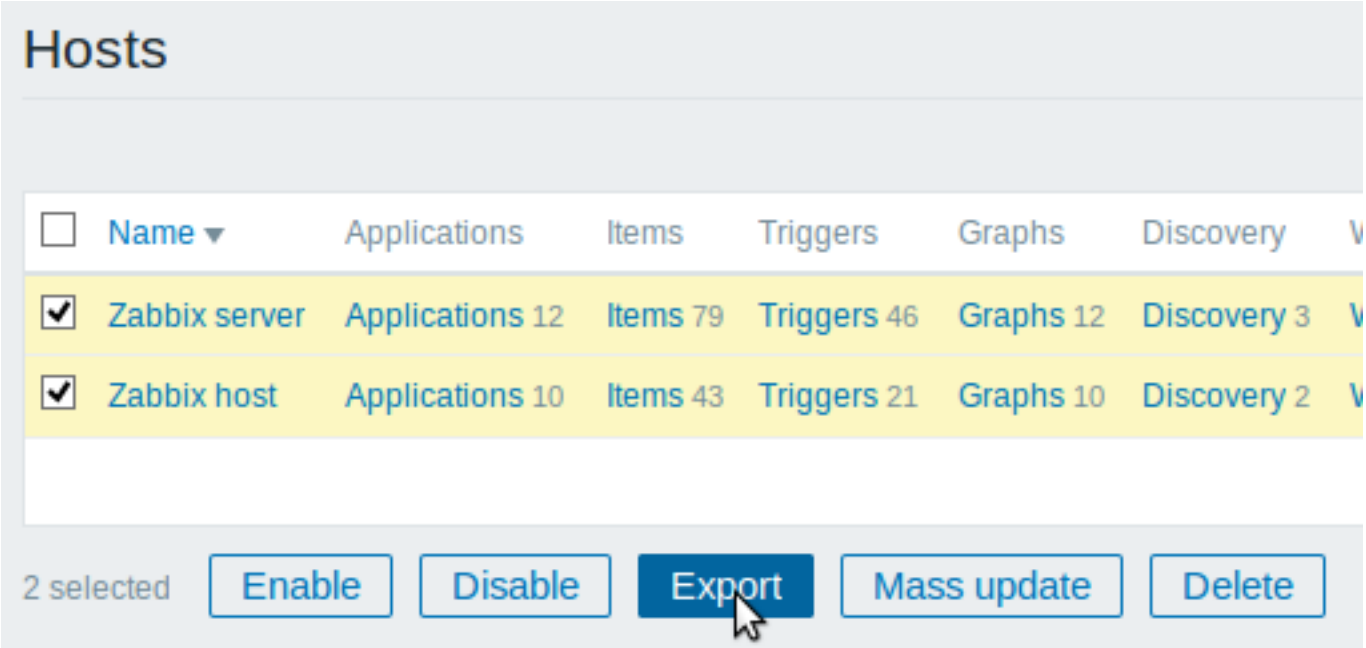
Host export contains:

- linked host groups
- host data
- template linkage
- host group linkage
- host interfaces
- directly linked applications
- directly linked items
- directly linked triggers
- directly linked graphs
- directly linked discovery rules with all prototypes
- directly linked web scenarios
- host macros
- host inventory data
- value maps

Exporting

To export hosts, do the following:

- Go to: *Configuration* → *Hosts*
- Mark the checkboxes of the hosts to export
- Click on *Export* below the list

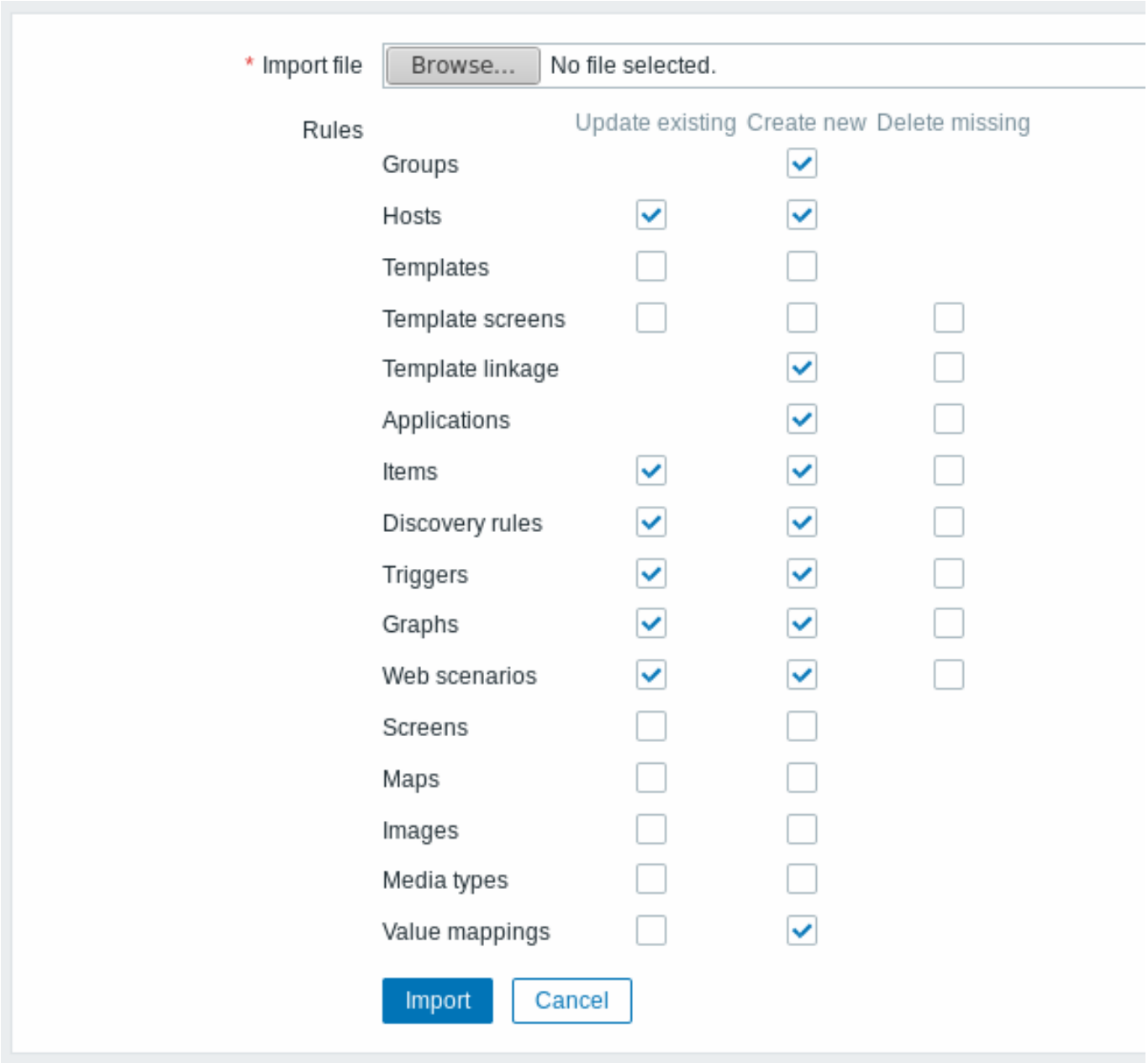


Selected hosts are exported to a local XML file with default name *zbx_export_hosts.xml*.

Importing

To import hosts, do the following:

- Go to: *Configuration* → *Hosts*
- Click on *Import* to the right
- Select the import file
- Mark the required options in import rules
- Click on *Import*



Note that before Zabbix 4.4.4, when a host is imported and updated, it can only be linked to additional templates and never be unlinked from any.

A success or failure message of the import will be displayed in the frontend.

Import rules:

Rule	Description
Update existing	Existing elements will be updated with data taken from the import file. Otherwise they will not be updated.
Create new	The import will add new elements using data from the import file. Otherwise it will not add them.
Delete missing	The import will remove existing elements not present in the import file. Otherwise it will not remove them. If *Delete missing* is marked for template linkage (only available since 4.4.4), existing template linkage not present in the import file will be removed from the host along with all entities inherited from the potentially unlinked templates (items, triggers, etc).

Export format

```
<?xml version="1.0" encoding="UTF-8"?>
<zabbix_export>
    <version>4.4</version>
```

```
    <date>2019-10-23T07:47:33Z</date>
    <groups>
        <group>
            <name>Discovered hosts</name>
        </group>
        <group>
            <name>Zabbix servers</name>
        </group>
    </groups>
    <hosts>
        <host>
            <host>Zabbix server 1</host>
            <name>Main Zabbix server</name>
            <proxy>
                <name>Remote proxy</name>
            </proxy>
            <tls_connect>TLS_PSK</tls_connect>
            <tls_accept>
                <option>NO_ENCRYPTION</option>
                <option>TLS_PSK</option>
            </tls_accept>
            <tls_psk_identity>z112</tls_psk_identity>
            <tls_psk>1f87b595725ac58dd977beef14b97461a7c1045b9a1c963065002c5473194952</tls_psk>
            <templates>
                <template>
                    <name>Template App Zabbix Server</name>
                </template>
                <template>
                    <name>Template OS Linux</name>
                </template>
            </templates>
            <groups>
                <group>
                    <name>Discovered hosts</name>
                </group>
                <group>
                    <name>Zabbix servers</name>
                </group>
            </groups>
            <interfaces>
                <interface>
                    <ip>192.168.1.1</ip>
                    <interface_ref>if1</interface_ref>
                </interface>
            </interfaces>
            <items>
                <item>
                    <name>Zabbix trap</name>
                    <type>TRAP</type>
                    <key>trap</key>
                    <delay>0</delay>
                    <history>1w</history>
                    <applications>
                        <application>
                            <name>Zabbix server</name>
                        </application>
                    </applications>
                    <preprocessing>
                        <step>
                            <type>MULTIPLIER</type>
                            <params>8</params>
                        </step>
```

```
                </preprocessing>
                <triggers>
                    <trigger>
                        <expression>{last()}=0</expression>
                        <name>Last value is zero</name>
                        <priority>WARNING</priority>
                        <tags>
                            <tag>
                                <tag>Process</tag>
                                <value>Internal test</value>
                            </tag>
                        </tags>
                    </trigger>
                </triggers>
            </item>
        </items>
        <tags>
            <tag>
                <tag>Process</tag>
                <value>Zabbix</value>
            </tag>
        </tags>
        <macros>
            <macro>
                <macro>{$HOST.MACRO}</macro>
                <value>123</value>
            </macro>
        </macros>
        <inventory>
            <type>Zabbix server</type>
            <name>yyyyyy-HP-Pro-3010-Small-Form-Factor-PC</name>
            <os>Linux yyyyyy-HP-Pro-3010-Small-Form-Factor-PC 4.4.0-165-generic #193-Ubuntu SMP Tue Se
        </inventory>
        <inventory_mode>AUTOMATIC</inventory_mode>
    </host>
</hosts>
<graphs>
    <graph>
        <name>CPU utilization server</name>
        <show_work_period>NO</show_work_period>
        <show_triggers>NO</show_triggers>
        <graph_items>
            <graph_item>
                <drawtype>FILLED_REGION</drawtype>
                <color>FF5555</color>
                <item>
                    <host>Zabbix server 1</host>
                    <key>system.cpu.util[,steal]</key>
                </item>
            </graph_item>
            <graph_item>
                <sortorder>1</sortorder>
                <drawtype>FILLED_REGION</drawtype>
                <color>55FF55</color>
                <item>
                    <host>Zabbix server 1</host>
                    <key>system.cpu.util[,softirq]</key>
                </item>
            </graph_item>
            <graph_item>
                <sortorder>2</sortorder>
                <drawtype>FILLED_REGION</drawtype>
```

```
                    <color>009999</color>
                    <item>
                        <host>Zabbix server 1</host>
                        <key>system.cpu.util[,interrupt]</key>
                    </item>
                </graph_item>
                <graph_item>
                    <sortorder>3</sortorder>
                    <drawtype>FILLED_REGION</drawtype>
                    <color>990099</color>
                    <item>
                        <host>Zabbix server 1</host>
                        <key>system.cpu.util[,nice]</key>
                    </item>
                </graph_item>
                <graph_item>
                    <sortorder>4</sortorder>
                    <drawtype>FILLED_REGION</drawtype>
                    <color>999900</color>
                    <item>
                        <host>Zabbix server 1</host>
                        <key>system.cpu.util[,iowait]</key>
                    </item>
                </graph_item>
                <graph_item>
                    <sortorder>5</sortorder>
                    <drawtype>FILLED_REGION</drawtype>
                    <color>990000</color>
                    <item>
                        <host>Zabbix server 1</host>
                        <key>system.cpu.util[,system]</key>
                    </item>
                </graph_item>
                <graph_item>
                    <sortorder>6</sortorder>
                    <drawtype>FILLED_REGION</drawtype>
                    <color>000099</color>
                    <calc_fnc>MIN</calc_fnc>
                    <item>
                        <host>Zabbix server 1</host>
                        <key>system.cpu.util[,user]</key>
                    </item>
                </graph_item>
                <graph_item>
                    <sortorder>7</sortorder>
                    <drawtype>FILLED_REGION</drawtype>
                    <color>009900</color>
                    <item>
                        <host>Zabbix server 1</host>
                        <key>system.cpu.util[,idle]</key>
                    </item>
                </graph_item>
            </graph_items>
        </graph>
    </graphs>
</zabbix_export>
```

Element tags

Element tag values are explained in the table below.

Host tags

Element	Element property	Required	Type	Range[1]	Description
groups		x			Root element for host groups.
group		x			Individual host group.
	name	x	`string`		Host group name.
hosts		-			Root element for hosts.
host		-			Individual host.
	host	x	`string`		Unique host name.
	name	-	`string`		Visible host name.
	description	-	`text`		Host description.
	status	-	`string`	0 - ENABLED (default) 1 - DISABLED	Host status.
	ipmi_authtype	-	`string`	-1 - DEFAULT (default) 0 - NONE 1 - MD2 2 - MD5 4 - STRAIGHT 5 - OEM 6 - RMCP_PLUS	IPMI session authentication type.
	ipmi_privilege	-	`string`	1 - CALLBACK 2 - USER (default) 3 - OPERATOR 4 - ADMIN 5 - OEM	IPMI session privilege level.
	ipmi_username	-	`string`		Username for IPMI checks.
	ipmi_password	-	`string`		Password for IPMI checks.
	tls_connect	-	`string`	1 - NO_ENCRYPTION (default) 2 - TLS_PSK 4 - TLS_CERTIFICATE	Type of outgoing connection.
tls_accept		-			Root element for incoming connection options.
	option	-	`string`	1 - NO_ENCRYPTION (default) 2 - TLS_PSK 4 - TLS_CERTIFICATE	Type of incoming connection. If both unencrypted and encrypted connection is allowed, the <option> property is used twice, one time with NO_ENCRYPTION and another with the encryption option (see example above).
	tls_issuer	-	`string`		Allowed agent/proxy certificate issuer.

Element	Element property	Required	Type	Range[1]	Description
	tls_subject	-	string		Allowed agent/proxy certificate subject.
	tls_psk_identity	-	string		PSK identity string. Required if either tls_connect or tls_accept has PSK enabled.
	tls_psk	-	string		The preshared key string, at least 32 hex digits. Required if either tls_connect or tls_accept has PSK enabled.
proxy		-			Proxy.
	name	x	string		Name of the proxy (if any) that monitors the host.
templates		-			Root element for linked templates.
template		-			Individual template.
	name	x	string		Template name.
interfaces		-			Root element for host interfaces.
interface		-			Individual interface.
	default	-	string	0 - NO 1 - YES (default)	Whether this is the primary host interface. There can be only one primary interface of one type on a host.
	type	-	string	1 - ZABBIX (default) 2 - SNMP 3 - IPMI 4 - JMX	Interface type.
	useip	-	string	0 - NO 1 - YES (default)	Whether to use IP as the interface for connecting to the host (if not, DNS will be used).

Element	Element property	Required	Type	Range[1]	Description
	ip	-	`string`		IP address, can be either IPv4 or IPv6. Required if the connection is made via IP.
	dns	-	`string`		DNS name. Required if the connection is made via DNS.
	port	-	`string`		Port number. Supports user macros.
	bulk	-	`string`	0 - NO 1 - YES (default)	Use bulk requests for SNMP.
	interface_ref	x	`string`	Format: `if<N>`	Interface reference name to be used in items.
items		-			Root element for items.
item		-			Individual item.
	For item element tag values, see host item tags.				
tags		-			Root element for host tags.
tag		-			Individual host tag.
	tag	x	`string`		Tag name.
	value	-	`string`		Tag value.
macros		-			Root element for macros.
macro		-			Individual macro.
	name	-			User macro name.
	value	-			User macro value.
inventory		-			Root element for host inventory.
	<inventory_property>	-			Individual inventory property. All available inventory properties are listed under the respective tags, e.g. <type>, <name>, <os> (see example above).
	inventory_mode	-	`string`	-1 - DISABLED 0 - MANUAL (default) 1 - AUTOMATIC	Inventory mode.

Host item tags

Element	Element property	Required	Type	Range[1]	Description
items		-			Root element for items.
item		-			Individual item.
	name	x	`string`		Item name.
	type	-	`string`	0 - ZABBIX_PASSIVE (default) 1 - SNMPV1 2 - TRAP 3 - SIMPLE 4 - SNMPV2 5 - INTERNAL 6 - SNMPV3 7 - ZABBIX_ACTIVE 8 - AGGREGATE 10 - EXTERNAL 11 - ODBC 12 - IPMI 13 - SSH 14 - TELNET 15 - CALCULATED 16 - JMX 17 - SNMP_TRAP 18 - DEPENDENT 19 - HTTP_AGENT	Item type.
	snmp_community	-	`string`		SNMP community. Required by SNMPv1 and SNMPv2 items.
	snmp_oid	-	`string`		SNMP object ID. Required by SNMP items.
	key	x	`string`		Item key.

Element	Element property	Required	Type	Range[1]	Description
	delay	-	`string`	Default: 1m	Update interval of the item. Accepts seconds or a time unit with suffix (30s, 1m, 2h, 1d). Optionally one or more custom intervals can be specified either as flexible intervals or scheduling. Multiple intervals are separated by a semicolon. User macros may be used. A single macro has to fill the whole field. Multiple macros in a field or macros mixed with text are not supported. Flexible intervals may be written as two macros separated by a forward slash (e.g. `{$FLEX_INTERVAL}/{$FLEX`
	history	-	`string`	Default: 90d	A time unit of how long the history data should be stored. Time unit with suffix, user macro or LLD macro.
	trends	-	`string`	Default: 365d	A time unit of how long the trends data should be stored. Time unit with suffix, user macro or LLD macro.
	status	-	`string`	0 - ENABLED (default) 1 - DISABLED	Item status.
	value_type	-	`string`	0 - FLOAT 1 - CHAR 2 - LOG 3 - UNSIGNED (default) 4 - TEXT	Received value type.

Element	Element property	Required	Type	Range[1]	Description
	allowed_hosts	-	`string`		List of IP addresses (comma delimited) of hosts allowed sending data for the item. Used by trapper and HTTP agent items.
	units	-	`string`		Units of returned values (bps, B, etc).
	snmpv3_contextname	-	`string`		SNMPv3 context name. Used only by SNMPv3 items.
	snmpv3_securityname	-	`string`		SNMPv3 security name. Used only by SNMPv3 items.
	snmpv3_securitylevel	-	`string`	0 - NOAUTHNOPRIV (default) 1 - AUTHNOPRIV 2 - AUTHPRIV	SNMPv3 security level. Used only by SNMPv3 items.
	snmpv3_authprotocol	-	`string`	0 - MD5 (default) 1 - SHA	SNMPv3 authentication protocol. Used only by SNMPv3 items.
	snmpv3_authpassphrase	-	`string`		SNMPv3 authentication passphrase. Used only by SNMPv3 items.
	snmpv3_privprotocol	-	`string`	0 - DES (default) 1 - AES	SNMPv3 privacy protocol. Used only by SNMPv3 items.
	snmpv3_privpassphrase	-	`string`		SNMPv3 privacy passphrase. Used only by SNMPv3 items.

Element	Element property	Required	Type	Range[1]	Description
	params	-	`text`		Additional parameters depending on the type of the item: - executed script for SSH and Telnet items; - SQL query for database monitor items; - formula for calculated items.
	ipmi_sensor	-	`string`		IPMI sensor. Used only by IPMI items.
	authtype	-	`string`	Authentication type for SSH agent items: 0 - PASSWORD (default) 1 - PUBLIC_KEY Authentication type for HTTP agent items: 0 - NONE (default) 1 - BASIC 2 - NTLM	Authentication type. Used only by SSH and HTTP agent items.
	username	-	`string`		Username for authentication. Used by simple check, SSH, Telnet, database monitor, JMX and HTTP agent items. Required by SSH and Telnet items. When used by JMX agent, password should also be specified together with the username or both properties should be left blank.

Element	Element property	Required	Type	Range[1]	Description
	password	-	`string`		Password for authentication. Used by simple check, SSH, Telnet, database monitor, JMX and HTTP agent items. When used by JMX agent, username should also be specified together with the password or both properties should be left blank.
	publickey	-	`string`		Name of the public key file. Required for SSH agent items.
	privatekey	-	`string`		Name of the private key file. Required for SSH agent items.
	port	-	`string`		Custom port monitored by the item. Can contain user macros. Used only by SNMP items.
	description	-	`text`		Item description.
	inventory_link	-	`string`	0 - NONE Capitalized host inventory field name. For example: 4 - ALIAS 6 - OS_FULL 14 - HARDWARE etc.	Host inventory field that is populated by the item. Refer to the host inventory page for a list of supported host inventory fields and their IDs.
	logtimefmt	-	`string`		Format of the time in log entries. Used only by log items.
	interface_ref	-	`string`	Format: `if<N>`	Reference to the host interface.
	jmx_endpoint	-	`string`		JMX endpoint. Used only by JMX agent items.

Element	Element property	Required	Type	Range[1]	Description
	url	-	string		URL string. Required only for HTTP agent items.
	allow_traps	-	string	0 - NO (default) 1 - YES	Allow to populate value as in a trapper item. Used only by HTTP agent items.
	follow_redirects	-	string	0 - NO 1 - YES (default)	Follow HTTP response redirects while pooling data. Used only by HTTP agent items.
headers		-			Root element for HTTP(S) request headers, where header name is used as key and header value as value. Used only by HTTP agent items.
header		-			Individual header.
	name	x	string		Header name.
	value	x	string		Header value.
	http_proxy	-	string		HTTP(S) proxy connection string. Used only by HTTP agent items.
	output_format	-	string	0 - RAW (default) 1 - JSON	How to process response. Used only by HTTP agent items.
	post_type	-	string	0 - RAW (default) 2 - JSON 3 - XML	Type of post data body. Used only by HTTP agent items.
	posts	-	string		HTTP(S) request body data. Used only by HTTP agent items.

Element	Element property	Required	Type	Range[1]	Description
query_fields		-			Root element for query parameters. Used only by HTTP agent items.
query_field		-			Individual query parameter.
	name	x	`string`		Parameter name.
	value	-	`string`		Parameter value.
	request_method	-	`string`	0 - GET (default) 1 - POST 2 - PUT 3 - HEAD	Request method. Used only by HTTP agent items.
	retrieve_mode	-	`string`	0 - BODY (default) 1 - HEADERS 2 - BOTH	What part of response should be stored. Used only by HTTP agent items.
	ssl_cert_file	-	`string`		Public SSL Key file path. Used only by HTTP agent items.
	ssl_key_file	-	`string`		Private SSL Key file path. Used only by HTTP agent items.
	ssl_key_password	-	`string`		Password for SSL Key file. Used only by HTTP agent items.
	status_codes	-	`string`		Ranges of required HTTP status codes separated by commas. Supports user macros. Example: 200,200-{$M},{$M},200-400 Used only by HTTP agent items.

Element	Element property	Required	Type	Range[1]	Description
	timeout	-	`string`		Item data polling request timeout. Supports user macros. Used only by HTTP agent items.
	verify_host	-	`string`	0 - NO (default) 1 - YES	Validate if host name in URL is in Common Name field or a Subject Alternate Name field of host certificate. Used only by HTTP agent items.
	verify_peer	-	`string`	0 - NO (default) 1 - YES	Validate if host certificate is authentic. Used only by HTTP agent items.
value map		-			Value map.
	name	x	`string`		Name of the value map to use for the item.
applications		-			Root element for applications.
application		-			Individual application.
	name	x	`string`		Application name.
preprocessing		-			Root element for item value preprocessing.
step		-			Individual item value preprocessing step.

Element	Element property	Required	Type	Range[1]	Description
	type	x	`string`	1 - MULTIPLIER 2 - RTRIM 3 - LTRIM 4 - TRIM 5 - REGEX 6 - BOOL_TO_DECIMAL 7 - OCTAL_TO_DECIMAL 8 - HEX_TO_DECIMAL 9 - SIMPLE_CHANGE (calculated as (received value-previous value)) 10 - CHANGE_PER_SECOND (calculated as (received value-previous value)/(time now-time of last check)) 11 - XMLPATH 12 - JSONPATH 13 - IN_RANGE 14 - MATCHES_REGEX 15 - NOT_MATCHES_REGEX 16 - CHECK_JSON_ERROR 17 - CHECK_XML_ERROR 18 - CHECK_REGEX_ERROR 19 - DISCARD_UNCHANGED 20 - DISCARD_UNCHANGED_HEARTBEAT 21 - JAVASCRIPT 22 - PROMETHEUS_PATTERN 23 - PROMETHEUS_TO_JSON 24 - CSV_TO_JSON	Type of the item value preprocessing step.
	params	x	`string`		Parameters of the item value preprocessing step. Multiple parameters are separated by LF (\n) character.
	error_handler	-	`string`	0 - ORIGINAL_ERROR (default) 1 - DISCARD_VALUE 2 - CUSTOM_VALUE 3 - CUSTOM_ERROR	Action type used in case of preprocessing step failure.
	error_handler_params	-	`string`		Error handler parameters used with 'error_handler'.
master_item		-			Individual item master item. Required by dependent items.

Element	Element property	Required	Type	Range[1]	Description
	key	x	`string`		Dependent item master item key value. Recursion up to 3 dependent items and maximum count of dependent items equal to 29999 are allowed.
triggers		-			Root element for simple triggers.
trigger		-			Individual simple trigger.
	For trigger element tag values, see host trigger tags.				

Host low-level discovery rule tags

Element	Element property	Required	Type	Range[1]	Description
discovery_rules		-			Root element for low-level discovery rules.
discovery_rule		-			Individual low-level discovery rule.
	For most of the element tag values, see element tag values for a regular item. Only the tags that are specific to low-level discovery rules, are described below.				
	type	-	`string`	0 - ZABBIX_PASSIVE (default) 1 - SNMPV1 2 - TRAP 3 - SIMPLE 4 - SNMPV2 5 - INTERNAL 6 - SNMPV3 7 - ZABBIX_ACTIVE 10 - EXTERNAL 11 - ODBC 12 - IPMI 13 - SSH 14 - TELNET 16 - JMX 18 - DEPENDENT 19 - HTTP_AGENT	Item type.

Element	Element property	Required	Type	Range[1]	Description
	lifetime	-	string	Default: 30d	Time period after which items that are no longer discovered will be deleted. Seconds, time unit with suffix or user macro.
filter					Individual filter.
	evaltype	-	string	0 - AND_OR (default) 1 - AND 2 - OR 3 - FORMULA	Logic to use for checking low-level discovery rule filter conditions.
	formula	-	string		Custom calculation formula for filter conditions.
conditions		-			Root element for filter conditions.
condition		-			Individual filter condition.
	macro	x	string		Low-level discovery macro name.
	value	-	string		Filter value: regular expression or global regular expression.
	operator	-	string	8 - MATCHES_REGEX (default) 9 - NOT_MATCHES_REGEX	Condition operator.
	formulaid	x	character		Arbitrary unique ID that is used to reference a condition from the custom expression. Can only contain capital-case letters. The ID must be defined by the user when modifying filter conditions, but will be generated anew when requesting them afterward.
lld_macro_paths		-			Root element for LLD macro paths.
lld_macro_path		-			Individual LLD macro path.
	lld_macro	x	string		Low-level discovery macro name.

Element	Element property	Required	Type	Range[1]	Description
	path	x	`string`		Selector for value which will be assigned to the corresponding macro.
preprocessing		-			LLD rule value preprocessing.
step		-			Individual LLD rule value preprocessing step.
	For most of the element tag values, see element tag values for a host item value preprocessing. Only the tags that are specific to low-level discovery value preprocessing, are described below.				
	type	x	`string`	5 - REGEX 11 - XMLPATH 12 - JSONPATH 15 - NOT_MATCHES_REGEX 16 - CHECK_JSON_ERROR 17 - CHECK_XML_ERROR 20 - DISCARD_UNCHANGED_HEARTBEAT 21 - JAVASCRIPT 23 - PROMETHEUS_TO_JSON 24 - CSV_TO_JSON	Type of the item value preprocessing step.
trigger_prototypes		-			Root element for trigger prototypes.
trigger_prototype		-			Individual trigger prototype.
	For trigger prototype element tag values, see regular host trigger tags.				
graph_prototypes		-			Root element for graph prototypes.
graph_prototype		-			Individual graph prototype.
	For graph prototype element tag values, see regular host graph tags.				
host_prototypes		-			Root element for host prototypes.
host_prototype		-			Individual host prototype.
	For host prototype element tag values, see regular host tags.				
item_prototypes		-			Root element for item prototypes.
item_prototype		-			Individual item prototype.

Element	Element property	Required	Type	Range[1]	Description
	For item prototype element tag values, see regular host item tags.				
application_prototypes		-			Root element for application prototypes.
application_prototype		-			Individual application prototype.
	name	x	`string`		Application prototype name.
master_item		-			Individual item prototype master item/item prototype data.
	key	x	`string`		Dependent item prototype master item/item prototype key value. Required for a dependent item.

Host trigger tags

Element	Element property	Required	Type	Range[1]	Description
triggers		-			Root element for triggers.
trigger		-			Individual trigger.
	expression	x	`string`		Trigger expression.
	recovery_mode	-	`string`	0 - EXPRESSION (default) 1 - RECOVERY_EXPRESSION 2 - NONE	Basis for generating OK events.
	recovery_expression	-	`string`		Trigger recovery expression.
	name	x	`string`		Trigger name.
	correlation_mode	-	`string`	0 - DISABLED (default) 1 - TAG_VALUE	Correlation mode (no event correlation or event correlation by tag).
	correlation_tag	-	`string`		The tag name to be used for event correlation.
	url	-	`string`		URL associated with the trigger.
	status	-	`string`	0 - ENABLED (default) 1 - DISABLED	Trigger status.

Element	Element property	Required	Type	Range[1]	Description
	priority	-	`string`	0 - NOT_CLASSIFIED (default) 1 - INFO 2 - WARNING 3 - AVERAGE 4 - HIGH 5 - DISASTER	Trigger severity.
	description	-	`text`		Trigger description.
	type	-	`string`	0 - SINGLE (default) 1 - MULTIPLE	Event generation type (single problem event or multiple problem events).
	manual_close	-	`string`	0 - NO (default) 1 - YES	Manual closing of problem events.
dependencies		-			Root element for dependencies.
dependency		-			Individual trigger dependency.
	name	x	`string`		Dependency trigger name.
	expression	x	`string`		Dependency trigger expression.
	recovery_expression	-	`string`		Dependency trigger recovery expression.
tags		-			Root element for event tags.
tag		-			Individual event tag.
	tag	x	`string`		Tag name.
	value	-	`string`		Tag value.

Host graph tags

Element	Element property	Required	Type	Range[1]	Description
graphs		-			Root element for graphs.
graph		-			Individual graph.
	name	x	`string`		Graph name.
	width	-	`integer`	20-65535 (default: 900)	Graph width, in pixels. Used for preview and for pie/exploded graphs.
	height	-	`integer`	20-65535 (default: 200)	Graph height, in pixels. Used for preview and for pie/exploded graphs.

Element	Element property	Required	Type	Range[1]	Description
	yaxismin	-	`double`	Default: 0	Value of Y axis minimum. Used if 'ymin_type_1' is FIXED.
	yaxismax	-	`double`	Default: 0	Value of Y axis maximum. Used if 'ymax_type_1' is FIXED.
	show_work_period	-	`string`	0 - NO 1 - YES (default)	Highlight non-working hours. Used by normal and stacked graphs.
	show_triggers	-	`string`	0 - NO 1 - YES (default)	Display simple trigger values as a line. Used by normal and stacked graphs.
	type	-	`string`	0 - NORMAL (default) 1 - STACKED 2 - PIE 3 - EXPLODED	Graph type.
	show_legend	-	`string`	0 - NO 1 - YES (default)	Display graph legend.
	show_3d	-	`string`	0 - NO (default) 1 - YES	Enable 3D style. Used by pie and exploded pie graphs.
	percent_left	-	`double`	Default:0	Show the percentile line for left axis. Used only for normal graphs.
	percent_right	-	`double`	Default:0	Show the percentile line for right axis. Used only for normal graphs.
	ymin_type_1	-	`string`	0 - CALCULATED (default) 1 - FIXED 2 - ITEM	Minimum value of Y axis. Used by normal and stacked graphs.
	ymax_type_1	-	`string`	0 - CALCULATED (default) 1 - FIXED 2 - ITEM	Maximum value of Y axis. Used by normal and stacked graphs.

Element	Element property	Required	Type	Range[1]	Description
ymin_item_1		-			Individual item details. Required if 'ymin_type_1' is ITEM.
	host	x	string		Item host.
	key	x	string		Item key.
ymax_item_1		-			Individual item details. Required if 'ymax_type_1' is ITEM.
	host	x	string		Item host.
	key	x	string		Item key.
graph_items		x			Root element for graph items.
graph_item		x			Individual graph item.
	sortorder	-	integer		Draw order. The smaller value is drawn first. Can be used to draw lines or regions behind (or in front of) another.
	drawtype	-	string	0 - SINGLE_LINE (default) 1 - FILLED_REGION 2 - BOLD_LINE 3 - DOTTED_LINE 4 - DASHED_LINE 5 - GRADIENT_LINE	Draw style of the graph item. Used only by normal graphs.
	color	-	string		Element colour (6 symbols, hex).
	yaxisside	-	string	0 - LEFT (default) 1 - RIGHT	Side of the graph where the graph item's Y scale will be drawn. Used by normal and stacked graphs.
	calc_fnc	-	string	1 - MIN 2 - AVG (default) 4 - MAX 7 - ALL (minimum, average and maximum; used only by simple graphs) 9 - LAST (used only by pie and exploded pie graphs)	Data to draw if more than one value exists for an item.
	type	-	string	0 - SIMPLE (default) 2 - GRAPH_SUM (value of the item represents the whole pie; used only by pie and exploded pie graphs)	Graph item type.
item		x			Individual item.
	host	x	string		Item host.
	key	x	string		Item key.

Host web scenario tags

Element	Element property	Required	Type	Range[1]	Description
httptests		-			Root element for web scenarios.
httptest		-			Individual web scenario.
	name	x	`string`		Web scenario name.
	delay	-	`string`	Default: 1m	Frequency of executing the web scenario. Seconds, time unit with suffix or user macro.
	attempts	-	`integer`	1-10 (default: 1)	The number of attempts for executing web scenario steps.
	agent	-	`string`	Default: Zabbix	Client agent. Zabbix will pretend to be the selected browser. This is useful when a website returns different content for different browsers.
	http_proxy	-	`string`		Specify an HTTP proxy to use, using the format: `http://[username[:passw`
variables		-			Root element for scenario-level variables (macros) that may be used in scenario steps.
variable		-			Individual variable.
	name	x	`text`		Variable name.
	value	x	`text`		Variable value.
headers		-			Root element for HTTP headers that will be sent when performing a request. Headers should be listed using the same syntax as they would appear in the HTTP protocol.
header		-			Individual header.
	name	x	`text`		Header name.
	value	x	`text`		Header value.
	status	-	`string`	0 - ENABLED (default) 1 - DISABLED	Web scenario status.

Element	Element property	Required	Type	Range[1]	Description
	authentication	-	string	0 - NONE (default) 1 - BASIC 2 - NTLM	Authentication method.
	http_user	-	string		User name used for basic, HTTP or NTLM authentication.
	http_password	-	string		Password used for basic, HTTP or NTLM authentication.
	verify_peer	-	string	0 - NO (default) 1 - YES	Verify the SSL certificate of the web server.
	verify_host	-	string	0 - NO (default) 1 - YES	Verify that the Common Name field or the Subject Alternate Name field of the web server certificate matches.
	ssl_cert_file	-	string		Name of the SSL certificate file used for client authentication (must be in PEM format).
	ssl_key_file	-	string		Name of the SSL private key file used for client authentication (must be in PEM format).
	ssl_key_password	-	string		SSL private key file password.
steps		x			Root element for web scenario steps.
step		x			Individual web scenario step.
	name	x	string		Web scenario step name.
	url	x	string		URL for monitoring.
query_fields		-			Root element for query fields - an array of HTTP fields that will be added to the URL when performing a request.
query_field		-			Individual query field.
	name	x	string		Query field name.
	value	-	string		Query field value.

Element	Element property	Required	Type	Range[1]	Description
posts		-			HTTP POST variables as a string (raw post data) or as an array of HTTP fields (form field data).
post_field		-			Individual post field.
	name	x	`string`		Post field name.
	value	x	`string`		Post field value.
variables		-			Root element of step-level variables (macros) that should be applied after this step. If the variable value has a 'regex:' prefix, then its value is extracted from the data returned by this step according to the regular expression pattern following the 'regex:' prefix
variable		-			Individual variable.
	name	x	`string`		Variable name.
	value	x	`string`		Variable value.
headers		-			Root element for HTTP headers that will be sent when performing a request. Headers should be listed using the same syntax as they would appear in the HTTP protocol.
header		-			Individual header.
	name	x	`string`		Header name.
	value	x	`string`		Header value.
	follow_redirects	-	`string`	0 - NO 1 - YES (default)	Follow HTTP redirects.
	retrieve_mode	-	`string`	0 - BODY (default) 1 - HEADERS 2 - BOTH	HTTP response retrieve mode.
	timeout	-	`string`	Default: 15s	Timeout of step execution. Seconds, time unit with suffix or user macro.

Element	Element property	Required	Type	Range[1]	Description
	required	-	`string`		Text that must be present in the response. Ignored if empty.
	status_codes	-	`string`		A comma delimited list of accepted HTTP status codes. Ignored if empty. For example: 200-201,210-299

Footnotes

[1] For string values, only the string will be exported (e.g. "ZABBIX_ACTIVE") without the numbering used in this table. The numbers for range values (corresponding to the API values) in this table is used for ordering only.

4 Network maps

Overview

Network map export contains:

- all related images
- map structure - all map settings, all contained elements with their settings, map links and map link status indicators

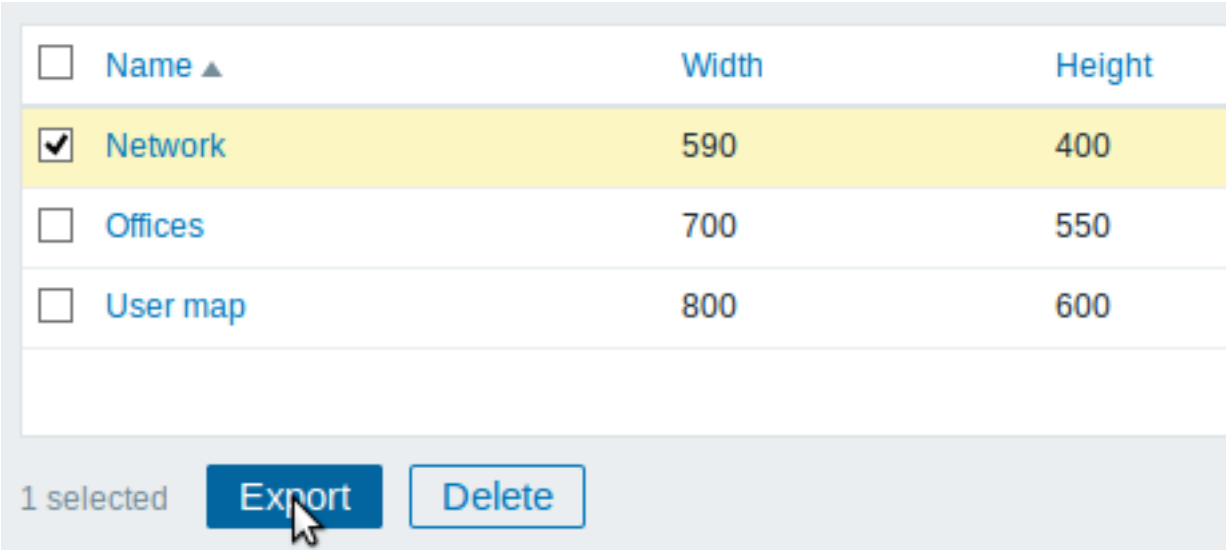
Not exported are host groups, hosts, triggers, other maps or any other elements that may be related to the exported map. Thus, if at least one of the elements the map refers to is missing, importing it will fail.

Network map export/import is supported since Zabbix 1.8.2.

Exporting

To export network maps, do the following:

- Go to: *Monitoring* → *Maps*
- Mark the checkboxes of the network maps to export
- Click on *Export* below the list



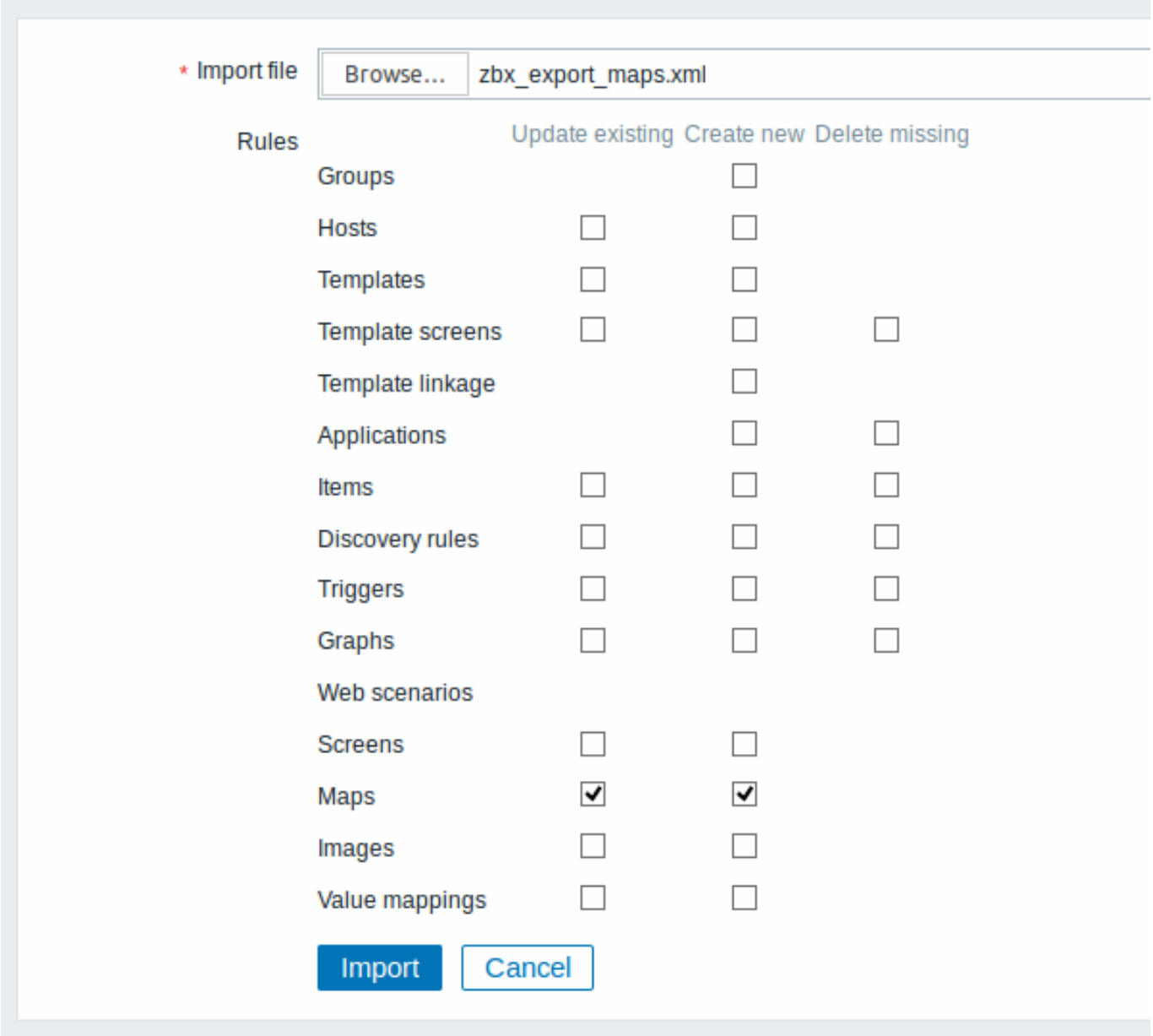
Selected maps are exported to a local XML file with default name *zabbix_export_maps.xml*.

Importing

To import network maps, do the following:

- Go to: *Monitoring* → *Maps*

- Click on *Import* to the right
- Select the import file
- Mark the required options in import rules
- Click on *Import*



All mandatory input fields are marked with a red asterisk.

A success or failure message of the import will be displayed in the frontend.

Import rules:

Rule	Description
Update existing	Existing maps will be updated with data taken from the import file. Otherwise they will not be updated.
Create new	The import will add new maps using data from the import file. Otherwise it will not add them.

If you uncheck both map options and check the respective options for images, images only will be imported. Image importing is only available to Zabbix Super Admin users.

Warning:
If replacing an existing image, it will affect all maps that are using this image.

Export format

Exporting a small network map with three elements, their images and some links between them. Note that images are truncated to save space.

```
<?xml version="1.0" encoding="UTF-8"?>
<zabbix_export>
    <version>4.4</version>
    <date>2019-06-14T09:22:17Z</date>
    <images>
        <image>
            <name>Server_(64)</name>
            <imagetype>1</imagetype>
            <encodedImage>iVBOR...SuQmCC</encodedImage>
        </image>
        <image>
            <name>Workstation_(64)</name>
            <imagetype>1</imagetype>
            <encodedImage>iVBOR...SuQmCC</encodedImage>
        </image>
        <image>
            <name>Zabbix_server_3D_(96)</name>
            <imagetype>1</imagetype>
            <encodedImage>iVBOR...ggg==</encodedImage>
        </image>
    </images>
    <maps>
        <map>
            <name>Network</name>
            <width>590</width>
            <height>400</height>
            <label_type>0</label_type>
            <label_location>0</label_location>
            <highlight>1</highlight>
            <expandproblem>0</expandproblem>
            <markelements>1</markelements>
            <show_unack>0</show_unack>
            <severity_min>2</severity_min>
            <show_suppressed>0</show_suppressed>
            <grid_size>40</grid_size>
            <grid_show>1</grid_show>
            <grid_align>1</grid_align>
            <label_format>0</label_format>
            <label_type_host>2</label_type_host>
            <label_type_hostgroup>2</label_type_hostgroup>
            <label_type_trigger>2</label_type_trigger>
            <label_type_map>2</label_type_map>
            <label_type_image>2</label_type_image>
            <label_string_host/>
            <label_string_hostgroup/>
            <label_string_trigger/>
            <label_string_map/>
            <label_string_image/>
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            <iconmap/>
            <urls/>
            <selements>
                <selement>
                    <elementtype>0</elementtype>
                    <label>Host 1</label>
                    <label_location>-1</label_location>
                    <x>476</x>
                    <y>28</y>
                    <elementsubtype>0</elementsubtype>
```

```
            <areatype>0</areatype>
            <width>200</width>
            <height>200</height>
            <viewtype>0</viewtype>
            <use_iconmap>0</use_iconmap>
            <selementid>8</selementid>
            <elements>
                <element>
                    <host>Discovered host</host>
                </element>
            </elements>
            <icon_off>
                <name>Server_(64)</name>
            </icon_off>
            <icon_on/>
            <icon_disabled/>
            <icon_maintenance/>
            <application/>
            <urls/>
        </selement>
        <selement>
            <elementtype>0</elementtype>
            <label>Zabbix server</label>
            <label_location>-1</label_location>
            <x>252</x>
            <y>50</y>
            <elementsubtype>0</elementsubtype>
            <areatype>0</areatype>
            <width>200</width>
            <height>200</height>
            <viewtype>0</viewtype>
            <use_iconmap>0</use_iconmap>
            <selementid>6</selementid>
            <elements>
                <element>
                    <host>Zabbix server</host>
                </element>
            </elements>
            <icon_off>
                <name>Zabbix_server_3D_(96)</name>
            </icon_off>
            <icon_on/>
            <icon_disabled/>
            <icon_maintenance/>
            <application/>
            <urls/>
        </selement>
        <selement>
            <elementtype>0</elementtype>
            <label>New host</label>
            <label_location>-1</label_location>
            <x>308</x>
            <y>230</y>
            <elementsubtype>0</elementsubtype>
            <areatype>0</areatype>
            <width>200</width>
            <height>200</height>
            <viewtype>0</viewtype>
            <use_iconmap>0</use_iconmap>
            <selementid>7</selementid>
            <elements>
                <element>
```

```
                        <host>Zabbix host</host>
                    </element>
                </elements>
                <icon_off>
                    <name>Workstation_(64)</name>
                </icon_off>
                <icon_on/>
                <icon_disabled/>
                <icon_maintenance/>
                <application/>
                <urls/>
            </selement>
        </selements>
        <links>
            <link>
                <drawtype>0</drawtype>
                <color>008800</color>
                <label/>
                <selementid1>6</selementid1>
                <selementid2>8</selementid2>
                <linktriggers/>
            </link>
            <link>
                <drawtype>2</drawtype>
                <color>00CC00</color>
                <label>100MBps</label>
                <selementid1>7</selementid1>
                <selementid2>6</selementid2>
                <linktriggers>
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                        <color>DD0000</color>
                        <trigger>
                            <description>Zabbix agent on {HOST.NAME} is unreachable for 5 minutes</des
                            <expression>{Zabbix host:agent.ping.nodata(5m)}=1</expression>
                            <recovery_expression/>
                        </trigger>
                    </linktrigger>
                </linktriggers>
            </link>
        </links>
    </map>
  </maps>
</zabbix_export>
```

Element tags

Element tag values are explained in the table below.

Element	Element property	Type	Range	Description
images				Root element for images.
image				Individual image.
	name	string		Unique image name.
	imagetype	integer	1 - image 2 - background	Image type.
	encodedImage			Base64 encoded image.
maps				Root element for maps.
map				Individual map.
	name	string		Unique map name.
	width	integer		Map width, in pixels.
	height	integer		Map height, in pixels.

Element	Element property	Type	Range	Description
	label_type	integer	0 - label 1 - host IP address 2 - element name 3 - status only 4 - nothing	Map element label type.
	label_location	integer	0 - bottom 1 - left 2 - right 3 - top	Map element label location by default.
	highlight	integer	0 - no 1 - yes	Enable icon highlighting for active triggers and host statuses.
	expandproblem	integer	0 - no 1 - yes	Display problem trigger for elements with a single problem.
	markelements	integer	0 - no 1 - yes	Highlight map elements that have recently changed their status.
	show_unack	integer	0 - count of all problems 1 - count of unacknowl-edged problems 2 - count of acknowl-edged and unacknowl-edged problems separately	Problem display.
	severity_min	integer	0 - not classified 1 - information 2 - warning 3 - average 4 - high 5 - disaster	Minimum trigger severity to show on the map by default.
	show_suppressed	integer	0 - no 1 - yes	Display problems which would otherwise be suppressed (not shown) because of host maintenance.
	grid_size	integer	20, 40, 50, 75 or 100	Cell size of a map grid in pixels, if ”grid_show=1”
	grid_show	integer	0 - yes 1 - no	Display a grid in map configuration.
	grid_align	integer	0 - yes 1 - no	Automatically align icons in map configuration.
	label_format	integer	0 - no 1 - yes	Use advanced label configuration.

Element	Element property	Type	Range	Description
	label_type_host	integer	0 - label 1 - host IP address 2 - element name 3 - status only 4 - nothing 5 - custom label	Display as host label, if ”label_format=1”
	label_type_hostgroup	integer	0 - label 2 - element name 3 - status only 4 - nothing 5 - custom label	Display as host group label, if ”label_format=1”
	label_type_trigger	integer	0 - label 2 - element name 3 - status only 4 - nothing 5 - custom label	Display as trigger label, if ”label_format=1”
	label_type_map	integer	0 - label 2 - element name 3 - status only 4 - nothing 5 - custom label	Display as map label, if ”label_format=1”
	label_type_image	integer	0 - label 2 - element name 4 - nothing 5 - custom label	Display as image label, if ”label_format=1”
	label_string_host	string		Custom label for host elements, if ”label_type_host=5”
	label_string_hostgroup	string		Custom label for host group elements, if ”label_type_hostgroup=5”
	label_string_trigger	string		Custom label for trigger elements, if ”label_type_trigger=5”
	label_string_map	string		Custom label for map elements, if ”label_type_map=5”
	label_string_image	string		Custom label for image elements, if ”label_type_image=5”
	expand_macros	integer	0 - no 1 - yes	Expand macros in labels in map configuration.
	background	id		ID of the background image (if any), if ”imagetype=2”
	iconmap	id		ID of the icon mapping (if any).

Element	Element property	Type	Range	Description
urls				
url				Individual URL.
	name	`string`		Link name.
	url	`string`		Link URL.
	elementtype	`integer`	0 - host 1 - map 2 - trigger 3 - host group 4 - image	Map item type the link belongs to.
selements				
selement				Individual map element.
	elementtype	`integer`	0 - host 1 - map 2 - trigger 3 - host group 4 - image	Map element type.
	label	`string`		Icon label.
	label_location	`integer`	-1 - use map default 0 - bottom 1 - left 2 - right 3 - top	
	x	`integer`		Location on the X axis.
	y	`integer`		Location on the Y axis.
	elementsubtype	`integer`	0 - single host group 1 - all host groups	Element subtype, if ”elementtype=3”
	areatype	`integer`	0 - same as whole map 1 - custom size	Area size, if ”elementsubtype=1”
	width	`integer`		Width of area, if ”areatype=1”
	height	`integer`		Height of area, if ”areatype=1”
	viewtype	`integer`	0 - place evenly in the area	Area placement algorithm, if ”elementsubtype=1”
	use_iconmap	`integer`	0 - no 1 - yes	Use icon mapping for this element. Relevant only if iconmapping is activated on map level.
	selementid	`id`		Unique element record ID.
	application	`string`		Application name filter. If an application name is given, only problems of triggers that belong to the given application will be displayed on the map.
elements				
element				Individual Zabbix entity that is represented on the map (map, hostgroup, host, etc).
	host			
icon_off				Image to use when element is in ’OK’ status.
icon_on				Image to use when element is in ’Problem’ status.

Element	Element property	Type	Range	Description
icon_disabled				Image to use when element is disabled.
icon_maintenance				Image to use when element is in maintenance.
	name	`string`		Unique image name.
links				
link				Individual link between map elements.
	drawtype	`integer`	0 - line 2 - bold line 3 - dotted line 4 - dashed line	Link style.
	color	`string`		Link color (6 symbols, hex).
	label	`string`		Link label.
	selementid1	`id`		ID of one element to connect.
	selementid2	`id`		ID of the other element to connect.
linktriggers				
linktrigger				Individual link status indicator.
	drawtype	`integer`	0 - line 2 - bold line 3 - dotted line 4 - dashed line	Link style when trigger is in the 'Problem' state.
	color	`string`		Link color (6 symbols, hex) when trigger is in the 'Problem' state.
trigger				Trigger used for indicating link status.
	description	`string`		Trigger name.
	expression	`string`		Trigger expression.
	recovery_expression	`string`		Trigger recovery expression.

5 Screens

Overview

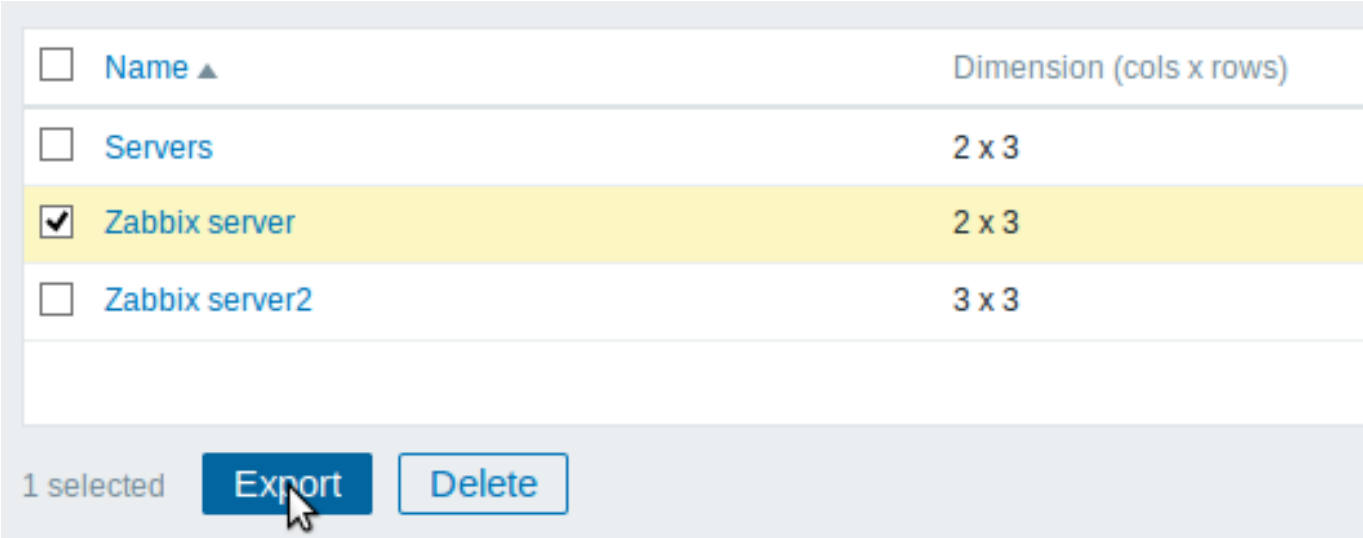
Screen export contains the screen structure - all screen settings and all screen elements along with their configuration.

Anything included in the screen itself (like a host, host group or any other data) is not exported. Thus, if at least one of the elements the screen refers to is missing, importing it will fail.

Exporting

To export screens, do the following:

- Go to: *Monitoring* → *Screens*
- Mark the checkboxes of the screens to export
- Click on *Export* below the list

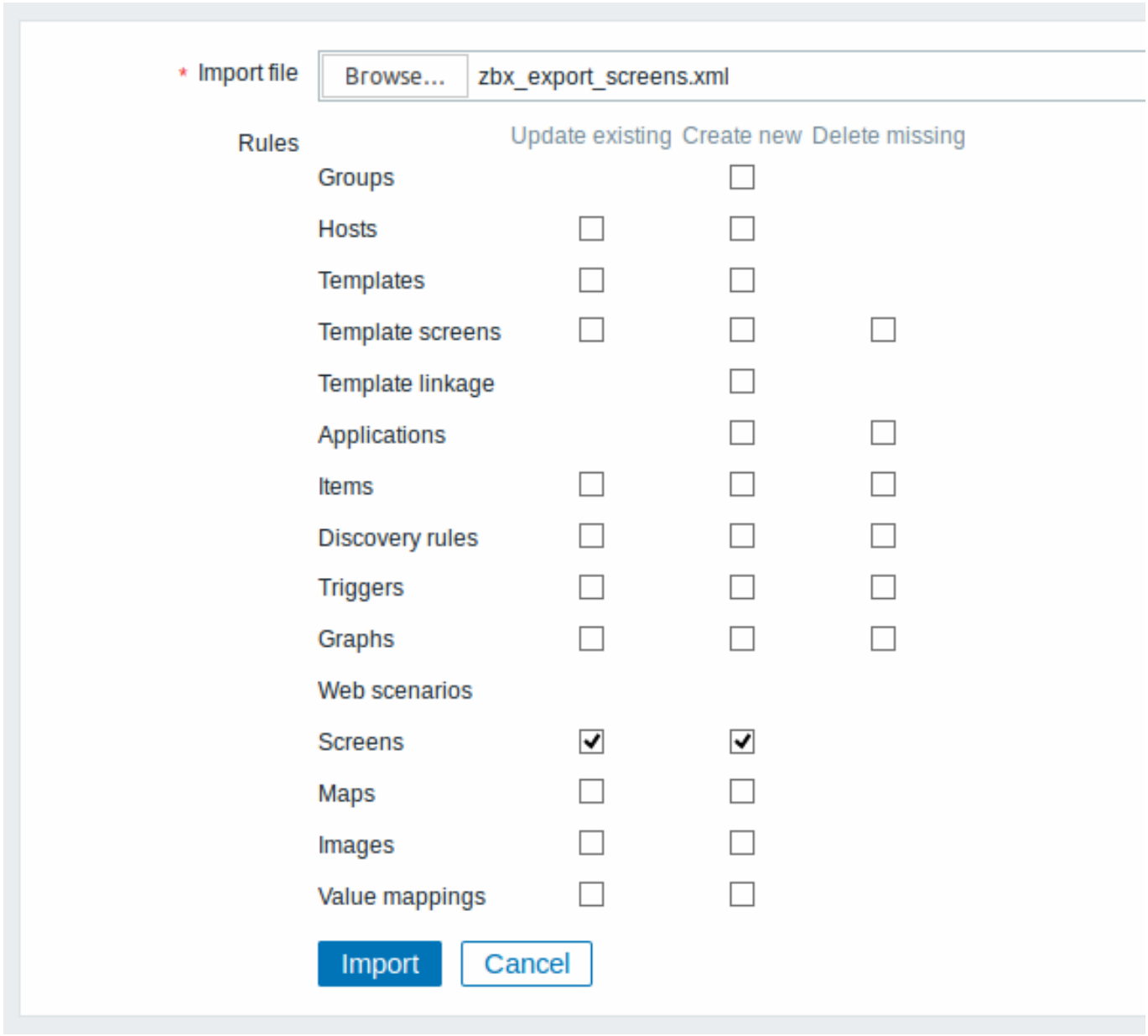


Selected screens are exported to a local XML file with default name *zabbix_export_screens.xml*.

Importing

To import screens, do the following:

- Go to: *Monitoring* → *Screens*
- Click on *Import* to the right
- Select the import file
- Mark the required options in import rules
- Click on *Import*



All mandatory input fields are marked with a red asterisk.

A success or failure message of the import will be displayed in the frontend.

Import rules:

Rule	Description
Update existing	Existing screens will be updated with data taken from the import file. Otherwise they will not be updated.
Create new	The import will add new screens using data from the import file. Otherwise it will not add them.

Export format

Exporting a small screen with two graphs taking up the first row of the screen.

```
<?xml version="1.0" encoding="UTF-8"?>
<zabbix_export>
    <version>4.4</version>
    <date>2019-06-14T09:22:17Z</date>
    <screens>
        <screen>
            <name>Zabbix server</name>
            <hsize>2</hsize>
```

```
            <vsize>3</vsize>
            <screen_items>
                <screen_item>
                    <resourcetype>0</resourcetype>
                    <width>300</width>
                    <height>80</height>
                    <x>0</x>
                    <y>0</y>
                    <colspan>1</colspan>
                    <rowspan>1</rowspan>
                    <elements>0</elements>
                    <valign>0</valign>
                    <halign>0</halign>
                    <style>0</style>
                    <url/>
                    <dynamic>1</dynamic>
                    <sort_triggers>0</sort_triggers>
                    <resource>
                        <name>CPU load</name>
                        <host>Zabbix host</host>
                    </resource>
                    <max_columns>3</max_columns>
                    <application/>
                </screen_item>
                <screen_item>
                    <resourcetype>0</resourcetype>
                    <width>300</width>
                    <height>80</height>
                    <x>1</x>
                    <y>0</y>
                    <colspan>1</colspan>
                    <rowspan>1</rowspan>
                    <elements>0</elements>
                    <valign>0</valign>
                    <halign>0</halign>
                    <style>0</style>
                    <url/>
                    <dynamic>1</dynamic>
                    <sort_triggers>0</sort_triggers>
                    <resource>
                        <name>CPU utilization</name>
                        <host>Zabbix host</host>
                    </resource>
                    <max_columns>3</max_columns>
                    <application/>
                </screen_item>
            </screen_items>
        </screen>
    </screens>
</zabbix_export>
```

Element tags

Element tag values are explained in the table below.

Element	Element property	Type	Range	Description
screens				
screen				
	name	string		Unique screen name.
	hsize	integer		Horizontal size, number of columns.
	vsize	integer		Vertical size, number of rows.

Element	Element property	Type	Range	Description
screen_items screen_item				
	resourcetype	`integer`	0 - graph 1 - simple graph 2 - map 3 - plain text 4 - host info 5 - trigger info 6 - server info 7 - clock 9 - trigger overview 10 - data overview 11 - URL 12 - history of actions 13 - history of events 14 - host group issues 15 - problems by severity 16 - host issues 19 - simple graph prototype 20 - graph prototype	Resource type.
	width	`integer`		Width of the screen item (in pixels) if ’resourcetype’ is 0, 1, 7, 11, 19 or 20.
	height	`integer`		Height of the screen item (in pixels) if ’resourcetype’ is 0, 1, 7, 11, 19 or 20.
	x	`integer`		X-coordinates of the screen item on the screen, from left to right. ’0’ means start from first column.
	y	`integer`		Y-coordinates of the screen item on the screen, from top to bottom. ’0’ means start from first row.
	colspan	`integer`		Number of columns the screen item will span across.
	rowspan	`integer`		Number or rows the screen item will span across.
	elements	`integer`		Number of lines to display on the screen item if ’resourcetype’ is 3, 12, 13, 14 or 16.

Element	Element property	Type	Range	Description
	valign	integer	0 - middle (default) 1 - top 2 - bottom	Vertical alignment.
	halign	integer	0 - center (default) 1 - left 2 - right	Horizontal alignment.
	style	integer	0 - plain text 1 - HTML	Option of displaying screen item if 'resourcetype' is 3.
		integer	0 - local time 1 - server time 2 - host time	Option of displaying screen item if 'resourcetype' is 7.
		integer	0 - horizontal 1 - vertical	Option of displaying screen item if 'resourcetype' is 4,5.
		integer	0 - left side 1 - top	Option of displaying screen item if 'resourcetype' is 9,10.
	url	string		Link URL if 'resourcetype' is 11.
	dynamic	integer	0 - no 1 - yes	Make screen item dynamic if 'resourcetype' is 0, 1, 3, 19 or 20.
	sort_triggers	integer	0 - last change (descending) 1 - severity (descending) 2 - host (ascending)	Option to sort triggers by if 'resourcetype' is 14,16.
		integer	3 - time (ascending) 4 - time (descending) 5 - type (ascending) 6 - type (descending) 7 - status (ascending) 8 - status (descending) 9 - retries left (ascending) 10 - retries left (descending) 11 - recipient (ascending) 12 - recipient (descending)	Option to sort triggers by if 'resourcetype' is 12.
	max_columns	integer		In how many columns generated graphs should be displayed in the screen cell if 'resourcetype' is 19 or 20. Useful when there are many LLD-generated graphs.

Element	Element property	Type	Range	Description
	application	`string`		Filter by application name if 'resourcetype' is 9 or 10.
resource				
	name	`string`		Resource name.
	host	`string`		Resource host.

6 Media types

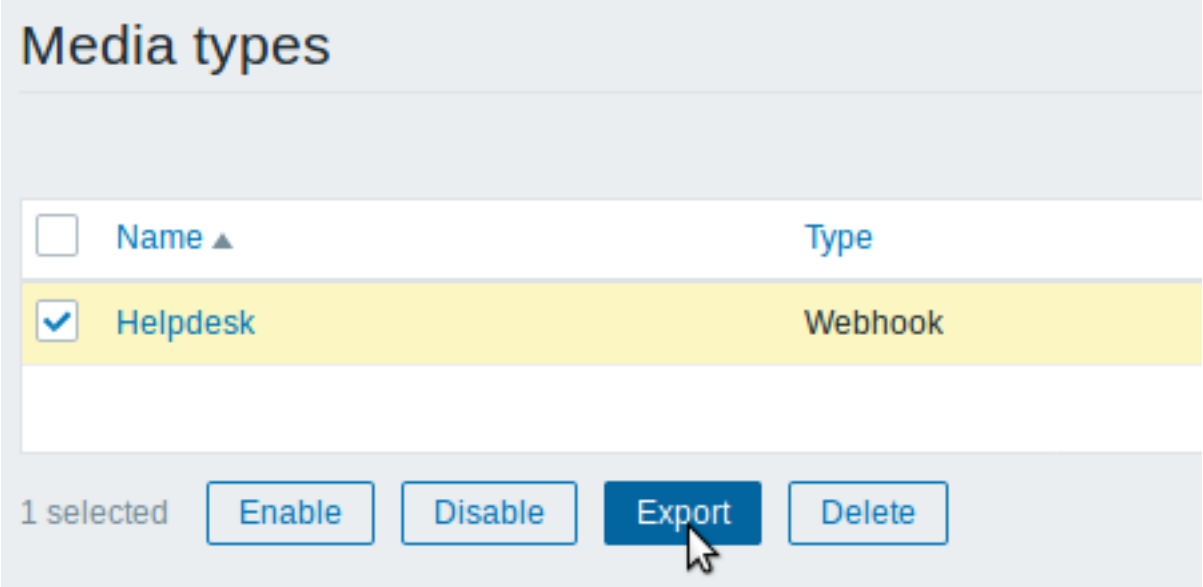
Overview

Media types are exported with all related objects and object relations.

Exporting

To export media types, do the following:

- Go to: *Administration* → *Media types*
- Mark the checkboxes of the media types to export
- Click on *Export* below the list

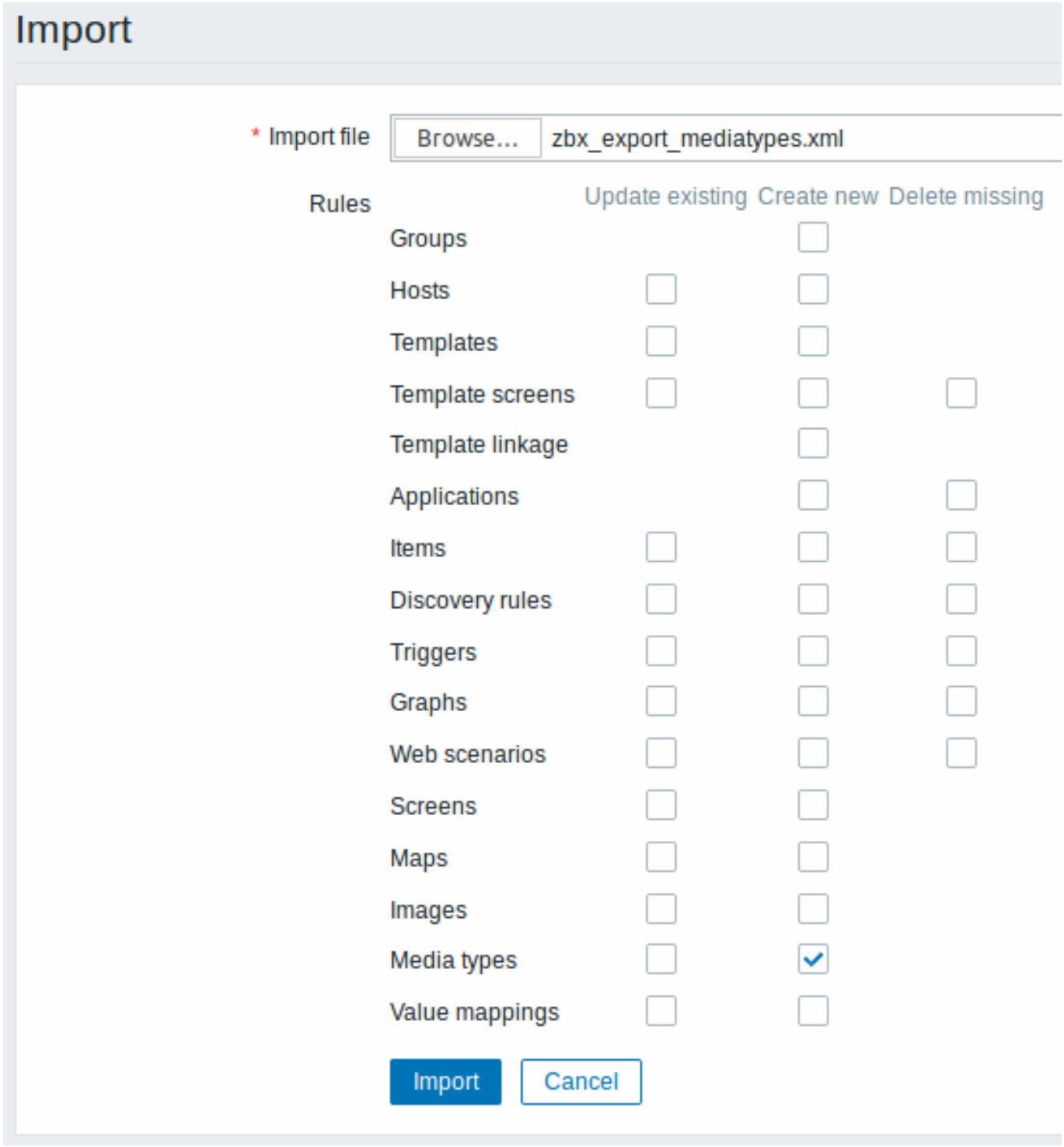


Selected media types are exported to a local XML file with default name *zbx_export_mediatypes.xml*.

Importing

To import media types, do the following:

- Go to: *Administration* → *Media types*
- Click on *Import* to the right
- Select the import file
- Mark the required options in import rules
- Click on *Import*



A success or failure message of the import will be displayed in the frontend.

Import rules:

Rule	Description
Update existing	Existing elements will be updated with data taken from the import file. Otherwise they will not be updated.
Create new	The import will add new elements using data from the import file. Otherwise it will not add them.
Delete missing	The import will remove existing elements not present in the import file. Otherwise it will not remove them.

Export format

```
<?xml version="1.0" encoding="UTF-8"?>
<zabbix_export>
```

```
    <version>4.4</version>
    <date>2019-10-24T06:44:38Z</date>
    <media_types>
        <media_type>
            <name>Slack chat</name>
            <type>WEBHOOK</type>
            <parameters>
                <parameter>
                    <name>channel</name>
                    <value>{ALERT.SENDTO}</value>
                </parameter>
                <parameter>
                    <name>text</name>
                    <value>{ALERT.MESSAGE}</value>
                </parameter>
                <parameter>
                    <name>username</name>
                    <value>bot</value>
                </parameter>
            </parameters>
            <script>var req = new CurlHttpRequest();
req.AddHeader('Content-Type: application/x-www-form-urlencoded');

Zabbix.Log(127, 'webhook requqest value='+value);

req.Post('https://hooks.slack.com/services/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',
  'payload='+value
);

Zabbix.Log(127, 'response code: '+req.Status());

return JSON.stringify({
  'tags': {
    'delivered': 'slack'
  }
});</script>
            <process_tags>YES</process_tags>
            <event_menu_url>https://www.zabbix.com</event_menu_url>
            <event_menu_name>Slack message</event_menu_name>
            <description>Slack chat messages.</description>
        </media_type>
    </media_types>
</zabbix_export>
```

Element tags

Element tag values are explained in the table below.

Element	Element property	Required	Type	Range[1]	Description
media_types		-			Root element for media_types.
media_type		-			Individual media_type.
	name	x	string		Media type name.
	type	x	string	0 - EMAIL 1 - SMS 2 - SCRIPT 4 - WEBHOOK	Transport used by the media type.
	status	-	string	0 - ENABLED (default) 1 - DISABLED	Whether the media type is enabled.

Element	Element property	Required	Type	Range[1]	Description
	max_sessions	-	integer	Possible values for SMS: 1 - (default) Possible values for other media types: 0-100, 0 - unlimited	The maximum number of alerts that can be processed in parallel.
	attempts	-	integer	1-10 (default: 3)	The maximum number of attempts to send an alert.
	attempt_interval	-	string	0-60s (default: 10s)	The interval between retry attempts. Accepts seconds and time unit with suffix.
	description	-	string		Media type description.
Used only by e-mail media type					
	smtp_server	x	string		SMTP server.
	smtp_port	-	integer	Default: 25	SMTP server port to connect to.
	smtp_helo	x	string		SMTP helo.
	smtp_email	x	string		Email address from which notifications will be sent.
	smtp_security	-	string	0 - NONE (default) 1 - STARTTLS 2 - SSL_OR_TLS	SMTP connection security level to use.
	smtp_verify_host	-	string	0 - NO (default) 1 - YES	SSL verify host for SMTP. Optional if smtp_security is STARTTLS or SSL_OR_TLS.
	smtp_verify_peer	-	string	0 - NO (default) 1 - YES	SSL verify peer for SMTP. Optional if smtp_security is STARTTLS or SSL_OR_TLS.
	smtp_authentication	-	string	0 - NONE (default) 1 - PASSWORD	SMTP authentication method to use.
	username	-	string		Username.
	password	-	string		Authentication password.
	content_type	-	string	0 - TEXT 1 - HTML (default)	Message format.
Used only by SMS media type					
	gsm_modem	x	string		Serial device name of the GSM modem.

Element	Element property	Required	Type	Range[1]	Description
Used only by script media type					
	script name	x	`string`		Script name.
parameters		-			Root element for script parameters.
parameter		-			Individual script parameter.
Used only by webhook media type					
	script	x	`string`		Script.
	timeout	-	`string`	1-60s (default: 30s)	Javascript script HTTP request timeout interval.
	process_tags	-	`string`	0 - NO (default) 1 - YES	Whether to process returned tags.
	show_event_menu	-	`string`	0 - NO (default) 1 - YES	If {EVENT.TAGS.*} were successfully resolved in event_menu_url and event_menu_name fields, this field indicates presence of entry in the event menu.
	event_menu_url	-	`string`		URL of the event menu entry. Supports {EVENT.TAGS.*} macro.
	event_menu_name	-	`string`		Name of the event menu entry. Supports {EVENT.TAGS.*} macro.
parameters		-			Root element for webhook media type parameters.
parameter		-			Individual webhook media type parameter.
	name	x	`string`		Webhook parameter name.
	value	-	`string`		Webhook parameter value.

Footnotes

[1] For string values, only the string will be exported (e.g. "EMAIL") without the numbering used in this table. The numbers for range values (corresponding to the API values) in this table is used for ordering only.

15. Discovery

Please use the sidebar to access content in the Discovery section.

1 Network discovery

Overview

Zabbix offers automatic network discovery functionality that is effective and very flexible.

With network discovery properly set up you can:

- speed up Zabbix deployment
- simplify administration
- use Zabbix in rapidly changing environments without excessive administration

Zabbix network discovery is based on the following information:

- IP ranges
- Availability of external services (FTP, SSH, WEB, POP3, IMAP, TCP, etc)
- Information received from Zabbix agent (only unencrypted mode is supported)
- Information received from SNMP agent

It does NOT provide:

- Discovery of network topology

Network discovery basically consists of two phases: discovery and actions.

Discovery

Zabbix periodically scans the IP ranges defined in network discovery rules. The frequency of the check is configurable for each rule individually.

Note that one discovery rule will always be processed by a single discoverer process. The IP range will not be split between multiple discoverer processes.

Each rule has a set of service checks defined to be performed for the IP range.

> **Note:**
> Discovery checks are processed independently from the other checks. If any checks do not find a service (or fail), other checks will still be processed.

Every check of a service and a host (IP) performed by the network discovery module generates a discovery event.

Event	Check of service result
Service Discovered	The service is 'up' after it was 'down' or when discovered for the first time.
Service Up	The service is 'up', consecutively.
Service Lost	The service is 'down' after it was 'up'.
Service Down	The service is 'down', consecutively.
Host Discovered	At least one service of a host is 'up' after all services of that host were 'down' or a service is discovered which belongs to a not registered host.
Host Up	At least one service of a host is 'up', consecutively.
Host Lost	All services of a host are 'down' after at least one was 'up'.
Host Down	All services of a host are 'down', consecutively.

Actions

Discovery events can be the basis of relevant actions, such as:

- Sending notifications

- Adding/removing hosts
- Enabling/disabling hosts
- Adding hosts to a group
- Removing hosts from a group
- Linking hosts to/unlinking from a template
- Executing remote scripts

These actions can be configured with respect to the device type, IP, status, uptime/downtime, etc. For full details on configuring actions for network-discovery based events, see action operation and conditions pages.

Note:
Linking a discovered host to templates will fail collectively if any of the linkable templates has a unique entity (e.g. item key) that is the same as a unique entity (e.g. item key) already existing on the host or on another of the linkable templates.

Host creation

A host is added if the *Add host* operation is selected. A host is also added, even if the *Add host* operation is missing, if you select operations resulting in actions on a host. Such operations are:

- enable host
- disable host
- add host to a host group
- link template to a host

Created hosts are added to the *Discovered hosts* group (by default, configurable in *Administration* → *General* → *Other*). If you wish hosts to be added to another group, add a *Remove from host groups* operation (specifying "Discovered hosts") and also add an *Add to host groups* operation (specifying another host group), because a host must belong to a host group.

Host naming

When adding hosts, a host name is the result of reverse DNS lookup or IP address if reverse lookup fails. Lookup is performed from the Zabbix server or Zabbix proxy, depending on which is doing the discovery. If lookup fails on the proxy, it is not retried on the server. If the host with such a name already exists, the next host would get **_2** appended to the name, then **_3** and so on.

It is also possible to override DNS/IP lookup and instead use an item value for host name, for example:

- You may discover multiple servers with Zabbix agent running using a Zabbix agent item for discovery and assign proper names to them automatically, based on the string value returned by this item
- You may discover multiple SNMP network devices using an SNMP agent item for discovery and assign proper names to them automatically, based on the string value returned by this item

If the host name has been set using an item value, it is not updated during the following discovery checks. If it is not possible to set host name using an item value, default value (DNS name) is used.

If a host already exists with the discovered IP address, a new host is not created. However, if the discovery action contains operations (link template, add to host group, etc), they are performed on the existing host.

Host removal

Hosts discovered by a network discovery rule are removed automatically from *Monitoring* → *Discovery* if a discovered entity is not in the rule's IP range any more. Hosts are removed immediately.

Interface creation when adding hosts

When hosts are added as a result of network discovery, they get interfaces created according to these rules:

- the services detected - for example, if an SNMP check succeeded, an SNMP interface will be created
- if a host responded both to Zabbix agent and SNMP requests, both types of interfaces will be created
- if uniqueness criteria are Zabbix agent or SNMP-returned data, the first interface found for a host will be created as the default one. Other IP addresses will be added as additional interfaces.
- if a host responded to agent checks only, it will be created with an agent interface only. If it would start responding to SNMP later, additional SNMP interfaces would be added.
- if 3 separate hosts were initially created, having been discovered by the "IP" uniqueness criteria, and then the discovery rule is modified so that hosts A, B and C have identical uniqueness criteria result, B and C are created as additional interfaces for A, the first host. The individual hosts B and C remain. In *Monitoring* → *Discovery* the added interfaces will be displayed in the "Discovered device" column, in black font and indented, but the "Monitored host" column will only display A, the first created host. "Uptime/Downtime" is not measured for IPs that are considered to be additional interfaces.

Changing proxy setting

The hosts discovered by different proxies are always treated as different hosts. While this allows to perform discovery on matching IP ranges used by different subnets, changing proxy for an already monitored subnet is complicated because the proxy changes must be also applied to all discovered hosts.

For example the steps to replace proxy in a discovery rule:

1. disable discovery rule
2. sync proxy configuration
3. replace the proxy in the discovery rule
4. replace the proxy for all hosts discovered by this rule
5. enable discovery rule

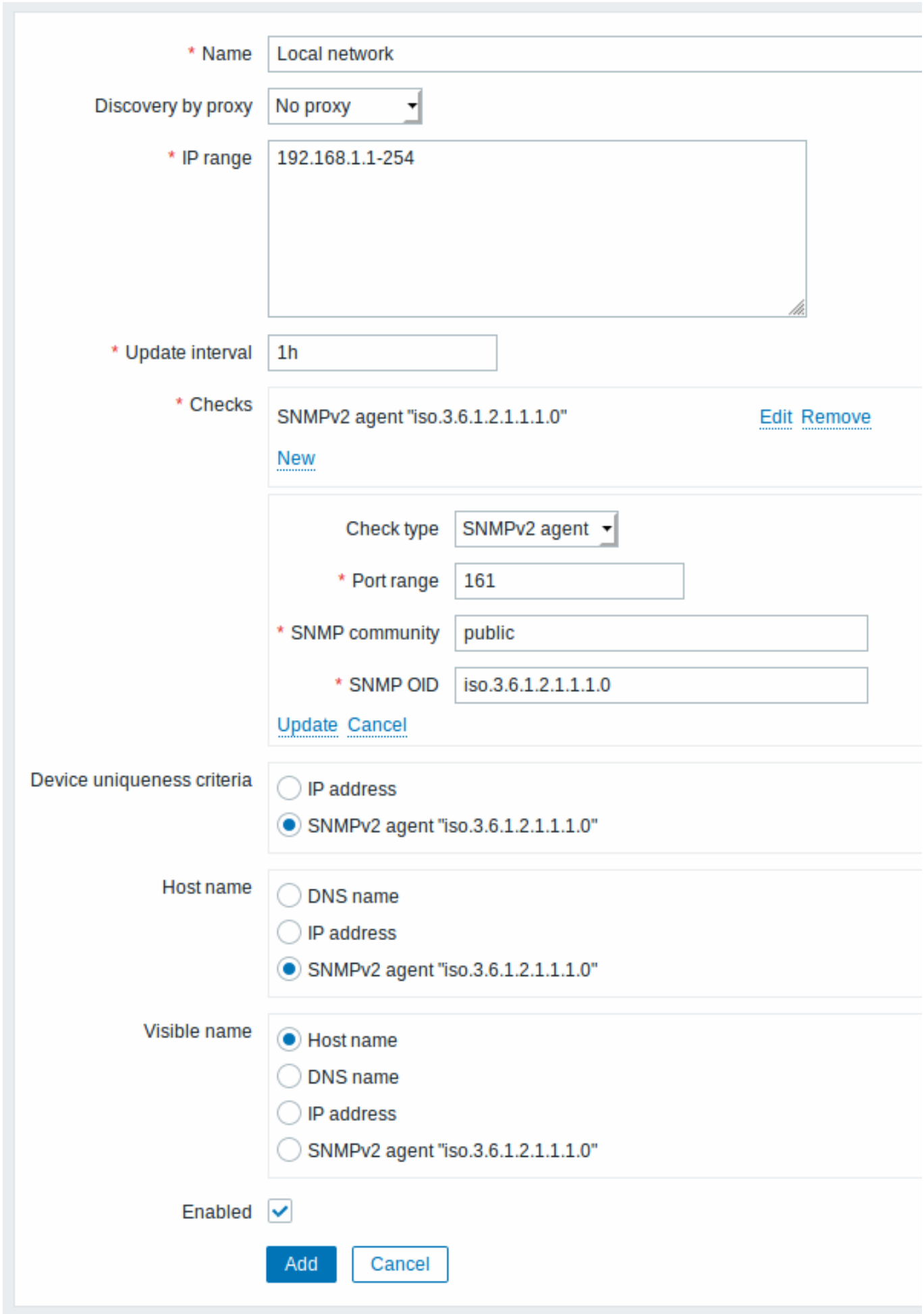
1 Configuring a network discovery rule

Overview

To configure a network discovery rule used by Zabbix to discover hosts and services:

- Go to *Configuration* → *Discovery*
- Click on *Create rule* (or on the rule name to edit an existing one)
- Edit the discovery rule attributes

Rule attributes


* Name
Local network
Discovery by proxy
No proxy
* IP range
192.168.1.1-254
* Update interval
1h
* Checks
SNMPv2 agent "iso.3.6.1.2.1.1.1.0"
Edit
Remove
New
Check type
SNMPv2 agent
* Port range
161
* SNMP community
public
* SNMP OID
iso.3.6.1.2.1.1.1.0
Update
Cancel
Device uniqueness criteria
IP address
SNMPv2 agent "iso.3.6.1.2.1.1.1.0"
Host name
DNS name
IP address
SNMPv2 agent "iso.3.6.1.2.1.1.1.0"
Visible name
Host name
DNS name
IP address
SNMPv2 agent "iso.3.6.1.2.1.1.1.0"
Enabled
Add
Cancel

Parameter	Description
Name	Unique name of the rule. For example, "Local network".
Discovery by proxy	What performs discovery: **no proxy** - Zabbix server is doing discovery **<proxy name>** - this proxy performs discovery
IP range	The range of IP addresses for discovery. It may have the following formats: Single IP: 192.168.1.33 Range of IP addresses: 192.168.1-10.1-255. The range is limited by the total number of covered addresses (less than 64K). IP mask: 192.168.4.0/24 supported IP masks: /16 - /30 for IPv4 addresses /112 - /128 for IPv6 addresses List: 192.168.1.1-255, 192.168.2.1-100, 192.168.2.200, 192.168.4.0/24 Since Zabbix 3.0.0 this field supports spaces, tabulation and multiple lines.
Update interval	This parameter defines how often Zabbix will execute the rule. The interval is measured after the execution of previous discovery instance ends so there is no overlap. Time suffixes are supported, e.g. 30s, 1m, 2h, 1d, since Zabbix 3.4.0. User macros are supported, since Zabbix 3.4.0. *Note* that if a user macro is used and its value is changed (e.g. 1w → 1h), the next check will be executed according to the previous value (far in the future with the example values).
Checks	Zabbix will use this list of checks for discovery. Supported checks: SSH, LDAP, SMTP, FTP, HTTP, HTTPS, POP, NNTP, IMAP, TCP, Telnet, Zabbix agent, SNMPv1 agent, SNMPv2 agent, SNMPv3 agent, ICMP ping. A protocol-based discovery uses the **net.tcp.service[]** functionality to test each host, except for SNMP which queries an SNMP OID. Zabbix agent is tested by querying an item in unencrypted mode. Please see agent items for more details. The 'Ports' parameter may be one of following: Single port: 22 Range of ports: 22-45 List: 22-45,55,60-70
Device uniqueness criteria	Uniqueness criteria may be: **IP address** - no processing of multiple single-IP devices. If a device with the same IP already exists it will be considered already discovered and a new host will not be added. **<discovery check>** - either Zabbix agent or SNMP agent check.
Host name	Set the technical host name of a created host using: **DNS name** - DNS name (default) **IP address** - IP address **<discovery check>** - received string value of the discovery check (e.g. Zabbix agent, SNMP agent check) See also: Host naming. This option is supported since 4.2.0.
Visible name	Set the visible host name of a created host using: **Host name** - technical host name (default) **DNS name** - DNS name **IP address** - IP address **<discovery check>** - received string value of the discovery check (e.g. Zabbix agent, SNMP agent check) See also: Host naming. This option is supported since 4.2.0.
Enabled	With the check-box marked the rule is active and will be executed by Zabbix server. If unmarked, the rule is not active. It won't be executed.

A real life scenario

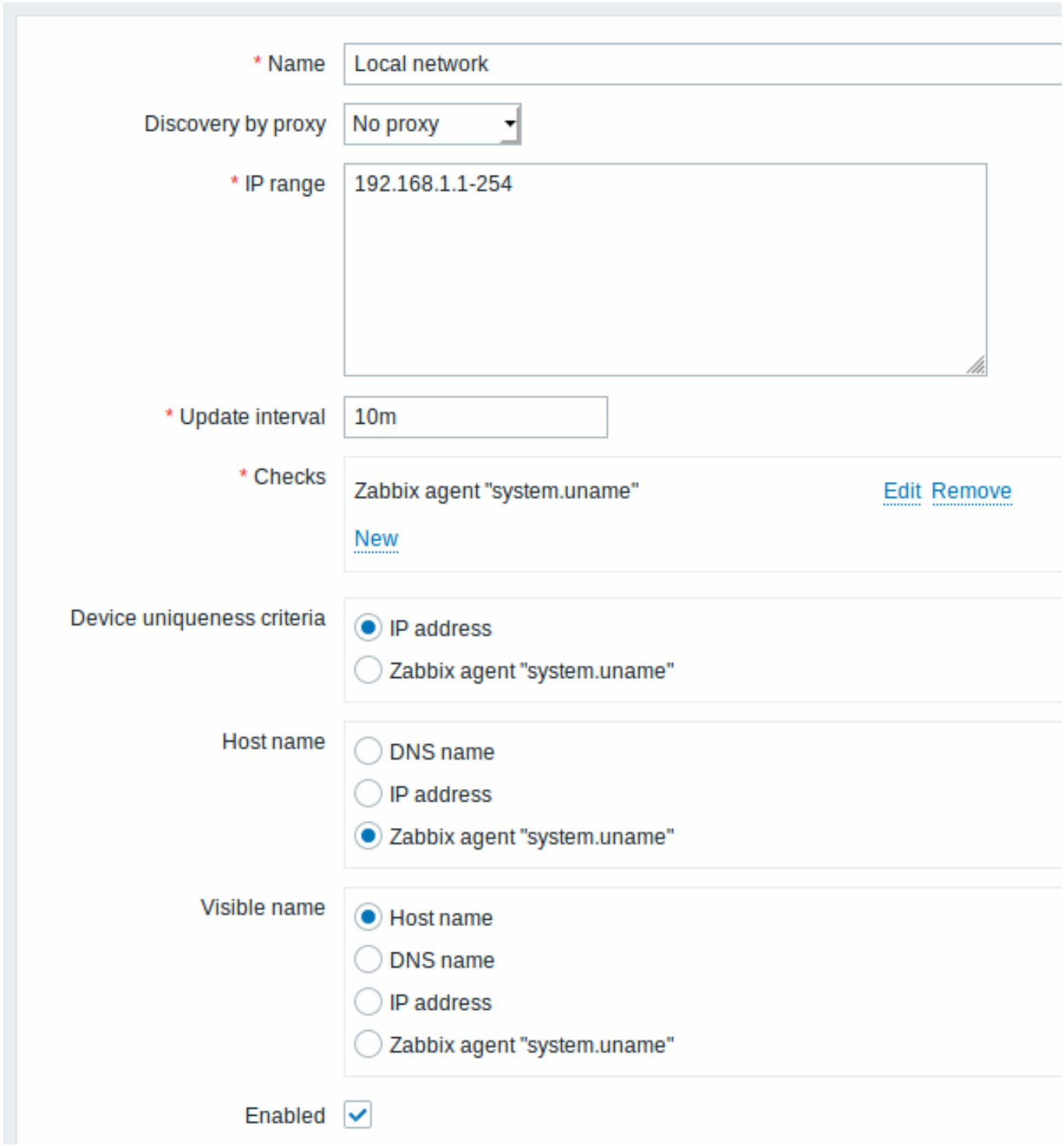
In this example we would like to set up network discovery for the local network having an IP range of 192.168.1.1-192.168.1.254.

In our scenario we want to:

- discover those hosts that have Zabbix agent running
- run discovery every 10 minutes
- add a host to monitoring if the host uptime is more than 1 hour
- remove hosts if the host downtime is more than 24 hours
- add Linux hosts to the ”Linux servers” group
- add Windows hosts to the ”Windows servers” group
- use *Template OS Linux* for Linux hosts
- use *Template OS Windows* for Windows hosts

Step 1

Defining a network discovery rule for our IP range.



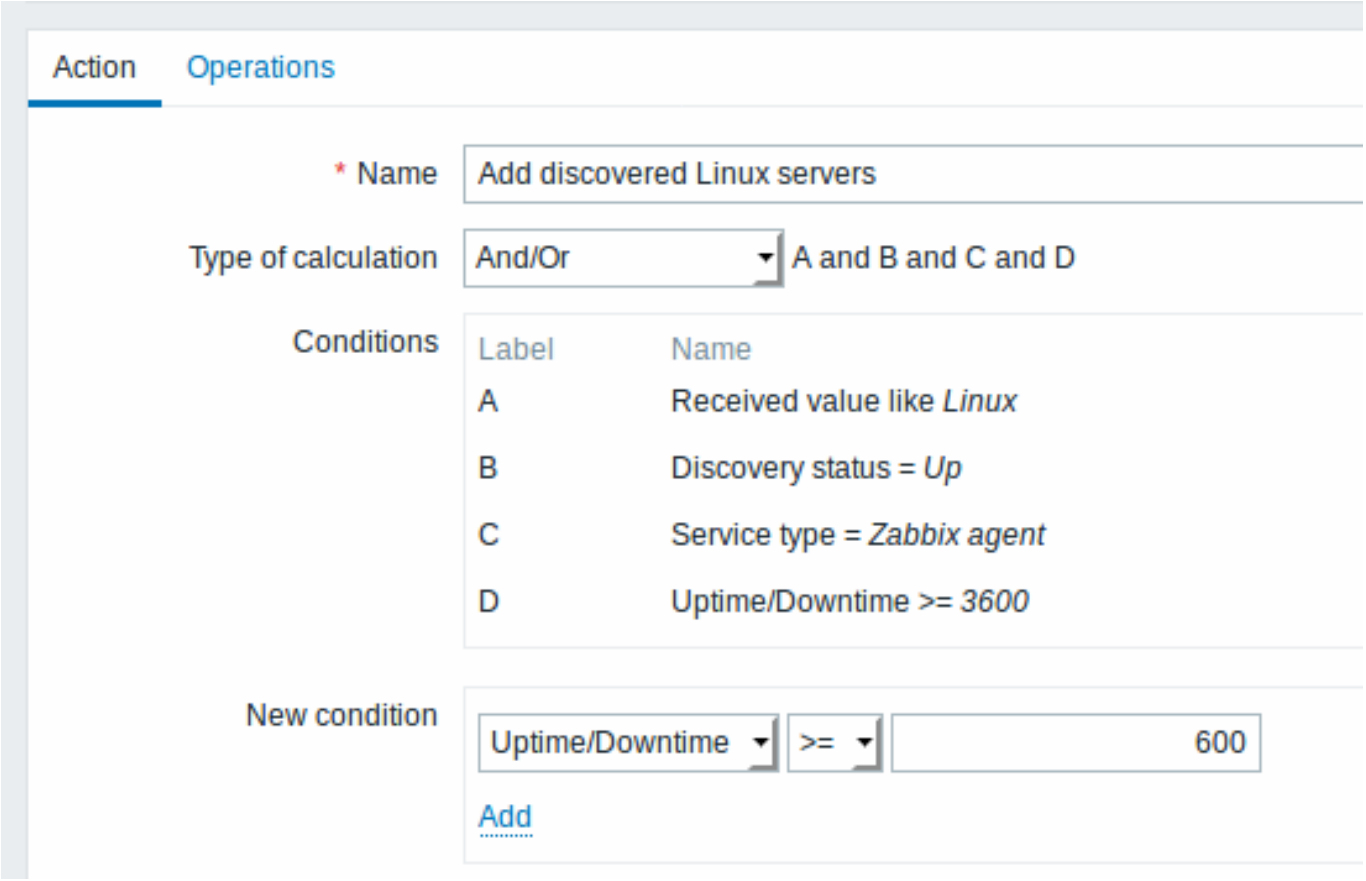
Zabbix will try to discover hosts in the IP range of 192.168.1.1-192.168.1.254 by connecting to Zabbix agents and getting the value from the **system.uname** key. The value received from the agent can be used to name the hosts and also to apply different actions for different operating systems. For example, link Windows servers to Template OS Windows, Linux servers to Template OS Linux.

The rule will be executed every 10 minutes.

When this rule is added, Zabbix will automatically start the discovery and generating discovery-based events for further processing.

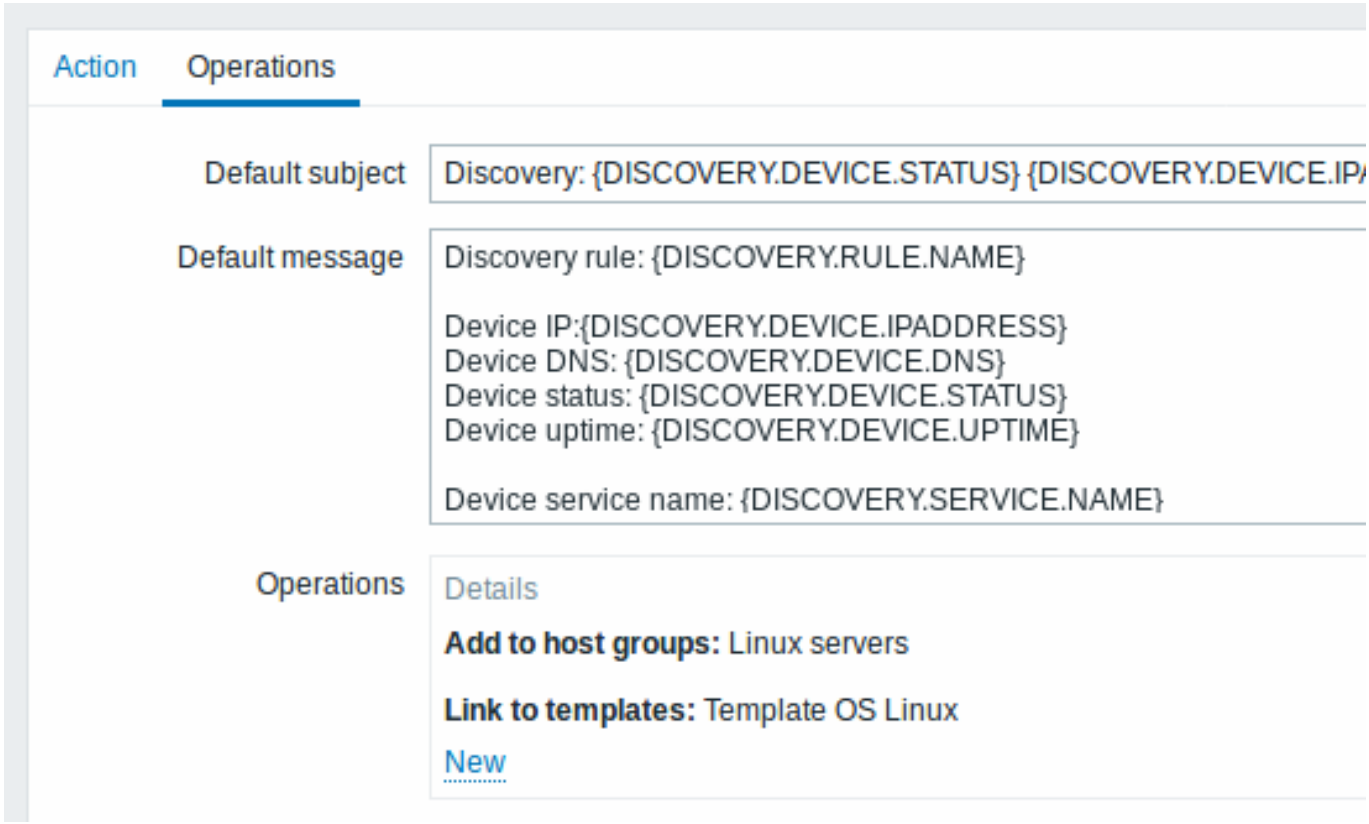
Step 2

Defining an action for adding the discovered Linux servers to the respective group/template.



The action will be activated if:

- the ”Zabbix agent” service is ”up”
- the value of system.uname (the Zabbix agent key we used in rule definition) contains ”Linux”
- Uptime is 1 hour (3600 seconds) or more

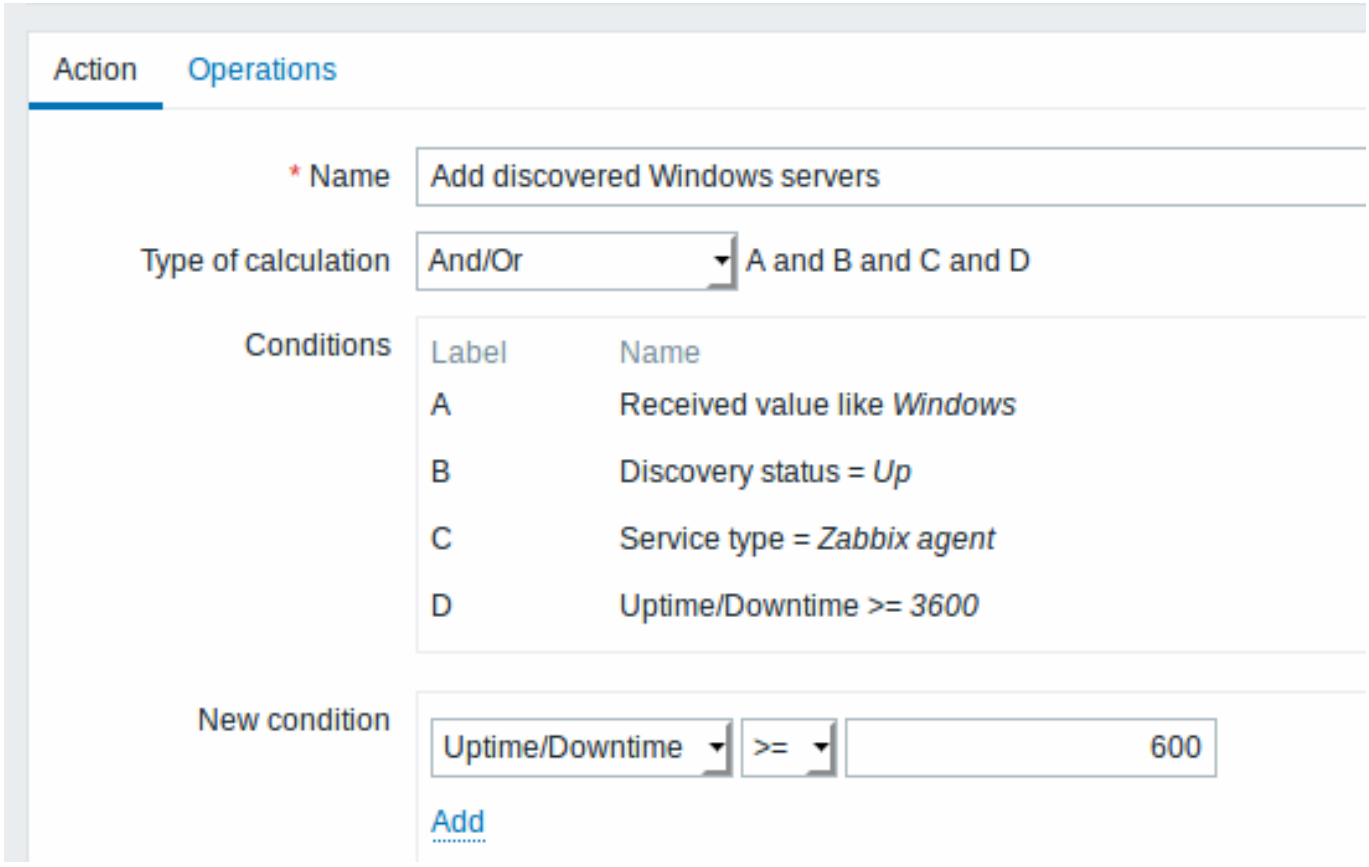


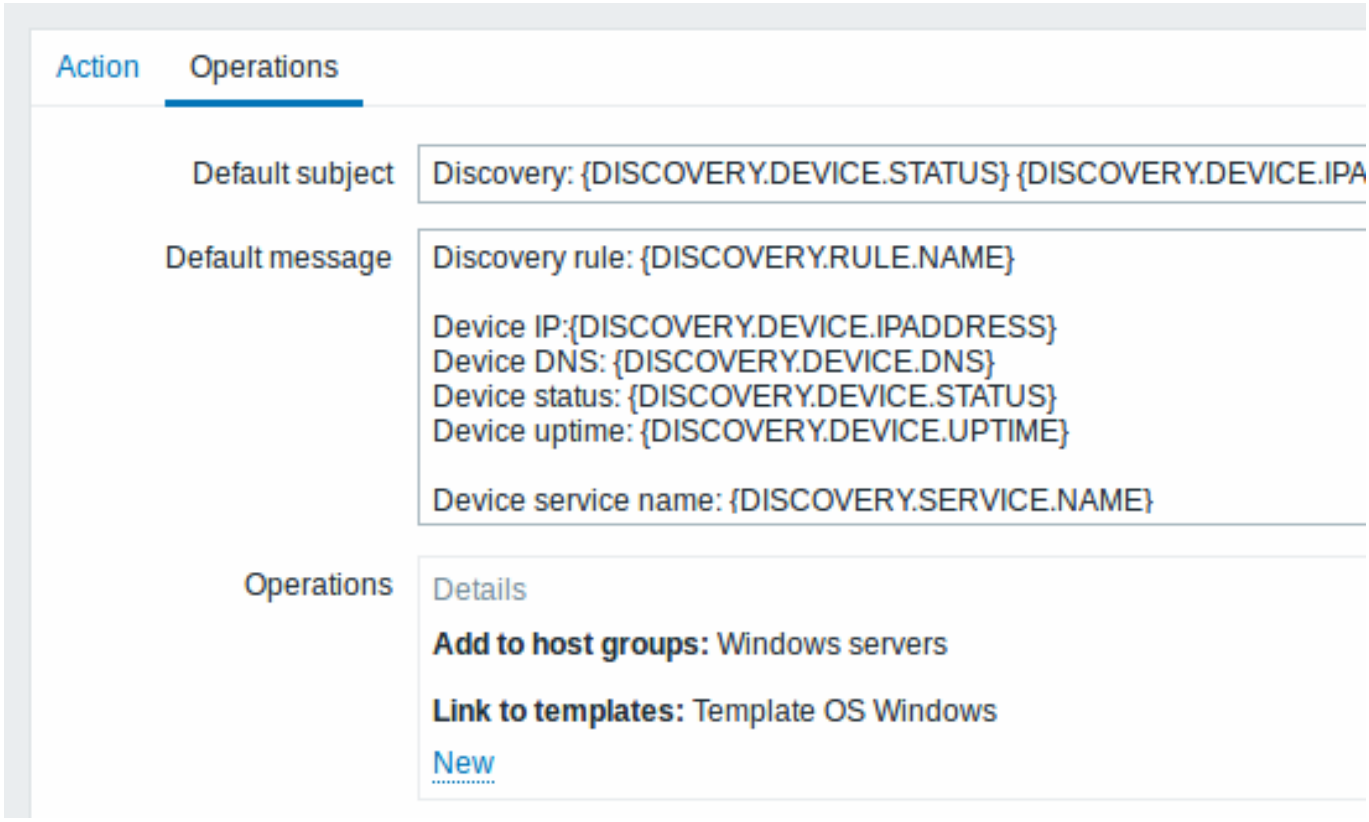
The action will execute the following operations:

- add the discovered host to the ”Linux servers” group (and also add host if it wasn’t added previously)
- link host to the ”Template OS Linux” template. Zabbix will automatically start monitoring the host using items and triggers from ”Template OS Linux”.

Step 3

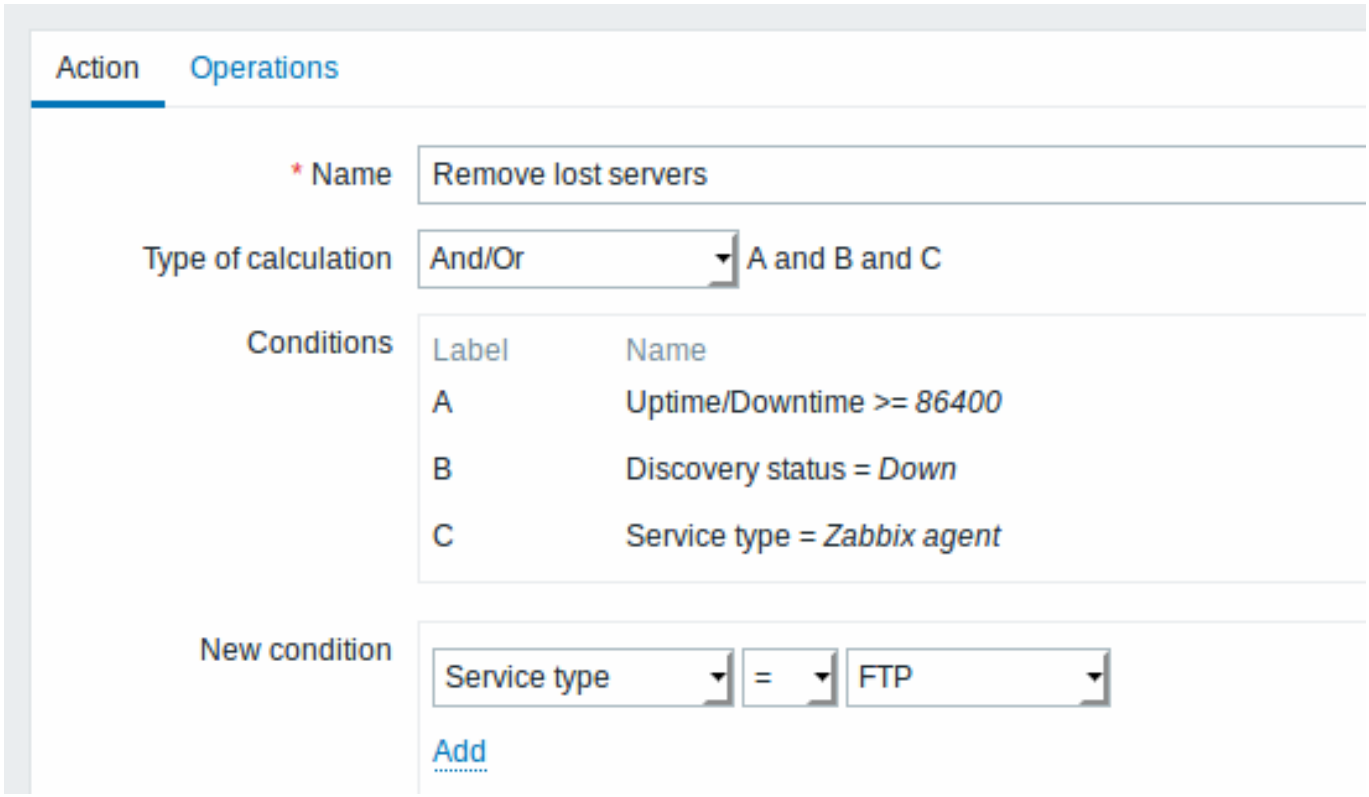
Defining an action for adding the discovered Windows servers to the respective group/template.

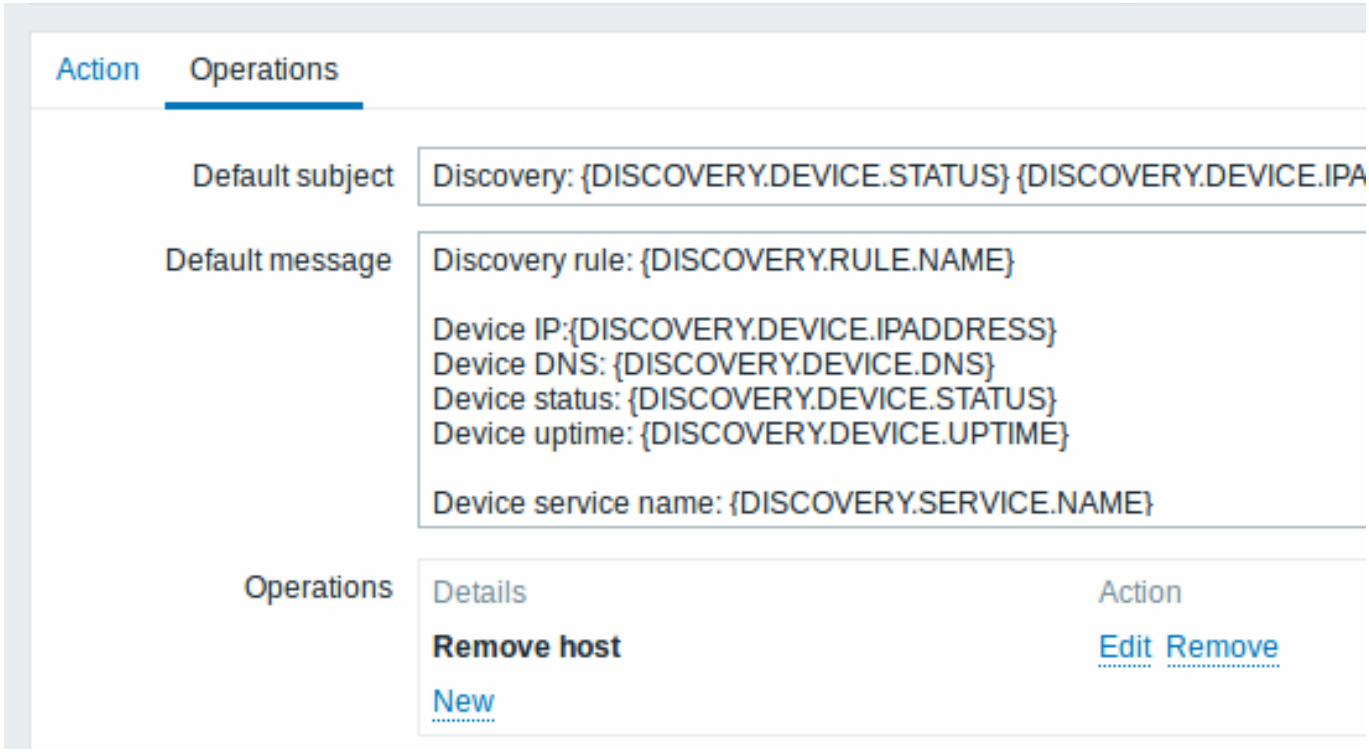




Step 4

Defining an action for removing lost servers.





A server will be removed if ”Zabbix agent” service is ’down’ for more than 24 hours (86400 seconds).

2 Active agent autoregistration

Overview

It is possible to allow active Zabbix agent autoregistration, after which the server can start monitoring them. This way new hosts can be added for monitoring without configuring them manually on the server.

Autoregistration can happen when a previously unknown active agent asks for checks.

The feature might be very handy for automatic monitoring of new Cloud nodes. As soon as you have a new node in the Cloud Zabbix will automatically start the collection of performance and availability data of the host.

Active agent autoregistration also supports the monitoring of added hosts with passive checks. When the active agent asks for checks, providing it has the ’ListenIP’ or ’ListenPort’ configuration parameters defined in the configuration file, these are sent along to the server. (If multiple IP addresses are specified, the first one is sent to the server.)

Server, when adding the new autoregistered host, uses the received IP address and port to configure the agent. If no IP address value is received, the one used for the incoming connection is used. If no port value is received, 10050 is used.

It is possible to specify that the host should be autoregistered with a DNS name as the default agent interface.

Autoregistration is rerun:

- if host metadata information changes:
  - due to HostMetadata changed and agent restarted
  - due to value returned by HostMetadataItem changed
- for manually created hosts with metadata missing
- if a host is manually changed to be monitored by another Zabbix proxy
- if autoregistration for the same host comes from a new Zabbix proxy

Configuration

Specify server

Make sure you have the Zabbix server identified in the agent configuration file - zabbix_agentd.conf

```
ServerActive=10.0.0.1
```

Unless you specifically define a *Hostname* in zabbix_agentd.conf, the system hostname of agent location will be used by server for naming the host. The system hostname in Linux can be obtained by running the ’hostname’ command.

Restart the agent after making any changes to the configuration file.

Action for active agent autoregistration

When server receives an autoregistration request from an agent it calls an action. An action of event source "Auto registration" must be configured for agent autoregistration.

> **Note:**
> Setting up network discovery is not required to have active agents autoregister.

In the Zabbix frontend, go to *Configuration* → *Actions*, select *Auto registration* as the event source and click on *Create action*:

- In the Action tab, give your action a name
- Optionally specify conditions. You can do a substring match or regular expression match in the conditions for host name/host metadata. If you are going to use the "Host metadata" condition, see the next section.
- In the Operations tab, add relevant operations, such as - 'Add host', 'Add to host group' (for example, *Discovered hosts*), 'Link to templates', etc.

> **Note:**
> If the hosts that will be autoregistering are likely to be supported for active monitoring only (such as hosts that are firewalled from your Zabbix server) then you might want to create a specific template like *Template_Linux-active* to link to.

Created hosts are added to the *Discovered hosts* group (by default, configurable in *Administration* → *General* → *Other*). If you wish hosts to be added to another group, add a *Remove from host group* operation (specifying "Discovered hosts") and also add an *Add to host group* operation (specifying another host group), because a host must belong to a host group.

Secure autoregistration

A secure way of autoregistration is possible by configuring PSK-based authentication with encrypted connections.

The level of encryption is configured globally in *Administration* → *General*, in the Autoregistration section accessible through the dropdown to the right. It is possible to select no encryption, TLS encryption with PSK authentication or both (so that some hosts may register without encryption while others through encryption).

Authentication by PSK is verified by Zabbix server before adding a host. If successful, the host is added and *Connections from/to host* are set to 'PSK' only with identity/pre-shared key the same as in the global autoregistration setting.

> **Attention:**
> To ensure security of autoregistration on installations using proxies, encryption between Zabbix server and proxy should be enabled.

Using DNS as default interface

HostInterface and HostInterfaceItem configuration parameters allow to specify a custom value for the host interface during autoregistration.

More specifically, they are useful if the host should be autoregistered with a DNS name as the default agent interface rather than its IP address. In that case the DNS name should be specified or returned as the value of either HostInterface or HostInterfaceItem parameters. Note that if the value of one of the two parameters changes, the autoregistered host interface is updated. So it is possible to update the default interface to another DNS name or update it to an IP address. For the changes to take effect though, the agent has to be restarted.

Using host metadata

When agent is sending an autoregistration request to the server it sends its hostname. In some cases (for example, Amazon cloud nodes) a hostname is not enough for Zabbix server to differentiate discovered hosts. Host metadata can be optionally used to send other information from an agent to the server.

Host metadata is configured in the agent configuration file - zabbix_agentd.conf. There are 2 ways of specifying host metadata in the configuration file:

`HostMetadata`
`HostMetadataItem`

See the description of the options in the link above.

<note:important>An autoregistration attempt happens every time an active agent sends a request to refresh active checks to the server. The delay between requests is specified in the RefreshActiveChecks parameter of the agent. The first request is sent immediately after the agent is restarted.

Example 1

Using host metadata to distinguish between Linux and Windows hosts.

Say you would like the hosts to be autoregistered by the Zabbix server. You have active Zabbix agents (see "Configuration" section above) on your network. There are Windows hosts and Linux hosts on your network and you have "Template OS Linux" and "Template OS Windows" templates available in your Zabbix frontend. So at host registration you would like the appropriate Linux/Windows template to be applied to the host being registered. By default only the hostname is sent to the server at autoregistration, which might not be enough. In order to make sure the proper template is applied to the host you should use host metadata.

Frontend configuration

The first thing to do is to configure the frontend. Create 2 actions. The first action:

- Name: Linux host autoregistration
- Conditions: Host metadata contains *Linux*
- Operations: Link to templates: Template OS Linux

Note:
You can skip an "Add host" operation in this case. Linking to a template requires adding a host first so the server will do that automatically.

The second action:

- Name: Windows host autoregistration
- Conditions: Host metadata contains *Windows*
- Operations: Link to templates: Template OS Windows

Agent configuration

Now you need to configure the agents. Add the next line to the agent configuration files:

```
HostMetadataItem=system.uname
```

This way you make sure host metadata will contain "Linux" or "Windows" depending on the host an agent is running on. An example of host metadata in this case:

```
Linux: Linux server3 3.2.0-4-686-pae #1 SMP Debian 3.2.41-2 i686 GNU/Linux
Windows: Windows WIN-0PXGGSTYNHO 6.0.6001 Windows Server 2008 Service Pack 1 Intel IA-32
```

Do not forget to restart the agent after making any changes to the configuration file.

Example 2

Step 1

Using host metadata to allow some basic protection against unwanted hosts registering.

Frontend configuration

Create an action in the frontend, using some hard-to-guess secret code to disallow unwanted hosts:

- Name: Autoregistration action Linux
- Conditions:

```
    * Type of calculation: AND
    * Condition (A): Host metadata contains //Linux//
    * Condition (B): Host metadata contains //21df83bf21bf0be663090bb8d4128558ab9b95fba66a6dbf834f8b91ae5e
* Operations:
    * Send message to users: Admin via all media
    * Add to host groups: Linux servers
    * Link to templates: Template OS Linux
```

Please note that this method alone does not provide strong protection because data is transmitted in plain text. Configuration cache reload is required for changes to have an immediate effect.

Agent configuration

Add the next line to the agent configuration file:

```
HostMetadata=Linux      21df83bf21bf0be663090bb8d4128558ab9b95fba66a6dbf834f8b91ae5e08ae
```

where "Linux" is a platform, and the rest of the string is the hard-to-guess secret text.

Do not forget to restart the agent after making any changes to the configuration file.

Step 2

It is possible to add additional monitoring for an already registered host.

Frontend configuration

Update the action in the frontend:

- Name: Autoregistration action Linux
- Conditions:

```
    * Type of calculation: AND
    * Condition (A): Host metadata contains Linux
    * Condition (B): Host metadata contains 21df83bf21bf0be663090bb8d4128558ab9b95fba66a6dbf834f8b91ae5e08
* Operations:
    * Send message to users: Admin via all media
    * Add to host groups: Linux servers
    * Link to templates: Template OS Linux
    * Link to templates: Template DB MySQL
```

Agent configuration

Update the next line in the agent configuration file:

```
HostMetadata=MySQL on Linux 21df83bf21bf0be663090bb8d4128558ab9b95fba66a6dbf834f8b91ae5e08ae
```

Do not forget to restart the agent after making any changes to the configuration file.

3 Low-level discovery

Overview

Low-level discovery provides a way to automatically create items, triggers, and graphs for different entities on a computer. For instance, Zabbix can automatically start monitoring file systems or network interfaces on your machine, without the need to create items for each file system or network interface manually. Additionally it is possible to configure Zabbix to remove unneeded entities automatically based on actual results of periodically performed discovery.

A user can define their own types of discovery, provided they follow a particular JSON protocol.

The general architecture of the discovery process is as follows.

First, a user creates a discovery rule in ”Configuration” → ”Templates” → ”Discovery” column. A discovery rule consists of (1) an item that discovers the necessary entities (for instance, file systems or network interfaces) and (2) prototypes of items, triggers, and graphs that should be created based on the value of that item.

An item that discovers the necessary entities is like a regular item seen elsewhere: the server asks a Zabbix agent (or whatever the type of the item is set to) for a value of that item, the agent responds with a textual value. The difference is that the value the agent responds with should contain a list of discovered entities in a JSON format. While the details of this format are only important for implementers of custom discovery checks, it is necessary to know that the returned value contains a list of macro → value pairs. For instance, item ”net.if.discovery” might return two pairs: ”{#IFNAME}” → ”lo” and ”{#IFNAME}” → ”eth0”.

These macros are used in names, keys and other prototype fields where they are then substituted with the received values for creating real items, triggers, graphs or even hosts for each discovered entity. See the full list of options for using LLD macros.

When the server receives a value for a discovery item, it looks at the macro → value pairs and for each pair generates real items, triggers, and graphs, based on their prototypes. In the example with ”net.if.discovery” above, the server would generate one set of items, triggers, and graphs for the loopback interface ”lo”, and another set for interface ”eth0”.

Note that since **Zabbix 4.2**, the format of the JSON returned by low-level discovery rules has been changed. It is no longer expected that the JSON will contain the ”data” object. Low-level discovery will now accept a normal JSON containing an array, in order to support new features such as the item value preprocessing and custom paths to low-level discovery macro values in a JSON document.

Built-in discovery keys have been updated to return an array of LLD rows at the root of JSON document. Zabbix will automatically extract a macro and value if an array field uses the {#MACRO} syntax as a key. Any new native discovery checks will use the new syntax without the ”data” elements. When processing a low-level discovery value first the root is located (array at `$.` or `$.data`).

While the ”data” element has been removed from all native items related to discovery, for backward compatibility Zabbix will still accept the JSON notation with a ”data” element, though its use is discouraged. If the JSON contains an object with only one ”data”

array element, then it will automatically extract the content of the element using JSONPath `$.data`. Low-level discovery now accepts optional user-defined LLD macros with a custom path specified in JSONPath syntax.

Warning:
As a result of the changes above, newer agents no longer will be able to work with an older Zabbix server.

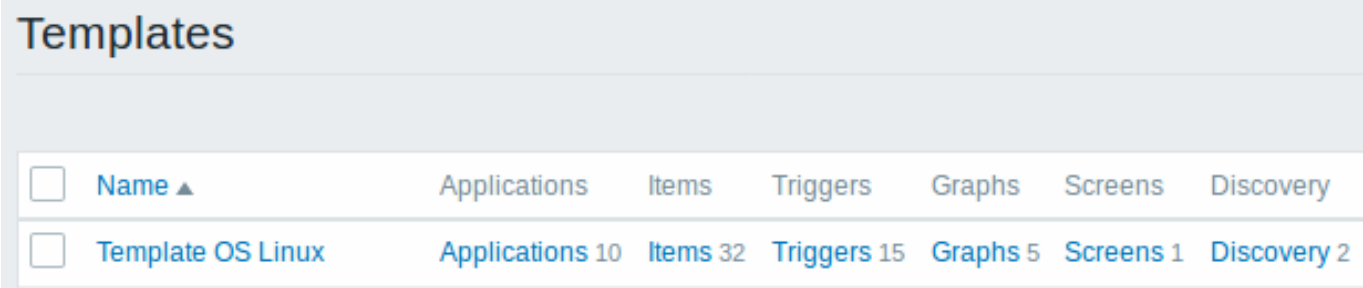
See also: Discovered entities

Configuring low-level discovery

We will illustrate low-level discovery based on an example of file system discovery.

To configure the discovery, do the following:

- Go to: *Configuration* → *Templates* or *Hosts*
- Click on *Discovery* in the row of an appropriate template/host



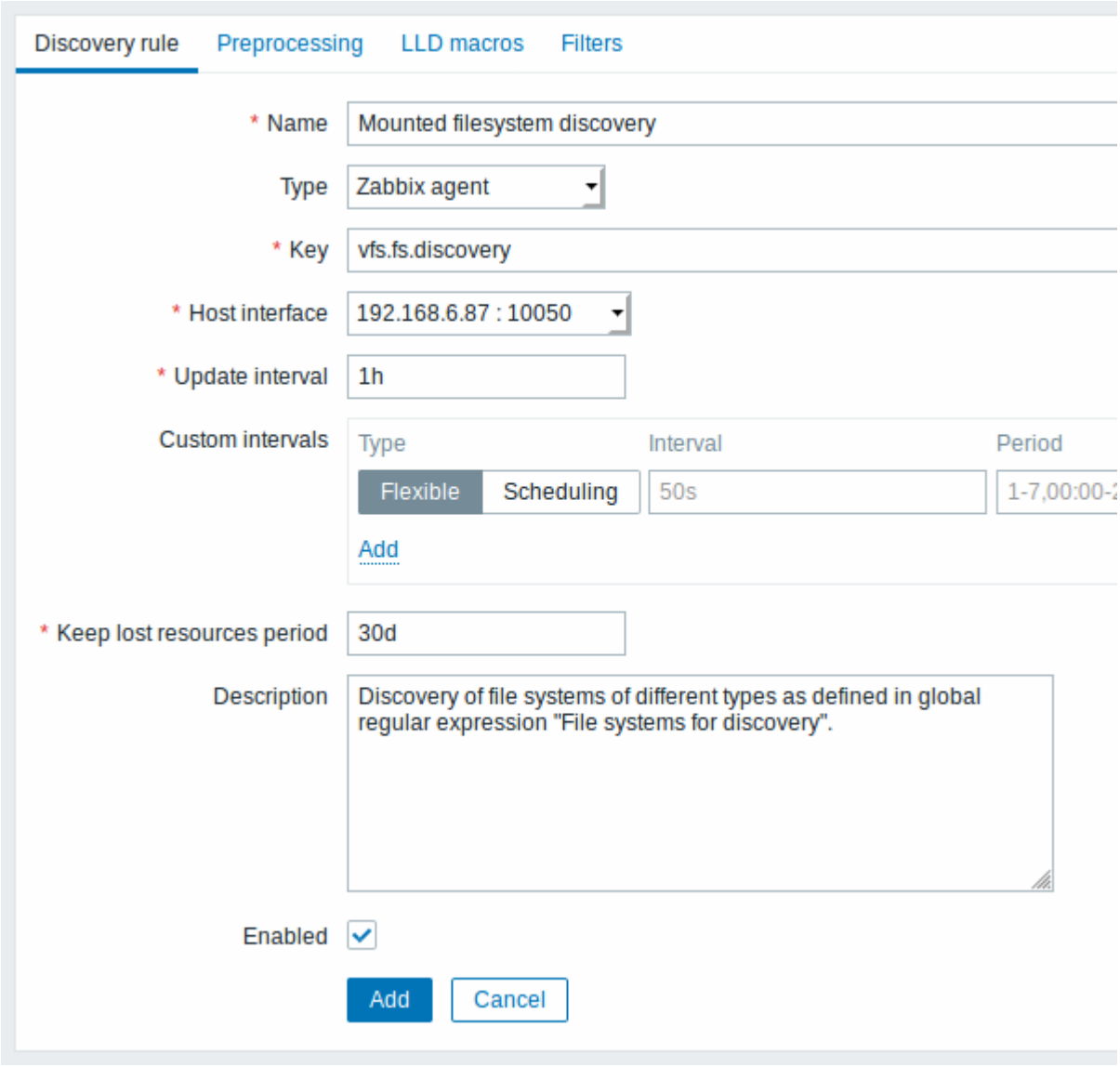
- Click on *Create discovery rule* in the upper right corner of the screen
- Fill in the discovery rule form with the required details

Discovery rule

The discovery rule form contains four tabs, representing, from left to right, the data flow during discovery:

- *Discovery rule* - specifies, most importantly, the built-in item or custom script to retrieve discovery data
- *Preprocessing* - applies some preprocessing to the discovered data
- *LLD macros* - allows to extract some macro values to use in discovered items, triggers, etc
- *Filters* - allows to filter the discovered values

The **Discovery rule** tab contains the item key to use for discovery (as well as some general discovery rule attributes):



All mandatory input fields are marked with a red asterisk.

Parameter	Description
Name	Name of discovery rule.
Type	The type of check to perform discovery. In this example we are using a *Zabbix agent* item key. The discovery rule can also be a dependent item, depending on a regular item. It cannot depend on another discovery rule. For a dependent item, select the respective type (*Dependent item*) and specify the master item in the 'Master item' field. The master item must exist.
Key	Enter the discovery item key. For example, you may use the built-in "vfs.fs.discovery" item key to return a JSON with the list of file systems present on the computer and their types. Note that another option for filesystem discovery is using discovery results by the "vfs.fs.get" agent key, supported since Zabbix 4.4.5 (see example).

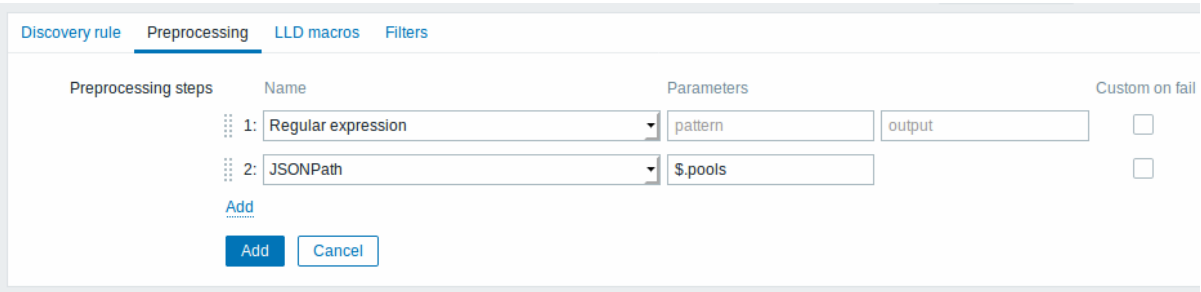
Parameter	Description
Update interval	This field specifies how often Zabbix performs discovery. In the beginning, when you are just setting up file system discovery, you might wish to set it to a small interval, but once you know it works you can set it to 30 minutes or more, because file systems usually do not change very often. Time suffixes are supported, e.g. 30s, 1m, 2h, 1d, since Zabbix 3.4.0. User macros are supported, since Zabbix 3.4.0. *Note*: The update interval can only be set to '0' if custom intervals exist with a non-zero value. If set to '0', and a custom interval (flexible or scheduled) exists with a non-zero value, the item will be polled during the custom interval duration. *Note* that for an existing discovery rule the discovery can be performed immediately by pushing the *Check now* button.
Custom intervals	You can create custom rules for checking the item: **Flexible** - create an exception to the *Update interval* (interval with different frequency) **Scheduling** - create a custom polling schedule. For detailed information see Custom intervals. Scheduling is supported since Zabbix 3.0.0.
Keep lost resources period	This field allows you to specify the duration for how long the discovered entity will be retained (won't be deleted) once its discovery status becomes "Not discovered anymore" (between 1 hour to 25 years; or "0"). Time suffixes are supported, e.g. 2h, 1d, since Zabbix 3.4.0. User macros are supported, since Zabbix 3.4.0. *Note:* If set to "0", entities will be deleted immediately. Using "0" is not recommended, since just wrongly editing the filter may end up in the entity being deleted with all the historical data.
Description	Enter a description.
Enabled	If checked, the rule will be processed.

Note:
Discovery rule history is not preserved.

Preprocessing

The **Preprocessing** tab allows to define transformation rules to apply to the result of discovery. One or several transformations are possible in this step. Transformations are executed in the order in which they are defined. All preprocessing is done by Zabbix server.

See also: Preprocessing details.



Type	Transformation	Description
Text		

Type	Transformation	Description
	Regular expression	Match the received value to the <pattern> regular expression and replace value with the extracted <output>. The regular expression supports extraction of maximum 10 captured groups with the \N sequence. Parameters: **pattern** - regular expression **output** - output formatting template. An \N (where N=1…9) escape sequence is replaced with the Nth matched group. A \0 escape sequence is replaced with the matched text. If you mark the *Custom on fail* checkbox, it is possible to specify custom error handling options: either to discard the value, set a specified value or set a specified error message.
Structured data		
	JSONPath	Extract value or fragment from JSON data using JSONPath functionality. If you mark the *Custom on fail* checkbox, the item will not become unsupported in case of failed preprocessing step and it is possible to specify custom error handling options: either to discard the value, set a specified value or set a specified error message.

	XML XPath	Extract value or fragment from XML data using XPath functionality.
		For this option to work, Zabbix server must be compiled with libxml support.
		Examples:
		`number(/document/item/value)` will extract 10 from `<document><item><value>10</value></item></do`
		`number(/document/item/@attribute)` will extract 10 from `<document><item attribute="10"></item></document>`
		`/document/item` will extract `<item><value>10</value></item>` from `<document><item><value>10</value></item></do`
		Note that namespaces are not supported.
		Supported since 4.4.0.
		If you mark the *Custom on fail* checkbox, it is possible to specify custom error handling options: either to discard the value, set a specified value or set a specified error message.

	CSV to JSON	Convert CSV file data into JSON format. For more information, see: CSV to JSON preprocessing. Supported since 4.4.0.
Custom scripts		
	JavaScript	Enter JavaScript code in the block that appears when clicking in the parameter field or on *Open*. Note that available JavaScript length depends on the database used. For more information, see: Javascript preprocessing
Validation		

Type	Transformation	Description
	Does not match regular expression	Specify a regular expression that a value must not match. E.g. `Error:(.*?)\.` If you mark the *Custom on fail* checkbox, it is possible to specify custom error handling options: either to discard the value, set a specified value or set a specified error message.
	Check for error in JSON	Check for an application-level error message located at JSONpath. Stop processing if succeeded and message is not empty; otherwise continue processing with the value that was before this preprocessing step. Note that these external service errors are reported to user as is, without adding preprocessing step information. E.g. `$.errors`. If a JSON like `{"errors":"e1"}` is received, the next preprocessing step will not be executed. If you mark the *Custom on fail* checkbox, it is possible to specify custom error handling options: either to discard the value, set a specified value or set a specified error message.
	Check for error in XML	Check for an application-level error message located at xpath. Stop processing if succeeded and message is not empty; otherwise continue processing with the value that was before this preprocessing step. Note that these external service errors are reported to user as is, without adding preprocessing step information. No error will be reported in case of failing to parse invalid XML. Supported since 4.4.0. If you mark the *Custom on fail* checkbox, it is possible to specify custom error handling options: either to discard the value, set a specified value or set a specified error message.
Throttling		
	Discard unchanged with heartbeat	Discard a value if it has not changed within the defined time period (in seconds). Positive integer values are supported to specify the seconds (minimum - 1 second). Time suffixes can be used in this field (e.g. 30s, 1m, 2h, 1d). User macros and low-level discovery macros can be used in this field. Only one throttling option can be specified for a discovery item. E.g. `1m`. If identical text is passed into this rule twice within 60 seconds, it will be discarded. *Note*: Changing item prototypes does not reset throttling. Throttling is reset only when preprocessing steps are changed.
Prometheus		
	Prometheus to JSON	Convert required Prometheus metrics to JSON. See Prometheus checks for more details.

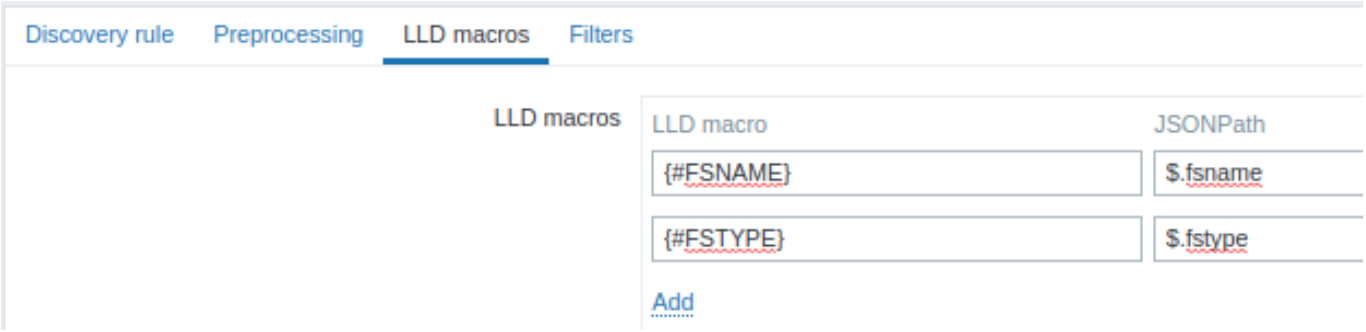
Note that if the discovery rule has been applied to the host via template then the content of this tab is read-only.

Custom macros

The **LLD macros** tab allows to specify custom low-level discovery macros.

Custom macros are useful in cases when the returned JSON does not have the required macros already defined. So, for example:

- The native `vfs.fs.discovery` key for filesystem discovery returns a JSON with some pre-defined LLD macros such as `{#FSNAME}`, `{#FSTYPE}`. These macros can be used in item, trigger prototypes (see subsequent sections of the page) directly; defining custom macros is not needed;
- The `vfs.fs.get` agent item (supported since Zabbix 4.4.5, see more info) also returns a JSON with filesystem data, but without any pre-defined LLD macros. In this case you may define the macros yourself, and map them to the values in the JSON using JSONPath.

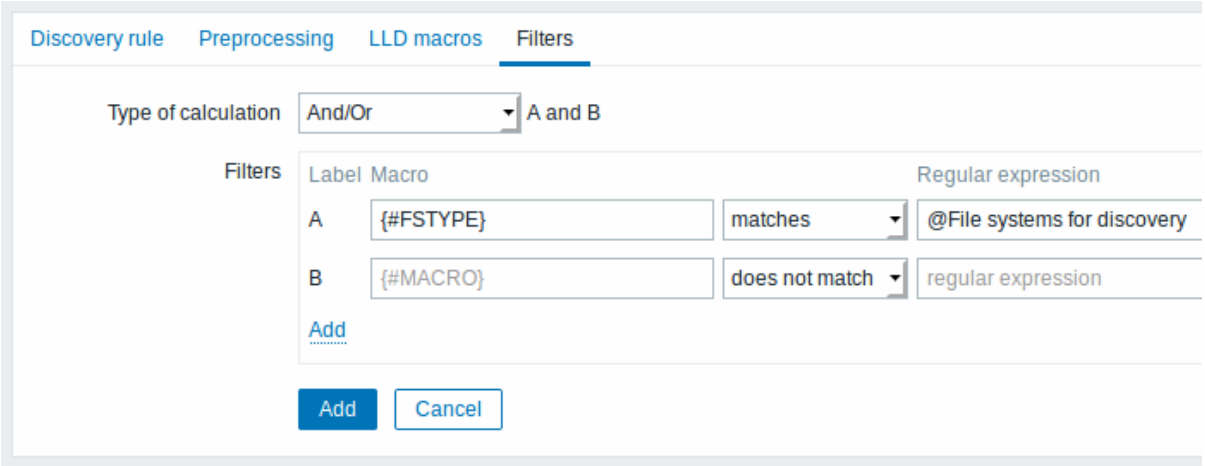


The extracted values can be used in discovered items, triggers, etc. Note that values will be extracted from the result of discovery and any preprocessing steps so far.

Parameter	Description
LLD macro	Name of the low-level discovery macro, using the following syntax: `{#MACRO}`.
JSONPath	Path that is used to extract LLD macro value from a LLD row, using JSONPath syntax. For example, `$.foo` will extract "bar" and "baz" from this JSON: `[{"foo":"bar"}, {"foo":"baz"}]` The values extracted from the returned JSON are used to replace the LLD macros in item, trigger, etc. prototype fields. JSONPath can be specified using the dot notation or the bracket notation. Bracket notation should be used in case of any special characters and Unicode, like `$['unicode + special chars #1']['unicode + special chars #2']`.

Filter

The **Filters** tab contains discovery rule filter definitions allowing to filter discovery values:



Parameter	Description
Type of calculation	The following options for calculating filters are available: **And** - all filters must be passed; **Or** - enough if one filter is passed; **And/Or** - uses *And* with different macro names and *Or* with the same macro name; **Custom expression** - offers the possibility to define a custom calculation of filters. The formula must include all filters in the list. Limited to 255 symbols.
Filters	A filter can be used to generate real items, triggers, and graphs only for certain file systems. It expects a Perl Compatible Regular Expression (PCRE). For instance, if you are only interested in C:, D:, and E: file systems, you could put {#FSNAME} into "Macro" and "^C|^D|^E" regular expression into "Regular expression" text fields. Filtering is also possible by file system types using {#FSTYPE} macro (e.g. "^ext|^reiserfs") and by drive types (supported only by Windows agent) using {#FSDRIVETYPE} macro (e.g., "fixed"). You can enter a regular expression or reference a global regular expression in "Regular expression" field. In order to test a regular expression you can use "grep -E", for example: `for f in ext2 nfs reiserfs smbfs; do echo $f | grep -E '^ext` macro on Windows is supported since Zabbix **3.0.0**. Defining several filters is supported since Zabbix **2.4.0**. Note that if some macro from the filter is missing in the response, the found entity will be ignored. Filter drop-down offers two values to specify whether a macro matches a regular expression or does not match.

Warning:
A mistake or typo in the regular expression used in LLD rule may cause deleting thousands of configuration elements, historical values and events for many hosts. For example, an incorrect "File systems for discovery" regular expression may cause deleting thousands of items, triggers, historical values and events.

Attention:
Zabbix database in MySQL must be created as case-sensitive if file system names that differ only by case are to be discovered correctly.

Form buttons

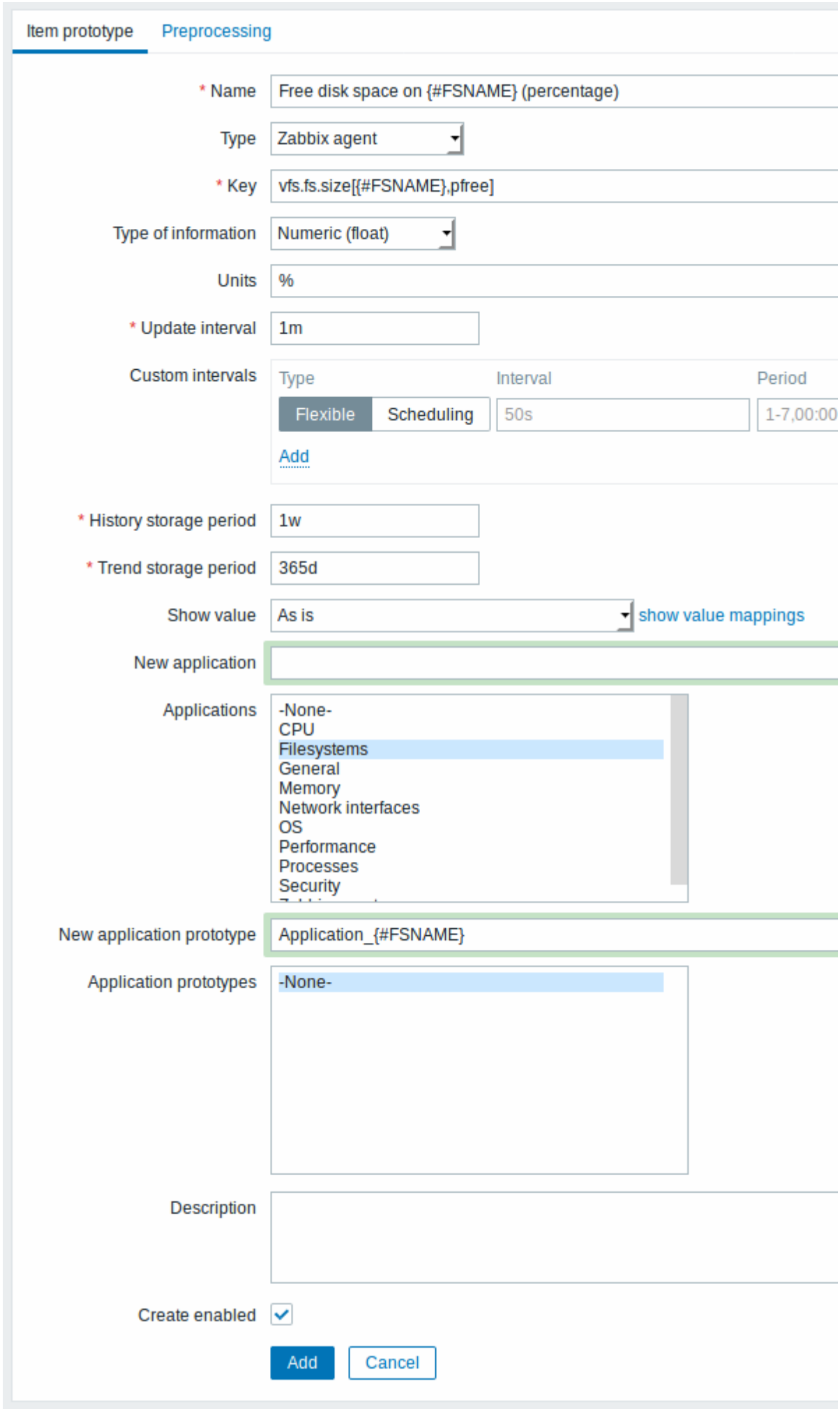
Buttons at the bottom of the form allow to perform several operations.

Add	Add a discovery rule. This button is only available for new discovery rules.
Update	Update the properties of a discovery rule. This button is only available for existing discovery rules.
Clone	Create another discovery rule based on the properties of the current discovery rule.
Check now	Perform discovery based on the discovery rule immediately. The discovery rule must already exist. See more details. *Note* that when performing discovery immediately, configuration cache is not updated, thus the result will not reflect very recent changes to discovery rule configuration.

Delete	Delete the discovery rule.
Cancel	Cancel the editing of discovery rule properties.

Item prototypes

Once a rule is created, go to the items for that rule and press ”Create prototype” to create an item prototype. Note how macro {#FSNAME} is used where a file system name is required. When the discovery rule is processed, this macro will be substituted with the discovered file system.


Item prototype
Preprocessing
* Name
Free disk space on {#FSNAME} (percentage)
Type
Zabbix agent
* Key
vfs.fs.size[{#FSNAME},pfree]
Type of information
Numeric (float)
Units
%
* Update interval
1m
Custom intervals
Type
Interval
Period
Flexible
Scheduling
50s
1-7,00:00
Add
* History storage period
1w
* Trend storage period
365d
Show value
As is
show value mappings
New application
Applications
-None-
CPU
Filesystems
General
Memory
Network interfaces
OS
Performance
Processes
Security
New application prototype
Application_{#FSNAME}
Application prototypes
-None-
Description
Create enabled
Add
Cancel

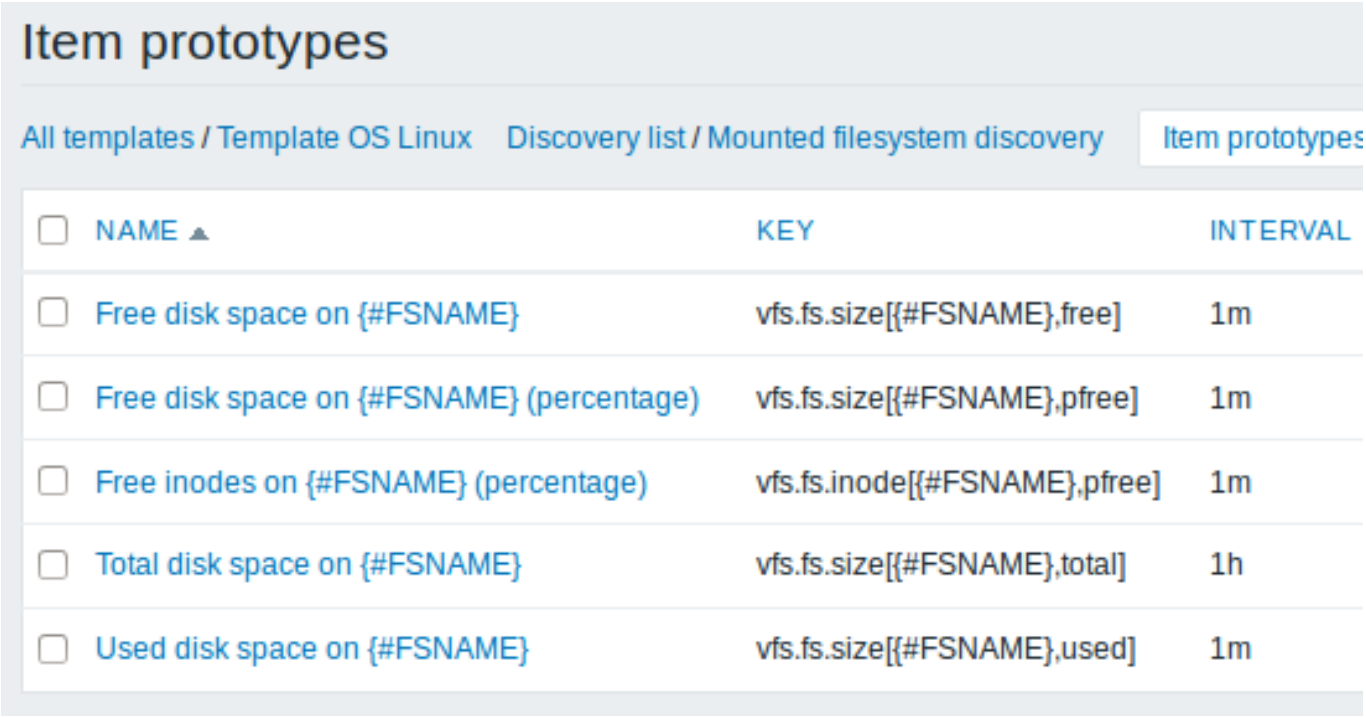
Low-level discovery macros and user macros may be used in item prototype configuration and item value preprocessing parameters. Note that when used in update intervals, a single macro has to fill the whole field. Multiple macros in one field or macros mixed with text are not supported.

Note:
Context-specific escaping of low-level discovery macros is performed for safe use in regular expression and XPath preprocessing parameters.

Attributes that are specific for item prototypes:

Parameter	Description
New application prototype	You may define a new application prototype. In application prototypes you can use low-level discovery macros that, after discovery, will be substituted with real values to create applications that are specific for the discovered entity. See also application discovery notes for more specific information.
Application prototypes	Select from the existing application prototypes.
Create enabled	If checked the item will be added in an enabled state. If unchecked, the item will be added to a discovered entity, but in a disabled state.

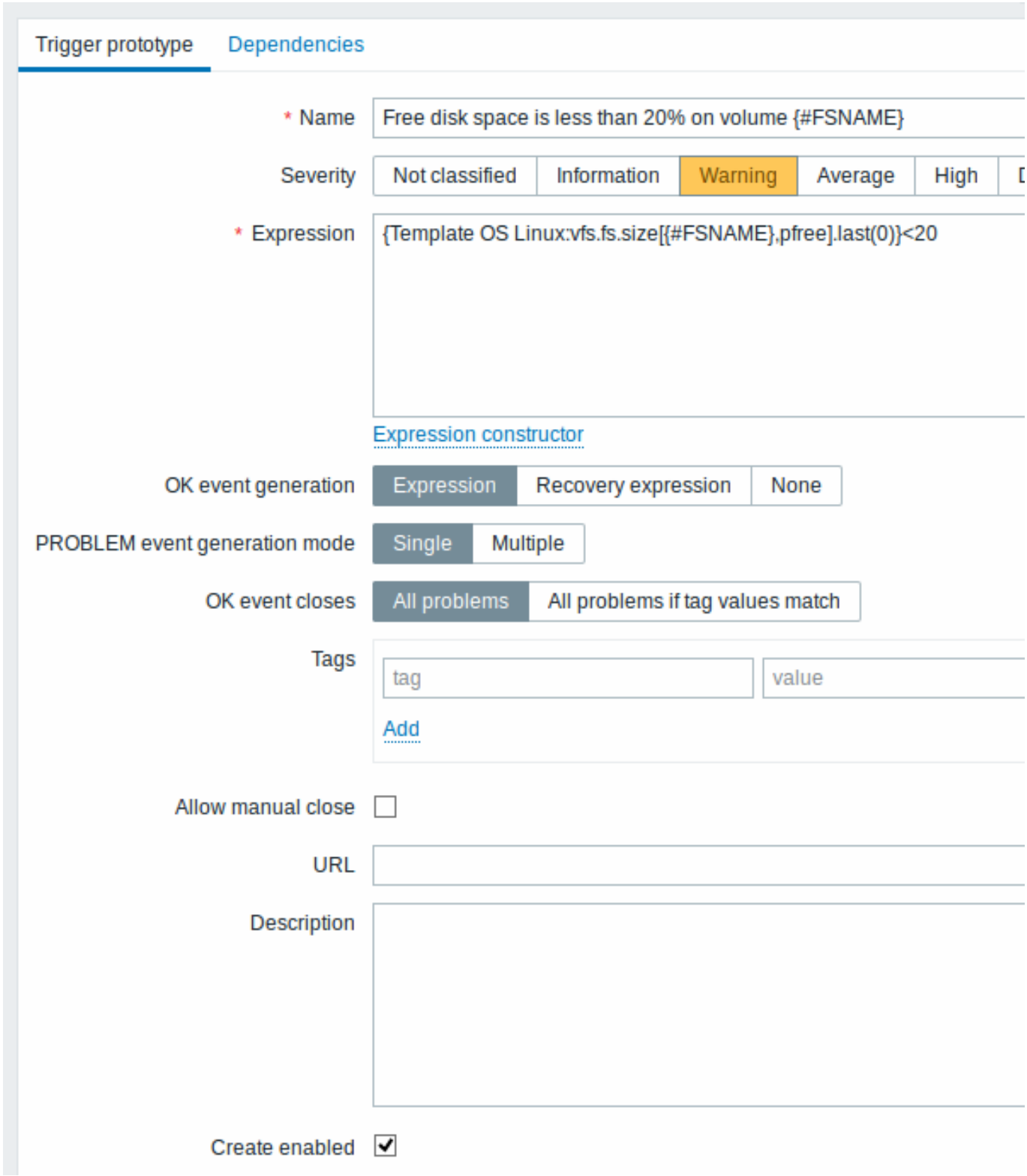
We can create several item prototypes for each file system metric we are interested in:



Mass update option is available if you want to update properties of several item prototypes at once.

Trigger prototypes

We create trigger prototypes in a similar way as item prototypes:



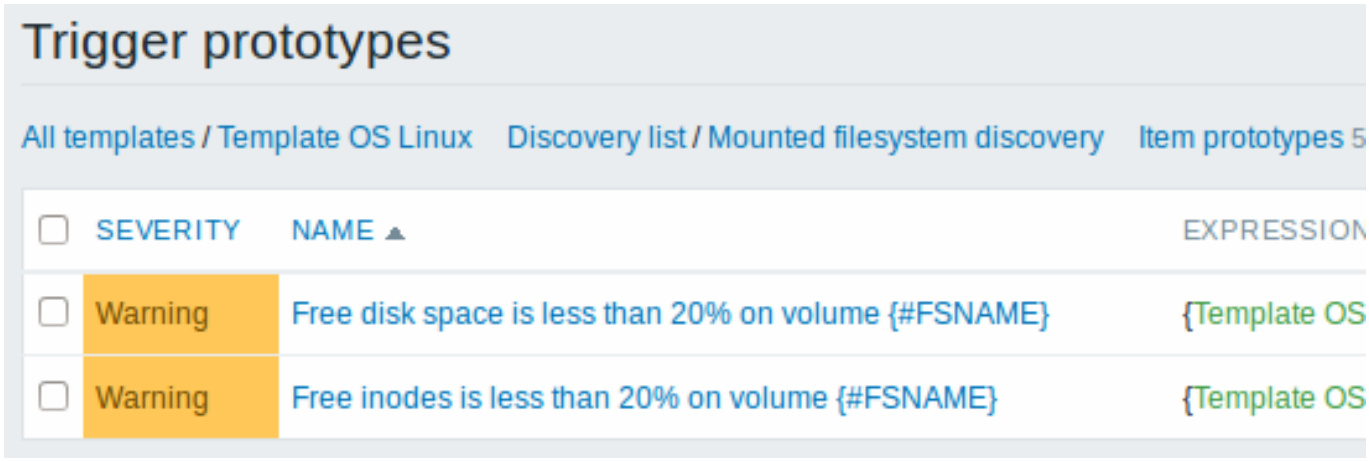
Attributes that are specific for trigger prototypes:

Parameter	Description
Create enabled	If checked the trigger will be added in an enabled state. If unchecked, the trigger will be added to a discovered entity, but in a disabled state.

When real triggers are created from the prototypes, there may be a need to be flexible as to what constant ('20' in our example) is used for comparison in the expression. See how user macros with context can be useful to accomplish such flexibility.

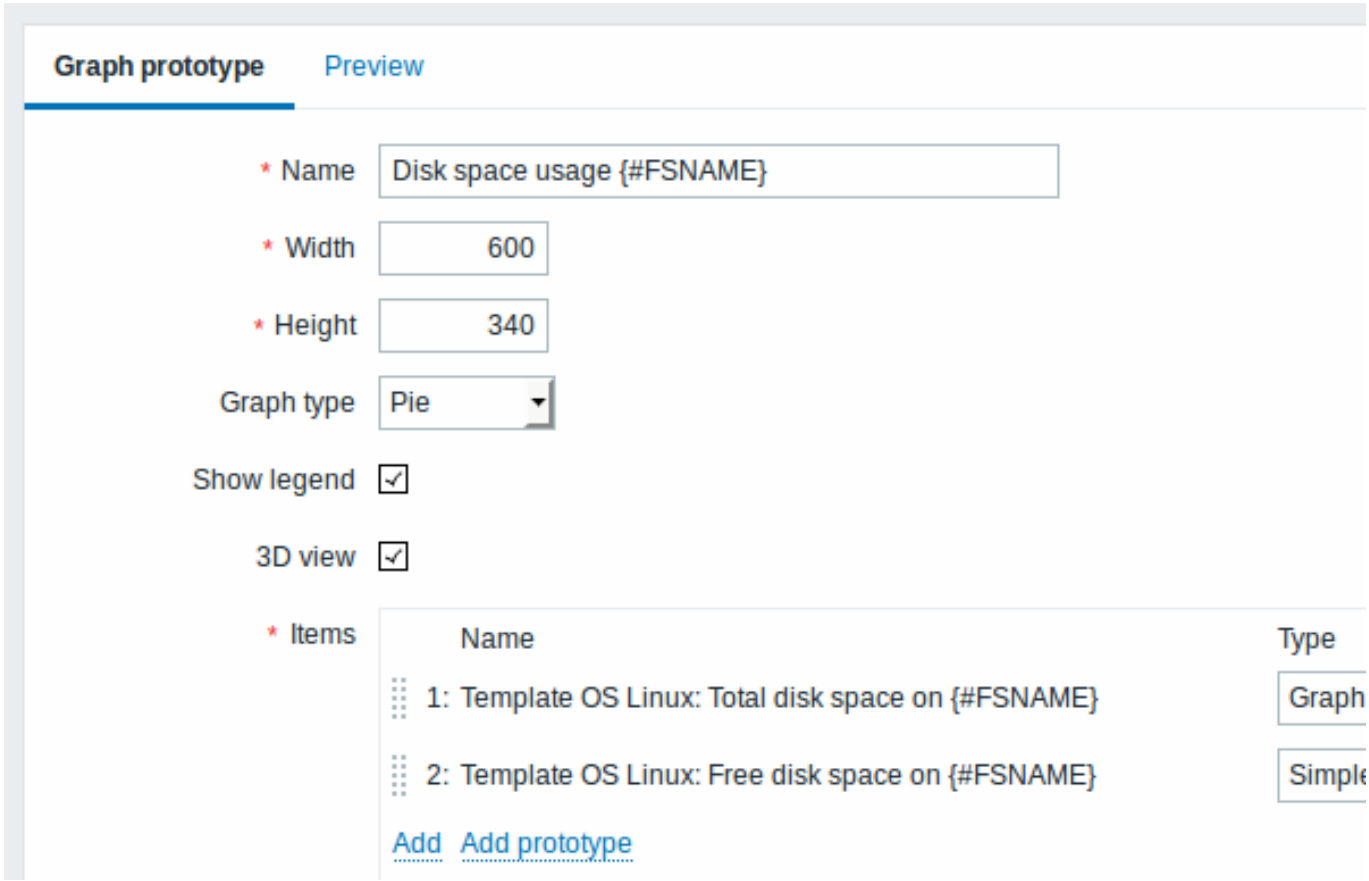
You can define dependencies between trigger prototypes as well (supported since Zabbix 3.0). To do that, go to the *Dependencies* tab. A trigger prototype may depend on another trigger prototype from the same low-level discovery (LLD) rule or on a regular

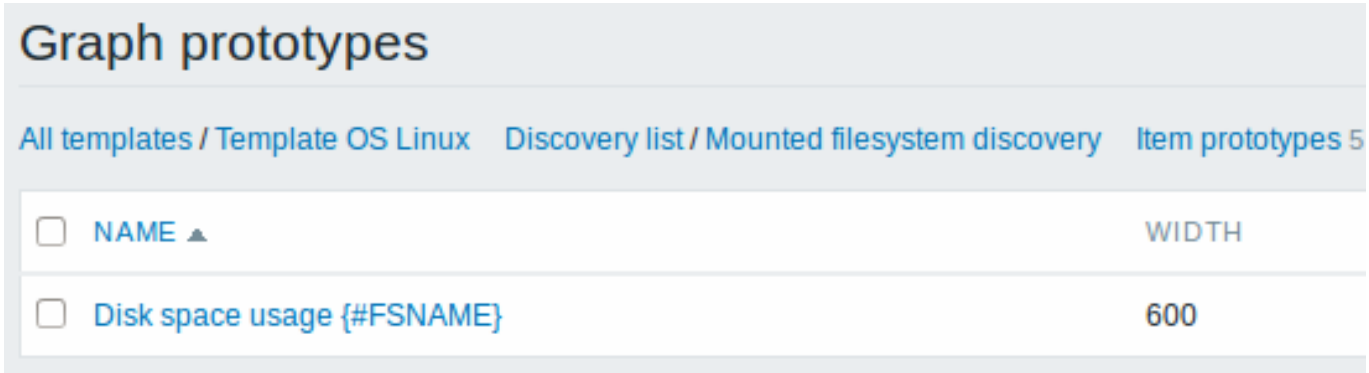
trigger. A trigger prototype may not depend on a trigger prototype from a different LLD rule or on a trigger created from trigger prototype. Host trigger prototype cannot depend on a trigger from a template.



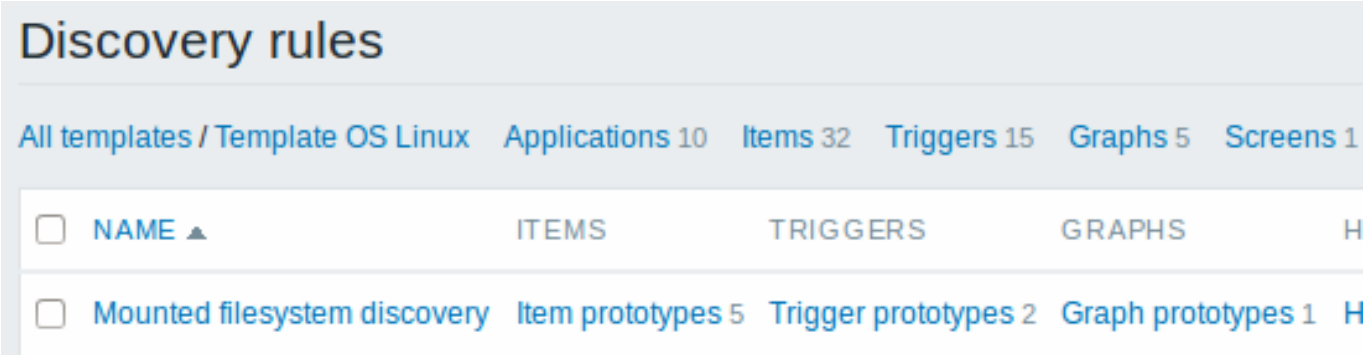
Graph prototypes

We can create graph prototypes, too:





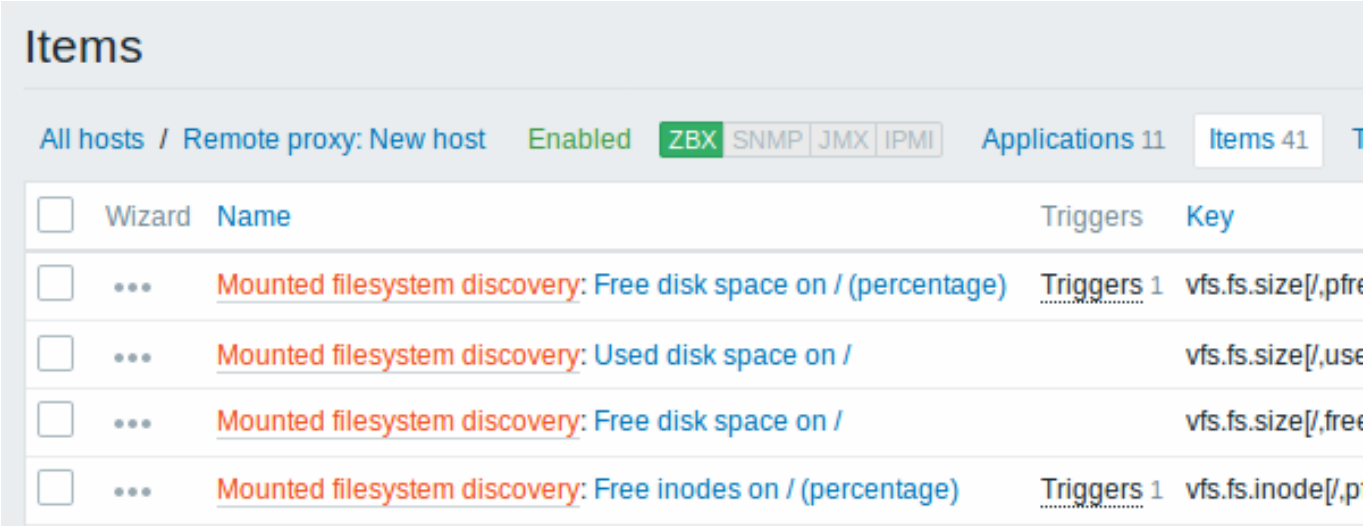
Finally, we have created a discovery rule that looks like shown below. It has five item prototypes, two trigger prototypes, and one graph prototype.



Note: For configuring host prototypes, see the section about host prototype configuration in virtual machine monitoring.

Discovered entities

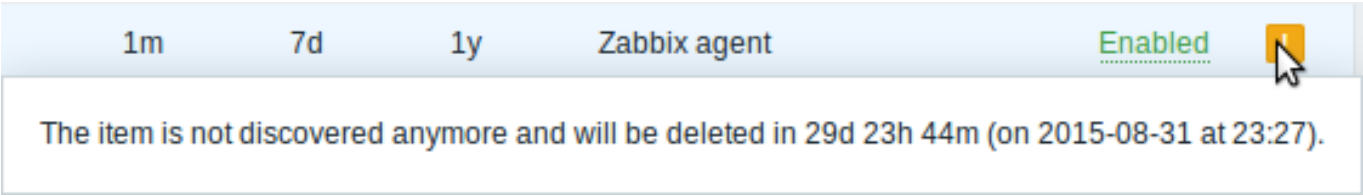
The screenshots below illustrate how discovered items, triggers, and graphs look like in the host's configuration. Discovered entities are prefixed with an orange link to a discovery rule they come from.



Note that discovered entities will not be created in case there are already existing entities with the same uniqueness criteria, for example, an item with the same key or graph with the same name. An error message is displayed in this case in the frontend that the low-level discovery rule could not create certain entities. The discovery rule itself, however, will not turn unsupported because some entity could not be created and had to be skipped. The discovery rule will go on creating/updating other entities.

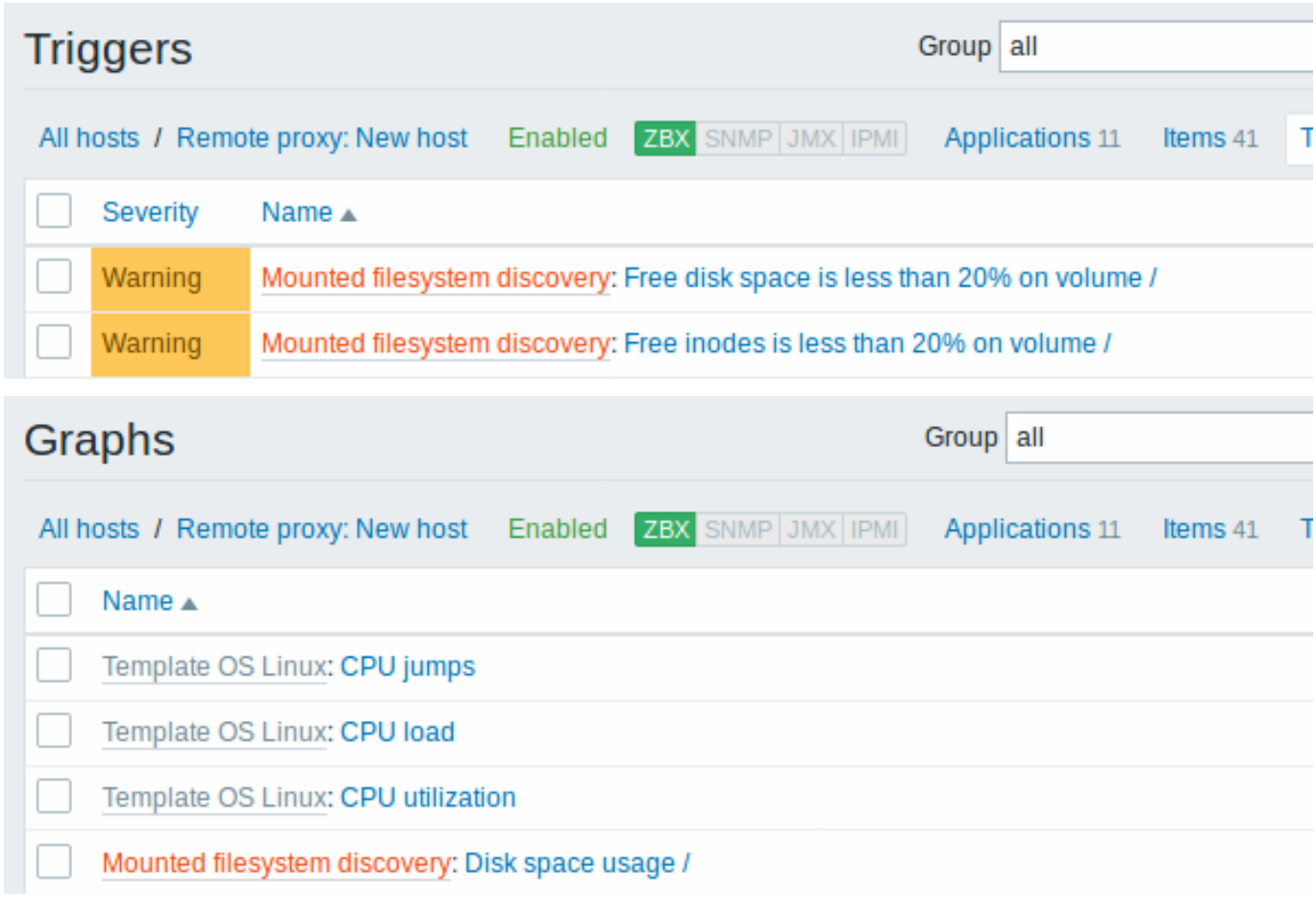
Items (similarly, triggers and graphs) created by a low-level discovery rule will be deleted automatically if a discovered entity (file system, interface, etc) stops being discovered (or does not pass the filter anymore). In this case the items, triggers and graphs will be deleted after the days defined in the *Keep lost resources period* field pass.

When discovered entities become 'Not discovered anymore', a lifetime indicator is displayed in the item list. Move your mouse pointer over it and a message will be displayed indicating how many days are left until the item is deleted.



If entities were marked for deletion, but were not deleted at the expected time (disabled discovery rule or item host), they will be deleted the next time the discovery rule is processed.

Entities containing other entities, which are marked for deletion, will not update if changed on the discovery rule level. For example, LLD-based triggers will not update if they contain items that are marked for deletion.



Other types of discovery

More detail and how-tos on other types of out-of-the-box discovery is available in the following sections:

- discovery of network interfaces;
- discovery of CPUs and CPU cores;
- discovery of SNMP OIDs;
- discovery of JMX objects;
- discovery using ODBC SQL queries;
- discovery of Windows services;
- discovery of host interfaces in Zabbix.

For more detail on the JSON format for discovery items and an example of how to implement your own file system discoverer as a Perl script, see creating custom LLD rules.

Data limits for return values

There is no limit for low-level discovery rule JSON data if it is received directly by Zabbix server, because return values are processed without being stored in a database. There's also no limit for custom low-level discovery rules, however, if it is intended to acquire custom LLD data using a user parameter, then user parameter return value limit applies (512 KB).

If data has to go through Zabbix proxy it has to store this data in database so database limits apply, for example, 2048 bytes on a Zabbix proxy run with IBM DB2 database.

Multiple LLD rules for same item

Since Zabbix agent version 3.2 it is possible to define several low-level discovery rules with the same discovery item.

To do that you need to define the Alias agent parameter, allowing to use altered discovery item keys in different discovery rules, for example `vfs.fs.discovery[foo]`, `vfs.fs.discovery[bar]`, etc.

Creating custom LLD rules

It is also possible to create a completely custom LLD rule, discovering any type of entities - for example, databases on a database server.

To do so, a custom item should be created that returns JSON, specifying found objects and optionally - some properties of them. The amount of macros per entity is not limited - while the built-in discovery rules return either one or two macros (for example, two for filesystem discovery), it is possible to return more.

The required JSON format is best illustrated with an example. Suppose we are running an old Zabbix 1.8 agent (one that does not support "vfs.fs.discovery"), but we still need to discover file systems. Here is a simple Perl script for Linux that discovers mounted file systems and outputs JSON, which includes both file system name and type. One way to use it would be as a UserParameter with key "vfs.fs.discovery_perl":

```
###!/usr/bin/perl

$first = 1;

print "[\n";

for (`cat /proc/mounts`)
{
    ($fsname, $fstype) = m/\S+ (\S+) (\S+)/;

    print "\t,\n" if not $first;
    $first = 0;

    print "\t{\n";
    print "\t\t\"{#FSNAME}\":\"$fsname\",\n";
    print "\t\t\"{#FSTYPE}\":\"$fstype\"\n";
    print "\t}\n";
}

print "]\n";
```

Attention:
Allowed symbols for LLD macro names are **0-9** , **A-Z** , _ , **.**

Lowercase letters are not supported in the names.

An example of its output (reformatted for clarity) is shown below. JSON for custom discovery checks has to follow the same format.

```
[
    { "{#FSNAME}":"/",                          "{#FSTYPE}":"rootfs"   },
    { "{#FSNAME}":"/sys",                       "{#FSTYPE}":"sysfs"    },
    { "{#FSNAME}":"/proc",                      "{#FSTYPE}":"proc"     },
    { "{#FSNAME}":"/dev",                       "{#FSTYPE}":"devtmpfs" },
    { "{#FSNAME}":"/dev/pts",                   "{#FSTYPE}":"devpts"   },
    { "{#FSNAME}":"/lib/init/rw",               "{#FSTYPE}":"tmpfs"    },
    { "{#FSNAME}":"/dev/shm",                   "{#FSTYPE}":"tmpfs"    },
    { "{#FSNAME}":"/home",                      "{#FSTYPE}":"ext3"     },
    { "{#FSNAME}":"/tmp",                       "{#FSTYPE}":"ext3"     },
    { "{#FSNAME}":"/usr",                       "{#FSTYPE}":"ext3"     },
    { "{#FSNAME}":"/var",                       "{#FSTYPE}":"ext3"     },
    { "{#FSNAME}":"/sys/fs/fuse/connections",   "{#FSTYPE}":"fusectl"  }
]
```

In previous example it is required that the keys match the LLD macro names used in prototypes, the alternative is to extract LLD macro values using JSONPath `{#FSNAME}` → `$.fsname` and `{#FSTYPE}` → `$.fstype`, thus making such script possible:

```
###!/usr/bin/perl

$first = 1;

print "[\n";

for (`cat /proc/mounts`)
{
    ($fsname, $fstype) = m/\S+ (\S+) (\S+)/;

    print "\t,\n" if not $first;
    $first = 0;
```

```
    print "\t{\n";
    print "\t\t\"fsname\":\"$fsname\",\n";
    print "\t\t\"fstype\":\"$fstype\"\n";
    print "\t}\n";
}

print "]\n";
```

An example of its output (reformatted for clarity) is shown below. JSON for custom discovery checks has to follow the same format.

```
[
    { "fsname":"/",                          "fstype":"rootfs"   },
    { "fsname":"/sys",                       "fstype":"sysfs"    },
    { "fsname":"/proc",                      "fstype":"proc"     },
    { "fsname":"/dev",                       "fstype":"devtmpfs" },
    { "fsname":"/dev/pts",                   "fstype":"devpts"   },
    { "fsname":"/lib/init/rw",               "fstype":"tmpfs"    },
    { "fsname":"/dev/shm",                   "fstype":"tmpfs"    },
    { "fsname":"/home",                      "fstype":"ext3"     },
    { "fsname":"/tmp",                       "fstype":"ext3"     },
    { "fsname":"/usr",                       "fstype":"ext3"     },
    { "fsname":"/var",                       "fstype":"ext3"     },
    { "fsname":"/sys/fs/fuse/connections",   "fstype":"fusectl"  }
]
```

Then, in the discovery rule's "Filter" field, we could specify "{#FSTYPE}" as a macro and "rootfs|ext3" as a regular expression.

Note:
You don't have to use macro names FSNAME/FSTYPE with custom LLD rules, you are free to use whatever names you like. In case JSONPath is used then LLD row will be an array element that can be an object, but it can be also another array or a value.

Note that, if using a user parameter, the return value is limited to 512 KB. For more details, see data limits for LLD return values.

Using LLD macros in user macro contexts

User macros with context can be used to accomplish more flexible thresholds in trigger expressions. Different thresholds may be defined on user macro level and then used in trigger constants depending on the discovered context. Discovered context appears when the low-level discovery macros used in the macros are resolved to real values.

To illustrate we can use data from the example above and assume that the following file systems will be discovered: `/`, `/home`, `/tmp`, `/usr`, `/var`.

We may define a free-disk-space trigger prototype for a host, where the threshold is expressed by a user macro with context:

`{host:vfs.fs.size[{#FSNAME},pfree].last()}<{$LOW_SPACE_LIMIT:"{#FSNAME}"}`

Then add user macros:

- `{$LOW_SPACE_LIMIT}` **10**
- `{$LOW_SPACE_LIMIT:/home}` **20**
- `{$LOW_SPACE_LIMIT:/tmp}` **50**

Now, once the file systems are discovered, events will be generated if `/`, `/usr` and `/var` filesystems have less than **10**% of free disk space, the `/home` filesystem - less than **20**% of free disk space or the `/tmp` filesystem - less than **50**% of free disk space.

1 Discovery of mounted filesystems

Overview

It is possible to discover mounted filesystems and their properties (mountpoint name, mountpoint type, filesystem size and inode statistics).

To do that, you may use a combination of:

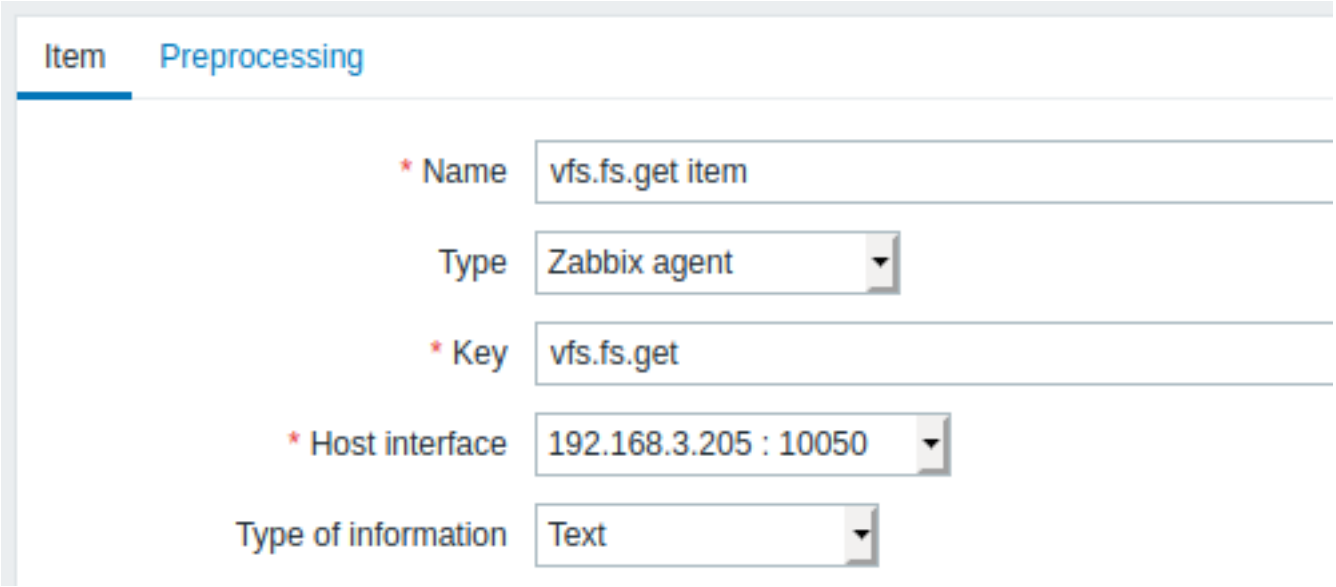
- the `vfs.fs.get` agent item (supported since Zabbix **4.4.5**) as the master item
- dependent low-level discovery rule and item prototypes

Configuration

Master item

Create a Zabbix agent item using the following key:

`vfs.fs.get`



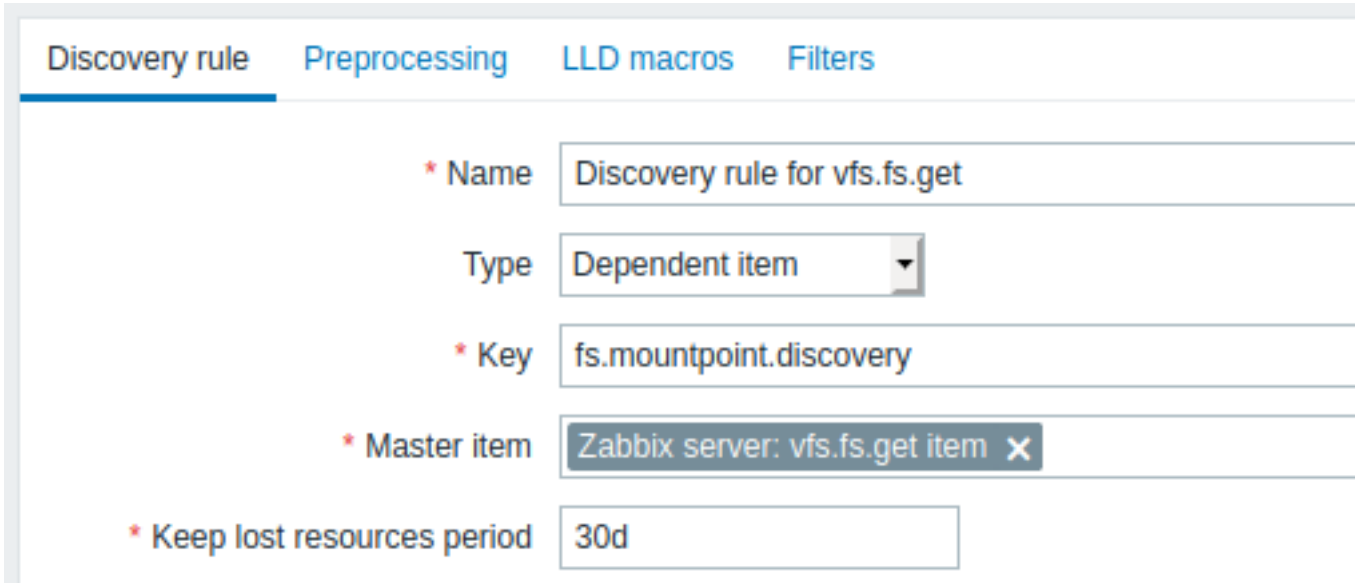
Set the type of information to ”Text” for possibly big JSON data.

The data returned by this item will contain something like the following for a mounted filesystem:

```
{
  "fsname": "/",
  "fstype": "rootfs",
  "bytes": {
    "total": 1000,
    "free": 500,
    "used": 500,
    "pfree": 50.00,
    "pused": 50.00
  },
  "inodes": {
    "total": 1000,
    "free": 500,
    "used": 500,
    "pfree": 50.00,
    "pused": 50.00
  }
}
```

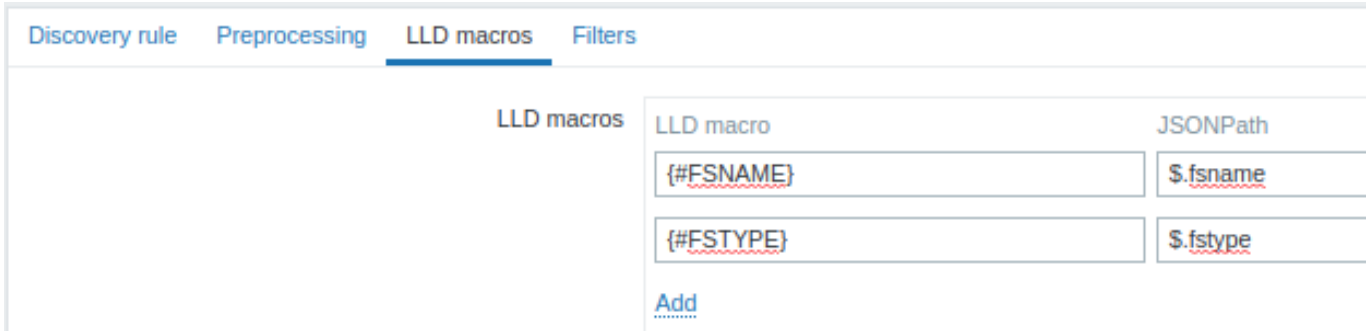
Dependent LLD rule

Create a low-level discovery rule as ”Dependent item” type:



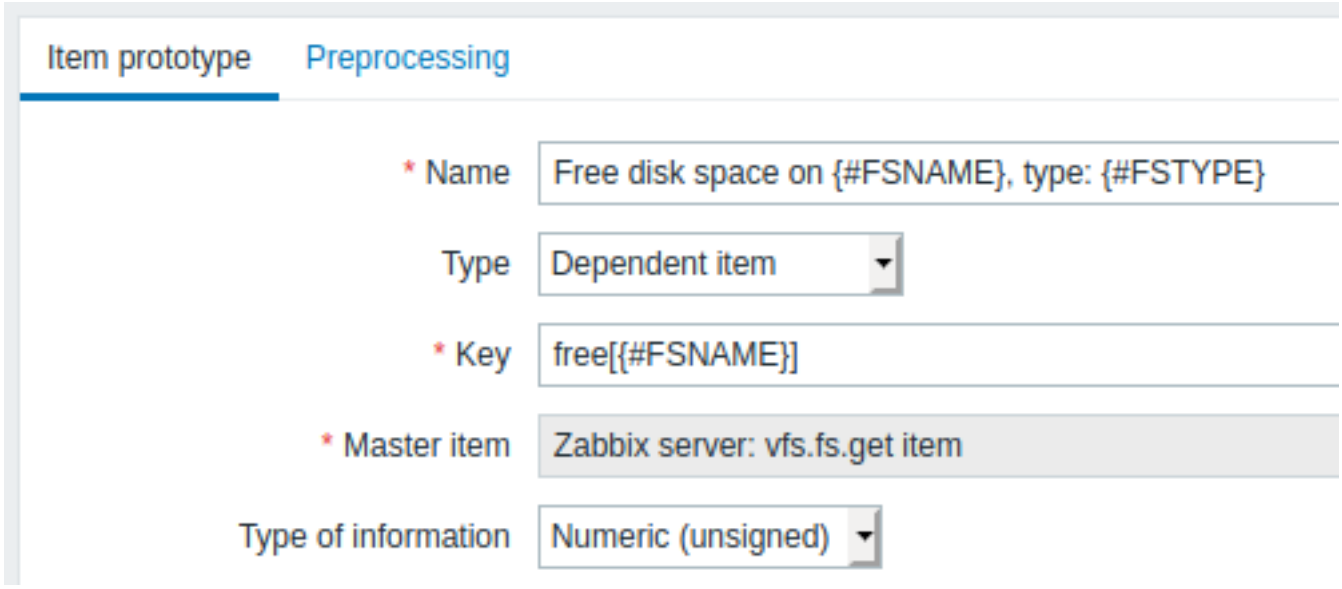
As master item select the `vfs.fs.get` item we created.

In the "LLD macros" tab define custom macros with the corresponding JSONPath:



Dependent item prototype

Create an item prototype with "Dependent item" type in this LLD rule. As master item for this prototype select the `vfs.fs.get` item we created.



Note the use of custom macros in the item prototype name and key:

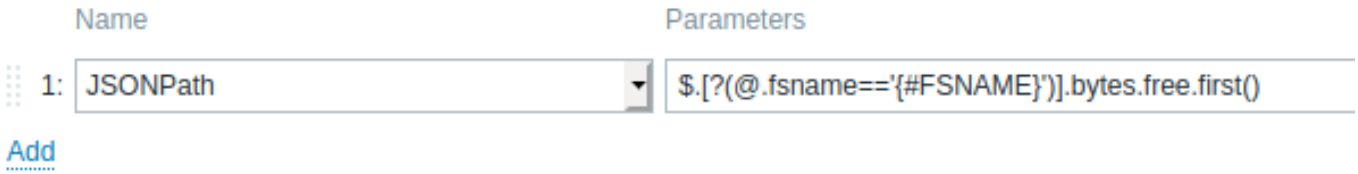
- *Name*: Free disk space on {#FSNAME}, type: {#FSTYPE}
- *Key*: Free[{#FSNAME}]

As type of information, use:

- *Numeric (unsigned)* for metrics like 'free', 'total', 'used'
- *Numeric (float)* for metrics like 'pfree', 'pused' (percentage)

In the item prototype ”Preprocessing” tab select JSONPath and use the following JSONPath expression as parameter:

```
$.[?(@.fsname=='{#FSNAME}')].bytes.free.first()
```



When discovery starts, one item per each mountpoint will be created. This item will return the number of free bytes for the given mountpoint.

2 Discovery of network interfaces

In a similar way as file systems are discovered, it is possible to also discover network interfaces.

Item key

The item key to use in the discovery rule is

```
net.if.discovery
```

This item is supported since Zabbix agent 2.0.

Supported macros

You may use the {#IFNAME} macro in the discovery rule filter and prototypes of items, triggers and graphs.

Examples of item prototypes that you might wish to create based on ”net.if.discovery”:

- ”net.if.in[{#IFNAME},bytes]”,
- ”net.if.out[{#IFNAME},bytes]”.

3 Discovery of CPUs and CPU cores

In a similar way as file systems are discovered, it is possible to also discover CPUs and CPU cores.

Item key

The item key to use in the discovery rule is

```
system.cpu.discovery
```

This item is supported since Zabbix agent 2.4.

Supported macros

This discovery key returns two macros - {#CPU.NUMBER} and {#CPU.STATUS} identifying the CPU order number and status respectively. Note that a clear distinction cannot be made between actual, physical processors, cores and hyperthreads. {#CPU.STATUS} on Linux, UNIX and BSD systems returns the status of the processor, which can be either ”online” or ”offline”. On Windows systems, this same macro may represent a third value - ”unknown” - which indicates that a processor has been detected, but no information has been collected for it yet.

CPU discovery relies on the agent’s collector process to remain consistent with the data provided by the collector and save resources on obtaining the data. This has the effect of this item key not working with the test (-t) command line flag of the agent binary, which will return a NOT_SUPPORTED status and an accompanying message indicating that the collector process has not been started.

Item prototypes that can be created based on CPU discovery include, for example:

- `system.cpu.util[{#CPU.NUMBER},<type>, <mode>]`
- `system.hw.cpu[{#CPU.NUMBER},<info>]`

4 Discovery of SNMP OIDs

Overview

In this section we will perform an SNMP discovery on a switch.

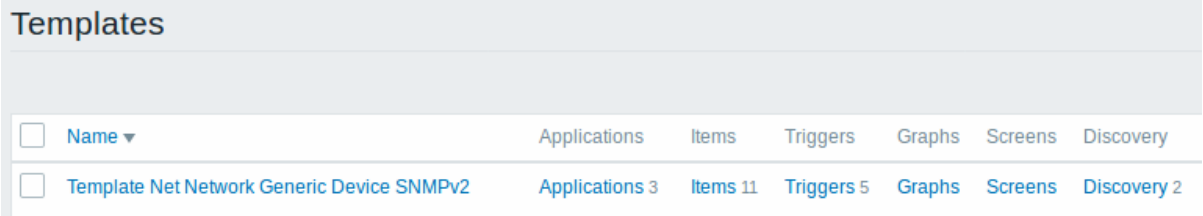
Item key

Unlike with file system and network interface discovery, the item does not necessarily has to have an ”snmp.discovery” key - item type of SNMP agent is sufficient.

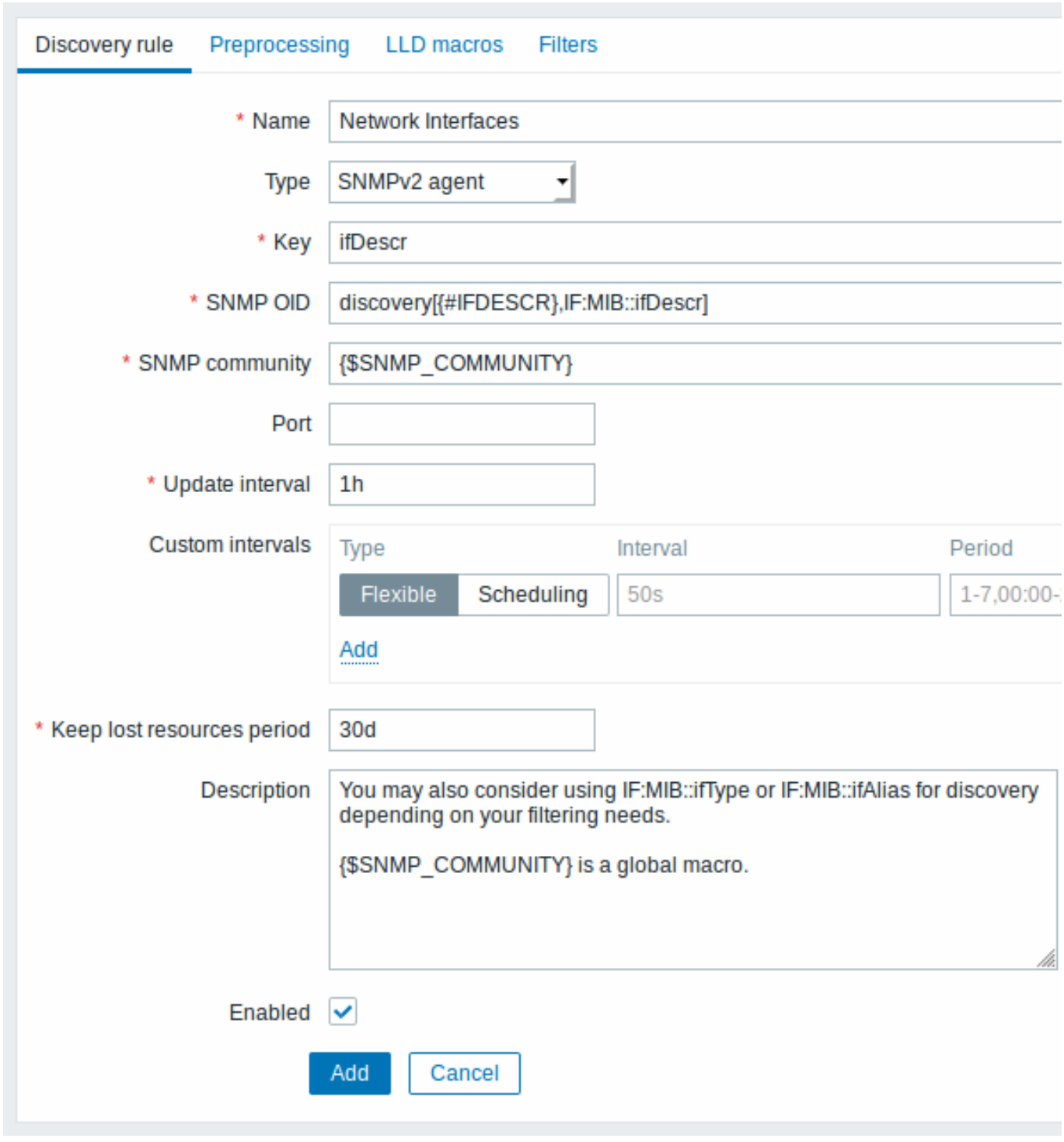
Discovery of SNMP OIDs is supported since Zabbix server/proxy 2.0.

To configure the discovery rule, do the following:

- Go to: *Configuration* → *Templates*
- Click on *Discovery* in the row of an appropriate template



- Click on *Create discovery rule* in the upper right corner of the screen
- Fill in the discovery rule form with the required details as in the screenshot below



All mandatory input fields are marked with a red asterisk.

The OIDs to discover are defined in SNMP OID field in the following format: `discovery[{#MACRO1}, oid1, {#MACRO2}, oid2, …,]`

where *{#MACRO1}*, *{#MACRO2}* ... are valid lld macro names and *oid1*, *oid2*... are OIDs capable of generating meaningful values for these macros. A built-in macro *{#SNMPINDEX}* containing index of the discovered OID is applied to discovered entities. The discovered entities are grouped by *{#SNMPINDEX}* macro value.

To understand what we mean, let us perform few snmpwalks on our switch:

```
$ snmpwalk -v 2c -c public 192.168.1.1 IF-MIB::ifDescr
IF-MIB::ifDescr.1 = STRING: WAN
IF-MIB::ifDescr.2 = STRING: LAN1
IF-MIB::ifDescr.3 = STRING: LAN2

$ snmpwalk -v 2c -c public 192.168.1.1 IF-MIB::ifPhysAddress
IF-MIB::ifPhysAddress.1 = STRING: 8:0:27:90:7a:75
IF-MIB::ifPhysAddress.2 = STRING: 8:0:27:90:7a:76
```

`IF-MIB::ifPhysAddress.3 = STRING: 8:0:27:2b:af:9e`

And set SNMP OID to: `discovery[{#IFDESCR}, ifDescr, {#IFPHYSADDRESS}, ifPhysAddress]`

Now this rule will discover entities with {#IFDESCR} macros set to **WAN**, **LAN1** and **LAN2**, {#IFPHYSADDRESS} macros set to **8:0:27:90:7a:75**, **8:0:27:90:7a:76**, and **8:0:27:2b:af:9e**, {#SNMPINDEX} macros set to the discovered OIDs indexes **1**, **2** and **3**:

```
[
    {
        "{#SNMPINDEX}": "1",
        "{#IFDESCR}": "WAN",
        "{#IFPHYSADDRESS}": "8:0:27:90:7a:75"
    },
    {
        "{#SNMPINDEX}": "2",
        "{#IFDESCR}": "LAN1",
        "{#IFPHYSADDRESS}": "8:0:27:90:7a:76"
    },
    {
        "{#SNMPINDEX}": "3",
        "{#IFDESCR}": "LAN2",
        "{#IFPHYSADDRESS}": "8:0:27:2b:af:9e"
    }
]
```

If an entity does not have the specified OID, then the corresponding macro will be omitted for this entity. For example if we have the following data:

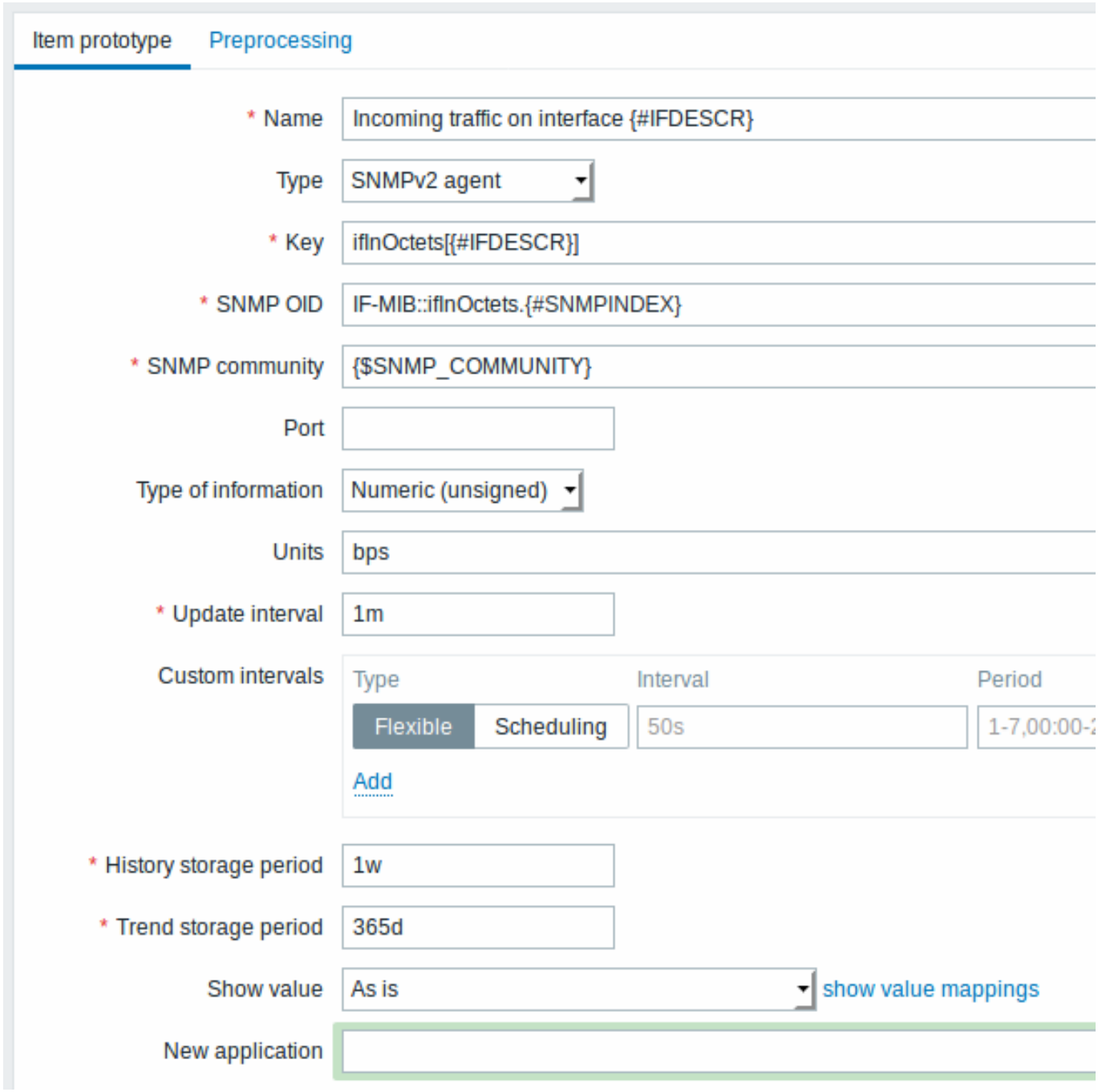
```
ifDescr.1 "Interface #1"
ifDescr.2 "Interface #2"
ifDescr.4 "Interface #4"

ifAlias.1 "eth0"
ifAlias.2 "eth1"
ifAlias.3 "eth2"
ifAlias.5 "eth4"
```

Then in this case SNMP discovery `discovery[{#IFDESCR}, ifDescr, {#IFALIAS}, ifAlias]` will return the following structure:

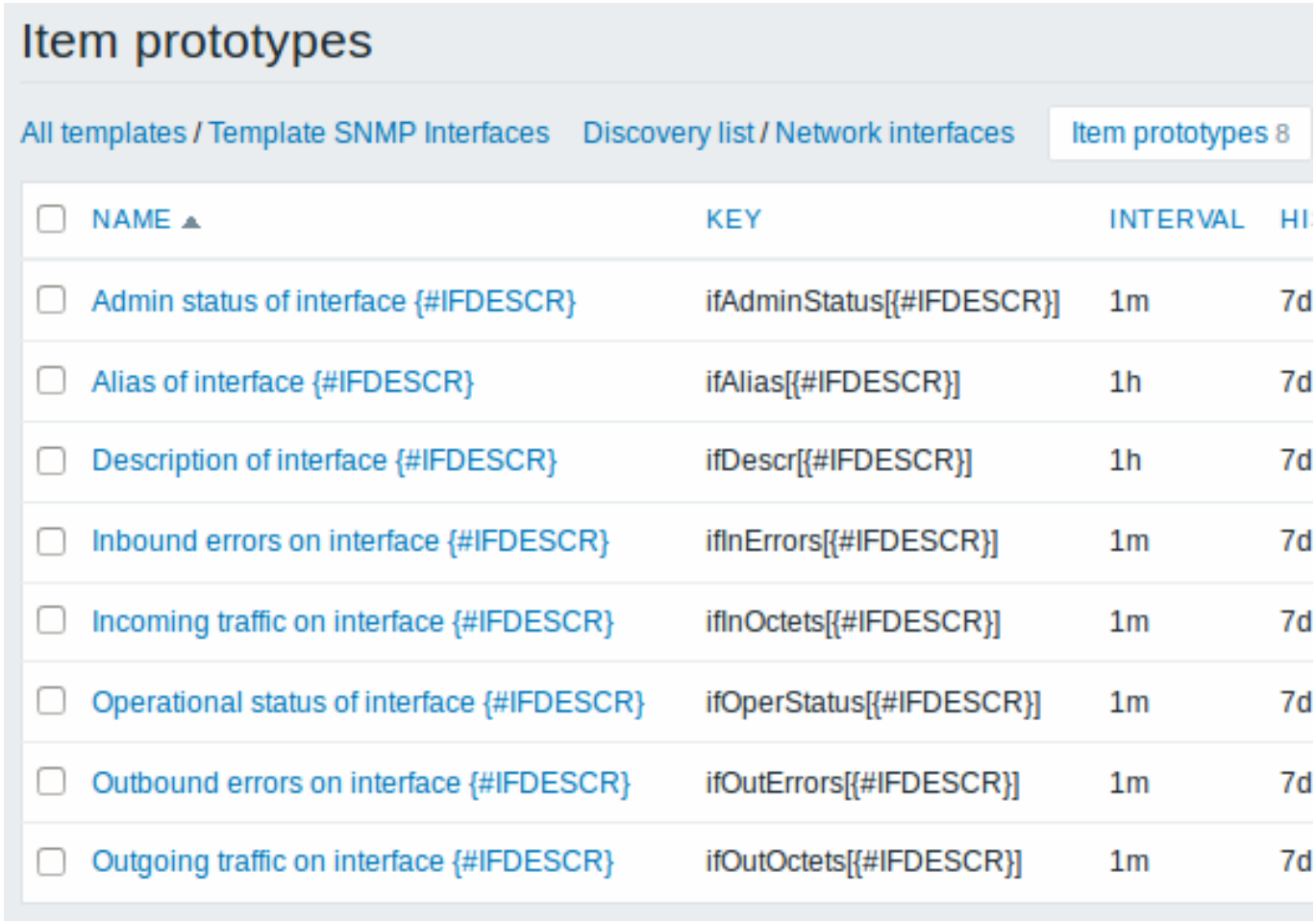
```
[
    {
        "{#SNMPINDEX}": 1,
        "{#IFDESCR}": "Interface #1",
        "{#IFALIAS}": "eth0"
    },
    {
        "{#SNMPINDEX}": 2,
        "{#IFDESCR}": "Interface #2",
        "{#IFALIAS}": "eth1"
    },
    {
        "{#SNMPINDEX}": 3,
        "{#IFALIAS}": "eth2"
    },
    {
        "{#SNMPINDEX}": 4,
        "{#IFDESCR}": "Interface #4"
    },
    {
        "{#SNMPINDEX}": 5,
        "{#IFALIAS}": "eth4"
    }
]
```

Item prototypes

The following screenshot illustrates how we can use these macros in item prototypes:

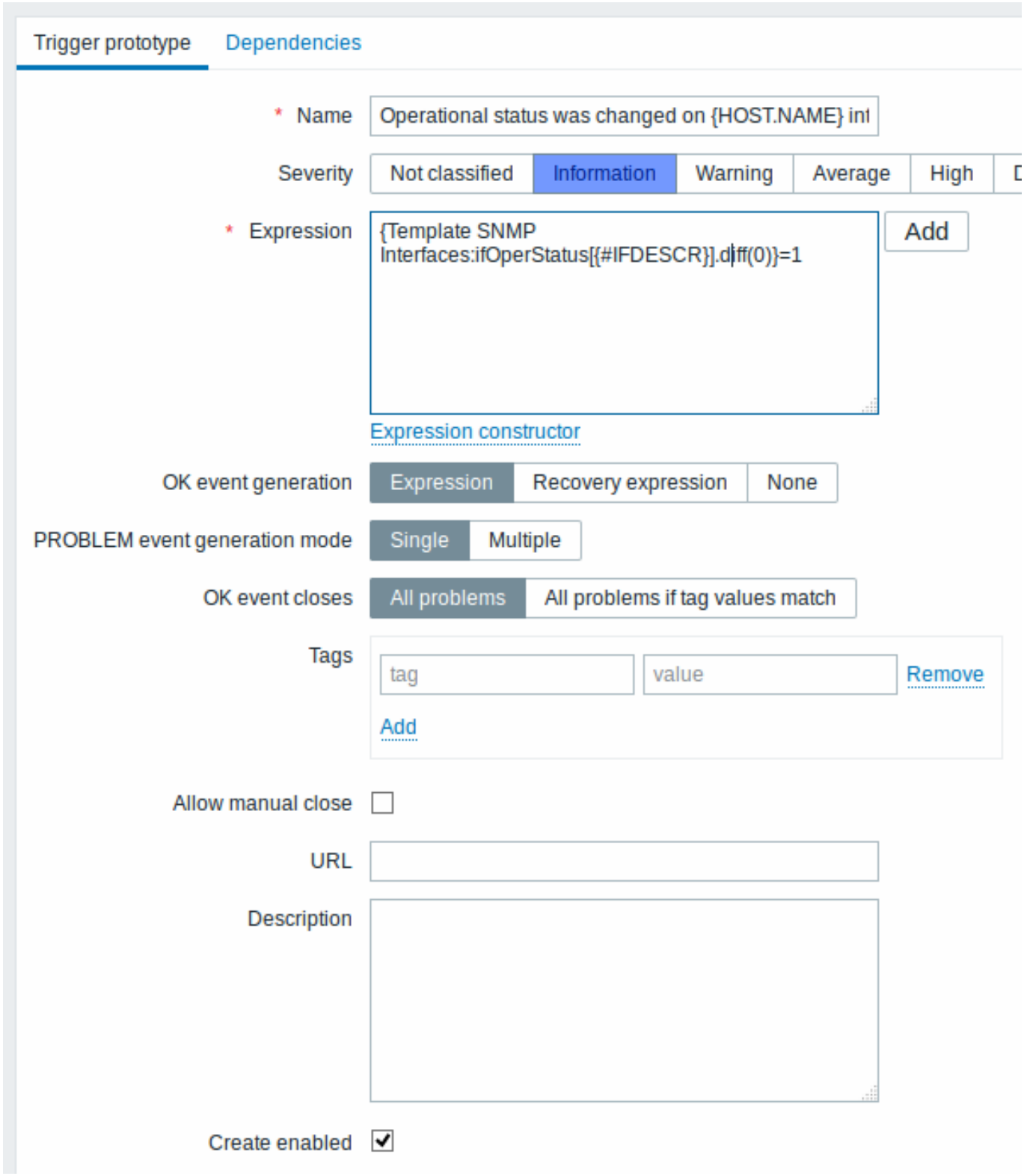


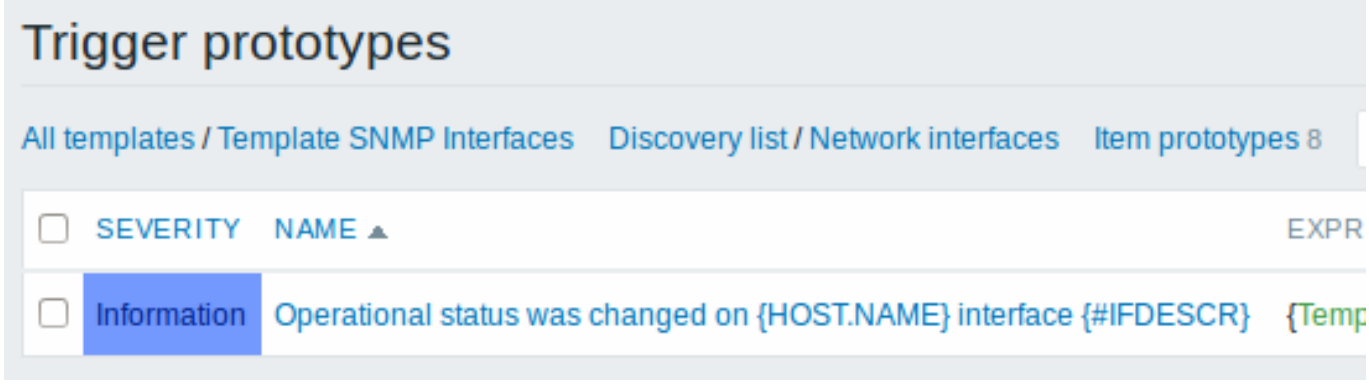
Again, creating as many item prototypes as needed:



Trigger prototypes

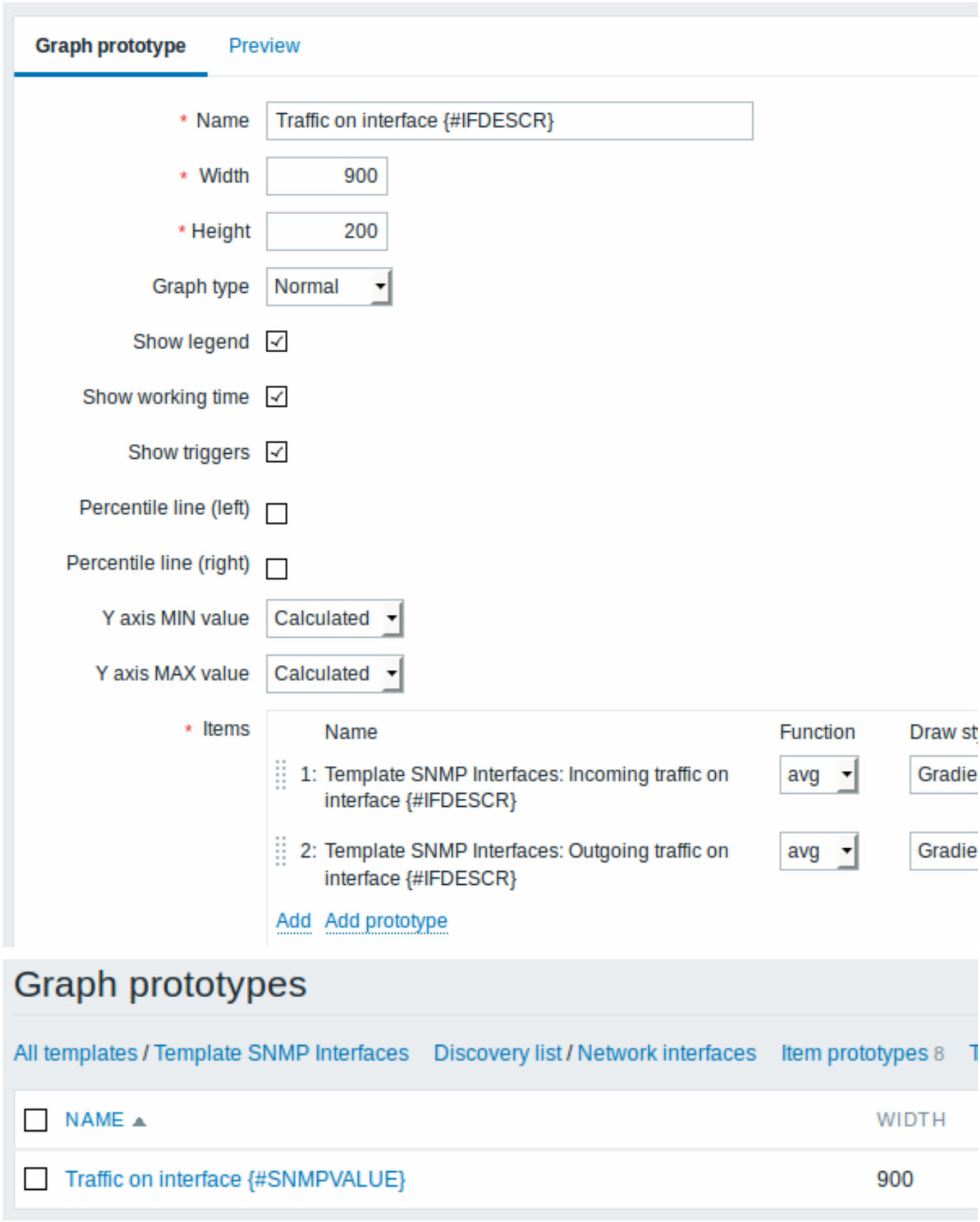
The following screenshot illustrates how we can use these macros in trigger prototypes:



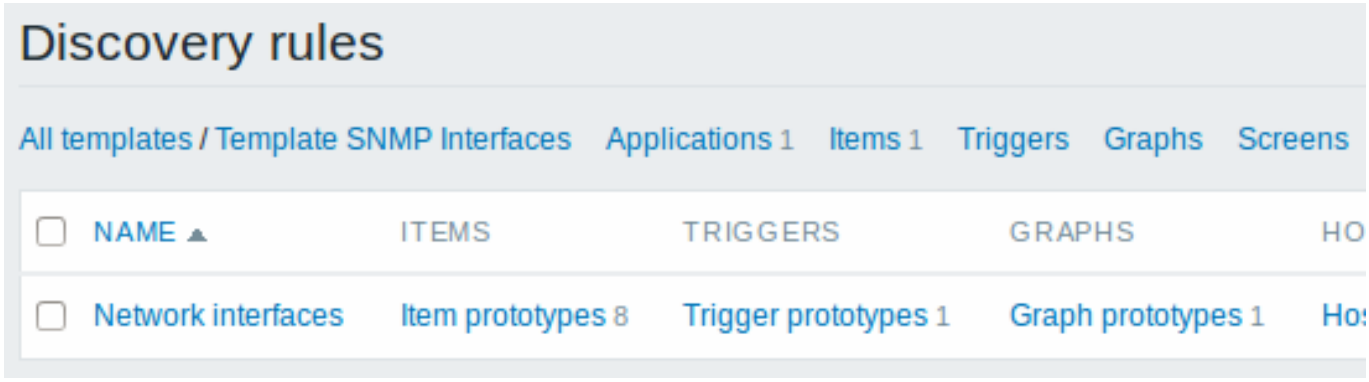


Graph prototypes

The following screenshot illustrates how we can use these macros in graph prototypes:

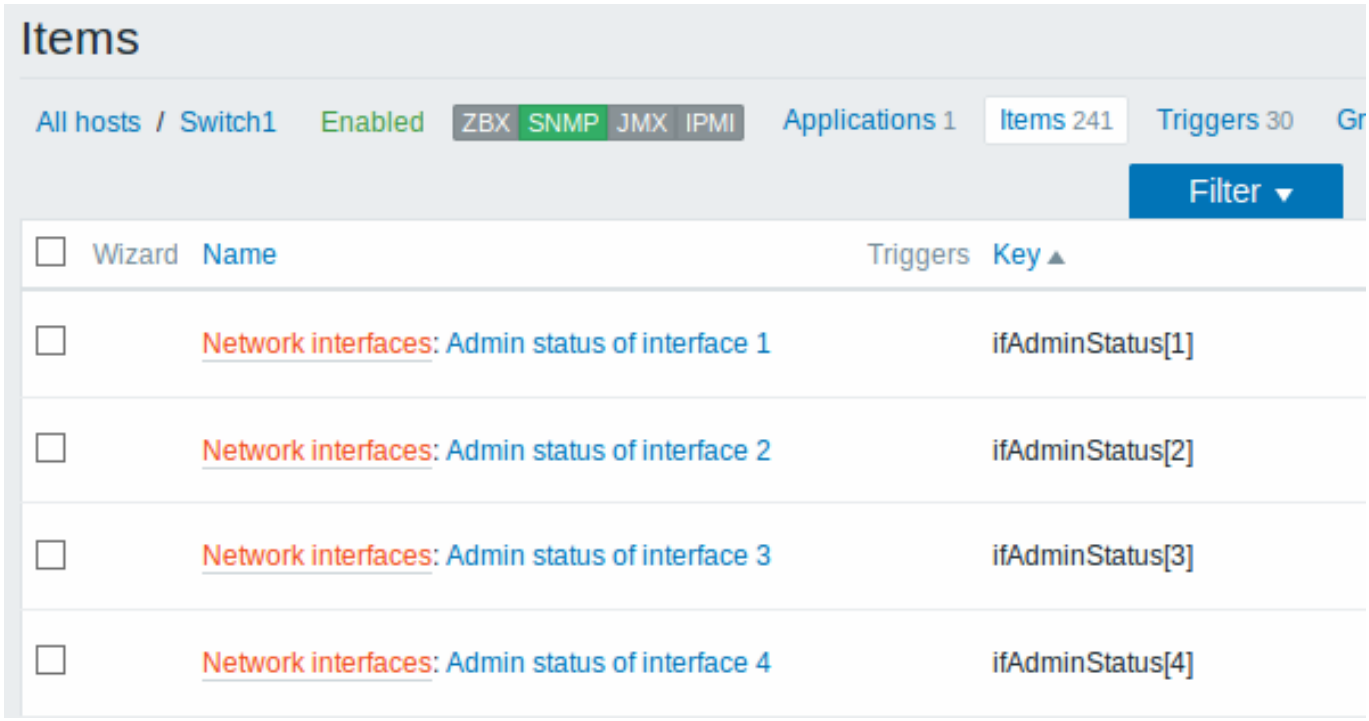


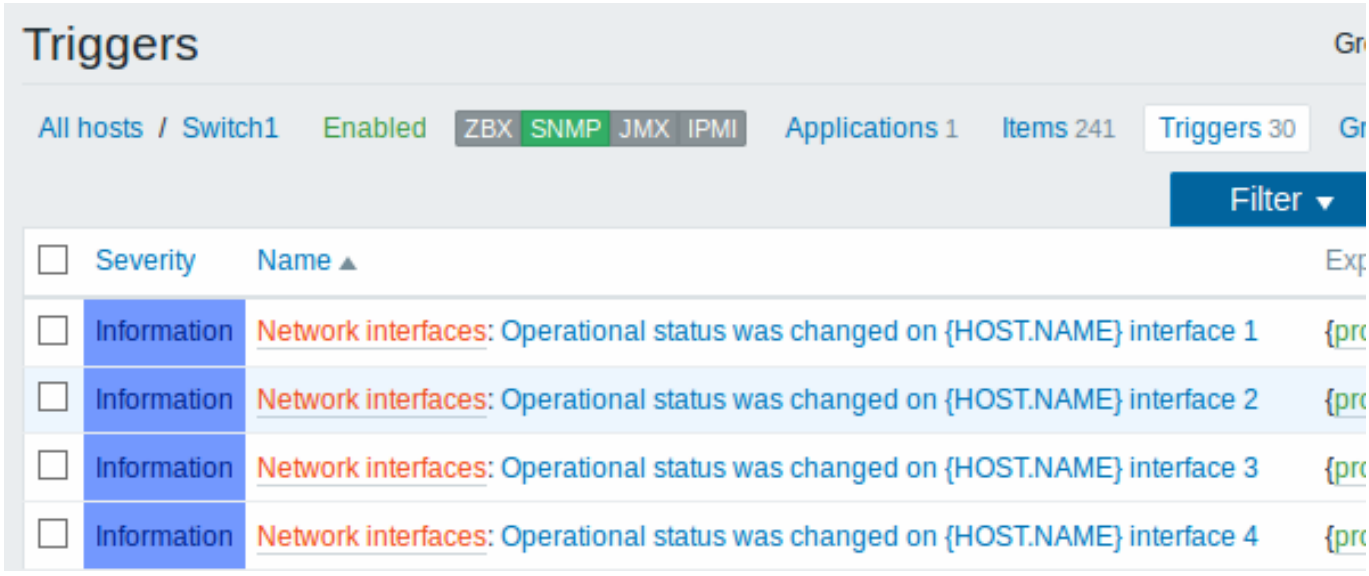
A summary of our discovery rule:

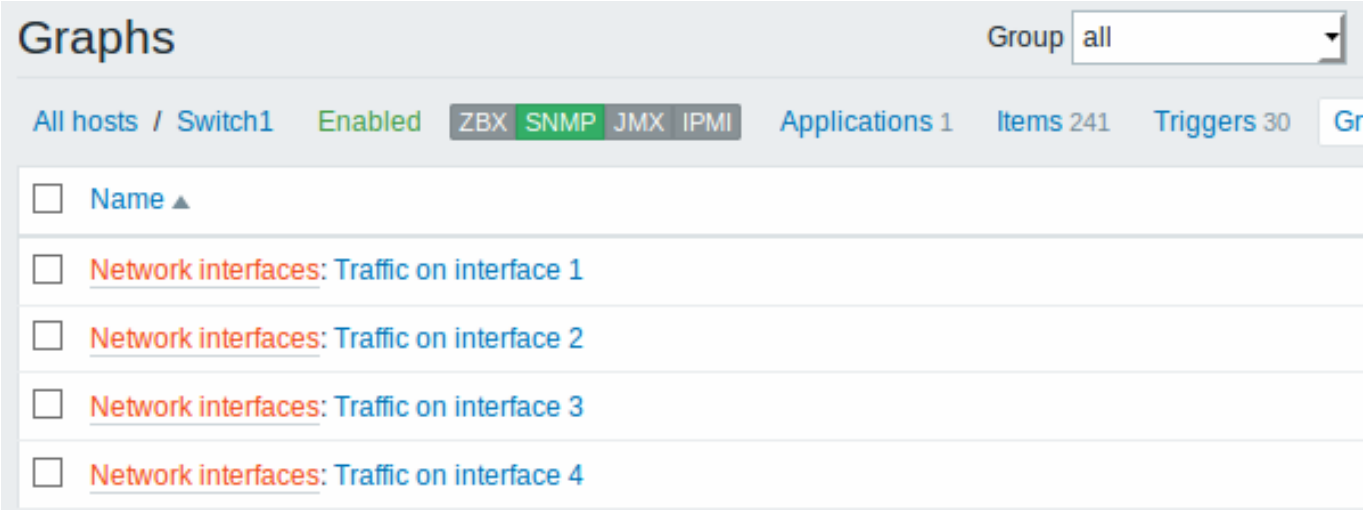


Discovered entities

When server runs, it will create real items, triggers and graphs based on the values the SNMP discovery rule returns. In the host configuration they are prefixed with an orange link to a discovery rule they come from.







5 Discovery of JMX objects

Overview

It is possible to discover all JMX MBeans or MBean attributes or to specify a pattern for the discovery of these objects.

It is mandatory to understand the difference between an Mbean and Mbean attributes for discovery rule configuration. An MBean is an object which can represent a device, an application, or any resource that needs to be managed.

For example, there is an Mbean which represents a web server. Its attributes are connection count, thread count, request timeout, http file cache, memory usage, etc. Expressing this thought in human comprehensive language we can define a coffee machine as an Mbean which has the following attributes to be monitored: water amount per cup, average consumption of water for a certain period of time, number of coffee beans required per cup, coffee beans and water refill time, etc.

Item key

In discovery rule configuration, select **JMX agent** in the *Type* field.

Two item keys are supported for JMX object discovery - jmx.discovery[] and jmx.get[]:

Item key	Return value	Parameters	Comment
jmx.discovery[<discovery mode>,<object name>]			

Item key			
	This item returns a JSON array with LLD macros describing MBean objects or their attributes.	**discovery mode** - one of the following: *attributes* (retrieve JMX MBean attributes, default) or *beans* (retrieve JMX MBeans) **object name** - object name pattern (see documentation) identifying the MBean names to be retrieved (empty by default, retrieving all registered beans)	Examples: → jmx.discovery - retrieve all JMX MBean attributes → jmx.discovery[beans] - retrieve all JMX MBeans → jmx.discovery[attribu - retrieve all garbage collector attributes → jmx.discovery[beans, - retrieve all garbage collectors There are some limitations to what MBean properties this item can return based on limited characters that are supported in macro name generation (supported characters can de-

Item key			
jmx.get[<discovery mode>,<object name>]	This item returns a JSON array with MBean objects or their attributes. Compared to `jmx.discovery` it does not define LLD macros.	**discovery mode** - one of the following: *attributes* (retrieve JMX MBean attributes, default) or *beans* (retrieve JMX MBeans) **object name** - object name pattern (see documentation) identifying the MBean names to be retrieved (empty by default, retrieving all registered beans)	When using this item, it is needed to define custom low-level discovery macros, pointing to values extracted from the returned JSON using JSONPath. Supported since Zabbix Java gateway 4.4.

Attention:
If no parameters are passed, all MBean attributes from JMX are requested. Not specifying parameters for JMX discovery or trying to receive all attributes for a wide range like `*:type=*,name=*` may lead to potential performance problems.

Using jmx.discovery

This item returns a JSON object with low-level discovery macros describing MBean objects or attributes. For example, in the discovery of MBean attributes (reformatted for clarity):

```
[
    {
        "{#JMXVALUE}":"0",
        "{#JMXTYPE}":"java.lang.Long",
```

```
        "{#JMXOBJ}":"java.lang:type=GarbageCollector,name=PS Scavenge",
        "{#JMXDESC}":"java.lang:type=GarbageCollector,name=PS Scavenge,CollectionCount",
        "{#JMXATTR}":"CollectionCount"
    },
    {
        "{#JMXVALUE}":"0",
        "{#JMXTYPE}":"java.lang.Long",
        "{#JMXOBJ}":"java.lang:type=GarbageCollector,name=PS Scavenge",
        "{#JMXDESC}":"java.lang:type=GarbageCollector,name=PS Scavenge,CollectionTime",
        "{#JMXATTR}":"CollectionTime"
    },
    {
        "{#JMXVALUE}":"true",
        "{#JMXTYPE}":"java.lang.Boolean",
        "{#JMXOBJ}":"java.lang:type=GarbageCollector,name=PS Scavenge",
        "{#JMXDESC}":"java.lang:type=GarbageCollector,name=PS Scavenge,Valid",
        "{#JMXATTR}":"Valid"
    },
    {
        "{#JMXVALUE}":"PS Scavenge",
        "{#JMXTYPE}":"java.lang.String",
        "{#JMXOBJ}":"java.lang:type=GarbageCollector,name=PS Scavenge",
        "{#JMXDESC}":"java.lang:type=GarbageCollector,name=PS Scavenge,Name",
        "{#JMXATTR}":"Name"
    },
    {
        "{#JMXVALUE}":"java.lang:type=GarbageCollector,name=PS Scavenge",
        "{#JMXTYPE}":"javax.management.ObjectName",
        "{#JMXOBJ}":"java.lang:type=GarbageCollector,name=PS Scavenge",
        "{#JMXDESC}":"java.lang:type=GarbageCollector,name=PS Scavenge,ObjectName",
        "{#JMXATTR}":"ObjectName"
    }
]
```

In the discovery of MBeans (reformatted for clarity):

```
[
    {
        "{#JMXDOMAIN}":"java.lang",
        "{#JMXTYPE}":"GarbageCollector",
        "{#JMXOBJ}":"java.lang:type=GarbageCollector,name=PS Scavenge",
        "{#JMXNAME}":"PS Scavenge"
    }
]
```

Supported macros

The following macros are supported for use in the discovery rule filter and prototypes of items, triggers and graphs:

Macro	Description
Discovery of MBean attributes	
{#JMXVALUE}	Attribute value.
{#JMXTYPE}	Attribute type.
{#JMXOBJ}	Object name.
{#JMXDESC}	Object name including attribute name.
{#JMXATTR}	Attribute name.
Discovery of MBeans	
{#JMXDOMAIN}	MBean domain. (*Zabbix reserved name*)
{#JMXOBJ}	Object name. (*Zabbix reserved name*)
{#JMX<key property>}	MBean properties (like {#JMXTYPE}, {#JMXNAME}) (see Limitations below).

Limitations

There are some limitations associated with the algorithm of creating LLD macro names from MBean property names:

- attribute names are changed to uppercase
- attribute names are ignored (no LLD macros are generated) if they consist of unsupported characters for LLD macro names. Supported characters can be described by the following regular expression: `A-Z0-9_\.`
- if an attribute is called "obj" or "domain" they will be ignored because of the overlap with the values of the reserved Zabbix properties {#JMXOBJ} and {#JMXDOMAIN} (supported since Zabbix 3.4.3.)

Please consider this jmx.discovery (with "beans" mode) example. MBean has the following properties defined:

```
name=test
  =Type
attributes []=1,2,3
Name=NameOfTheTest
domAin=some
```

As a result of JMX discovery, the following LLD macros will be generated:

- {#JMXDOMAIN} - Zabbix internal, describing the domain of MBean
- {#JMXOBJ} - Zabbix internal, describing MBean object
- {#JMXNAME} - created from "name" property

Ignored properties are:

- тип : its name contains unsupported characters (non-ASCII)
- attributes[] : its name contains unsupported characters (square brackets are not supported)
- Name : it's already defined (name=test)
- domAin : it's a Zabbix reserved name

Examples

Let's review two more practical examples of a LLD rule creation with the use of Mbean. To understand the difference between a LLD rule collecting Mbeans and a LLD rule collecting Mbean attributes better please take a look at following table:

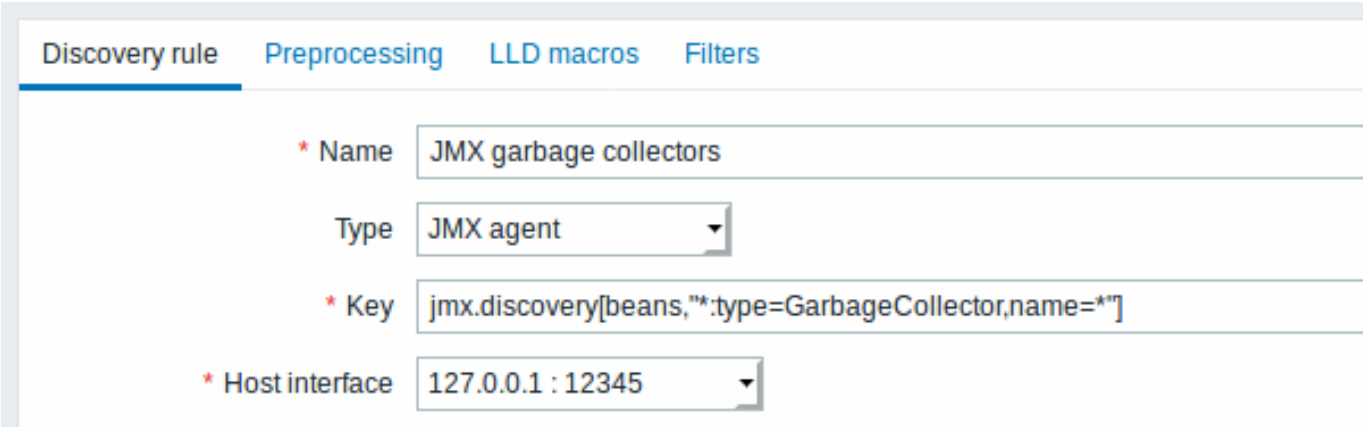
MBean1	**MBean2**	**MBean3**
MBean1Attribute1	MBean2Attribute1	MBean3Attribute1
MBean1Attribute2	MBean2Attribute2	MBean3Attribute2
MBean1Attribute3	MBean2Attribute3	MBean3Attribute3

Example 1: Discovering Mbeans

This rule will return 3 objects: the top row of the column: MBean1, MBean2, MBean3.

For more information about objects please refer to supported macros table, *Discovery of MBeans* section.

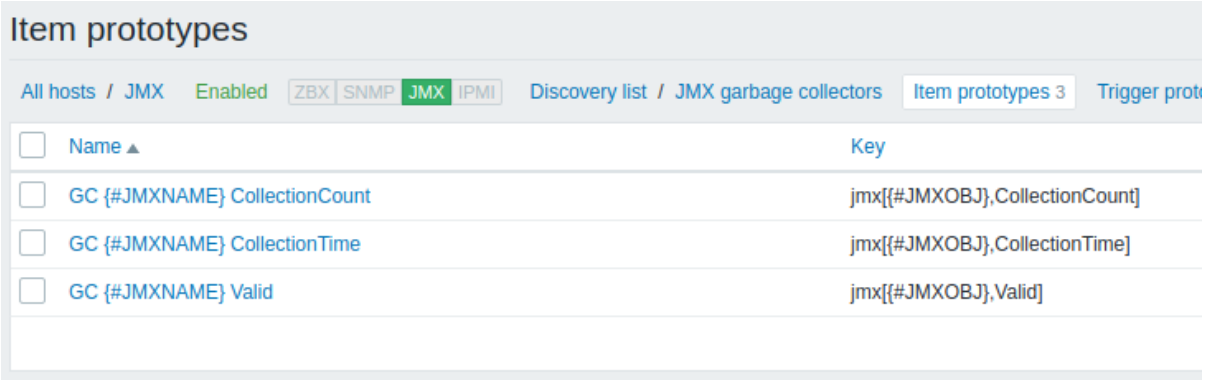
Discovery rule configuration collecting Mbeans (without the attributes) looks like the following:



Key used:

```
jmx.discovery[beans,"*:type=GarbageCollector,name=*"]
```

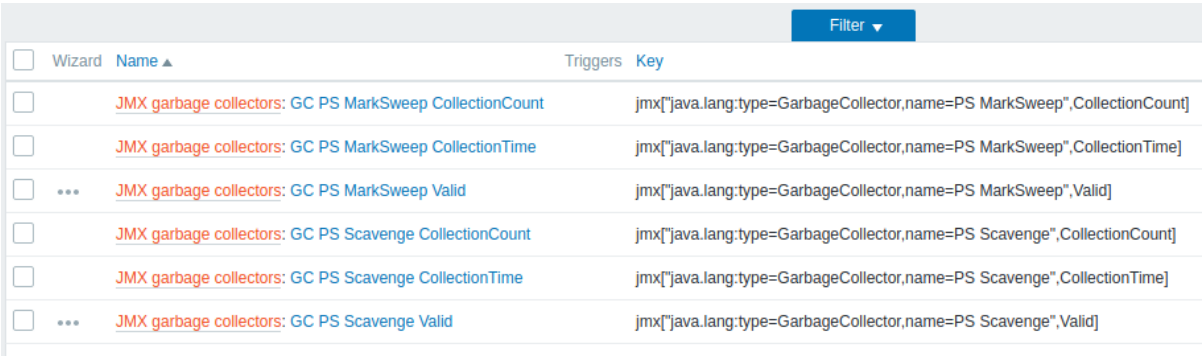
All the garbage collectors without attributes will be discovered. As Garbage collectors have the same attribute set, we can use desired attributes in item prototypes the following way:



Keys used:

```
jmx[{#JMXOBJ},CollectionCount]
jmx[{#JMXOBJ},CollectionTime]
jmx[{#JMXOBJ},Valid]
```

LLD discovery rule will result in something close to this (items are discovered for two Garbage collectors):

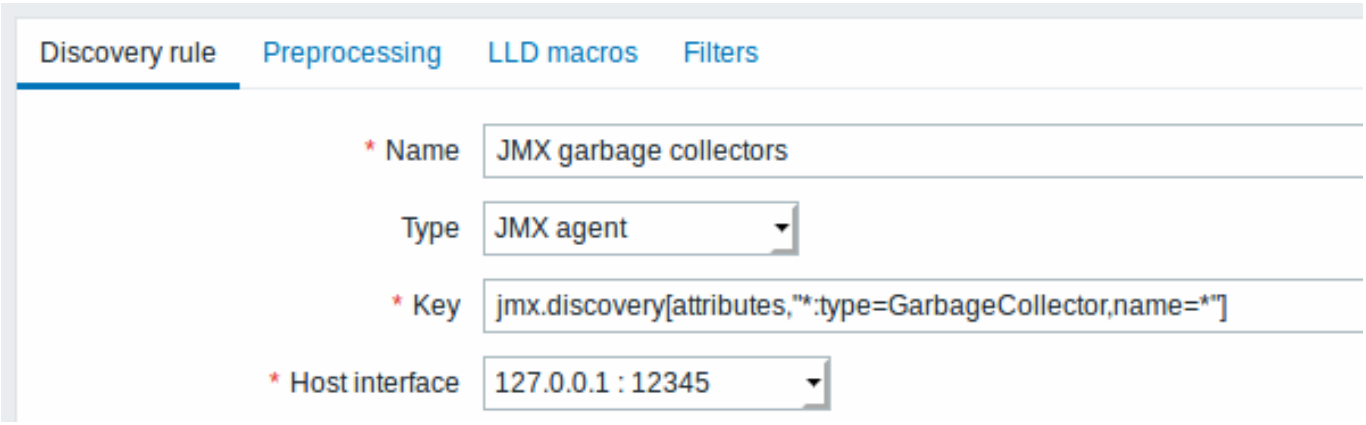


Example 2: Discovering Mbean attributes

This rule will return 9 objects with the following fields: MBean1Attribute1, MBean2Attribute1, Mbean3Attribute1,MBean1Attribute2,MBean2Attr
Mbean3Attribute2, MBean1Attribute3, MBean2Attribute3, Mbean3Attribute3.

For more information about objects please refer to supported macros table, *Discovery of MBean attributes* section.

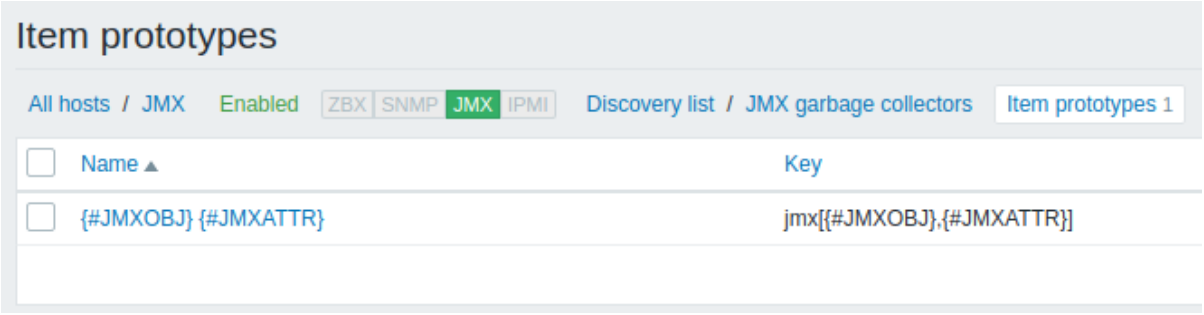
Discovery rule configuration collecting Mbean attributes looks like the following:



Key used:

```
jmx.discovery[attributes,"*:type=GarbageCollector,name=*"]
```

All the garbage collectors with a single item attribute will be discovered.



In this particular case an item will be created from prototype for every MBean attribute. The main drawback of this configuration is that trigger creation from trigger prototypes is impossible as there is only one item prototype for all attributes. So this setup can be used for data collection, but is not recommended for automatic monitoring.

Using jmx.get

`jmx.get[]` is similar to the `jmx.discovery[]` item, but is does not turn Java object properties into low-level discovery macro names and therefore can return values without limitations that are associated with LLD macro name generation such as hyphens or non-ASCII characters.

When using `jmx.get[]` for discovery, low-level discovery macros can be defined separately in the custom LLD macro tab of the discovery rule configuration, using JSONPath to point to the required values.

Discovering MBeans

Discovery item: `jmx.get[beans,"com.example:type=*,*"]`

Response:

```
[
    {
        "object": "com.example:type=Hello,data-src=data-base,key=value",
        "domain": "com.example",
        "properties": {
            "data-src": "data-base",
            "key": "value",
            "type": "Hello"
        }
    },
    {
        "object": "com.example:type=Atomic",
        "domain": "com.example",
        "properties": {
            "type": "Atomic"
        }
    }
]
```

Discovering MBean attributes

Discovery item: `jmx.get[attributes,"com.example:type=*,*"]`

Response:

```
[
    {
        "object": "com.example:type=*",
        "domain": "com.example",
        "properties": {
            "type": "Simple"
        }
    },
    {
        "object": "com.zabbix:type=yes,domain=zabbix.com,data-source=/dev/rand,key=value,obj=true",
        "domain": "com.zabbix",
        "properties": {
            "type": "Hello",
            "domain": "com.example",
```

```
            "data-source": "/dev/rand",
            "key": "value",
            "obj": true
        }
    }
]
```

6 Discovery of systemd services

Overview

It is possible to discover systemd units (services, by default) with Zabbix.

Item key

The item to use in the discovery rule is the

`systemd.unit.discovery`

Attention:
This item key is only supported in Zabbix agent 2.

This item returns a JSON with information about systemd units, for example:

```
[{
    "{#UNIT.NAME}": "mysqld.service",
    "{#UNIT.DESCRIPTION}": "MySQL Server",
    "{#UNIT.LOADSTATE}": "loaded",
    "{#UNIT.ACTIVESTATE}": "active",
    "{#UNIT.SUBSTATE}": "running",
    "{#UNIT.FOLLOWED}": "",
    "{#UNIT.PATH}": "/org/freedesktop/systemd1/unit/mysqld_2eservice",
    "{#UNIT.JOBID}": 0,
    "{#UNIT.JOBTYPE}": ""
    "{#UNIT.JOBPATH}": "/",

}, {
    "{#UNIT.NAME}": "systemd-journald.socket",
    "{#UNIT.DESCRIPTION}": "Journal Socket",
    "{#UNIT.LOADSTATE}": "loaded",
    "{#UNIT.ACTIVESTATE}": "active",
    "{#UNIT.SUBSTATE}": "running",
    "{#UNIT.FOLLOWED}": "",
    "{#UNIT.PATH}": "/org/freedesktop/systemd1/unit/systemd_2djournald_2esocket",
    "{#UNIT.JOBID}": 0,
    "{#UNIT.JOBTYPE}": "",
    "{#UNIT.JOBPATH}": "/"
}]
```

Supported macros

The following macros are supported for use in the discovery rule filter and prototypes of items, triggers and graphs:

Macro	Description
{#UNIT.NAME}	Primary unit name.
{#UNIT.DESCRIPTION}	Human readable description.
{#UNIT.LOADSTATE}	Load state (i.e. whether the unit file has been loaded successfully)
{#UNIT.ACTIVESTATE}	Active state (i.e. whether the unit is currently started or not)
{#UNIT.SUBSTATE}	Sub state (a more fine-grained version of the active state that is specific to the unit type, which the active state is not)
{#UNIT.FOLLOWED}	Unit that is being followed in its state by this unit, if there is any; otherwise an empty string.
{#UNIT.PATH}	Unit object path.
{#UNIT.JOBID}	Numeric job ID if there is a job queued for the job unit; 0 otherwise.

Macro	Description
{#UNIT.JOBTYPE}	Job type.
{#UNIT.JOBPATH}	Job object path.

Item prototypes

Item prototypes that can be created based on systemd service discovery include, for example:

- Item name: `{#UNIT.DESCRIPTION}`; item key: `systemd.unit.info["{#UNIT.NAME}"]`
- Item name: `{#UNIT.DESCRIPTION}`; item key: `systemd.unit.info["{#UNIT.NAME}",LoadState]`

`systemd.unit.info` agent items are supported since Zabbix 4.4.

7 Discovery of Windows services

Overview

In a similar way as file systems are discovered, it is possible to also discover Windows services.

Item key

The item to use in the discovery rule is

`service.discovery`

This item is supported since Zabbix Windows agent 3.0.

Supported macros

The following macros are supported for use in the discovery rule filter and prototypes of items, triggers and graphs:

Macro	Description
{#SERVICE.NAME}	Service name.
{#SERVICE.DISPLAYNAME}	Displayed service name.
{#SERVICE.DESCRIPTION}	Service description.
{#SERVICE.STATE}	Numerical value of the service state: 0 - Running 1 - Paused 2 - Start pending 3 - Pause pending 4 - Continue pending 5 - Stop pending 6 - Stopped 7 - Unknown
{#SERVICE.STATENAME}	Name of the service state (*Running*, *Paused*, *Start pending*, *Pause pending*, *Continue pending*, *Stop pending*, *Stopped* or *Unknown*).
{#SERVICE.PATH}	Service path.
{#SERVICE.USER}	Service user.
{#SERVICE.STARTUP}	Numerical value of the service startup type: 0 - Automatic 1 - Automatic delayed 2 - Manual 3 - Disabled 4 - Unknown
{#SERVICE.STARTUPNAME}	Name of the service startup type (*Automatic*, *Automatic delayed*, *Manual*, *Disabled*, *Unknown*).
{#SERVICE.STARTUPTRIGGER}	Numerical value to indicate if the service startup type has: 0 - no startup triggers 1 - has startup triggers This macro is supported since Zabbix 3.4.4. It is useful to discover such service startup types as *Automatic (trigger start)*, *Automatic delayed (trigger start)* and *Manual (trigger start).*

Based on Windows service discovery you may create an item prototype like

`service.info[{#SERVICE.NAME},<param>]`

where `param` accepts the following values: *state*, *displayname*, *path*, *user*, *startup* or *description*.

For example, to acquire the display name of a service you may use a "service.info[{#SERVICE.NAME},displayname]" item. If `param` value is not specified ("service.info[{#SERVICE.NAME}]"), the default *state* parameter is used.

8 Discovery using WMI queries

Overview

WMI is a powerful interface in Windows that can be used for retrieving various information about Windows components, services, state and software installed.

It can be used for physical disk discovery and their performance data collection, network interface discovery, Hyper-V guest discovery, monitoring Windows services and many other things in Windows OS.

This type of low-level discovery is done using WQL queries whose results get automatically transformed into a JSON object suitable for low-level discovery.

Item key

The item to use in the discovery rule is

`wmi.getall[<namespace>,<query>]`

This item transforms the query result into a JSON array. For example:

`select * from Win32_DiskDrive where Name like '%PHYSICALDRIVE%'`

may return something like this:


```
[
    {
        "DeviceID" : "\\.\PHYSICALDRIVE0",
        "BytesPerSector" : 512,
        "Capabilities" : [
            3,
            4
        ],
        "CapabilityDescriptions" : [
            "Random Access",
            "Supports Writing"
        ],
        "Caption" : "VBOX HARDDISK ATA Device",
        "ConfigManagerErrorCode" : "0",
        "ConfigManagerUserConfig" : "false",
        "CreationClassName" : "Win32_DiskDrive",
        "Description" : "Disk drive",
        "FirmwareRevision" : "1.0",
        "Index" : 0,
        "InterfaceType" : "IDE"
    },
    {
        "DeviceID" : "\\.\PHYSICALDRIVE1",
        "BytesPerSector" : 512,
        "Capabilities" : [
            3,
            4
        ],
        "CapabilityDescriptions" : [
            "Random Access",
            "Supports Writing"
        ],
        "Caption" : "VBOX HARDDISK ATA Device",
        "ConfigManagerErrorCode" : "0",
        "ConfigManagerUserConfig" : "false",
        "CreationClassName" : "Win32_DiskDrive",
```

```
        "Description" : "Disk drive",
        "FirmwareRevision" : "1.0",
        "Index" : 1,
        "InterfaceType" : "IDE"
    }
]
```

This item is supported since Zabbix Windows agent 4.4.

Low-level discovery macros

Even though no low-level discovery macros are created in the returned JSON, these macros can be defined by the user as an additional step, using the custom LLD macro functionality with JSONPath pointing to the discovered values in the returned JSON.

The macros then can be used to create item, trigger, etc prototypes.

9 Discovery using ODBC SQL queries

Overview

This type of low-level discovery is done using SQL queries, whose results get automatically transformed into a JSON object suitable for low-level discovery.

Item key

SQL queries are performed using a "Database monitor" item type. Therefore, most of the instructions on ODBC monitoring page apply in order to get a working "Database monitor" discovery rule.

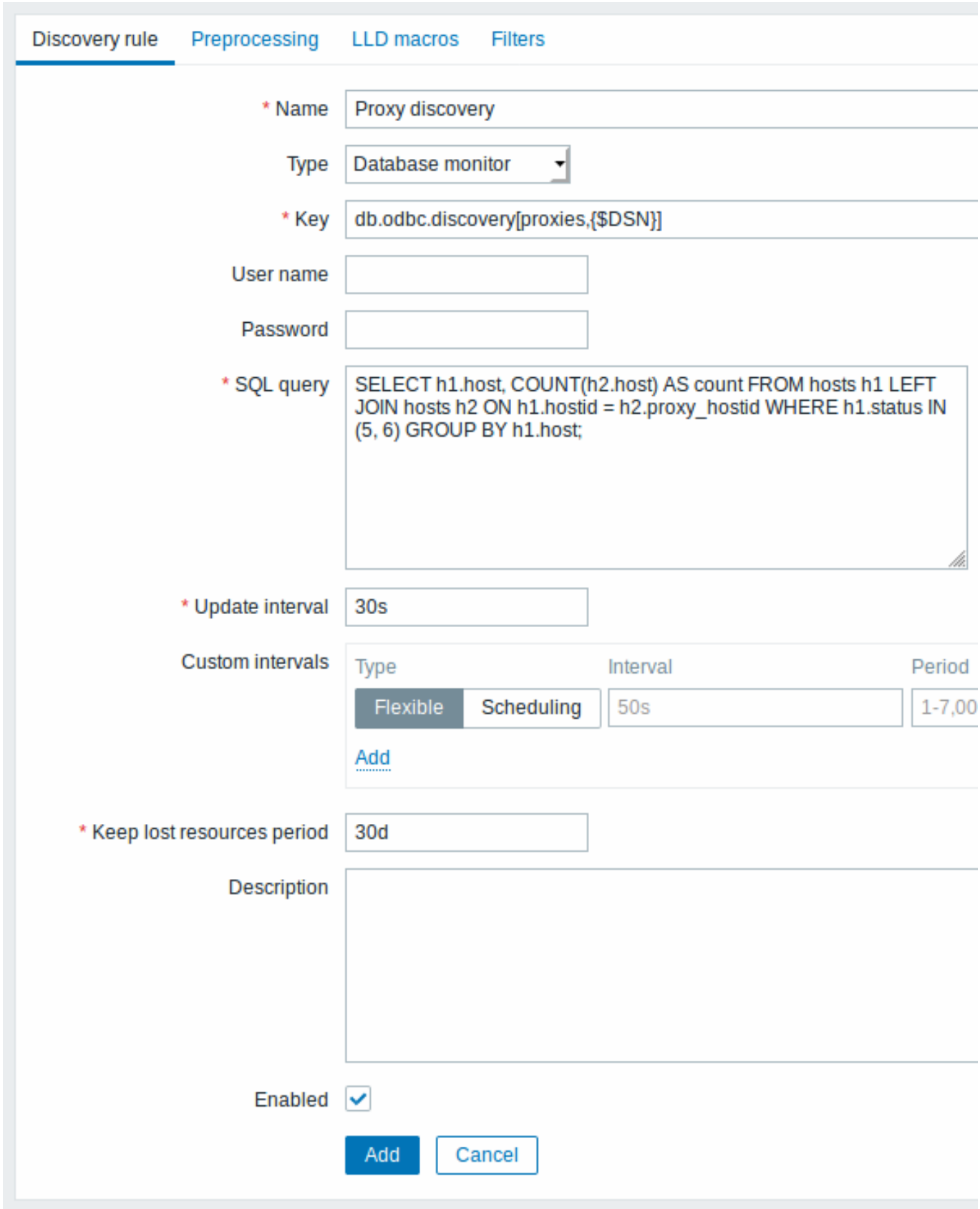
Two item keys may be used in "Database monitor" discovery rules:

- **db.odbc.discovery**[unique_description,data_source_name] - this item transforms the SQL query result into a JSON array, turning the column names from the query result into low-level discovery macro names paired with the discovered field values. These macros can be used in creating item, trigger, etc prototypes. See also: Using db.odbc.discovery.
- **db.odbc.get**[unique_description,data_source_name] - this item transforms the SQL query result into a JSON array, keeping the original column names from the query result as a field name in JSON paired with the discovered values. Compared to `db.odbc.discovery[]`, this item does not create low-level discovery macros in the returned JSON, therefore there is no need to check if the column names can be valid macro names. The low-level discovery macros can be defined as an additional step as required, using the custom LLD macro functionality with JSONPath pointing to the discovered values in the returned JSON. See also: Using db.odbc.get. This item is supported since Zabbix 4.4.

Using db.odbc.discovery

As a practical example to illustrate how the SQL query is transformed into JSON, let us consider low-level discovery of Zabbix proxies by performing an ODBC query on Zabbix database. This is useful for automatic creation of "zabbix[proxy,<name>,lastaccess]" internal items to monitor which proxies are alive.

Let us start with discovery rule configuration:



All mandatory input fields are marked with a red asterisk.

Here, the following direct query on Zabbix database is used to select all Zabbix proxies, together with the number of hosts they are monitoring. The number of hosts can be used, for instance, to filter out empty proxies:

```
mysql> SELECT h1.host, COUNT(h2.host) AS count FROM hosts h1 LEFT JOIN hosts h2 ON h1.hostid = h2.proxy_ho
+---------+-------+
| host    | count |
+---------+-------+
| Japan 1 |     5 |
```

```
| Japan 2 |    12 |
| Latvia  |     3 |
+---------+-------+
3 rows in set (0.01 sec)
```

By the internal workings of "db.odbc.discovery[,{$DSN}]" item, the result of this query gets automatically transformed into the following JSON:

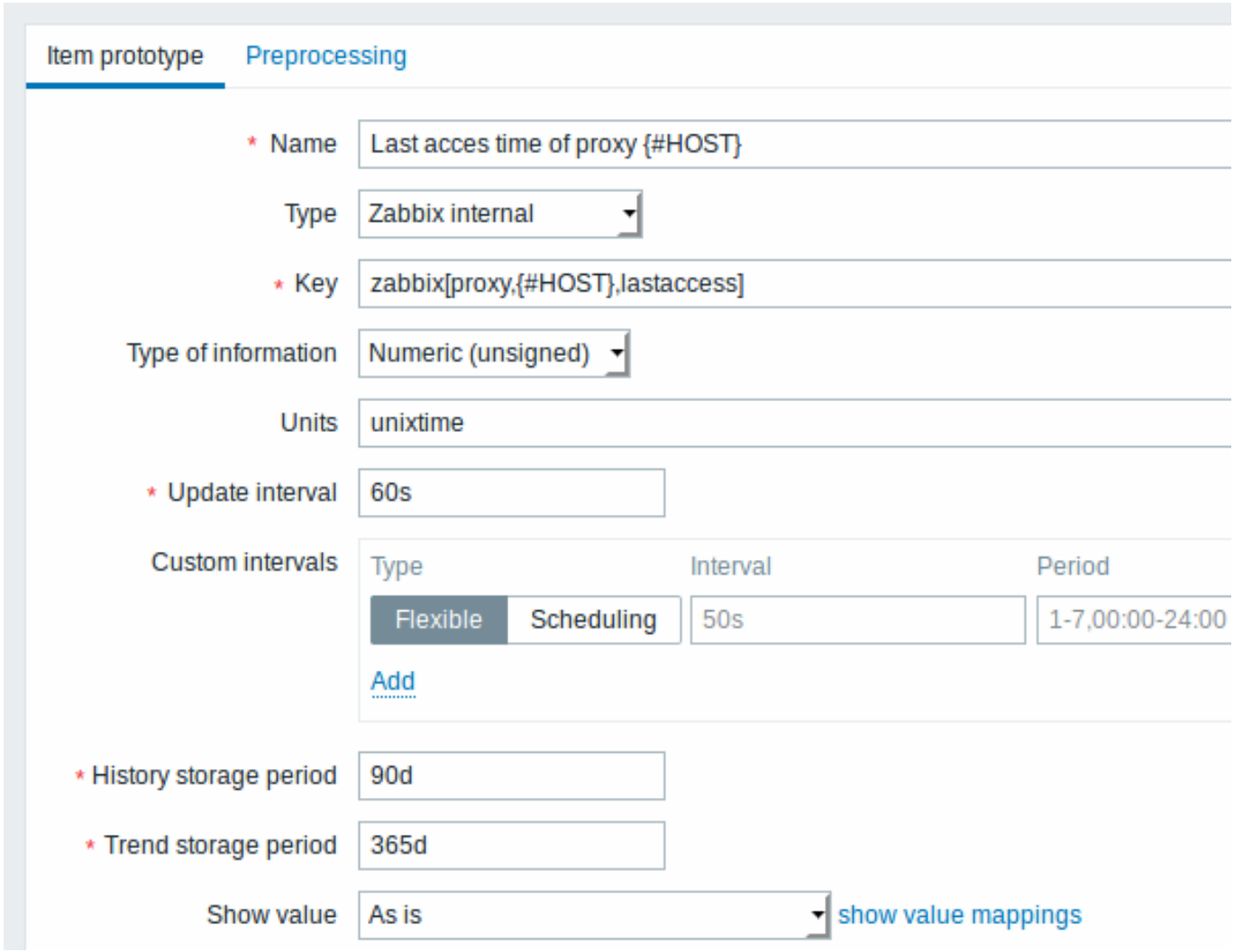
```
[
    {
        "{#HOST}": "Japan 1",
        "{#COUNT}": "5"
    },
    {
        "{#HOST}": "Japan 2",
        "{#COUNT}": "12"
    },
    {
        "{#HOST}": "Latvia",
        "{#COUNT}": "3"
    }
]
```

It can be seen that column names become macro names and selected rows become the values of these macros.

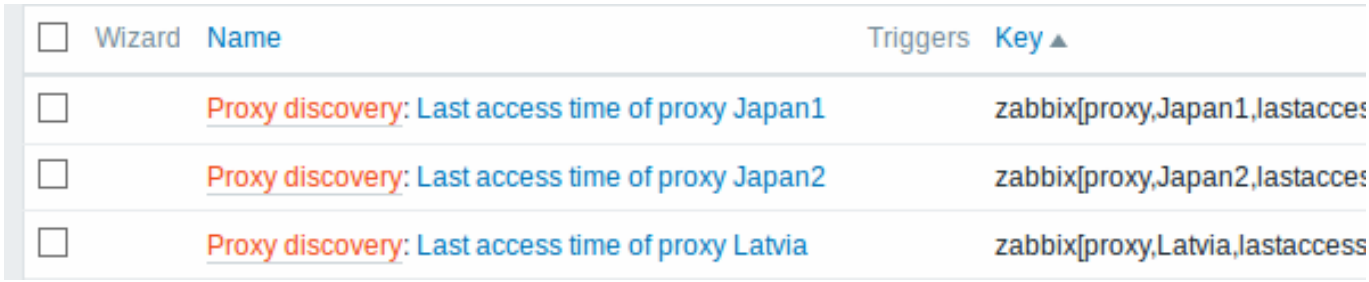
Note:
If it is not obvious how a column name would be transformed into a macro name, it is suggested to use column aliases like "COUNT(h2.host) AS count" in the example above.
In case a column name cannot be converted into a valid macro name, the discovery rule becomes not supported, with the error message detailing the offending column number. If additional help is desired, the obtained column names are provided under DebugLevel=4 in Zabbix server log file:

```
$ grep db.odbc.discovery /tmp/zabbix_server.log
 ...
 23876:20150114:153410.856 In db_odbc_discovery() query:'SELECT h1.host, COUNT(h2.host) FROM hosts h1 I
 23876:20150114:153410.860 db_odbc_discovery() column[1]:'host'
 23876:20150114:153410.860 db_odbc_discovery() column[2]:'COUNT(h2.host)'
 23876:20150114:153410.860 End of db_odbc_discovery():NOTSUPPORTED
 23876:20150114:153410.860 Item [Zabbix server:db.odbc.discovery[proxies,{$DSN}]] error: Cannot convert
```

Now that we understand how a SQL query is transformed into a JSON object, we can use {#HOST} macro in item prototypes:



Once discovery is performed, an item will be created for each proxy:



Using db.odbc.get

Using `db.odbc.get[,{$DSN}]` and the following SQL example:

```
mysql> SELECT h1.host, COUNT(h2.host) AS count FROM hosts h1 LEFT JOIN hosts h2 ON h1.hostid = h2.proxy_ho
+---------+-------+
| host    | count |
+---------+-------+
| Japan 1 |     5 |
| Japan 2 |    12 |
| Latvia  |     3 |
+---------+-------+
3 rows in set (0.01 sec)
```

this JSON will be returned:

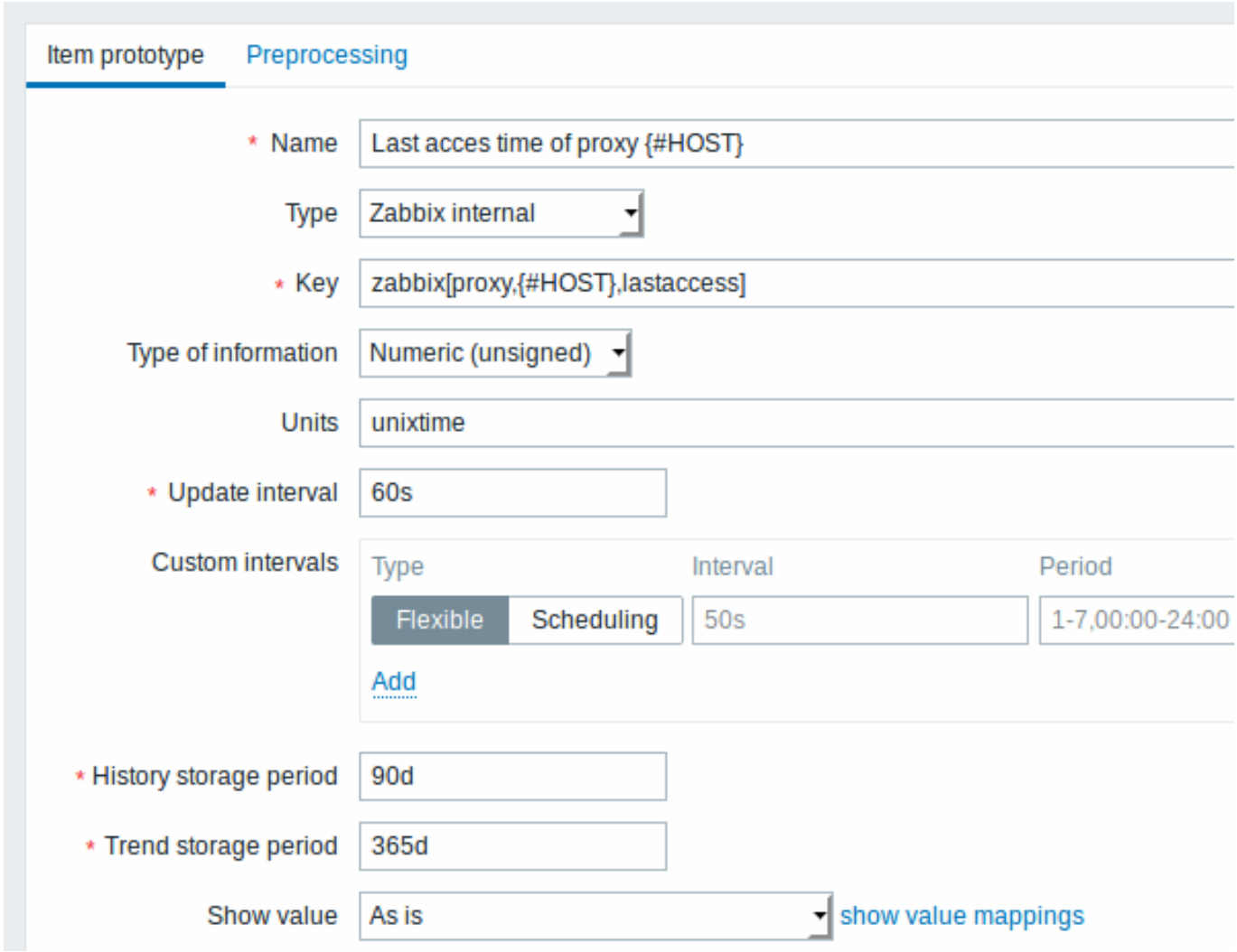
```
[
    {
        "host": "Japan 1",
        "count": "5"
```

```
    },
    {
        "host": "Japan 2",
        "count": "12"
    },
    {
        "host": "Latvia",
        "count": "3"
    }
]
```

As you can see, there are no low-level discovery macros there. However, custom low-level discovery macros can be created in the LLD macros tab of a discovery rule using JSONPath, for example:

`{#HOST}` → `$.host`

Now this `{#HOST}` macro may be used in item prototypes:



10 Discovery using Prometheus data

Overview

Data provided in Prometheus line format can be used for low-level discovery.

See Prometheus checks for details how Prometheus data querying is implemented in Zabbix.

Configuration

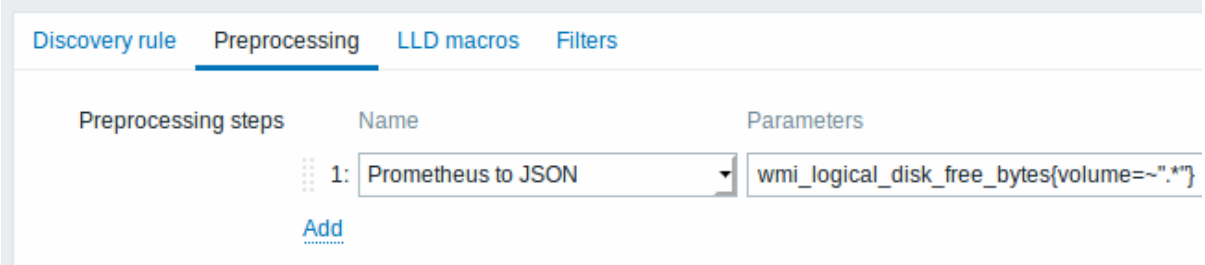
The low-level discovery rule should be created as a dependent item to the HTTP master item that collects Prometheus data.

Prometheus to JSON

In the discovery rule, go to the Preprocessing tab and select the *Prometheus to JSON* preprocessing option. Data in JSON format are needed for discovery and the *Prometheus to JSON* preprocessing option will return exactly that, with the following attributes:

- metric name
- metric value
- help (if present)
- type (if present)
- labels (if present)
- raw line

For example, querying `wmi_logical_disk_free_bytes`:



from these Prometheus lines:

```
# HELP wmi_logical_disk_free_bytes Free space in bytes (LogicalDisk.PercentFreeSpace)
# TYPE wmi_logical_disk_free_bytes gauge
wmi_logical_disk_free_bytes{volume="C:"} 3.5180249088e+11
wmi_logical_disk_free_bytes{volume="D:"} 2.627731456e+09
wmi_logical_disk_free_bytes{volume="HarddiskVolume4"} 4.59276288e+08
```

will return:

```
[
    {
        "name": "wmi_logical_disk_free_bytes",
        "help": "Free space in bytes (LogicalDisk.PercentFreeSpace)",
        "type": "gauge",
        "labels": {
            "volume": "C:"
         },
        "value": "3.5180249088e+11",
        "line_raw": "wmi_logical_disk_free_bytes{volume=\"C:\"} 3.5180249088e+11"
    },
    {
        "name": "wmi_logical_disk_free_bytes",
        "help": "Free space in bytes (LogicalDisk.PercentFreeSpace)",
        "type": "gauge",
        "labels": {
            "volume": "D:"
         },
        "value": "2.627731456e+09",
        "line_raw": "wmi_logical_disk_free_bytes{volume=\"D:\"} 2.627731456e+09"
    },
    {
        "name": "wmi_logical_disk_free_bytes",
        "help": "Free space in bytes (LogicalDisk.PercentFreeSpace)",
        "type": "gauge",
        "labels": {
            "volume": "HarddiskVolume4"
         },
        "value": "4.59276288e+08",
        "line_raw": "wmi_logical_disk_free_bytes{volume=\"HarddiskVolume4\"} 4.59276288e+08"
    }
]
```

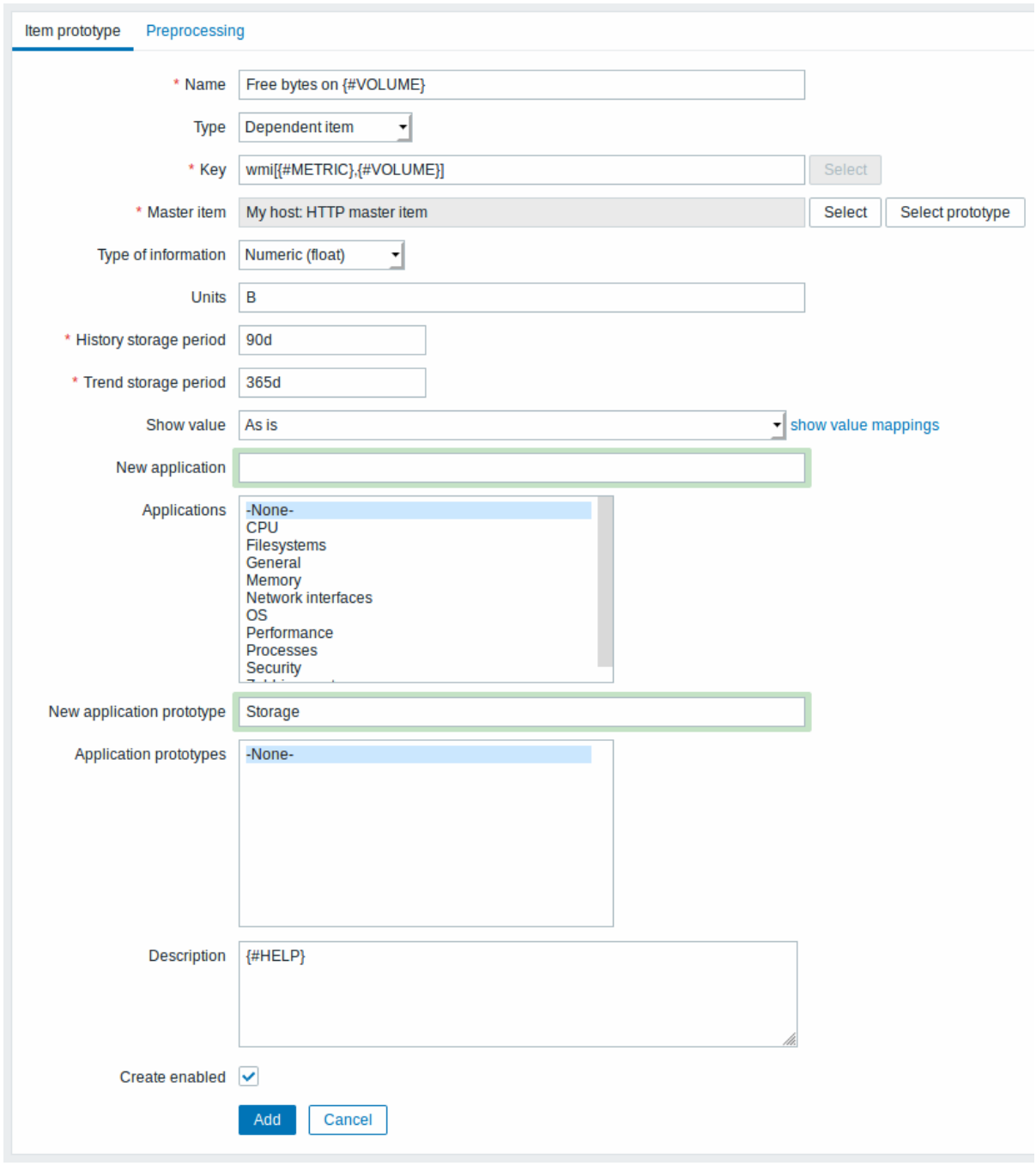
Mapping LLD macros

Next you have to go to the LLD macros tab and make the following mappings:

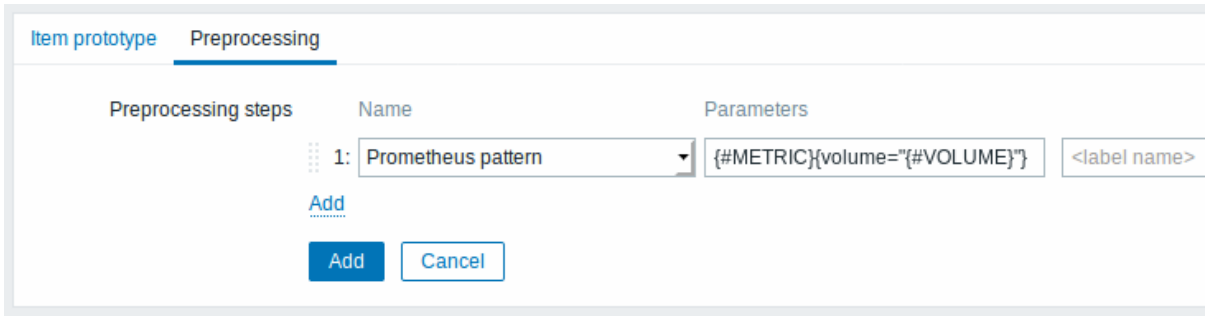
```
{#VOLUME}=$.labels['volume']
{#METRIC}=$['name']
{#HELP}=$['help']
```

Item prototype

You may want to create an item prototype like this:



with preprocessing options:



11 Discovery of block devices

In a similar way as file systems are discovered, it is possible to also discover block devices and their type.

Item key

The item key to use in the discovery rule is

`vfs.dev.discovery`

This item is supported on Linux platforms only, since Zabbix agent 4.4.

You may create discovery rules using this discovery item and:

- filter: **{#DEVNAME} matches** `sd[\D]$` - to discover devices named "sd0", "sd1", "sd2", ...
- filter: **{#DEVTYPE} matches** `disk` **AND {#DEVNAME} does not match** `^loop.*` - to discover disk type devices whose name does not start with "loop"

Supported macros

This discovery key returns two macros - {#DEVNAME} and {#DEVTYPE} identifying the block device name and type respectively, e.g.:

```
[
   {
      "{#DEVNAME}":"loop1",
      "{#DEVTYPE}":"disk"
   },
   {
      "{#DEVNAME}":"dm-0",
      "{#DEVTYPE}":"disk"
   },
   {
      "{#DEVNAME}":"sda",
      "{#DEVTYPE}":"disk"
   },
   {
      "{#DEVNAME}":"sda1",
      "{#DEVTYPE}":"partition"
   }
]
```

Block device discovery allows to use `vfs.dev.read[]` and `vfs.dev.write[]` items to create item prototypes using the {#DEVNAME} macro, for example:

- "vfs.dev.read[{#DEVNAME},sps]"
- "vfs.dev.write[{#DEVNAME},sps]"

{#DEVTYPE} is intended for device filtering.

12 Discovery of host interfaces in Zabbix

Overview

It is possible to discover all interfaces configured in Zabbix frontend for a host.

Item key

The item to use in the discovery rule is the

`zabbix[host,discovery,interfaces]`

internal item. This item is supported since Zabbix server 3.4.

This item returns a JSON with the description of interfaces, including:

- IP address/DNS hostname (depending on the "Connect to" host setting)
- Port number
- Interface type (Zabbix agent, SNMP, JMX, IPMI)
- If it is the default interface or not
- If the bulk request feature is enabled - for SNMP interfaces only.

For example:

```
[{"{#IF.CONN}":"192.168.3.1","{#IF.IP}":"192.168.3.1","{#IF.DNS}":"","{#IF.PORT}":"10050","{#IF.TYPE}":"AG
```

With multiple interfaces their records in JSON are ordered by:

- Interface type,
- Default - the default interface is put before non-default interfaces,
- Interface ID (in ascending order).

Supported macros

The following macros are supported for use in the discovery rule filter and prototypes of items, triggers and graphs:

Macro	Description
{#IF.CONN}	Interface IP address or DNS host name.
{#IF.IP}	Interface IP address.
{#IF.DNS}	Interface DNS host name.
{#IF.PORT}	Interface port number.
{#IF.TYPE}	Interface type (”AGENT”, ”SNMP”, ”JMX”, or ”IPMI”).
{#IF.DEFAULT}	Default status for the interface: 0 - not default interface 1 - default interface
{#IF.SNMP.BULK}	SNMP bulk processing status for the interface: 0 - disabled 1 - enabled This macro is returned only if interface type is “SNMP”.

Notes on low-level discovery

Application discovery

Application prototypes support LLD macros.

One application prototype can be used by several item prototypes of the same discovery rule.

If created application prototype is not used by any item prototype it gets removed from ’Application prototypes’ list automatically.

Like other discovered entities applications follow the lifetime defined in discovery rule (’keep lost resources period’ setting) - they are removed after not being discovered for the specified number of days.

If an application is not discovered anymore, the application itself may not be removed because of the ’lost resources period’ setting, however:

- items that are still discovered are automatically removed from it;
- items that are no longer discovered are not removed from it (note that they would be removed before Zabbix 4.4.6).

Application prototypes defined by one discovery rule can’t discover the same application. In this situation only the first prototype discovery will succeed, the rest will report appropriate LLD error. Only application prototypes defined in different discovery rules can result in discovering the same application.

16. Distributed monitoring

Overview Zabbix provides an effective and reliable way of monitoring a distributed IT infrastructure using Zabbix proxies.

Proxies can be used to collect data locally on behalf of a centralized Zabbix server and then report the data to the server.

Proxy features

When making a choice of using/not using a proxy, several considerations must be taken into account.

	Proxy
Lightweight	**Yes**
GUI	No
Works independently	**Yes**

	Proxy
Easy maintenance	**Yes**
Automatic DB creation[1]	**Yes**
Local administration	No
Ready for embedded hardware	**Yes**
One way TCP connections	**Yes**
Centralised configuration	**Yes**
Generates notifications	No

Note:
[1] Automatic DB creation feature only works with SQLite. Other databases require a manual setup.

1 Proxies

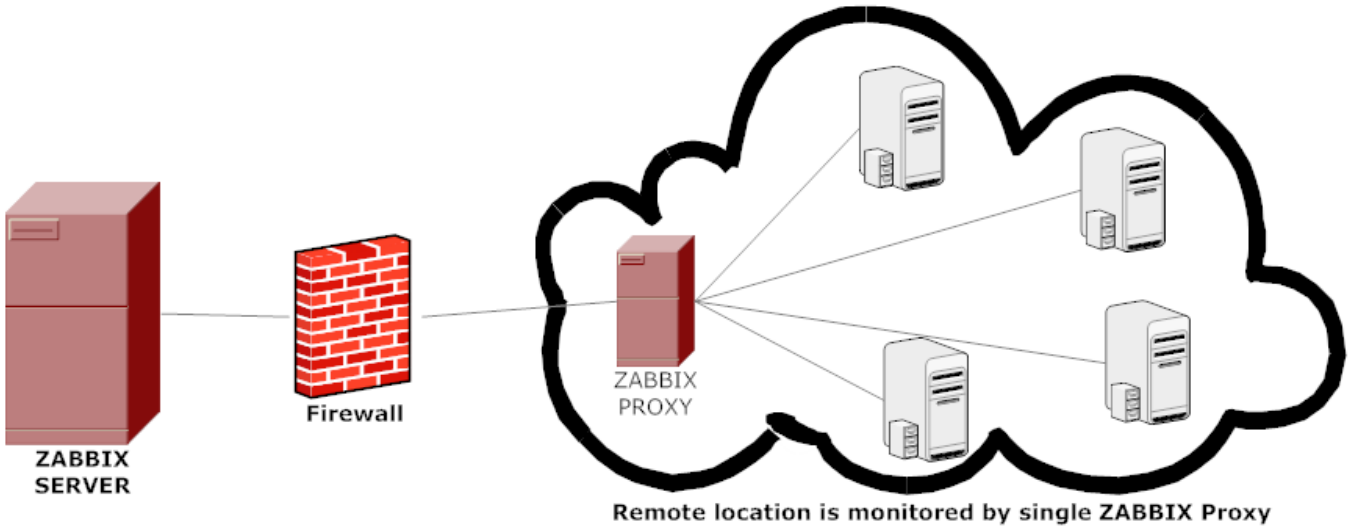
Overview

A Zabbix proxy can collect performance and availability data on behalf of the Zabbix server. This way, a proxy can take on itself some of the load of collecting data and offload the Zabbix server.

Also, using a proxy is the easiest way of implementing centralized and distributed monitoring, when all agents and proxies report to one Zabbix server and all data is collected centrally.

A Zabbix proxy can be used to:

- Monitor remote locations
- Monitor locations having unreliable communications
- Offload the Zabbix server when monitoring thousands of devices
- Simplify the maintenance of distributed monitoring



The proxy requires only one TCP connection to the Zabbix server. This way it is easier to get around a firewall as you only need to configure one firewall rule.

Attention:
Zabbix proxy must use a separate database. Pointing it to the Zabbix server database will break the configuration.

All data collected by the proxy is stored locally before transmitting it over to the server. This way no data is lost due to any temporary communication problems with the server. The *ProxyLocalBuffer* and *ProxyOfflineBuffer* parameters in the proxy configuration file control for how long the data are kept locally.

Attention:
It may happen that a proxy, which receives the latest configuration changes directly from Zabbix server database, has a more up-to-date configuration than Zabbix server whose configuration may not be updated as fast due to the value of CacheUpdateFrequency. As a result, proxy may start gathering data and send them to Zabbix server that ignores these data.

Zabbix proxy is a data collector. It does not calculate triggers, process events or send alerts. For an overview of what proxy functionality is, review the following table:

Function		Supported by proxy
Items		
	Zabbix agent checks	**Yes**
	Zabbix agent checks (active)	**Yes** [1]
	Simple checks	**Yes**
	Trapper items	**Yes**
	SNMP checks	**Yes**
	SNMP traps	**Yes**
	IPMI checks	**Yes**
	JMX checks	**Yes**
	Log file monitoring	**Yes**
	Internal checks	**Yes**
	SSH checks	**Yes**
	Telnet checks	**Yes**
	External checks	**Yes**
	Dependent items	**Yes**
Built-in web monitoring		**Yes**
Item value preprocessing		**Yes**
Network discovery		**Yes**
Active agent autoregistration		**Yes**
Low-level discovery		**Yes**
Remote commands		**Yes**
Calculating triggers		*No*
Processing events		*No*
Event correlation		*No*
Sending alerts		*No*

Note:
[1] To make sure that an agent asks the proxy (and not the server) for active checks, the proxy must be listed in the **ServerActive** parameter in the agent configuration file.

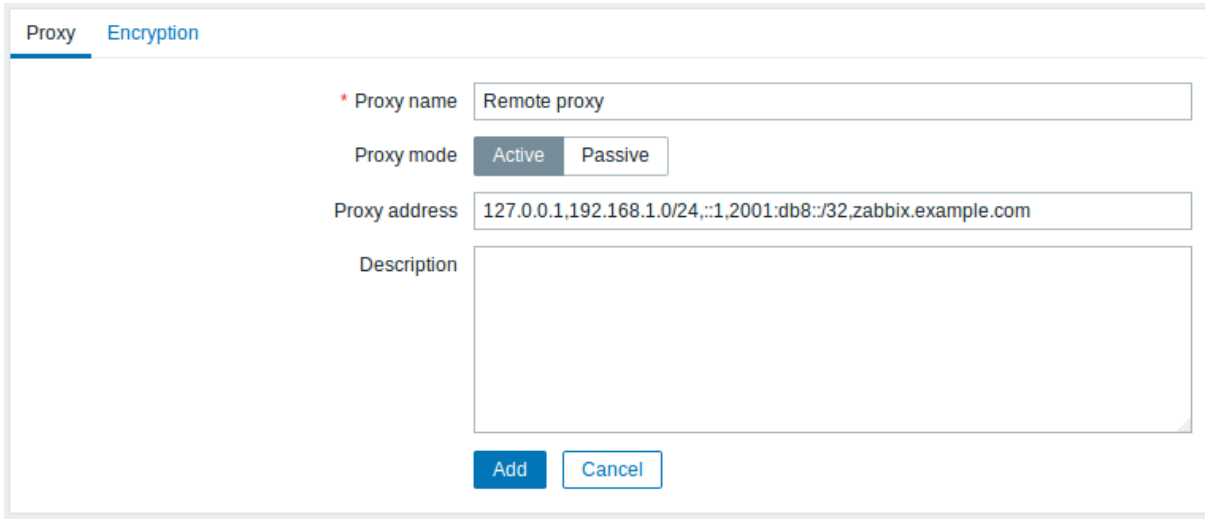
Configuration

Once you have installed and configured a proxy, it is time to configure it in the Zabbix frontend.

Adding proxies

To configure a proxy in Zabbix frontend:

- Go to: *Administration* → *Proxies*
- Click on *Create proxy*



Parameter		Description
Proxy name		Enter the proxy name. It must be the same name as in the *Hostname* parameter in the proxy configuration file.
Proxy mode		Select the proxy mode. **Active** - the proxy will connect to the Zabbix server and request configuration data **Passive** - Zabbix server connects to the proxy *Note* that without encrypted communications (sensitive) proxy configuration data may become available to parties having access to the Zabbix server trapper port when using an active proxy. This is possible because anyone may pretend to be an active proxy and request configuration data if authentication does not take place or proxy addresses are not limited in the *Proxy address* field.
Proxy address		If specified then active proxy requests are only accepted from this list of comma-delimited IP addresses, optionally in CIDR notation, or DNS names of active Zabbix proxy. This field is only available if an active proxy is selected in the *Proxy mode* field. Macros are not supported. This option is supported since Zabbix 4.0.0.
Interface		Enter interface details for the passive proxy. This field is only available if a passive proxy is selected in the *Proxy mode* field.
	IP address	IP address of the passive proxy (optional).
	DNS name	DNS name of the passive proxy (optional).
	Connect to	Clicking the respective button will tell Zabbix server what to use to retrieve data from proxy: **IP** - Connect to the proxy IP address (recommended) **DNS** - Connect to the proxy DNS name
	Port	TCP/UDP port number of the passive proxy (10051 by default).
Description		Enter the proxy description.

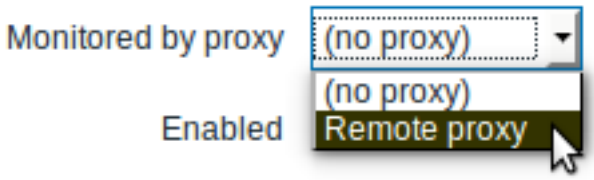
The **Encryption** tab allows you to require encrypted connections with the proxy.

Parameter	Description
Connections to proxy	How the server connects to the passive proxy: no encryption (default), using PSK (pre-shared key) or certificate.
Connections from proxy	Select what type of connections are allowed from the active proxy. Several connection types can be selected at the same time (useful for testing and switching to other connection type). Default is ”No encryption”.

Parameter	Description
Issuer	Allowed issuer of certificate. Certificate is first validated with CA (certificate authority). If it is valid, signed by the CA, then the *Issuer* field can be used to further restrict allowed CA. This field is optional, intended to use if your Zabbix installation uses certificates from multiple CAs.
Subject	Allowed subject of certificate. Certificate is first validated with CA. If it is valid, signed by the CA, then the *Subject* field can be used to allow only one value of *Subject* string. If this field is empty then any valid certificate signed by the configured CA is accepted.
PSK identity	Pre-shared key identity string. Do not put sensitive information in the PSK identity, it is transmitted unencrypted over the network to inform a receiver which PSK to use.
PSK	Pre-shared key (hex-string). Maximum length: 512 hex-digits (256-byte PSK) if Zabbix uses GnuTLS or OpenSSL library, 64 hex-digits (32-byte PSK) if Zabbix uses mbed TLS (PolarSSL) library. Example: 1f87b595725ac58dd977beef14b97461a7c1045b9a1c963065002c5473194952

Host configuration

You can specify that an individual host should be monitored by a proxy in the host configuration form, using the *Monitored by proxy* field.



Host mass update is another way of specifying that hosts should be monitored by a proxy.

17. Encryption

Overview Zabbix supports encrypted communications between Zabbix components using Transport Layer Security (TLS) protocol v.1.2 and 1.3 (depending on the crypto library). Certificate-based and pre-shared key-based encryption is supported.

Encryption can be configured between Zabbix server, Zabbix proxy, Zabbix agent, zabbix_sender and zabbix_get utilities.

Encryption is optional and configurable for individual components:

- Some proxies and agents can be configured to use certificate-based encryption with the server, while others can use pre-shared key-based encryption, and yet others continue with unencrypted communications (as before)
- Server (proxy) can use different encryption configurations for different hosts

Zabbix daemon programs use one listening port for encrypted and unencrypted incoming connections. Adding an encryption does not require opening new ports on firewalls.

Limitations

- Private keys are stored in plain text in files readable by Zabbix components during startup
- Pre-shared keys are entered in Zabbix frontend and stored in Zabbix database in plain text
- Built-in encryption does not protect communications:

```
   * Between the web server running Zabbix frontend and user web browser
   * Between Zabbix frontend and Zabbix server
   * Between Zabbix server (proxy) and Zabbix database
* Currently each encrypted connection opens with a full TLS handshake, no session caching and tickets are
* Adding encryption increases the time for item checks and actions, depending on network latency:
  * For example, if packet delay is 100ms then opening a TCP connection and sending unencrypted request ta
```

```
  * Timeouts may need to be increased, otherwise some items and actions running remote scripts on agents m
* Encryption is not supported by [[/manual/discovery/network_discovery|network discovery]]. Zabbix agent c
```

Compiling Zabbix with encryption support To support encryption Zabbix must be compiled and linked with one of four crypto libraries:

- GnuTLS - from version 3.1.18
- OpenSSL - versions 1.0.1, 1.0.2, 1.1.0, 1.1.1
- LibreSSL - tested with versions 2.7.4, 2.8.2:
  - LibreSSL 2.6.x is not supported
  - LibreSSL is supported as a compatible replacement of OpenSSL; the new `tls_*()` LibreSSL-specific API functions are not used. Zabbix components compiled with *LibreSSL* will not be able to use PSK, only certificates can be used.
- mbed TLS (formerly PolarSSL) - version 1.3.9 and later 1.3.x
  - mbed TLS 2.x is currently not supported; it is not a drop-in replacement for the 1.3 branch, Zabbix will not compile with mbed TLS 2.x.

The library is selected by specifying the respective option to "configure" script:

- `--with-gnutls[=DIR]`
- `--with-openssl[=DIR]` (also used for LibreSSL)
- `--with-mbedtls[=DIR]`

For example, to configure the sources for server and agent with *OpenSSL* you may use something like:
./configure --enable-server --enable-agent --with-mysql --enable-ipv6 --with-net-snmp --with-libcurl --with-libxml2 --with-openssl

Different Zabbix components may be compiled with different crypto libraries (e.g. a server with *OpenSSL*, an agent with *GnuTLS*).

Attention:
If you plan to use pre-shared keys (PSK) consider using *GnuTLS* or *mbed TLS* libraries in Zabbix components using PSKs. *GnuTLS* and *mbed TLS* libraries support PSK ciphersuites with Perfect Forward Secrecy. *OpenSSL* library (versions 1.0.1, 1.0.2c) does support PSKs but available PSK ciphersuites do not provide Perfect Forward Secrecy.

Connection encryption management Connections in Zabbix can use:

- no encryption (default)
- RSA certificate-based encryption
- PSK-based encryption

There are two important parameters used to specify encryption between Zabbix components:

- TLSConnect - specifies what encryption to use for outgoing connections (unencrypted, PSK or certificate)
- TLSAccept - specifies what types of connections are allowed for incoming connections (unencrypted, PSK or certificate). One or more values can be specified.

`TLSConnect` is used in the configuration files for Zabbix proxy (in active mode, specifies only connections to server) and Zabbix agent (for active checks). In Zabbix frontend the TLSConnect equivalent is the *Connections to host* field in *Configuration* → *Hosts* → *<some host>* → *Encryption* tab and the *Connections to proxy* field in *Administration* → *Proxies* → *<some proxy>* → *Encryption* tab. If the configured encryption type for connection fails, no other encryption types will be tried.

`TLSAccept` is used in the configuration files for Zabbix proxy (in passive mode, specifies only connections from server) and Zabbix agent (for passive checks). In Zabbix frontend the TLSAccept equivalent is the *Connections from host* field in *Configuration* → *Hosts* → *<some host>* → *Encryption* tab and the *Connections from proxy* field in *Administration* → *Proxies* → *<some proxy>* → *Encryption* tab.

Normally you configure only one type of encryption for incoming encryptions. But you may want to switch the encryption type, e.g. from unencrypted to certificate-based with minimum downtime and rollback possibility. To achieve this:

- Set `TLSAccept=unencrypted,cert` in the agent configuration file and restart Zabbix agent
- Test connection with zabbix_get to the agent using certificate. If it works, you can reconfigure encryption for that agent in Zabbix frontend in the *Configuration* → *Hosts* → *<some host>* → *Encryption* tab by setting *Connections to host* to "Certificate".
- When server configuration cache gets updated (and proxy configuration is updated if the host is monitored by proxy) then connections to that agent will be encrypted
- If everything works as expected you can set `TLSAccept=cert` in the agent configuration file and restart Zabbix agent. Now the agent will be accepting only encrypted certificate-based connections. Unencrypted and PSK-based connections will be rejected.

In a similar way it works on server and proxy. If in Zabbix frontend in host configuration *Connections from host* is set to "Certificate" then only certificate-based encrypted connections will be accepted from the agent (active checks) and zabbix_sender (trapper items).

Most likely you will configure incoming and outgoing connections to use the same encryption type or no encryption at all. But technically it is possible to configure it asymmetrically, e.g. certificate-based encryption for incoming and PSK-based for outgoing connections.

Encryption configuration for each host is displayed in the Zabbix frontend, in *Configuration* → *Hosts* in the *Agent encryption* column. For example:

Example	Connections to host	Allowed connections from host	Rejected connections from host
NONE	Unencrypted	Unencrypted	Encrypted, certificate and PSK-based encrypted
CERT NONE PSK CERT	Encrypted, certificate-based	Encrypted, certificate-based	Unencrypted and PSK-based encrypted
PSK NONE PSK CERT	Encrypted, PSK-based	Encrypted, PSK-based	Unencrypted and certificate-based encrypted
PSK NONE PSK CERT	Encrypted, PSK-based	Unencrypted and PSK-based encrypted	Certificate-based encrypted
CERT NONE PSK CERT	Encrypted, certificate-based	Unencrypted, PSK or certificate-based encrypted	-

Attention:
Connections are unencrypted by default. Encryption must be configured for each host and proxy individually.

zabbix_get and zabbix_sender with encryption See zabbix_get and zabbix_sender manpages for using them with encryption.

Ciphersuites Ciphersuites by default are configured internally during Zabbix startup and, before Zabbix 4.4.7, are not user-configurable.

Since Zabbix 4.4.7 also user-configured ciphersuites are supported for GnuTLS and OpenSSL. Users may configure ciphersuites according to their security policies. Using this feature is optional (built-in default ciphersuites still work).

For crypto libraries compiled with default settings Zabbix built-in rules typically result in the following ciphersuites (in order from higher to lower priority):

Library	Certificate ciphersuites	PSK ciphersuites
mbed TLS (PolarSSL) 1.3.9	TLS-ECDHE-RSA-WITH-AES-128-GCM-SHA256 TLS-ECDHE-RSA-WITH-AES-128-CBC-SHA256 TLS-ECDHE-RSA-WITH-AES-128-CBC-SHA TLS-RSA-WITH-AES-128-GCM-SHA256 TLS-RSA-WITH-AES-128-CBC-SHA256 TLS-RSA-WITH-AES-128-CBC-SHA	TLS-ECDHE-PSK-WITH-AES-128-CBC-SHA256 TLS-ECDHE-PSK-WITH-AES-128-CBC-SHA TLS-PSK-WITH-AES-128-GCM-SHA256 TLS-PSK-WITH-AES-128-CBC-SHA256 TLS-PSK-WITH-AES-128-CBC-SHA
GnuTLS 3.1.18	TLS_ECDHE_RSA_AES_128_GCM_SHA256 TLS_ECDHE_RSA_AES_128_CBC_SHA256 TLS_ECDHE_RSA_AES_128_CBC_SHA1 TLS_RSA_AES_128_GCM_SHA256 TLS_RSA_AES_128_CBC_SHA256 TLS_RSA_AES_128_CBC_SHA1	TLS_ECDHE_PSK_AES_128_CBC_SHA256 TLS_ECDHE_PSK_AES_128_CBC_SHA1 TLS_PSK_AES_128_GCM_SHA256 TLS_PSK_AES_128_CBC_SHA256 TLS_PSK_AES_128_CBC_SHA1
OpenSSL 1.0.2c	ECDHE-RSA-AES128-GCM-SHA256 ECDHE-RSA-AES128-SHA256 ECDHE-RSA-AES128-SHA AES128-GCM-SHA256 AES128-SHA256 AES128-SHA	PSK-AES128-CBC-SHA

Library	Certificate ciphersuites	PSK ciphersuites
OpenSSL 1.1.0	ECDHE-RSA-AES128-GCM-SHA256 ECDHE-RSA-AES128-SHA256 ECDHE-RSA-AES128-SHA AES128-GCM-SHA256 AES128-CCM8 AES128-CCM AES128-SHA256 AES128-SHA	ECDHE-PSK-AES128-CBC-SHA256 ECDHE-PSK-AES128-CBC-SHA PSK-AES128-GCM-SHA256 PSK-AES128-CCM8 PSK-AES128-CCM PSK-AES128-CBC-SHA256 PSK-AES128-CBC-SHA

Cipher suites using certificates:

	TLS server		
TLS client	*mbed TLS (PolarSSL)*	*GnuTLS*	*OpenSSL 1.0.2*
mbed TLS (PolarSSL)	TLS-ECDHE-RSA-WITH-AES-128-GCM-SHA256	TLS-ECDHE-RSA-WITH-AES-128-GCM-SHA256	TLS-ECDHE-RSA-WITH-AES-128-GCM-SHA256
GnuTLS	TLS-ECDHE-RSA-WITH-AES-128-GCM-SHA256	TLS-ECDHE-RSA-WITH-AES-128-GCM-SHA256	TLS-ECDHE-RSA-WITH-AES-128-GCM-SHA256
OpenSSL 1.0.2	TLS-ECDHE-RSA-WITH-AES-128-GCM-SHA256	TLS-ECDHE-RSA-WITH-AES-128-GCM-SHA256	TLS-ECDHE-RSA-WITH-AES-128-GCM-SHA256

Cipher suites using PSK:

	TLS server		
TLS client	*mbed TLS (PolarSSL)*	*GnuTLS*	*OpenSSL 1.0.2*
mbed TLS (PolarSSL)	TLS-ECDHE-PSK-WITH-AES-128-CBC-SHA256	TLS-ECDHE-PSK-WITH-AES-128-CBC-SHA256	TLS-PSK-WITH-AES-128-CBC-SHA
GnuTLS	TLS-ECDHE-PSK-WITH-AES-128-CBC-SHA256	TLS-ECDHE-PSK-WITH-AES-128-CBC-SHA256	TLS-PSK-WITH-AES-128-CBC-SHA
OpenSSL 1.0.2	TLS-PSK-WITH-AES-128-CBC-SHA	TLS-PSK-WITH-AES-128-CBC-SHA	TLS-PSK-WITH-AES-128-CBC-SHA

User-configured ciphersuites The built-in ciphersuite selection criteria can be overridden with user-configured ciphersuites (since Zabbix 4.4.7).

Attention:
User-configured ciphersuites is a feature intended for advanced users who understand TLS ciphersuites, their security and consequences of mistakes, and who are comfortable with TLS troubleshooting.

The built-in ciphersuite selection criteria can be overridden using the following parameters:

Override scope	Parameter	Value	Description
Ciphersuite selection for certificates	TLSCipherCert13	Valid OpenSSL 1.1.1 cipher strings for TLS 1.3 protocol (their values are passed to the OpenSSL function SSL_CTX_set_ciphersuites()).	Certificate-based ciphersuite selection criteria for TLS 1.3 Only OpenSSL 1.1.1 or newer.

Override scope	Parameter	Value	Description
	TLSCipherCert	Valid OpenSSL cipher strings for TLS 1.2 or valid GnuTLS priority strings. Their values are passed to the SSL_CTX_set_cipher_list() or gnutls_priority_init() functions, respectively.	Certificate-based ciphersuite selection criteria for TLS 1.2/1.3 (GnuTLS), TLS 1.2 (OpenSSL)
Ciphersuite selection for PSK	TLSCipherPSK13	Valid OpenSSL 1.1.1 cipher strings for TLS 1.3 protocol (their values are passed to the OpenSSL function SSL_CTX_set_ciphersuites()).	PSK-based ciphersuite selection criteria for TLS 1.3 Only OpenSSL 1.1.1 or newer.
	TLSCipherPSK	Valid OpenSSL cipher strings for TLS 1.2 or valid GnuTLS priority strings. Their values are passed to the SSL_CTX_set_cipher_list() or gnutls_priority_init() functions, respectively.	PSK-based ciphersuite selection criteria for TLS 1.2/1.3 (GnuTLS), TLS 1.2 (OpenSSL)
Combined ciphersuite list for certificate and PSK	TLSCipherAll13	Valid OpenSSL 1.1.1 cipher strings for TLS 1.3 protocol (their values are passed to the OpenSSL function SSL_CTX_set_ciphersuites()).	Ciphersuite selection criteria for TLS 1.3 Only OpenSSL 1.1.1 or newer.

Override scope	Parameter	Value	Description
	TLSCipherAll	Valid OpenSSL cipher strings for TLS 1.2 or valid GnuTLS priority strings. Their values are passed to the SSL_CTX_set_cipher_list() or gnutls_priority_init() functions, respectively.	Ciphersuite selection criteria for TLS 1.2/1.3 (GnuTLS), TLS 1.2 (OpenSSL)

To override the ciphersuite selection in zabbix_get and zabbix_sender utilities - use the command-line parameters:

- `--tls-cipher13`
- `--tls-cipher`

The new parameters are optional. If a parameter is not specified, the internal default value is used. If a parameter is defined it cannot be empty.

If the setting of a TLSCipher* value in the crypto library fails then the server, proxy or agent will not start and an error is logged.

It is important to understand when each parameter is applicable.

Outgoing connections

The simplest case is outgoing connections:

- For outgoing connections with certificate - use TLSCipherCert13 or TLSCipherCert
- For outgoing connections with PSK - use TLSCipherPSK13 and TLSCipherPSK
- In case of zabbix_get and zabbix_sender utilities the command-line parameters `--tls-cipher13` and `--tls-cipher` can be used (encryption is unambiguously specified with a `--tls-connect` parameter)

Incoming connections

It is a bit more complicated with incoming connections because rules are specific for components and configuration.

For Zabbix **agent**:

Agent connection setup	Cipher configuration
TLSConnect=cert	TLSCipherCert, TLSCipherCert13
TLSConnect=psk	TLSCipherPSK, TLSCipherPSK13
TLSAccept=cert	TLSCipherCert, TLSCipherCert13
TLSAccept=psk	TLSCipherPSK, TLSCipherPSK13
TLSAccept=cert,psk	TLSCipherAll, TLSCipherAll13

For Zabbix **server** and ** proxy**:

Connection setup	Cipher configuration
Outgoing connections using PSK	TLSCipherPSK, TLSCipherPSK13
Incoming connections using certificates	TLSCipherAll, TLSCipherAll13
Incoming connections using PSK if server has no certificate	TLSCipherPSK, TLSCipherPSK13
Incoming connections using PSK if server has certificate	TLSCipherAll, TLSCipherAll13

Some pattern can be seen in the two tables above:

- TLSCipherAll and TLSCipherAll13 can be specified only if a combined list of certificate- **and** PSK-based ciphersuites is used. There are two cases when it takes place: server (proxy) with a configured certificate (PSK ciphersuites are always configured on server, proxy if crypto library supports PSK), agent configured to accept both certificate- and PSK-based incoming connections
- in other cases TLSCipherCert* and/or TLSCipherPSK* are sufficient

The following tables show the `TLSCipher*` built-in default values. They could be a good starting point for your own custom values.

Parameter	GnuTLS 3.6.12
TLSCipherCert	NONE:+VERS-TLS1.2:+ECDHE-RSA:+RSA:+AES-128-GCM:+AES-128-CBC:+AEAD:+SHA256:+SHA1:+CURVE-ALL:+COMP-NULL:+SIGN-ALL:+CTYPE-X.509
TLSCipherPSK	NONE:+VERS-TLS1.2:+ECDHE-PSK:+PSK:+AES-128-GCM:+AES-128-CBC:+AEAD:+SHA256:+SHA1:+CURVE-ALL:+COMP-NULL:+SIGN-ALL
TLSCipherAll	NONE:+VERS-TLS1.2:+ECDHE-RSA:+RSA:+ECDHE-PSK:+PSK:+AES-128-GCM:+AES-128-CBC:+AEAD:+SHA256:+SHA1:+CURVE-ALL:+COMP-NULL:+SIGN-ALL:+CTYPE-X.509

Parameter	OpenSSL 1.1.1d [1]
TLSCipherCert13	
TLSCipherCert	EECDH+aRSA+AES128:RSA+aRSA+AES128
TLSCipherPSK13	TLS_CHACHA20_POLY1305_SHA256:TLS_AES_128_GCM_SHA256
TLSCipherPSK	kECDHEPSK+AES128:kPSK+AES128
TLSCipherAll13	
TLSCipherAll	EECDH+aRSA+AES128:RSA+aRSA+AES128:kECDHEPSK+AES128:kPSK+AES128

[1] Default values are different for older OpenSSL versions (1.0.1, 1.0.2, 1.1.0), for LibreSSL and if OpenSSL is compiled without PSK support.

** Examples of user-configured ciphersuites **

See below the following examples of user-configured ciphersuites:

- Testing cipher strings and allowing only PFS ciphersuites
- Switching from AES128 to AES256

Testing cipher strings and allowing only PFS ciphersuites

To see which ciphersuites have been selected you need to set 'DebugLevel=4' in the configuration file, or use the `-vv` option for zabbix_sender.

Some experimenting with `TLSCipher*` parameters might be necessary before you get the desired ciphersuites. It is inconvenient to restart Zabbix server, proxy or agent multiple times just to tweak `TLSCipher*` parameters. More convenient options are using zabbix_sender or the `openssl` command. Let's show both.

1. Using zabbix_sender.

Let's make a test configuration file, for example /home/zabbix/test.conf, with the syntax of a zabbix_agentd.conf file:

```
Hostname=nonexisting
ServerActive=nonexisting

TLSConnect=cert
TLSCAFile=/home/zabbix/ca.crt
TLSCertFile=/home/zabbix/agent.crt
TLSKeyFile=/home/zabbix/agent.key
TLSPSKIdentity=nonexisting
TLSPSKFile=/home/zabbix/agent.psk
```

You need valid CA and agent certificates and PSK for this example. Adjust certificate and PSK file paths and names for your environment.

If you are not using certificates, but only PSK, you can make a simpler test file:

```
Hostname=nonexisting
ServerActive=nonexisting
```

```
TLSConnect=psk
TLSPSKIdentity=nonexisting
TLSPSKFile=/home/zabbix/agentd.psk
```

The selected ciphersuites can be seen by running zabbix_sender (example compiled with OpenSSL 1.1.d):

```
$ zabbix_sender -vv -c /home/zabbix/test.conf -k nonexisting_item -o 1 2>&1 | grep ciphersuites
zabbix_sender [41271]: DEBUG: zbx_tls_init_child() certificate ciphersuites: TLS_AES_256_GCM_SHA384 TLS_
zabbix_sender [41271]: DEBUG: zbx_tls_init_child() PSK ciphersuites: TLS_CHACHA20_POLY1305_SHA256 TLS_AE
zabbix_sender [41271]: DEBUG: zbx_tls_init_child() certificate and PSK ciphersuites: TLS_AES_256_GCM_SHA
```

Here you see the ciphersuites selected by default. These default values are chosen to ensure interoperability with Zabbix agents running on systems with older OpenSSL versions (from 1.0.1).

With newer systems you can choose to tighten security by allowing only a few ciphersuites, e.g. only ciphersuites with PFS (Perfect Forward Secrecy). Let's try to allow only ciphersuites with PFS using `TLSCipher*` parameters.

Attention:
The result will not be interoperable with systems using OpenSSL 1.0.1 and 1.0.2, if PSK is used. Certificate-based encryption should work.

Add two lines to the `test.conf` configuration file:

```
TLSCipherCert=EECDH+aRSA+AES128
TLSCipherPSK=kECDHEPSK+AES128
```

and test again:

```
$ zabbix_sender -vv -c /home/zabbix/test.conf -k nonexisting_item -o 1 2>&1 | grep ciphersuites
zabbix_sender [42892]: DEBUG: zbx_tls_init_child() certificate ciphersuites: TLS_AES_256_GCM_SHA384 TLS_
zabbix_sender [42892]: DEBUG: zbx_tls_init_child() PSK ciphersuites: TLS_CHACHA20_POLY1305_SHA256 TLS_AE
zabbix_sender [42892]: DEBUG: zbx_tls_init_child() certificate and PSK ciphersuites: TLS_AES_256_GCM_SHA
```

The "certificate ciphersuites" and "PSK ciphersuites" lists have changed - they are shorter than before, only containing TLS 1.3 ciphersuites and TLS 1.2 ECDHE-* ciphersuites as expected.

2. TLSCipherAll and TLSCipherAll13 cannot be tested with zabbix_sender; they do not affect "certificate and PSK ciphersuites" value shown in the example above. To tweak TLSCipherAll and TLSCipherAll13 you need to experiment with the agent, proxy or server.

So, to allow only PFS ciphersuites you may need to add up to three parameters

```
TLSCipherCert=EECDH+aRSA+AES128
TLSCipherPSK=kECDHEPSK+AES128
TLSCipherAll=EECDH+aRSA+AES128:kECDHEPSK+AES128
```

to zabbix_agentd.conf, zabbix_proxy.conf and zabbix_server_conf if each of them has a configured certificate and agent has also PSK.

If your Zabbix environment uses only PSK-based encryption and no certificates, then only one:

```
TLSCipherPSK=kECDHEPSK+AES128
```

Now that you understand how it works you can test the ciphersuite selection even outside of Zabbix, with the `openssl` command. Let's test all three `TLSCipher*` parameter values:

```
$ openssl ciphers EECDH+aRSA+AES128 | sed 's/:/ /g'
TLS_AES_256_GCM_SHA384 TLS_CHACHA20_POLY1305_SHA256 TLS_AES_128_GCM_SHA256 ECDHE-RSA-AES128-GCM-SHA256 E
$ openssl ciphers kECDHEPSK+AES128 | sed 's/:/ /g'
TLS_AES_256_GCM_SHA384 TLS_CHACHA20_POLY1305_SHA256 TLS_AES_128_GCM_SHA256 ECDHE-PSK-AES128-CBC-SHA256 E
$ openssl ciphers EECDH+aRSA+AES128:kECDHEPSK+AES128 | sed 's/:/ /g'
TLS_AES_256_GCM_SHA384 TLS_CHACHA20_POLY1305_SHA256 TLS_AES_128_GCM_SHA256 ECDHE-RSA-AES128-GCM-SHA256 E
```

You may prefer `openssl ciphers` with option `-V` for a more verbose output:

```
$ openssl ciphers -V EECDH+aRSA+AES128:kECDHEPSK+AES128
           0x13,0x02 - TLS_AES_256_GCM_SHA384  TLSv1.3 Kx=any      Au=any  Enc=AESGCM(256) Mac=AEAD
           0x13,0x03 - TLS_CHACHA20_POLY1305_SHA256 TLSv1.3 Kx=any      Au=any  Enc=CHACHA20/POLY1305(256
           0x13,0x01 - TLS_AES_128_GCM_SHA256  TLSv1.3 Kx=any      Au=any  Enc=AESGCM(128) Mac=AEAD
           0xC0,0x2F - ECDHE-RSA-AES128-GCM-SHA256 TLSv1.2 Kx=ECDH     Au=RSA  Enc=AESGCM(128) Mac=AEAD
```

```
0xC0,0x27 - ECDHE-RSA-AES128-SHA256 TLSv1.2 Kx=ECDH     Au=RSA  Enc=AES(128)  Mac=SHA256
0xC0,0x13 - ECDHE-RSA-AES128-SHA    TLSv1 Kx=ECDH     Au=RSA  Enc=AES(128)  Mac=SHA1
0xC0,0x37 - ECDHE-PSK-AES128-CBC-SHA256 TLSv1 Kx=ECDHEPSK Au=PSK  Enc=AES(128)  Mac=SHA256
0xC0,0x35 - ECDHE-PSK-AES128-CBC-SHA TLSv1 Kx=ECDHEPSK Au=PSK  Enc=AES(128)  Mac=SHA1
```

Similarly, you can test the priority strings for GnuTLS:

```
$ gnutls-cli -l --priority=NONE:+VERS-TLS1.2:+ECDHE-RSA:+AES-128-GCM:+AES-128-CBC:+AEAD:+SHA256:+CURVE-A
Cipher suites for NONE:+VERS-TLS1.2:+ECDHE-RSA:+AES-128-GCM:+AES-128-CBC:+AEAD:+SHA256:+CURVE-ALL:+COMP-
TLS_ECDHE_RSA_AES_128_GCM_SHA256                        0xc0, 0x2f      TLS1.2
TLS_ECDHE_RSA_AES_128_CBC_SHA256                        0xc0, 0x27      TLS1.2

Protocols: VERS-TLS1.2
Ciphers: AES-128-GCM, AES-128-CBC
MACs: AEAD, SHA256
Key Exchange Algorithms: ECDHE-RSA
Groups: GROUP-SECP256R1, GROUP-SECP384R1, GROUP-SECP521R1, GROUP-X25519, GROUP-X448, GROUP-FFDHE2048, GR
PK-signatures: SIGN-RSA-SHA256, SIGN-RSA-PSS-SHA256, SIGN-RSA-PSS-RSAE-SHA256, SIGN-ECDSA-SHA256, SIGN-E
```

Switching from AES128 to AES256

Zabbix uses AES128 as the built-in default for data. Let's assume you are using certificates and want to switch to AES256, on OpenSSL 1.1.1.

This can be achieved by adding the respective parameters in `zabbix_server.conf`:

```
TLSCAFile=/home/zabbix/ca.crt
TLSCertFile=/home/zabbix/server.crt
TLSKeyFile=/home/zabbix/server.key
TLSCipherCert13=TLS_AES_256_GCM_SHA384
TLSCipherCert=EECDH+aRSA+AES256:-SHA1:-SHA384
TLSCipherPSK13=TLS_CHACHA20_POLY1305_SHA256
TLSCipherPSK=kECDHEPSK+AES256:-SHA1
TLSCipherAll13=TLS_AES_256_GCM_SHA384
TLSCipherAll=EECDH+aRSA+AES256:-SHA1:-SHA384
```

Attention:
Although only certificate-related ciphersuites will be used, `TLSCipherPSK*` parameters are defined as well to avoid their default values which include less secure ciphers for wider interoperability. PSK ciphersuites cannot be completely disabled on server/proxy.

And in `zabbix_agentd.conf`:

```
TLSConnect=cert
TLSAccept=cert
TLSCAFile=/home/zabbix/ca.crt
TLSCertFile=/home/zabbix/agent.crt
TLSKeyFile=/home/zabbix/agent.key
TLSCipherCert13=TLS_AES_256_GCM_SHA384
TLSCipherCert=EECDH+aRSA+AES256:-SHA1:-SHA384
```

1 Using certificates

Overview

Zabbix can use RSA certificates in PEM format, signed by a public or in-house certificate authority (CA). Certificate verification is done against a pre-configured CA certificate. Optionally certificate revocation lists (CRL) can be used. Each Zabbix component can have only one certificate configured.

For more information how to set up and operate internal CA, how to generate certificate requests and sign them, how to revoke certificates you can find numerous online how-tos, for example, OpenSSL PKI Tutorial v1.1 .

Carefully consider and test your certificate extensions - see Limitations on using X.509 v3 certificate extensions.

Certificate configuration parameters

Parameter	Mandatory	Description
TLSCAFile	*	Full pathname of a file containing the top-level CA(s) certificates for peer certificate verification. In case of certificate chain with several members they must be ordered: lower level CA certificates first followed by certificates of higher level CA(s). Certificates from multiple CA(s) can be included in a single file.
TLSCRLFile		Full pathname of a file containing Certificate Revocation Lists. See notes in Certificate Revocation Lists (CRL).
TLSCertFile	*	Full pathname of a file containing certificate (certificate chain). In case of certificate chain with several members they must be ordered: server, proxy, or agent certificate first, followed by lower level CA certificates then certificates of higher level CA(s).
TLSKeyFile	*	Full pathname of a file containing private key. Set access rights to this file - it must be readable only by Zabbix user.
TLSServerCertIssuer		Allowed server certificate issuer.
TLSServerCertSubject		Allowed server certificate subject.

Configuring certificate on Zabbix server

1. In order to verify peer certificates, Zabbix server must have access to file with their top-level self-signed root CA certificates. For example, if we expect certificates from two independent root CAs, we can put their certificates into file `/home/zabbix/zabbix_ca_file` like this:

```
Certificate:
    Data:
        Version: 3 (0x2)
        Serial Number: 1 (0x1)
    Signature Algorithm: sha1WithRSAEncryption
        Issuer: DC=com, DC=zabbix, O=Zabbix SIA, OU=Development group, CN=Root1 CA
            ...
        Subject: DC=com, DC=zabbix, O=Zabbix SIA, OU=Development group, CN=Root1 CA
        Subject Public Key Info:
            Public Key Algorithm: rsaEncryption
                Public-Key: (2048 bit)
            ...
        X509v3 extensions:
            X509v3 Key Usage: critical
                Certificate Sign, CRL Sign
            X509v3 Basic Constraints: critical
                CA:TRUE
            ...
-----BEGIN CERTIFICATE-----
MIID2jCCAsKgAwIBAgIBATANBgkqhkiG9w0BAQUFADB+MRMwEQYKCZImiZPyLGQB
....
9wEzdN8uTrqoyU78gi12npLj08LegRKjb5hFTVmO
-----END CERTIFICATE-----
Certificate:
    Data:
        Version: 3 (0x2)
        Serial Number: 1 (0x1)
    Signature Algorithm: sha1WithRSAEncryption
        Issuer: DC=com, DC=zabbix, O=Zabbix SIA, OU=Development group, CN=Root2 CA
            ...
        Subject: DC=com, DC=zabbix, O=Zabbix SIA, OU=Development group, CN=Root2 CA
```

```
        Subject Public Key Info:
            Public Key Algorithm: rsaEncryption
                Public-Key: (2048 bit)
            ....
        X509v3 extensions:
            X509v3 Key Usage: critical
                Certificate Sign, CRL Sign
            X509v3 Basic Constraints: critical
                CA:TRUE
            ....
-----BEGIN CERTIFICATE-----
MIID3DCCAsSgAwIBAgIBATANBgkqhkiG9w0BAQUFADB/MRMwEQYKCZImiZPyLGQB
...
vdGNYoSfvu41GQAR5Vj5FnRJRzv5XQOZ3B6894GY1zY=
-----END CERTIFICATE-----
```

2. Put Zabbix server certificate chain into file, for example, `/home/zabbix/zabbix_server.crt`:

```
Certificate:
    Data:
        Version: 3 (0x2)
        Serial Number: 1 (0x1)
    Signature Algorithm: sha1WithRSAEncryption
        Issuer: DC=com, DC=zabbix, O=Zabbix SIA, OU=Development group, CN=Signing CA
        ...
        Subject: DC=com, DC=zabbix, O=Zabbix SIA, OU=Development group, CN=Zabbix server
        Subject Public Key Info:
            Public Key Algorithm: rsaEncryption
                Public-Key: (2048 bit)
                ...
        X509v3 extensions:
            X509v3 Key Usage: critical
                Digital Signature, Key Encipherment
            X509v3 Basic Constraints:
                CA:FALSE
            ...
-----BEGIN CERTIFICATE-----
MIIECDCCAvCgAwIBAgIBATANBgkqhkiG9w0BAQUFADCBgTETMBEGCgmSJomT8ixk
...
h02u1GHiy46GI+xfR3LsPwFKlkTaaLaL/6aaoQ==
-----END CERTIFICATE-----
Certificate:
    Data:
        Version: 3 (0x2)
        Serial Number: 2 (0x2)
    Signature Algorithm: sha1WithRSAEncryption
        Issuer: DC=com, DC=zabbix, O=Zabbix SIA, OU=Development group, CN=Root1 CA
        ...
        Subject: DC=com, DC=zabbix, O=Zabbix SIA, OU=Development group, CN=Signing CA
        Subject Public Key Info:
            Public Key Algorithm: rsaEncryption
                Public-Key: (2048 bit)
            ...
        X509v3 extensions:
            X509v3 Key Usage: critical
                Certificate Sign, CRL Sign
            X509v3 Basic Constraints: critical
                CA:TRUE, pathlen:0
        ...
-----BEGIN CERTIFICATE-----
MIID4TCCAsmgAwIBAgIBAjANBgkqhkiG9w0BAQUFADB+MRMwEQYKCZImiZPyLGQB
...
dyCeWnvL7u5sd6ffo8iRny0QzbHKmQt/wUtcVIvWXdMIFJM0Hw==
-----END CERTIFICATE-----
```

Here the first is Zabbix server certificate, followed by intermediate CA certificate.

3. Put Zabbix server private key into file, for example, `/home/zabbix/zabbix_server.key`:

```
-----BEGIN PRIVATE KEY-----
MIIEwAIBADANBgkqhkiG9w0BAQEFAASCBKowggSmAgEAAoIBAQC9tIXIJoVnNXDl
...
IJLkhbybBYEf47MLhffWa7XvZTY=
-----END PRIVATE KEY-----
```

4. Edit TLS parameters in Zabbix server configuration file like this:

```
TLSCAFile=/home/zabbix/zabbix_ca_file
TLSCertFile=/home/zabbix/zabbix_server.crt
TLSKeyFile=/home/zabbix/zabbix_server.key
```

Configuring certificate-based encryption for Zabbix proxy

1. Prepare files with top-level CA certificates, proxy certificate (chain) and private key as described in Configuring certificate on Zabbix server. Edit parameters `TLSCAFile`, `TLSCertFile`, `TLSKeyFile` in proxy configuration accordingly.

2. For active proxy edit `TLSConnect` parameter:

```
TLSConnect=cert
```

For passive proxy edit `TLSAccept` parameter:

```
TLSAccept=cert
```

3. Now you have a minimal certificate-based proxy configuration. You may prefer to improve proxy security by setting `TLSServerCertIssuer` and `TLSServerCertSubject` parameters (see Restricting allowed certificate Issuer and Subject).

4. In final proxy configuration file TLS parameters may look like:

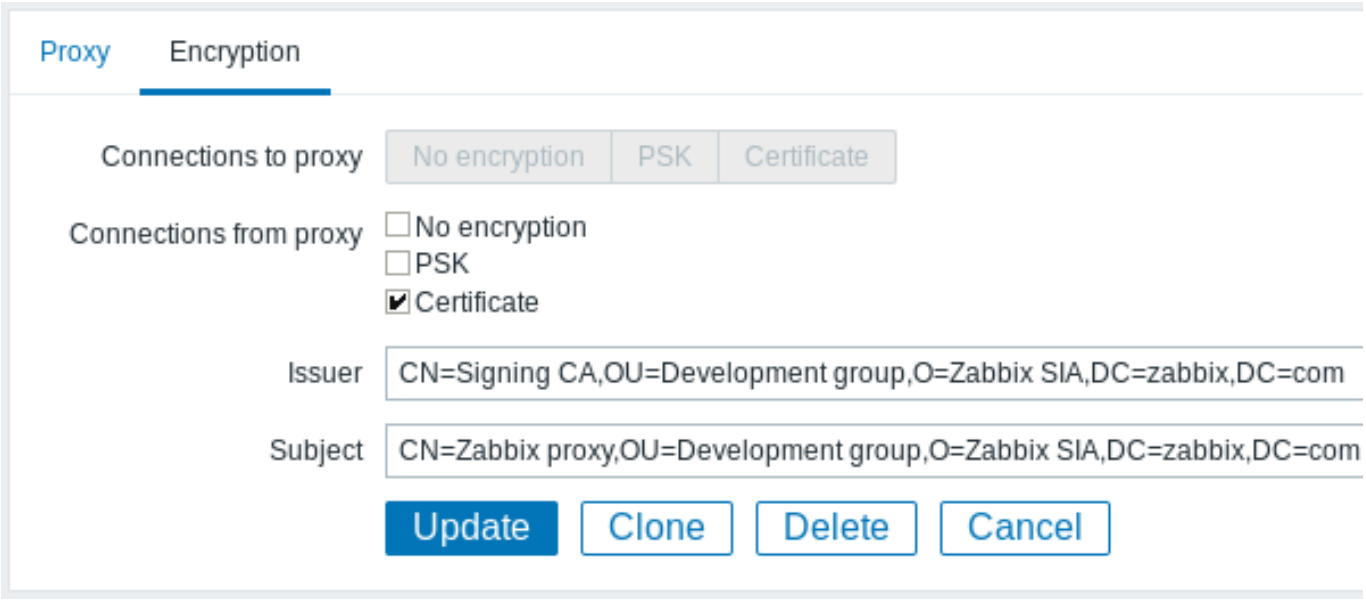
```
TLSConnect=cert
TLSAccept=cert
TLSCAFile=/home/zabbix/zabbix_ca_file
TLSServerCertIssuer=CN=Signing CA,OU=Development group,O=Zabbix SIA,DC=zabbix,DC=com
TLSServerCertSubject=CN=Zabbix server,OU=Development group,O=Zabbix SIA,DC=zabbix,DC=com
TLSCertFile=/home/zabbix/zabbix_proxy.crt
TLSKeyFile=/home/zabbix/zabbix_proxy.key
```

5. Configure encryption for this proxy in Zabbix frontend:

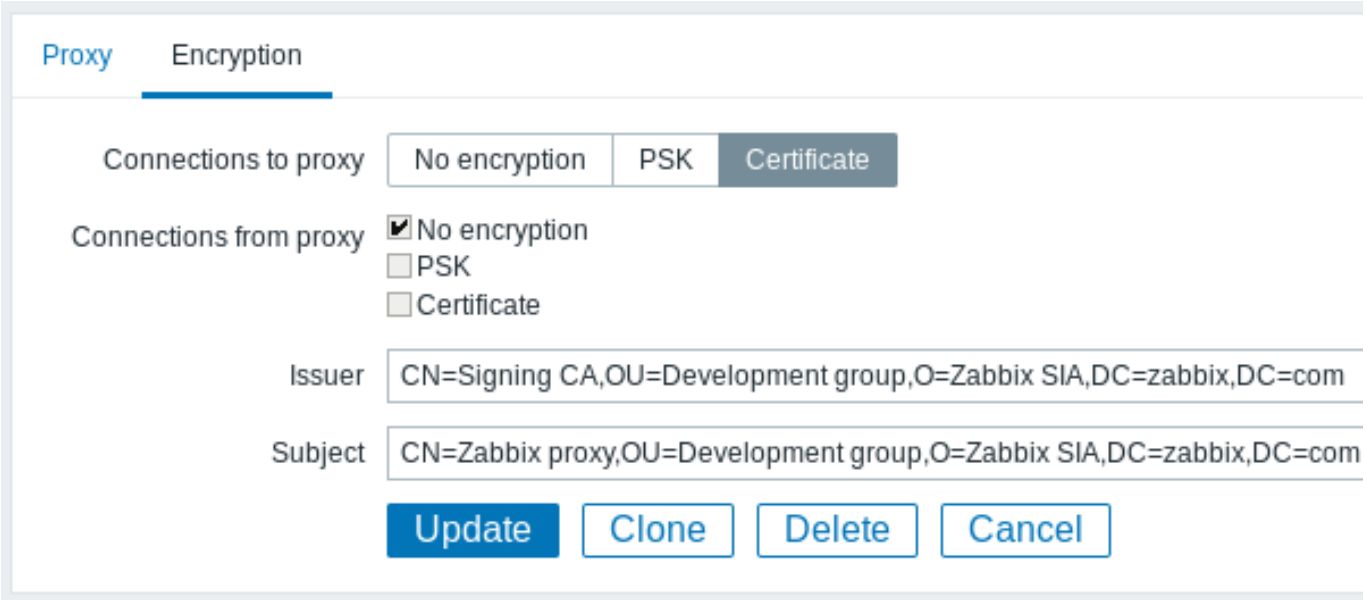
- Go to: *Administration* → *Proxies*
- Select proxy and click on **Encryption** tab

In examples below Issuer and Subject fields are filled in - see Restricting allowed certificate Issuer and Subject why and how to use these fields.

For active proxy



For passive proxy



Configuring certificate-based encryption for Zabbix agent

1. Prepare files with top-level CA certificates, agent certificate (chain) and private key as described in Configuring certificate on Zabbix server. Edit parameters `TLSCAFile`, `TLSCertFile`, `TLSKeyFile` in agent configuration accordingly.

2. For active checks edit `TLSConnect` parameter:

```
TLSConnect=cert
```

For passive checks edit `TLSAccept` parameter:

```
TLSAccept=cert
```

3. Now you have a minimal certificate-based agent configuration. You may prefer to improve agent security by setting `TLSServerCertIssuer` and `TLSServerCertSubject` parameters. (see Restricting allowed certificate Issuer and Subject).

4. In final agent configuration file TLS parameters may look like:

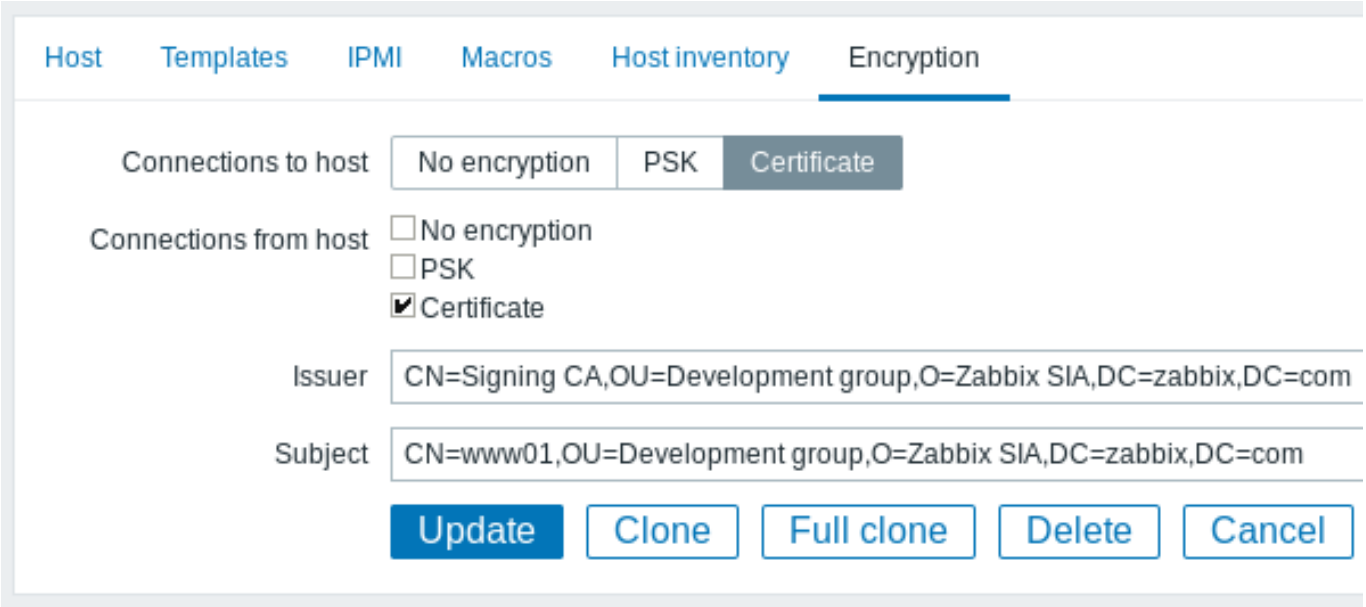
```
TLSConnect=cert
TLSAccept=cert
TLSCAFile=/home/zabbix/zabbix_ca_file
TLSServerCertIssuer=CN=Signing CA,OU=Development group,O=Zabbix SIA,DC=zabbix,DC=com
TLSServerCertSubject=CN=Zabbix proxy,OU=Development group,O=Zabbix SIA,DC=zabbix,DC=com
TLSCertFile=/home/zabbix/zabbix_agentd.crt
TLSKeyFile=/home/zabbix/zabbix_agentd.key
```

(Example assumes that host is monitored via proxy, hence proxy certificate Subject.)

5. Configure encryption for this agent in Zabbix frontend:

- Go to: *Configuration* → *Hosts*
- Select host and click on **Encryption** tab

In example below Issuer and Subject fields are filled in - see Restricting allowed certificate Issuer and Subject why and how to use these fields.



Restricting allowed certificate Issuer and Subject

When two Zabbix components (e.g. server and agent) establish a TLS connection they both check each others certificates. If a peer certificate is signed by a trusted CA (with pre-configured top-level certificate in `TLSCAFile`), is valid, has not expired and passes some other checks then communication can proceed. Certificate issuer and subject are not checked in this simplest case.

Here is a risk - anybody with a valid certificate can impersonate anybody else (e.g. a host certificate can be used to impersonate server). This may be acceptable in small environments where certificates are signed by a dedicated in-house CA and risk of impersonating is low.

If your top-level CA is used for issuing other certificates which should not be accepted by Zabbix or you want to reduce risk of impersonating you can restrict allowed certificates by specifying their Issuer and Subject strings.

For example, you can write in Zabbix proxy configuration file:

```
TLSServerCertIssuer=CN=Signing CA,OU=Development group,O=Zabbix SIA,DC=zabbix,DC=com
TLSServerCertSubject=CN=Zabbix server,OU=Development group,O=Zabbix SIA,DC=zabbix,DC=com
```

With these settings, an active proxy will not talk to Zabbix server with different Issuer or Subject string in certificate, a passive proxy will not accept requests from such server.

A few notes about Issuer or Subject string matching:

1. Issuer and Subject strings are checked independently. Both are optional.
2. UTF-8 characters are allowed.
3. Unspecified string means any string is accepted.
4. Strings are compared "as-is", they must be exactly the same to match.
5. Wildcards and regexp's are not supported in matching.
6. Only some requirements from RFC 4514 Lightweight Directory Access Protocol (LDAP): String Representation of Distinguished Names are implemented:

```
    - escape characters '"' (U+0022), '+' U+002B, ',' U+002C, ';' U+003B, '<' U+003C, '>' U+003E, '\' U+00
    - escape characters space (' ' U+0020) or number sign ('#' U+0023) at the beginning of string.
    - escape character space (' ' U+0020) at the end of string.
- Match fails if a null character (U+0000) is encountered ([[http://tools.ietf.org/html/rfc4514|RFC 4514]]
- Requirements of [[http://tools.ietf.org/html/rfc4517| RFC 4517 Lightweight Directory Access Protocol (LD
```

Order of fields in Issuer and Subject strings and formatting are important! Zabbix follows RFC 4514 recommendation and uses "reverse" order of fields.

The reverse order can be illustrated by example:

```
TLSServerCertIssuer=CN=Signing CA,OU=Development group,O=Zabbix SIA,DC=zabbix,DC=com
TLSServerCertSubject=CN=Zabbix proxy,OU=Development group,O=Zabbix SIA,DC=zabbix,DC=com
```

Note that it starts with low level (CN), proceeds to mid-level (OU, O) and ends with top-level (DC) fields.

OpenSSL by default shows certificate Issuer and Subject fields in "normal" order, depending on additional options used:

```
$ openssl x509 -noout -in /home/zabbix/zabbix_proxy.crt -issuer -subject
issuer= /DC=com/DC=zabbix/O=Zabbix SIA/OU=Development group/CN=Signing CA
```

```
subject= /DC=com/DC=zabbix/O=Zabbix SIA/OU=Development group/CN=Zabbix proxy

$ openssl x509 -noout -text -in /home/zabbix/zabbix_proxy.crt
Certificate:
        ...
        Issuer: DC=com, DC=zabbix, O=Zabbix SIA, OU=Development group, CN=Signing CA
    ...
        Subject: DC=com, DC=zabbix, O=Zabbix SIA, OU=Development group, CN=Zabbix proxy
```

Here Issuer and Subject strings start with top-level (DC) and end with low-level (CN) field, spaces and field separators depend on options used. None of these values will match in Zabbix Issuer and Subject fields!

Attention:
To get proper Issuer and Subject strings usable in Zabbix invoke OpenSSL with special options `-nameopt esc_2253,esc_ctrl,utf8,dump_nostr,dump_unknown,dump_der,sep_comma_plus,dn_rev,sname`:

```
$ openssl x509 -noout -issuer -subject \
        -nameopt esc_2253,esc_ctrl,utf8,dump_nostr,dump_unknown,dump_der,sep_comma_plus,dn_rev,sname \
        -in /home/zabbix/zabbix_proxy.crt
issuer= CN=Signing CA,OU=Development group,O=Zabbix SIA,DC=zabbix,DC=com
subject= CN=Zabbix proxy,OU=Development group,O=Zabbix SIA,DC=zabbix,DC=com
```

Now string fields are in reverse order, fields are comma-separated, can be used in Zabbix configuration files and frontend.

Limitations on using X.509 v3 certificate extensions

- **Subject Alternative Name (*subjectAltName*)** extension.
  Alternative subject names from *subjectAltName* extension (like IP address, e-mail address) are not supported by Zabbix. Only value of "Subject" field can be checked in Zabbix (see Restricting allowed certificate Issuer and Subject).
  If certificate uses the *subjectAltName* extension then result depends on particular combination of crypto toolkits Zabbix components are compiled with (it may or may not work, Zabbix may refuse to accept such certificates from peers).
- **Extended Key Usage** extension.
  If used then generally both *clientAuth* (TLS WWW client authentication) and *serverAuth* (TLS WWW server authentication) are necessary.
  For example, in passive checks Zabbix agent acts in a TLS server role, so *serverAuth* must be set in agent certificate. For active checks agent certificate needs *clientAuth* to be set.
  GnuTLS issues a warning in case of key usage violation but allows communication to proceed.
- **Name Constraints** extension.
  Not all crypto toolkits support it. This extension may prevent Zabbix from loading CA certificates where this section is marked as *critical* (depends on particular crypto toolkit).

Certificate Revocation Lists (CRL)

If a certificate is compromised CA can revoke it by including in CRL. CRLs can be configured in server, proxy and agent configuration file using parameter `TLSCRLFile`. For example:

```
TLSCRLFile=/home/zabbix/zabbix_crl_file
```

where `zabbix_crl_file` may contain CRLs from several CAs and look like:

```
-----BEGIN X509 CRL-----
MIIB/DCB5QIBATANBgkqhkiG9w0BAQUFADCBgTETMBEGCgmSJomT8ixkARkWA2Nv
...
treZeUPjb7LSmZ3K2hpbZN7SoOZcAoHQ3GWd9npuctg=
-----END X509 CRL-----
-----BEGIN X509 CRL-----
MIIB+TCB4gIBATANBgkqhkiG9w0BAQUFADB/MRMwEQYKCZImiZPyLGQBGRYDY29t
...
CAEebS2CND3ShBedZ8YSil59O6JvaDP611R5lNs=
-----END X509 CRL-----
```

CRL file is loaded only on Zabbix start. CRL update requires restart.

Attention:
If Zabbix component is compiled with *OpenSSL* and CRLs are used then each top and intermediate level CA in certificate chains must have a corresponding CRL (it can be empty) in `TLSCRLFile`.

Limitations on using CRL extensions

- **Authority Key Identifier** extension.
  CRLs for CAs with identical names may not work in case of *mbedTLS* (*PolarSSL*), even with "Authority Key Identifier" extension.

2 Using pre-shared keys

Overview

Each pre-shared key (PSK) in Zabbix actually is a pair of:

- non-secret PSK identity string,
- secret PSK string value.

PSK identity string is a non-empty UTF-8 string. For example, "PSK ID 001 Zabbix agentd". It is a unique name by which this specific PSK is referred to by Zabbix components. Do not put sensitive information in PSK identity string - it is transmitted over the network unencrypted.

PSK value is a hard to guess string of hexadecimal digits, for example, "e560cb0d918d26d31b4f642181f5f570ad89a390931102e5391d08327b

Size limits

There are size limits for PSK identity and value in Zabbix, in some cases a crypto library can have lower limit:

Component	PSK identity max size	PSK value min size	PSK value max size
Zabbix	128 UTF-8 characters	128-bit (16-byte PSK, entered as 32 hexadecimal digits)	2048-bit (256-byte PSK, entered as 512 hexadecimal digits)
GnuTLS	128 bytes (may include UTF-8 characters)	-	2048-bit (256-byte PSK, entered as 512 hexadecimal digits)
mbed TLS (PolarSSL)	128 UTF-8 characters	-	256-bit (default limit) (32-byte PSK, entered as 64 hexadecimal digits)
OpenSSL 1.0.x, 1.1.0	127 bytes (may include UTF-8 characters)	-	2048-bit (256-byte PSK, entered as 512 hexadecimal digits)
OpenSSL 1.1.1	127 bytes (may include UTF-8 characters)	-	512-bit (64-byte PSK, entered as 128 hexadecimal digits)

Attention:
Zabbix frontend allows configuring up to 128-character long PSK identity string and 2048-bit long PSK regardless of crypto libraries used.
If some Zabbix components support lower limits, it is the user's responsibility to configure PSK identity and value with allowed length for these components.
Exceeding length limits results in communication failures between Zabbix components.

Before Zabbix server connects to agent using PSK, the server looks up the PSK identity and PSK value configured for that agent in database (actually in configuration cache). Upon receiving a connection the agent uses PSK identity and PSK value from its configuration file. If both parties have the same PSK identity string and PSK value the connection may succeed.

Attention:
Each PSK identity must be paired with only one value. It is the user's responsibility to ensure that there are no two PSKs with the same identity string but different values. Failing to do so may lead to unpredictable disruptions of communication between Zabbix components using PSKs with this PSK identity string.

Generating PSK

For example, a 256-bit (32 bytes) PSK can be generated using the following commands:

- with *OpenSSL*:

```
$ openssl rand -hex 32
af8ced32dfe8714e548694e2d29e1a14ba6fa13f216cb35c19d0feb1084b0429
```

- with *GnuTLS*:

```
$ psktool -u psk_identity -p database.psk -s 32
Generating a random key for user 'psk_identity'
Key stored to database.psk

$ cat database.psk
psk_identity:9b8eafedfaae00cece62e85d5f4792c7d9c9bcc851b23216a1d300311cc4f7cb
```

Note that "psktool" above generates a database file with a PSK identity and its associated PSK. Zabbix expects just a PSK in the PSK file, so the identity string and colon (':') should be removed from the file.

Configuring PSK for server-agent communication (example)

On the agent host, write the PSK value into a file, for example, `/home/zabbix/zabbix_agentd.psk`. The file must contain PSK in the first text string, for example:

```
1f87b595725ac58dd977beef14b97461a7c1045b9a1c963065002c5473194952
```

Set access rights to PSK file - it must be readable only by Zabbix user.

Edit TLS parameters in agent configuration file `zabbix_agentd.conf`, for example, set:

```
TLSConnect=psk
TLSAccept=psk
TLSPSKFile=/home/zabbix/zabbix_agentd.psk
TLSPSKIdentity=PSK 001
```

The agent will connect to server (active checks) and accept from server and `zabbix_get` only connections using PSK. PSK identity will be "PSK 001".

Restart the agent. Now you can test the connection using `zabbix_get`, for example:

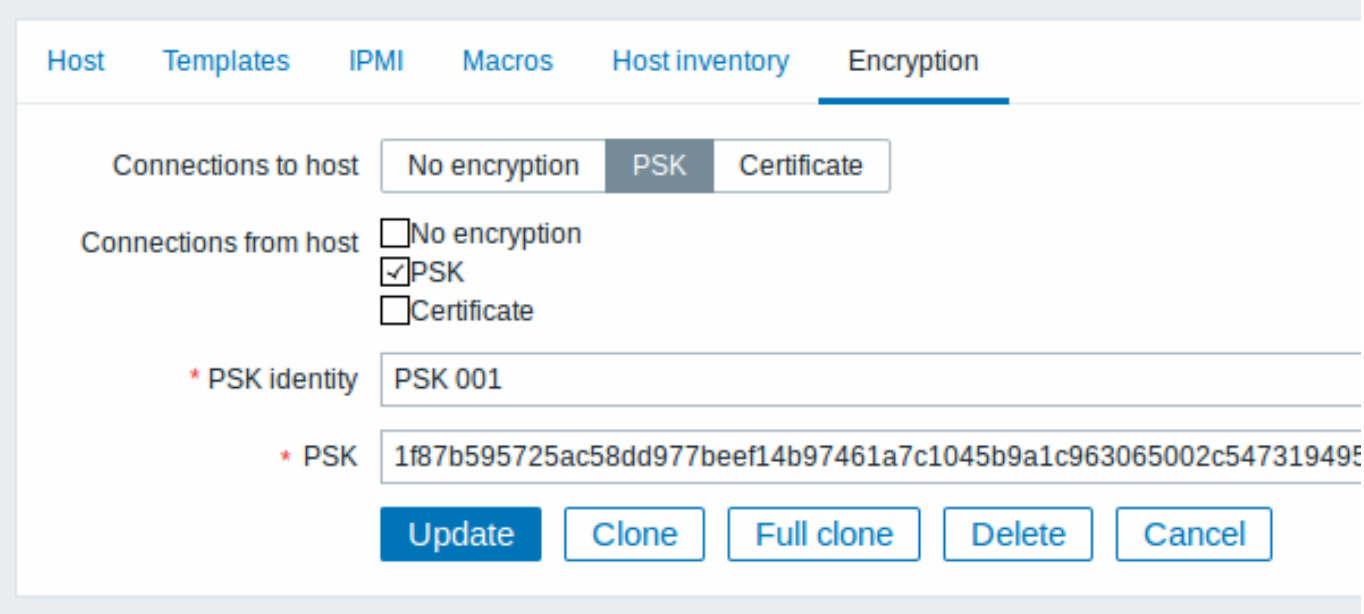
```
$ zabbix_get -s 127.0.0.1 -k "system.cpu.load[all,avg1]" --tls-connect=psk \
            --tls-psk-identity="PSK 001" --tls-psk-file=/home/zabbix/zabbix_agentd.psk
```

(To minimize downtime see how to change connection type in Connection encryption management).

Configure PSK encryption for this agent in Zabbix frontend:

- Go to: *Configuration* → *Hosts*
- Select host and click on **Encryption** tab

Example:



All mandatory input fields are marked with a red asterisk.

When configuration cache is synchronized with database the new connections will use PSK. Check server and agent logfiles for error messages.

Configuring PSK for server - active proxy communication (example)

On the proxy, write the PSK value into a file, for example, `/home/zabbix/zabbix_proxy.psk`. The file must contain PSK in the first text string, for example:

```
e560cb0d918d26d31b4f642181f5f570ad89a390931102e5391d08327ba434e9
```

Set access rights to PSK file - it must be readable only by Zabbix user.

Edit TLS parameters in proxy configuration file `zabbix_proxy.conf`, for example, set:

```
TLSConnect=psk
TLSPSKFile=/home/zabbix/zabbix_proxy.psk
TLSPSKIdentity=PSK 002
```

The proxy will connect to server using PSK. PSK identity will be "PSK 002".

(To minimize downtime see how to change connection type in Connection encryption management).

Configure PSK for this proxy in Zabbix frontend. Go to *Administration→Proxies*, select the proxy, go to "Encryption" tab. In "Connections from proxy" mark PSK. Paste into "PSK identity" field "PSK 002" and "e560cb0d918d26d31b4f642181f5f570ad89a390931102e5391d083 into "PSK" field. Click "Update".

Restart proxy. It will start using PSK-based encrypted connections to server. Check server and proxy logfiles for error messages.

For a passive proxy the procedure is very similar. The only difference - set `TLSAccept=psk` in proxy configuration file and set "Connections to proxy" in Zabbix frontend to PSK.

3 Troubleshooting

General recommendations

- Start with understanding which component acts as a TLS client and which one acts as a TLS server in problem case.
  Zabbix server, proxies and agents, depending on interaction between them, all can work as TLS servers and clients.
  For example, Zabbix server connecting to agent for a passive check, acts as a TLS client. The agent is in role of TLS server.
  Zabbix agent, requesting a list of active checks from proxy, acts as a TLS client. The proxy is in role of TLS server.
  `zabbix_get` and `zabbix_sender` utilities always act as TLS clients.
- Zabbix uses mutual authentication.
  Each side verifies its peer and may refuse connection.
  For example, Zabbix server connecting to agent can close connection immediately if agent's certificate is invalid. And vice versa - Zabbix agent accepting a connection from server can close connection if server is not trusted by agent.
- Examine logfiles in both sides - in TLS client and TLS server.
  The side which refuses connection may log a precise reason why it was refused. Other side often reports rather general error (e.g. "Connection closed by peer", "connection was non-properly terminated").
- Sometimes misconfigured encryption results in confusing error messages in no way pointing to real cause.
  In subsections below we try to provide a (far from exhaustive) collection of messages and possible causes which could help in troubleshooting.
  Please note that different crypto toolkits (OpenSSL, GnuTLS, mbed TLS (PolarSSL)) often produce different error messages in same problem situations.
  Sometimes error messages depend even on particular combination of crypto toolkits on both sides.

1 Connection type or permission problems

Server is configured to connect with PSK to agent but agent accepts only unencrypted connections

In server or proxy log (with *mbed TLS* (*PolarSSL*) 1.3.11)

```
Get value from agent failed: ssl_handshake(): SSL - The connection indicated an EOF
```

In server or proxy log (with *GnuTLS* 3.3.16)

```
Get value from agent failed: zbx_tls_connect(): gnutls_handshake() failed: \
    -110 The TLS connection was non-properly terminated.
```

In server or proxy log (with *OpenSSL* 1.0.2c)

```
Get value from agent failed: TCP connection successful, cannot establish TLS to [[127.0.0.1]:10050]: \
    Connection closed by peer. Check allowed connection types and access rights
```

One side connects with certificate but other side accepts only PSK or vice versa

In any log (with *mbed TLS* (*PolarSSL*)):

```
failed to accept an incoming connection: from 127.0.0.1: ssl_handshake():\
    SSL - The server has no ciphersuites in common with the client
```

In any log (with *GnuTLS*):

```
failed to accept an incoming connection: from 127.0.0.1: zbx_tls_accept(): gnutls_handshake() failed:\
    -21 Could not negotiate a supported cipher suite.
```

In any log (with *OpenSSL* 1.0.2c):

```
failed to accept an incoming connection: from 127.0.0.1: TLS handshake returned error code 1:\
    file .\ssl\s3_srvr.c line 1411: error:1408A0C1:SSL routines:ssl3_get_client_hello:no shared cipher:\
    TLS write fatal alert "handshake failure"
```

Attempting to use Zabbix sender compiled with TLS support to send data to Zabbix server/proxy compiled without TLS

In connecting-side log:

Linux:

```
...In zbx_tls_init_child()
...OpenSSL library (version OpenSSL 1.1.1  11 Sep 2018) initialized
...
...In zbx_tls_connect(): psk_identity:"PSK test sender"
...End of zbx_tls_connect():FAIL error:'connection closed by peer'
...send value error: TCP successful, cannot establish TLS to [[localhost]:10051]: connection closed by pee
```

Windows:

```
...OpenSSL library (version OpenSSL 1.1.1a  20 Nov 2018) initialized
...
...In zbx_tls_connect(): psk_identity:"PSK test sender"
...zbx_psk_client_cb() requested PSK identity "PSK test sender"
...End of zbx_tls_connect():FAIL error:'SSL_connect() I/O error: [0x00000000] The operation completed succ
...send value error: TCP successful, cannot establish TLS to [[192.168.1.2]:10051]: SSL_connect() I/O erro
```

In accepting-side log:

```
...failed to accept an incoming connection: from 127.0.0.1: support for TLS was not compiled in
```

One side connects with PSK but other side uses LibreSSL or has been compiled without encryption support

LibreSSL does not support PSK.

In connecting-side log:

```
...TCP successful, cannot establish TLS to [[192.168.1.2]:10050]: SSL_connect() I/O error: [0] Success
```

In accepting-side log:

```
...failed to accept an incoming connection: from 192.168.1.2: support for PSK was not compiled in
```

In Zabbix frontend:

```
Get value from agent failed: TCP successful, cannot establish TLS to [[192.168.1.2]:10050]: SSL_connect()
```

One side connects with PSK but other side uses OpenSSL with PSK support disabled

In connecting-side log:

```
...TCP successful, cannot establish TLS to [[192.168.1.2]:10050]: SSL_connect() set result code to SSL_ERR
```

In accepting-side log:

```
...failed to accept an incoming connection: from 192.168.1.2: TLS handshake set result code to 1: file ssl
```

2 Certificate problems

OpenSSL used with CRLs and for some CA in the certificate chain its CRL is not included in `TLSCRLFile`

In TLS server log in case of *mbed TLS (PolarSSL)* and *OpenSSL* peers:

```
failed to accept an incoming connection: from 127.0.0.1: TLS handshake with 127.0.0.1 returned error code
    file s3_srvr.c line 3251: error:14089086: SSL routines:ssl3_get_client_certificate:certificate verify
    TLS write fatal alert "unknown CA"
```

In TLS server log in case of *GnuTLS* peer:

```
failed to accept an incoming connection: from 127.0.0.1: TLS handshake with 127.0.0.1 returned error code
    file rsa_pk1.c line 103: error:0407006A: rsa routines:RSA_padding_check_PKCS1_type_1:\
    block type is not 01 file rsa_eay.c line 705: error:04067072: rsa routines:RSA_EAY_PUBLIC_DECRYPT:padd
```

CRL expired or expires during server operation

OpenSSL, in server log:

- before expiration:

```
cannot connect to proxy "proxy-openssl-1.0.1e": TCP successful, cannot establish TLS to [[127.0.0.1]:20004
    SSL_connect() returned SSL_ERROR_SSL: file s3_clnt.c line 1253: error:14090086:\
    SSL routines:ssl3_get_server_certificate:certificate verify failed:\
    TLS write fatal alert "certificate revoked"
```

- after expiration:

```
cannot connect to proxy "proxy-openssl-1.0.1e": TCP successful, cannot establish TLS to [[127.0.0.1]:20004
    SSL_connect() returned SSL_ERROR_SSL: file s3_clnt.c line 1253: error:14090086:\
    SSL routines:ssl3_get_server_certificate:certificate verify failed:\
    TLS write fatal alert "certificate expired"
```

The point here is that with valid CRL a revoked certificate is reported as ”certificate revoked”. When CRL expires the error message changes to ”certificate expired” which is quite misleading.

GnuTLS, in server log:

- before and after expiration the same:

```
cannot connect to proxy "proxy-openssl-1.0.1e": TCP successful, cannot establish TLS to [[127.0.0.1]:20004
      invalid peer certificate: The certificate is NOT trusted. The certificate chain is revoked.
```

mbed TLS (*PolarSSL*), in server log:

- before expiration:

```
cannot connect to proxy "proxy-openssl-1.0.1e": TCP successful, cannot establish TLS to [[127.0.0.1]:20004
    invalid peer certificate: revoked
```

- after expiration:

```
cannot connect to proxy "proxy-openssl-1.0.1e": TCP successful, cannot establish TLS to [[127.0.0.1]:20004
      invalid peer certificate: revoked, CRL expired
```

Self-signed certificate, unknown CA

OpenSSL, in log:

```
error:'self signed certificate: SSL_connect() set result code to SSL_ERROR_SSL: file ../ssl/statem/statem_
      line 1924: error:1416F086:SSL routines:tls_process_server_certificate:certificate verify failed:\
      TLS write fatal alert "unknown CA"'
```

This was observed when server certificate by mistake had the same Issuer and Subject string, although it was signed by CA. Issuer and Subject are equal in top-level CA certificate, but they cannot be equal in server certificate. (The same applies to proxy and agent certificates.)

3 PSK problems

PSK contains an odd number of hex-digits

Proxy or agent does not start, message in the proxy or agent log:

```
invalid PSK in file "/home/zabbix/zabbix_proxy.psk"
```

PSK identity string longer than 128 bytes is passed to GnuTLS

In TLS client side log:

```
gnutls_handshake() failed: -110 The TLS connection was non-properly terminated.
```

In TLS server side log.

```
gnutls_handshake() failed: -90 The SRP username supplied is illegal.
```

PSK longer than 32 bytes is passed to mbed TLS (PolarSSL)

In any Zabbix log:

```
ssl_set_psk(): SSL - Bad input parameters to function
```

Too long PSK value used with OpenSSL 1.1.1

In connecting-side log:

```
...OpenSSL library (version OpenSSL 1.1.1  11 Sep 2018) initialized
...
...In zbx_tls_connect(): psk_identity:"PSK 1"
...zbx_psk_client_cb() requested PSK identity "PSK 1"
...End of zbx_tls_connect():FAIL error:'SSL_connect() set result code to SSL_ERROR_SSL: file ssl\statem\ex
```

In accepting-side log:

```
...Message from 123.123.123.123 is missing header. Message ignored.
```

This problem typically arises when upgrading OpenSSL from 1.0.x or 1.1.0 to 1.1.1 and if the PSK value is longer than 512-bit (64-byte PSK, entered as 128 hexadecimal digits).

See also: Value size limits

18. Web interface

Overview For an easy access to Zabbix from anywhere and from any platform, the web-based interface is provided.

> **Note:**
> Trying to access two Zabbix frontend installations on the same host, on different ports, simultaneously will fail. Logging into the second one will terminate the session on the first one - unless the default frontend session name is adjusted for the second frontend in frontend definitions (see ZBX_SESSION_NAME).

1 Frontend sections

1 Monitoring

Overview

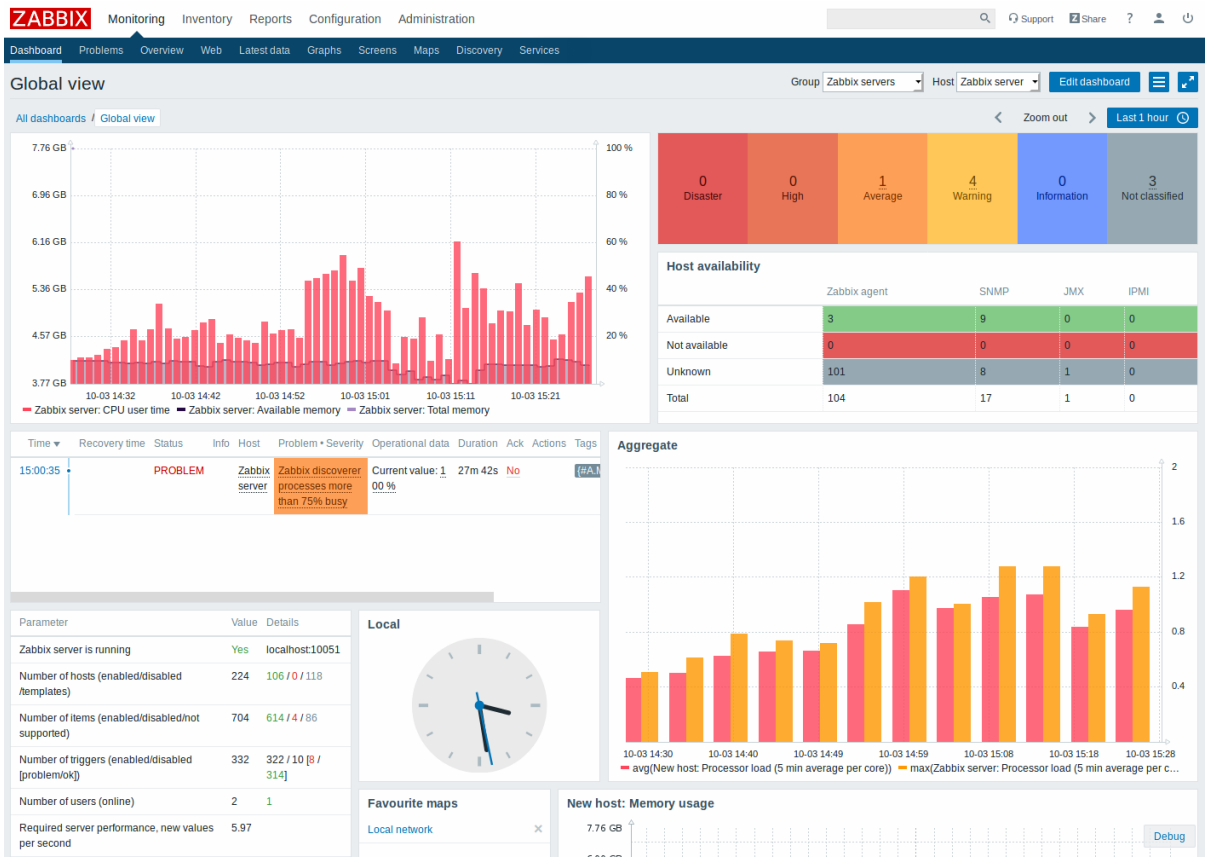
The Monitoring menu is all about displaying data. Whatever information Zabbix is configured to gather, visualize and act upon, it will be displayed in the various sections of the Monitoring menu.

1 Dashboard

Overview

The *Monitoring* → *Dashboard* section is designed to display summaries of all the important information.

A dashboard consists of widgets and each widget is designed to display information of a certain kind and source, which can be a summary, a map, a graph, the clock, etc.



Widgets are added and edited in the dashboard editing mode. Widgets are viewed in the dashboard viewing mode.

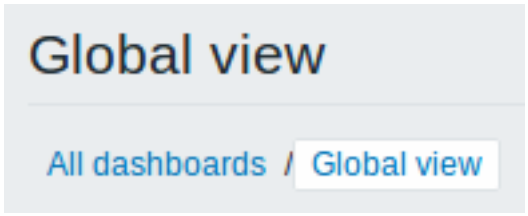
While in a single dashboard you can group widgets from various sources for a quick overview, it is also possible to create several dashboards containing different sets of overviews and switch between them.

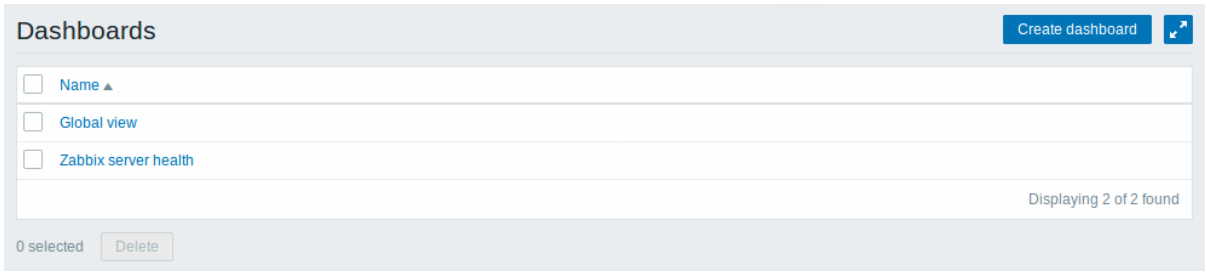
The time period that is displayed in graph widgets is controlled by the time period selector located above the widgets. The time period selector label, located to the right, displays the currently selected time period. Clicking the tab label allows to expand and collapse the time period selector.

Note that when the dashboard is displayed in kiosk mode (accessible from the fullscreen mode) and widgets only are displayed, it is possible to zoom out the graph period by double clicking in the graph.

Viewing dashboards

To access all configured dashboards, click on the *All dashboards* link just below the section title.



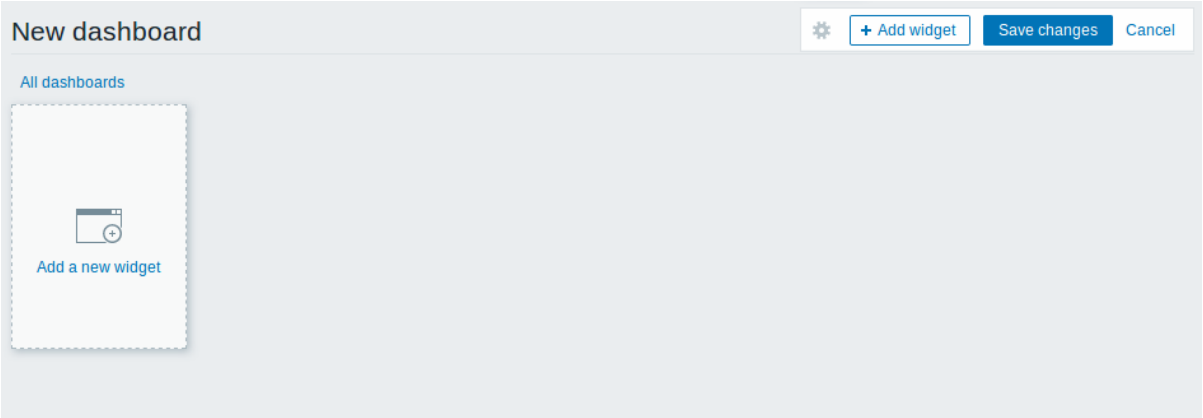


To view a single dashboard, click on its name in the list of all dashboards.

To delete one or several dashboards, mark the checkboxes of the respective dashboards and click on *Delete* below the list.

Creating a dashboard

When viewing all dashboards, you can click on the *Create dashboard* button to create a new dashboard:



Initially the dashboard is empty. To populate the dashboard, you can add widgets.

Click on the *Save changes* button to save the dashboard. If you click on *Cancel*, the dashboard will not be created.

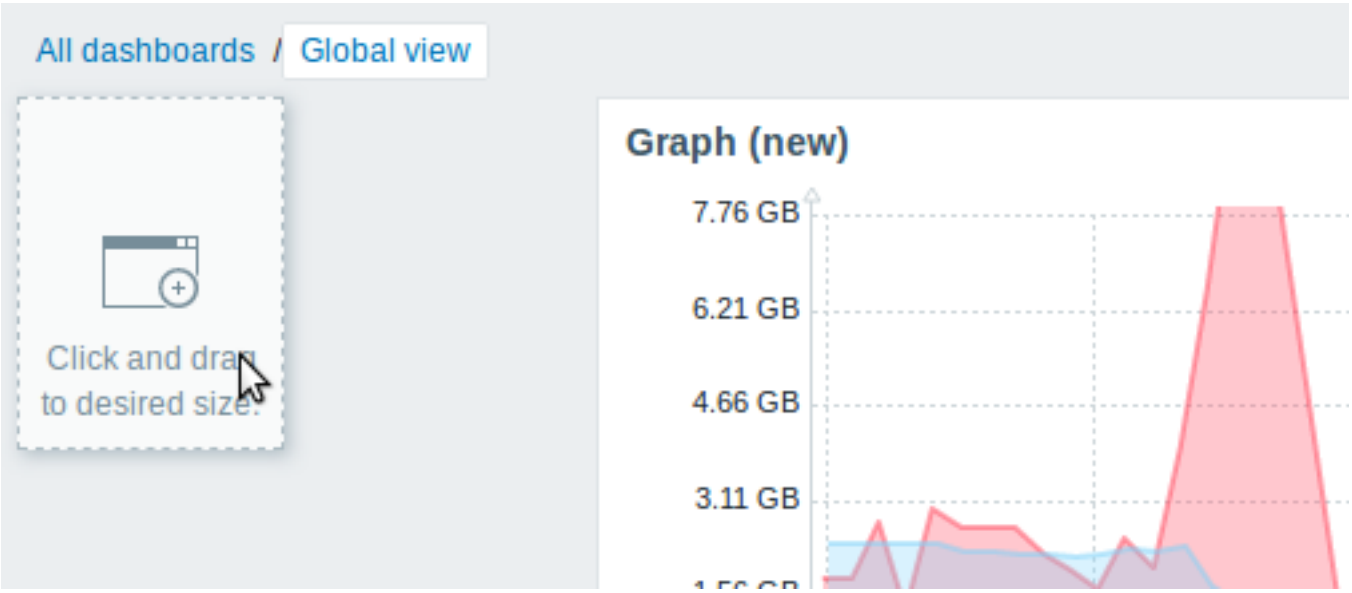
Adding widgets

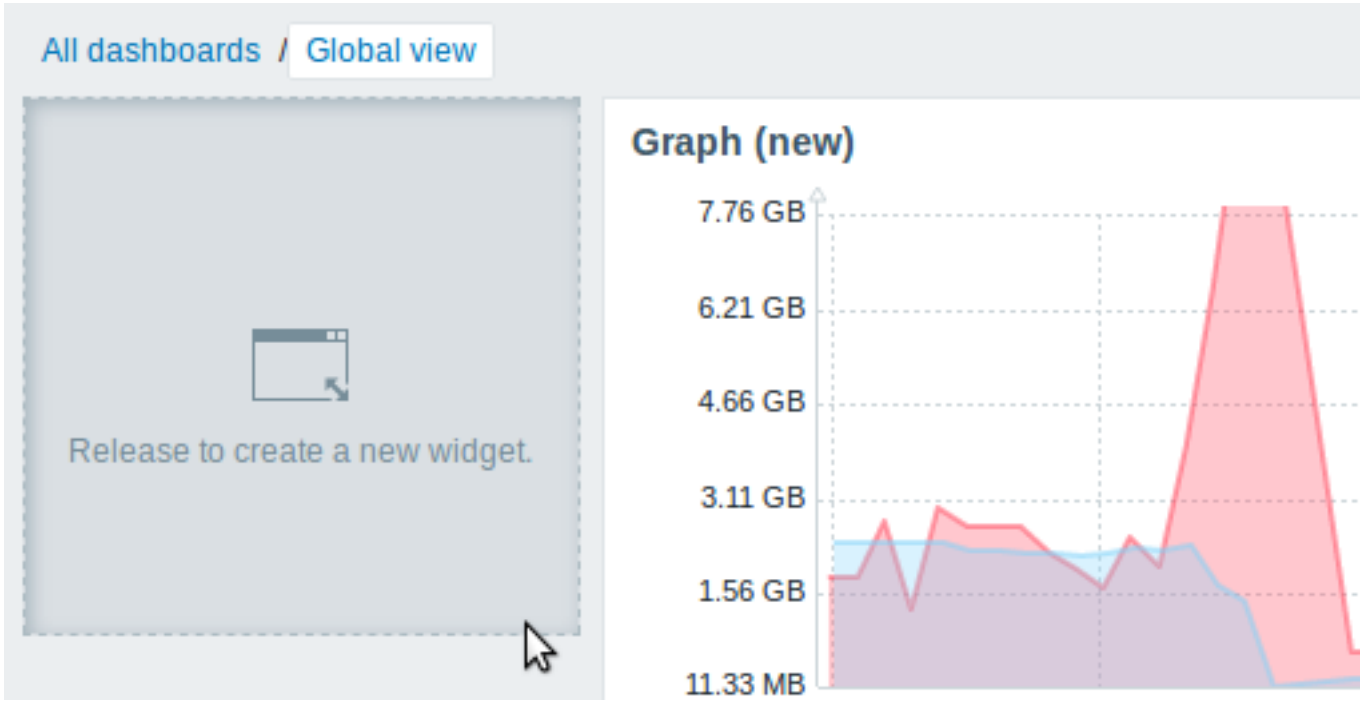
To add a widget to a dashboard:

- Click on the *Add widget* button in dashboard editing mode. The widget will be created in its default size and placed after the existing widgets (if any);

Or

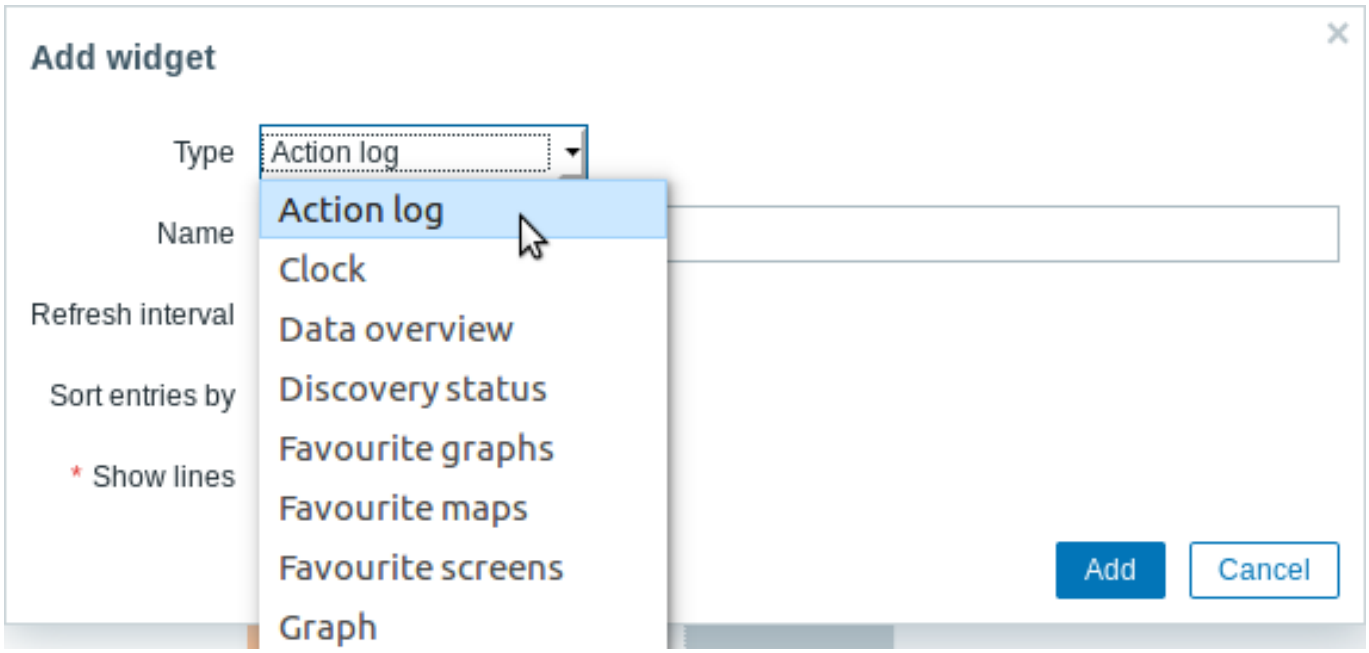
- Move your mouse to the desired empty spot for the new widget. Notice how a placeholder appears, on mouseover, on any empty slot on the dashboard. Then click to open the widget configuration form. After filling the form the widget will be created in its default size or take up all the available space if its default size is bigger. Alternatively you may click and drag the placeholder to the desired widget size, then release.





Then, in the widget configuration form:

- Select the *Type* of widget
- Enter widget parameters
- Click on *Add*



The following widgets can be added to a dashboard:

- Action log
- Clock
- Data overview
- Discovery status
- Favourite graphs
- Favourite maps
- Favourite screens
- Graph
- Graph (classic)
- Graph prototype
- Host availability
- Problem hosts
- Map

- Map navigation tree
- Plain text
- Problems
- System information
- Problems by severity
- Trigger overview
- URL
- Web monitoring

In dashboard editing mode widgets can be resized and moved around the dashboard by clicking on the widget title bar and dragging it to a new location. Also, you can click on the following buttons within the widget to:

- - edit a widget;
- - remove a widget

Click on *Save changes* for the dashboard to make any changes to the widgets permanent.

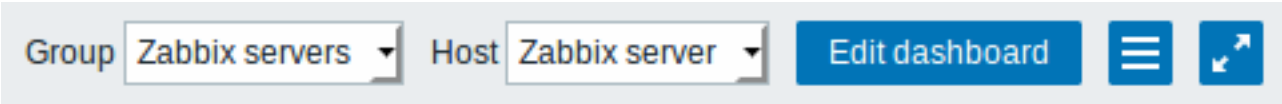
Dynamic widgets

When configuring some of the widgets:

- Graphs (simple and custom)
- Plain text
- URL

there is an extra option called *Dynamic item*. You can check this box to make the widget dynamic - i.e. capable of displaying different content based on the selected host.

Now, when saving the dashboard, you will notice that two new dropdowns have appeared atop the dashboard for selecting the host group/host:



Thus you have a widget, which can display content that is based on the data from the host that is selected in the dropdown. The benefit of this is that you do not need to create extra widgets just because, for example, you want to see the same graphs containing data from various hosts.

Viewing and editing a dashboard

When viewing a single dashboard, the following options are available:

Edit dashboard		Switch to the dashboard editing mode.
		Open the action menu.
	Sharing	Edit sharing preferences for the dashboard. Dashboards can be made public or private. Public dashboards are visible to all users. Private dashboards are visible only to their owner. Private dashboards can be shared by the owner to other users and user groups. For details on configuring sharing, see the map configuration section.
	Create new	Create a new dashboard. First you are prompted to enter general properties of the new dashboard - owner and name. Then, the new dashboard opens in editing mode and you can add widgets.

	Clone	Create a new dashboard by copying properties of the existing one. First you are prompted to enter general properties of the new dashboard - owner and name. Then, the new dashboard opens in editing mode with all the widgets of the original dashboard.
	Delete	Delete the dashboard.
		Display dashboard in fullscreen mode. Fullscreen mode can also be accessed with the following URL parameters: `/zabbix.php?action=dashboard.view&fullsc` To exit: `/zabbix.php?action=dashboard.view&fullsc`

		Display dashboard in kiosk mode. In this mode only widgets are displayed.
		The kiosk mode button appears when the fullscreen mode is activated.
		To exit kiosk mode, move the mouse cursor until the  exit button appears and click on it. Note that you will be taken back to normal mode (not fullscreen mode).
		Kiosk mode can also be accessed with the following URL parameters:
		`/zabbix.php?action=dashboard.view&kiosk=`
		To exit to normal mode:
		`/zabbix.php?action=dashboard.view&fullsc`

Editing mode is opened:

- when a new dashboard is being created
- when you click on the edit button of a widget
- when you click the *Edit dashboard* button for an existing dashboard

In the dashboard editing mode the following options are available:

	Edit general dashboard properties - name and owner.
+ Add widget	Add a new widget.
Save changes	Save dashboard changes.
Cancel	Cancel dashboard changes.

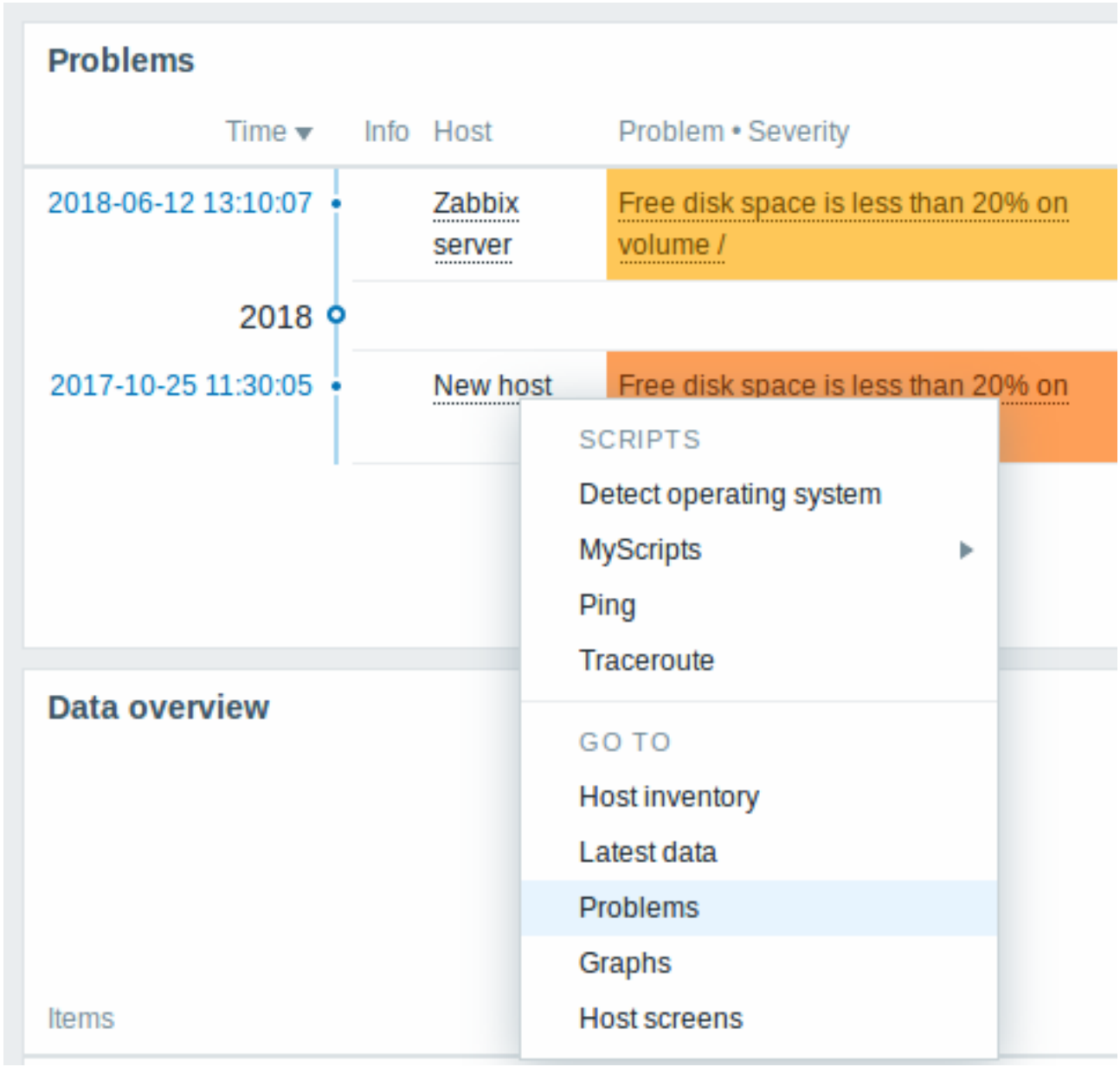
Permissions to dashboards

Permissions to dashboards for regular and Zabbix Admin users are limited in the following way:

- They can see and clone a dashboard if they have at least READ rights to it;
- They can edit and delete dashboard only if they have READ/WRITE rights to it;
- They cannot change the dashboard owner.

Host menu

Clicking on a host in the *Problems* widget brings up the host menu. It includes links to custom scripts, inventory, latest data, problems, graphs and screens for the host.

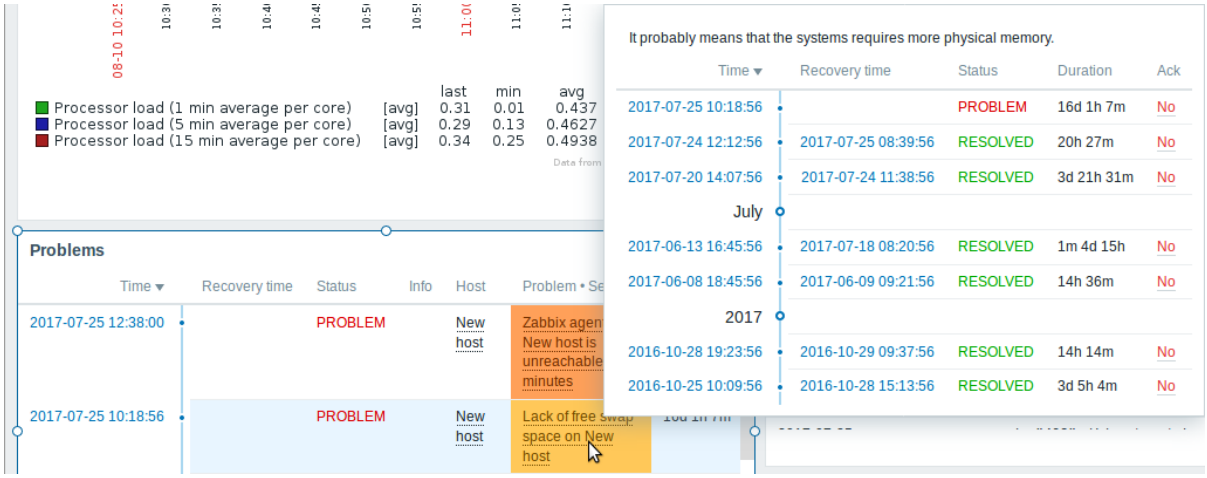


The host menu is accessible by clicking on a host in several other frontend sections:

- Monitoring → Problems
- Monitoring → Problems → Event details
- Monitoring → Overview (on *Hosts: left*)
- Monitoring → Latest data
- Monitoring → Screens (in *Host issues* and *Host group issues* widgets)
- Monitoring → Maps
- Reports → Triggers top 100

Problem event popup

The problem event popup includes the list of problem events for this trigger and, if defined, the trigger description and a clickable URL.



To bring up the problem event popup:

- roll a mouse over the problem name in the *Problem-Severity* column of the *Problems* widget. The popup disappears once you remove the mouse from the problem name.
- click on the problem name in the *Problem-Severity* column of the *Problems* widget. The popup disappears only if you click on the problem name again.

Attention:
Resolved values of {ITEM.VALUE} and {ITEM.LASTVALUE} macros in trigger descriptions are truncated to 20 characters. To see the entire values you may use macro functions with these macros, e.g. `{{ITEM.VALUE}.regsub("(.*)", \1)}`, `{{ITEM.LASTVALUE}.regsub("(.*)", \1)}` as a workaround.

1 Dashboard widgets

Overview

This section lists available dashboard widgets and provides details for widget configuration.

The following parameters are common for every single widget:

Name	Enter a widget name.
Refresh interval	Configure default refresh interval. Default refresh intervals for widgets range from *No refresh* to *15 minutes* depending on the type of widget. For example:// No refresh// for URL widget, *1 minute* for action log widget, *15 minutes* for clock widget.
Show header	Mark the checkbox to show the header permanently. When unchecked the header is hidden to save space and only slides up and becomes visible again when the mouse is positioned over the widget, both in view and edit modes. It is also semi-visible when dragging a widget to a new place.

Refresh intervals for a widget can be set to a default value for all the corresponding users and also each user can set his own refresh interval value:

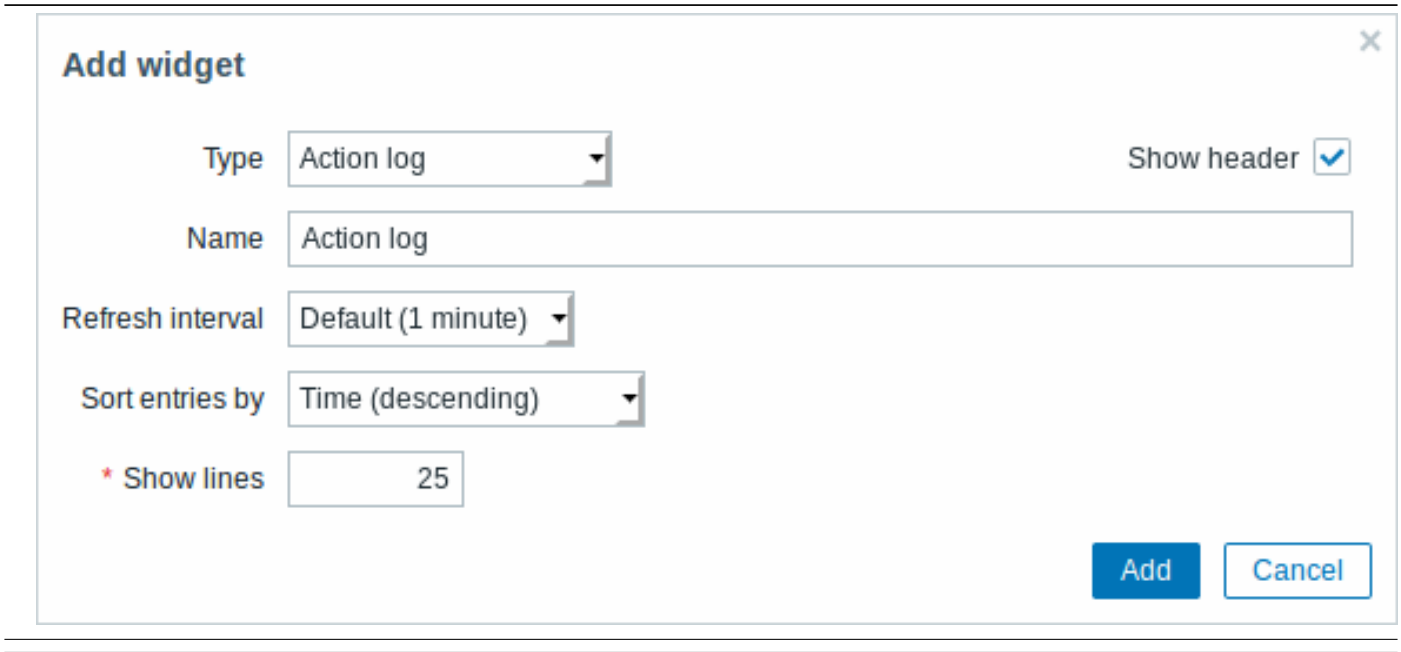
- To set a default value for all the corresponding users switch to editing mode (click the *Edit dashboard* button, find the right widget, click the *Edit* button opening the editing form of a widget) and choose the required refresh interval from the dropdown list.
- Setting a unique refresh interval for each user separately is possible in view mode by clicking the button for a certain widget.

Unique refresh interval set by a user has priority over the widget setting and once it's set it's always preserved when the widget's setting is modified.

Action log

In the action log widget you can display details of action operations (notifications, remote commands). It replicates information from *Administration* → *Audit*.

To configure, select *Action log* as type:



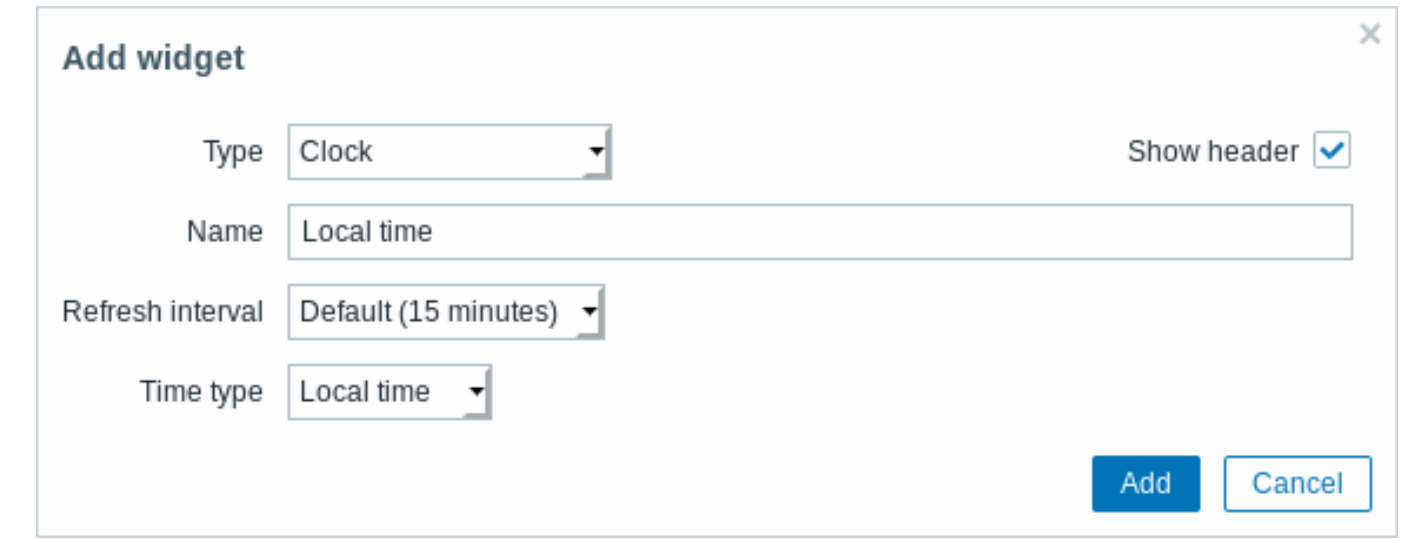
You may set the following specific options:

Sort entries by	Sort entries by: **Time** (descending or ascending) **Type** (descending or ascending) **Status** (descending or ascending) **Recipient** (descending or ascending).
Show lines	Set how many action log lines will be displayed in the widget.

Clock

In the clock widget you may display local, server or specified host time.

To configure, select *Clock* as type:



You may set the following specific options:

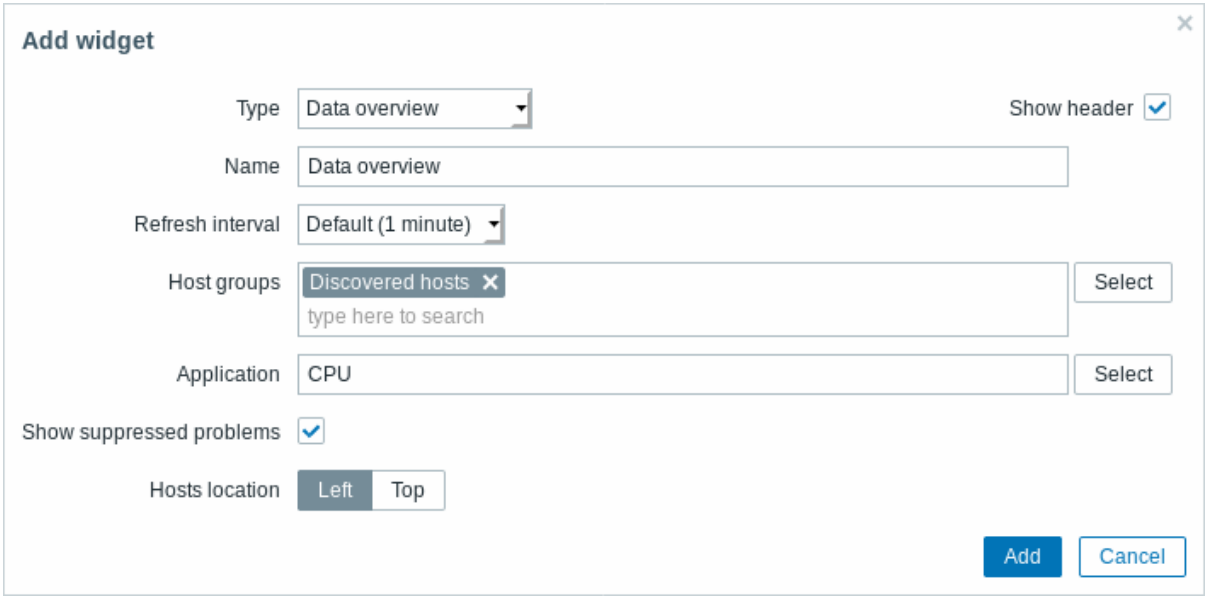
Time type	Select local, server or specified host time.

Item	Select the item for displaying time. To display host time, use the `system.localtime[local]` item. This item must exist on the host. This field is available only when *Host time* is selected.

Data overview

In the data overview widget you can display the latest data for a group of hosts. It replicates information from *Monitoring* → *Overview* (when *Data* is selected as Type there).

To configure, select *Data overview* as type:

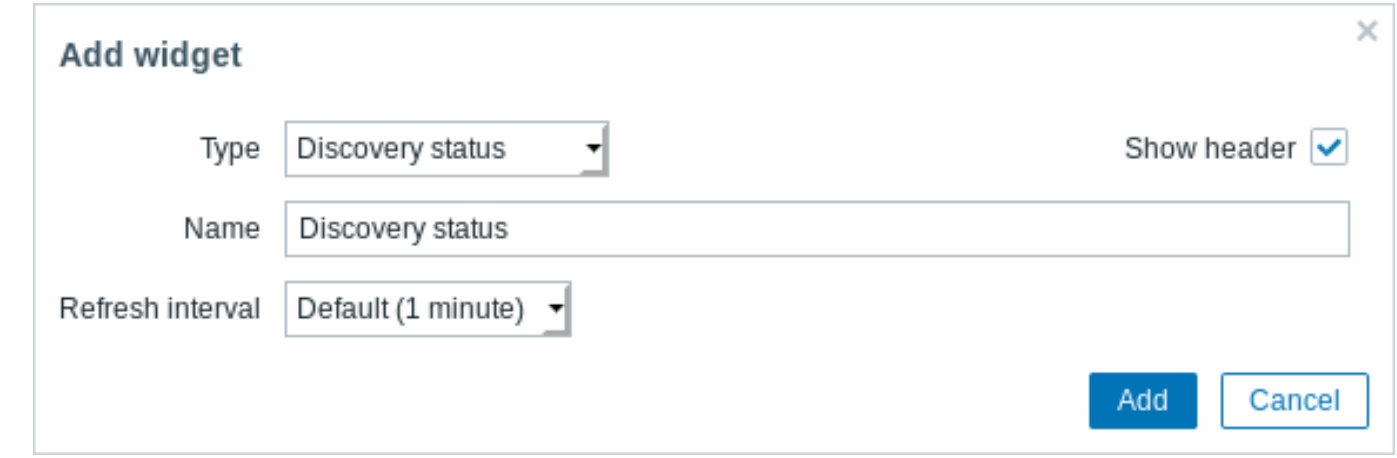


You may set the following specific options:

Host groups	Select host groups. This field is auto-complete so starting to type the name of a group will offer a dropdown of matching groups. Scroll down to select. Click on 'x' to remove the selected.
Application	Enter application name.
Show suppressed problems	Mark the checkbox to display problems which would otherwise be suppressed (not shown) because of host maintenance.
Hosts location	Select host location - left or top.

Discovery status

This widget displays a status summary of the active network discovery rules.



Favourite graphs

This widget contains shortcuts to the most needed graphs, sorted alphabetically.

The list of shortcuts is populated when you view a graph and then click on its *Add to favourites* button.

Favourite maps

This widget contains shortcuts to the most needed maps, sorted alphabetically.

The list of shortcuts is populated when you view a map and then click on its *Add to favourites* button.

Favourite screens

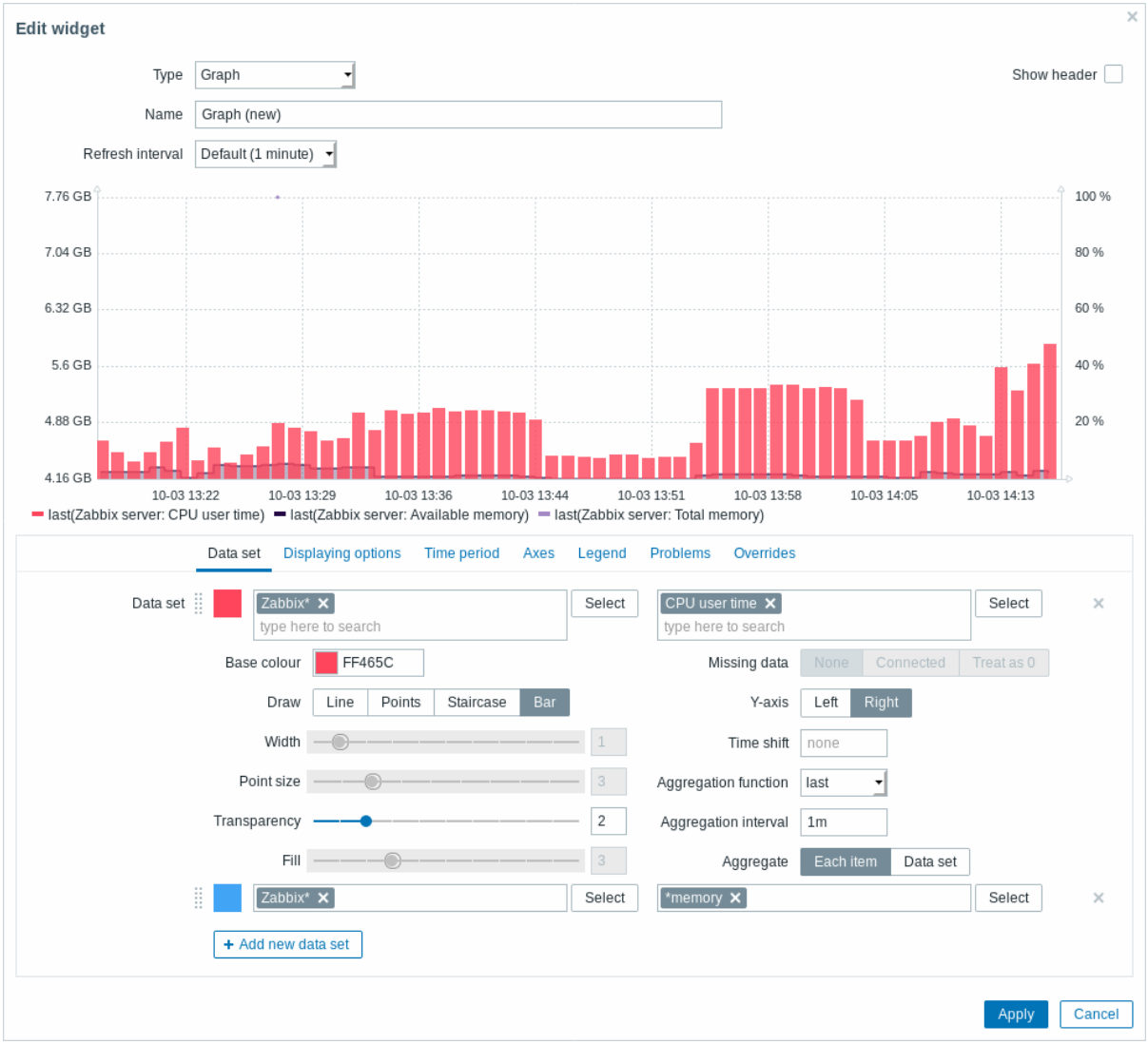
This widget contains shortcuts to the most needed screens and slide shows, sorted alphabetically.

The list of shortcuts is populated when you view a screen/slide show and then click on its *Add to favourites* button.

Graph

The graph widget provides a modern and versatile way of visualizing data collected by Zabbix using a vector image drawing technique. This graph widget is supported since Zabbix 4.0. The graph widget supported before Zabbix 4.0 can still be used and is renamed to Graph (classic).

To configure, select *Graph* as type:



The **Data set** tab allows to add data sets and define their visual representation:

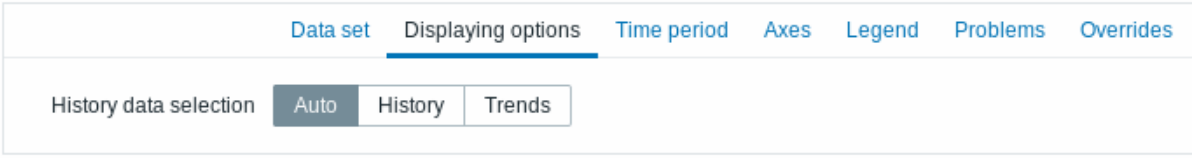
Data set		Select hosts and items to display on the graph. Alternatively you may enter host and item patterns. Wildcard patterns may be used (for example, `*` will return results that match zero or more characters). To specify a wildcard pattern, just enter the string manually and press *Enter*. While you are typing, note how all matching hosts are displayed in the dropdown. Up to 50 items may be displayed in the graph. Host pattern and item pattern fields are mandatory. *Note* that item names containing deprecated positional macros (`$1`-`$9`) are not resolved in this field. Therefore it will not be possible to add any of the items named like `CPU $2 time` individually to the graph using its resolved name (like `CPU user time`); while using its unresolved name `CPU $2 time` will add all corresponding items to the graph (e.g. `CPU user time`, `CPU system time`, `CPU idle time`, etc.). The wildcard symbol is always interpreted, therefore it is not possible to add, for example, an item named "item*" individually, if there are other matching items (e.g. item2, item3).
	Base colour	Adjust base colour, either from the colour picker or manually. Base colour is used to calculate different colours for each item of the data set. Base colour input field is mandatory.
	Draw	Choose the draw type of the metric. Possible draw types are *Line* (set by default), *Points*, *Staircase* and *Bar*. Note that if there's only one data point in line/staircase graph it is drawn as point regardless of draw type. The point size is calculated from line width, but it cannot be smaller than 3 pixels, even if line width is less.
	Width	Set the line width. This option is available when *Line* or *Staircase* draw type is selected.
	Point size	Set the point size. This option is available when *Points* draw type is selected.
	Transparency	Set the transparency level.
	Fill	Set the fill level. This option is available when *Line* or *Staircase* draw type is selected.

	Missing data	Select the option for displaying missing data: **None** - the gap is left empty **Connected** - two border values are connected **Treat as 0** - the missing data is displayed as 0 values Not applicable for the *Points* and *Bar* draw type.
	Y-axis	Select the side of the graph where Y-axis will be displayed.
	Time shift	Specify time shift if required. You may use time suffixes in this field. Negative values are allowed.
	Aggregation function	Specify which aggregation function to use: **min** - display the smallest value **max** - display the largest value **avg** - display the average value **sum** - display the sum of values **count** - display the count of values **first** - display the first value **last** - display the last value **none** - display all values (no aggregation) Aggregation allows to display an aggregated value for the chosen interval (5 minutes, an hour, a day), instead of all values. See also: Aggregation in graphs. This option is supported since Zabbix 4.4.
	Aggregation interval	Specify the interval for aggregating values. You may use time suffixes in this field. A numeric value without a suffix will be regarded as seconds. This option is supported since Zabbix 4.4.
	Aggregate	Specify whether to aggregate: **Each item** - each item in the dataset will be aggregated and displayed separately. **Data set** - all dataset items will be aggregated and displayed as one value. This option is supported since Zabbix 4.4.

Existing data sets are displayed in a list. You may:

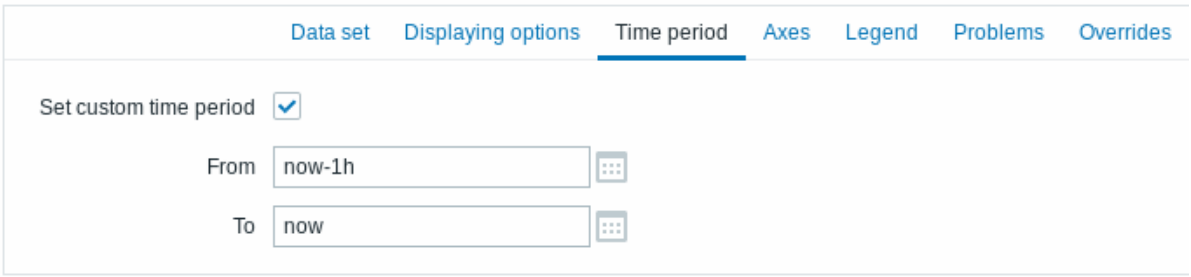
-  - click on this button to add a new data set
- - click on the colour icon to expand/collapse data set details
-  - click on the move icon and drag a data set to a new place in the list

The **Displaying options** tab allows to define history data selection:



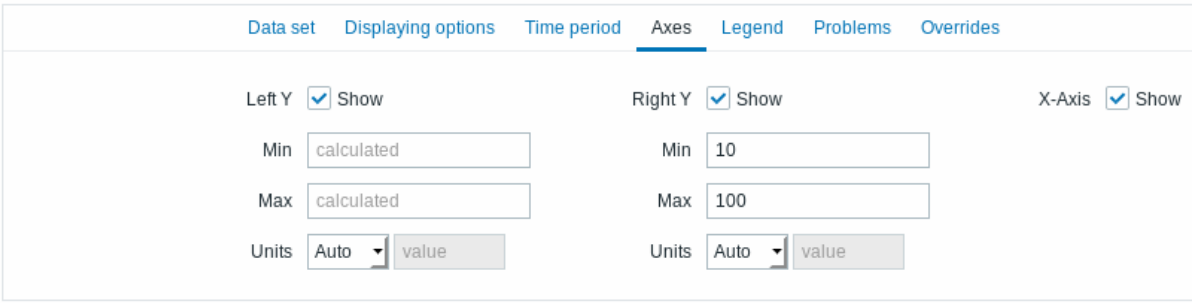
History data selection	Set the source of graph data: **Auto** - data are sourced according to the classic graph algorithm (default) **History** - data from history **Trends** - data from trends

The **Time period** tab allows to set a custom time period:



Set custom time period	Mark this checkbox to set custom time period for the graph (unmarked by default).
From	Set the start time of the custom time period for the graph.
To	Set the end time of the custom time period for the graph.

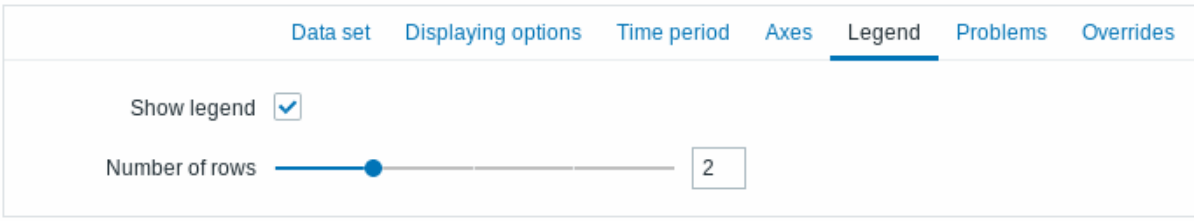
The **Axes** tab allows to customize how axes are displayed:



Left Y	Mark this checkbox to make left Y axis visible. The checkbox may be disabled if unselected either in *Data set* or in *Overrides* tab.
Right Y	Mark this checkbox to make right Y axis visible. The checkbox may be disabled if unselected either in *Data set* or in *Overrides* tab.
X-Axis	Unmark this checkbox to hide X axis (marked by default).
Min	Set the minimum value of the corresponding axis. Visible range minimum value of Y axis is specified.
Max	Set the maximum value of the corresponding axis. Visible range maximum value of Y axis is specified.

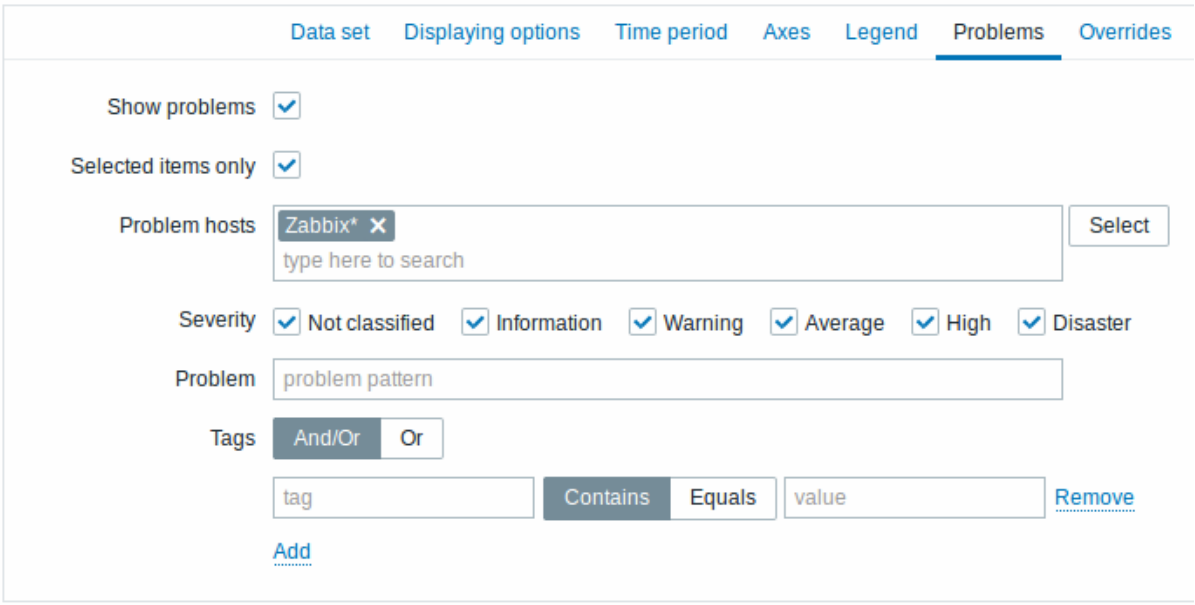
Units	Choose the unit for the graph axis values from the dropdown. If *Auto* option is chosen axis values are displayed using units of the first item of corresponding axis. *Static* option allows you to assign corresponding axis' custom name. If *Static* option is chosen and *value* input field left blank the corresponding axis' name will only consist of a numeric value.

The **Legend** tab allows to customize the graph legend:



Show legend	Unmark this checkbox to hide the legend on the graph (marked by default).
Number of rows	Set the number of rows to be displayed on the graph.

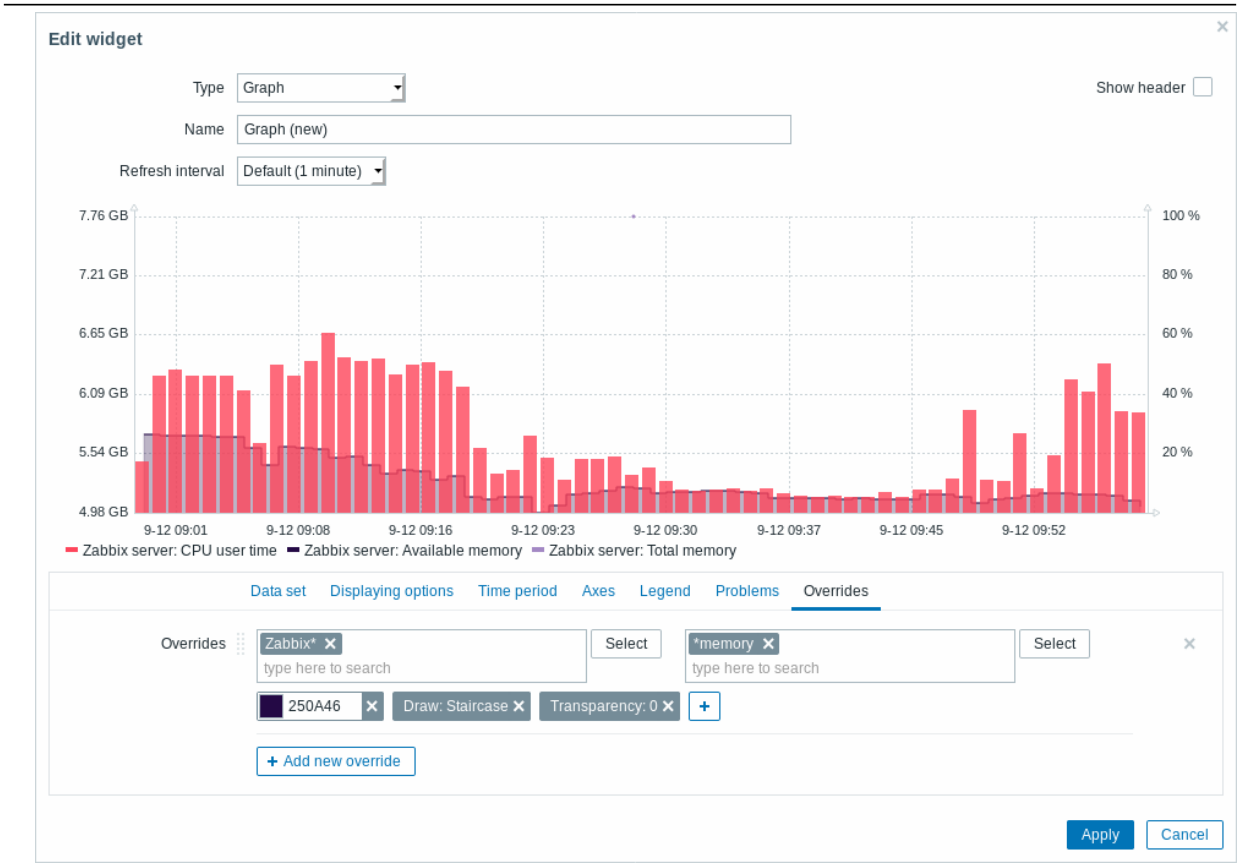
The **Problems** tab allows to customize the problem display:



Show problems	Mark this checkbox to enable problem displaying on the graph (unmarked, i.e. disabled by default).
Selected items only	Mark this checkbox to include problems for the selected items only to be displayed on the graph.
Problem hosts	Select the problem hosts to be displayed on the graph. Wildcard patterns may be used (for example, * will return results that match zero or more characters). To specify a wildcard pattern, just enter the string manually and press *Enter*. While you are typing, note how all matching hosts are displayed in the dropdown.
Severity	Mark the problem severities to be displayed on the graph.

Problem	Specify the problem's name to be displayed on the graph.
Tags	Specify tag name and value to limit the number of problems displayed on the graph. To add more tag names and values, click on *Add*. There are two calculation types for several conditions: **And/Or** - all conditions must be met, conditions having same tag name will be grouped by Or condition **Or** - enough if one condition is met There are two ways of matching the tag value: **Contains** - case-sensitive substring match (tag value contains the entered string) **Equals** - case-sensitive string match (tag value equals the entered string)

The **Overrides** tab allows to add custom overrides for data sets:



Overrides are useful when several items are selected for a data set using the * wildcard and you want to change how the items are displayed by default (e.g. default base colour or any other property).

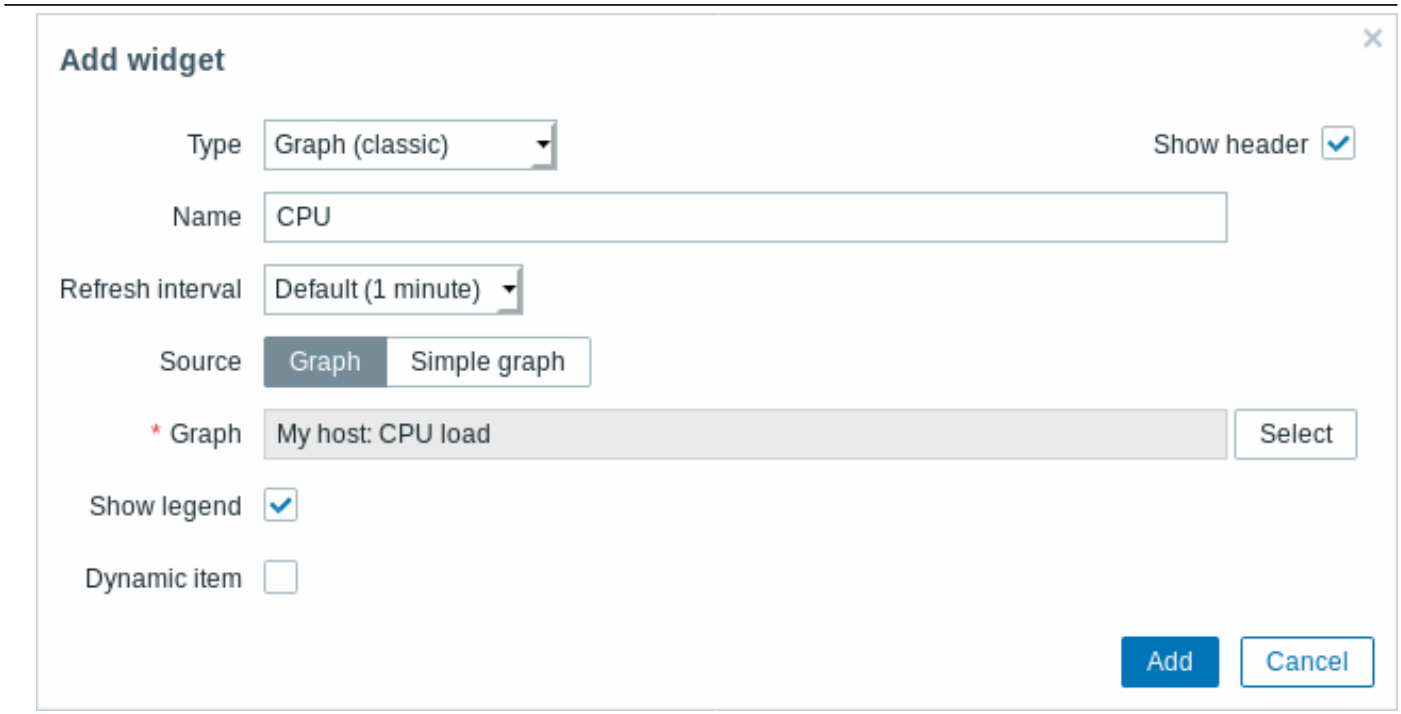
Existing overrides (if any) are displayed in a list. To add a new override:

- Click on the + Add new override button
- Select hosts and items for the override. Alternatively you may enter host and item patterns. Wildcard patterns may be used (for example, * will return results that match zero or more characters). To specify a wildcard pattern, just enter the string manually and press *Enter*. While you are typing, note how all matching hosts are displayed in the dropdown. The wildcard symbol is always interpreted, therefore it is not possible to add, for example, an item named "item*" individually, if there are other matching items (e.g. item2, item3). Host pattern and item pattern fields are mandatory.
- Click on +, to select override parameters. At least one override parameter should be selected. For parameter descriptions, see the *Data set* tab above.

Graph (classic)

In the classic graph widget you can display a single custom graph or simple graph.

To configure, select *Graph* as type:



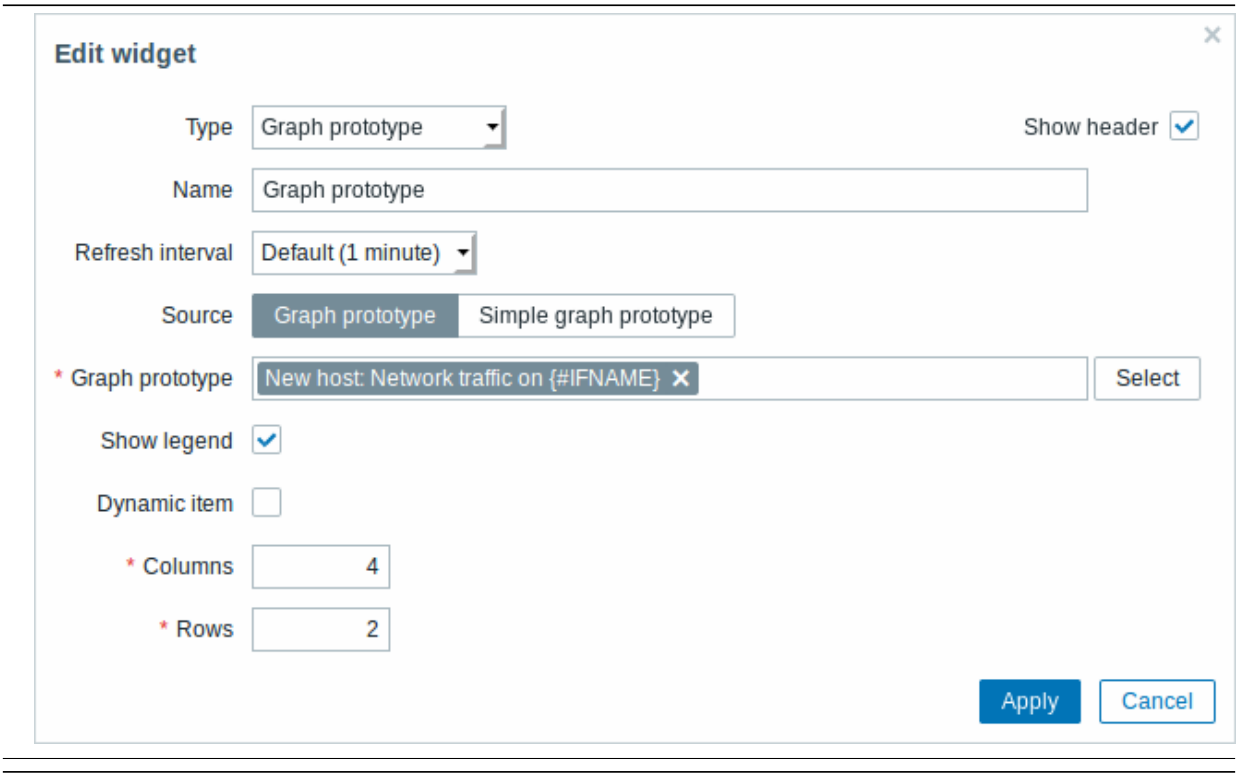
You may set the following specific options:

Source	Select graph type: **Graph** - custom graph **Simple graph** - simple graph
Graph	Select the custom graph to display. This option is available if 'Graph' is selected as *Source*.
Item	Select the item to display in a simple graph. This option is available if 'Simple graph' is selected as *Source*.
Show legend	Unmark this checkbox to hide the legend on the graph (marked by default).
Dynamic item	Set graph to display different data depending on the selected host.

Graph prototype

In the graph prototype widget you can display a grid of graphs created from either a graph prototype or an item prototype by low-level discovery.

To configure, select *Graph prototype* as widget type:



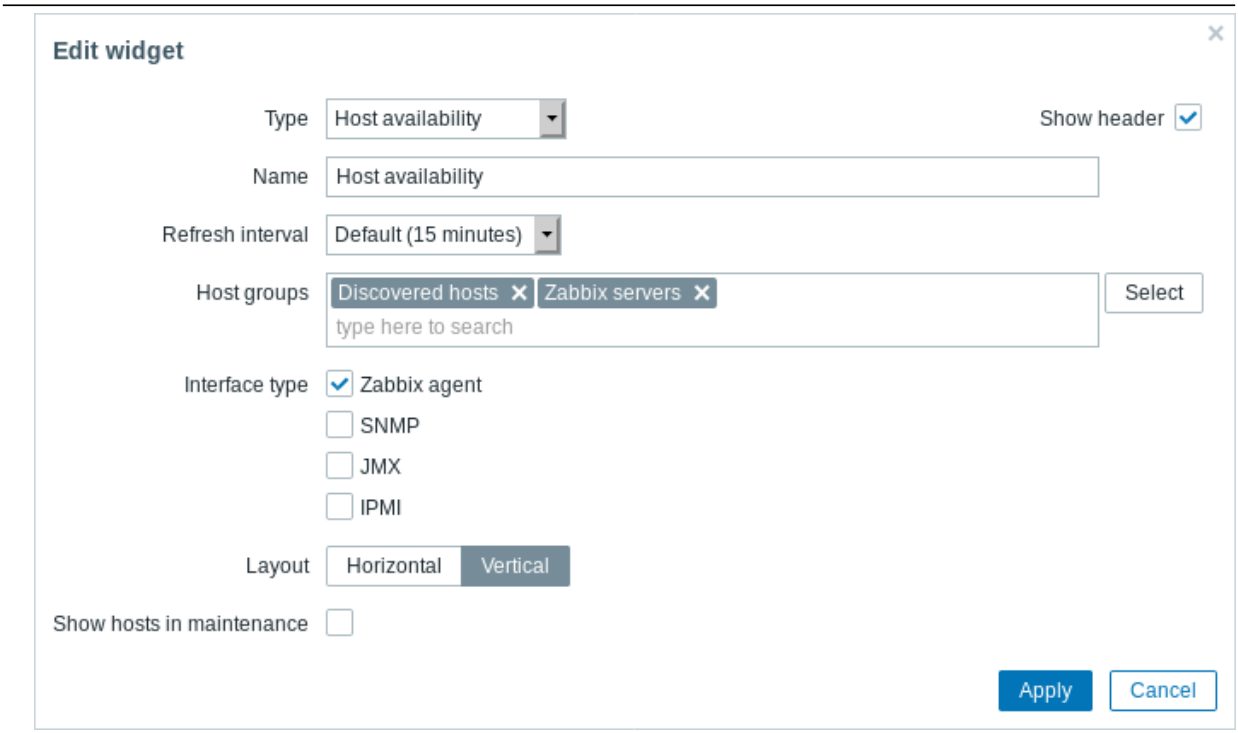
You may set the following specific options:

Source	Select source: either a **Graph prototype** or an **Item prototype**.
Graph prototype	Select a graph prototype to display discovered graphs of the graph prototype. This option is available if 'Graph prototype' is selected as Source.
Item prototype	Select an item prototype to display simple graphs based on discovered items of an item prototype. This option is available if 'Simple graph prototype' is selected as Source.
Show legend	Mark this checkbox to show the legend on the graphs (marked by default).
Dynamic item	Set graphs to display different data depending on the selected host.
Columns	Enter number of columns of graphs to display within a graph prototype widget.
Rows	Enter number of rows of graphs to display within a graph prototype widget.

Host availability

In the host availability widget you can display high-level statistics about host availability.

To configure, select *Host availability* as type:



You may set the following specific options:

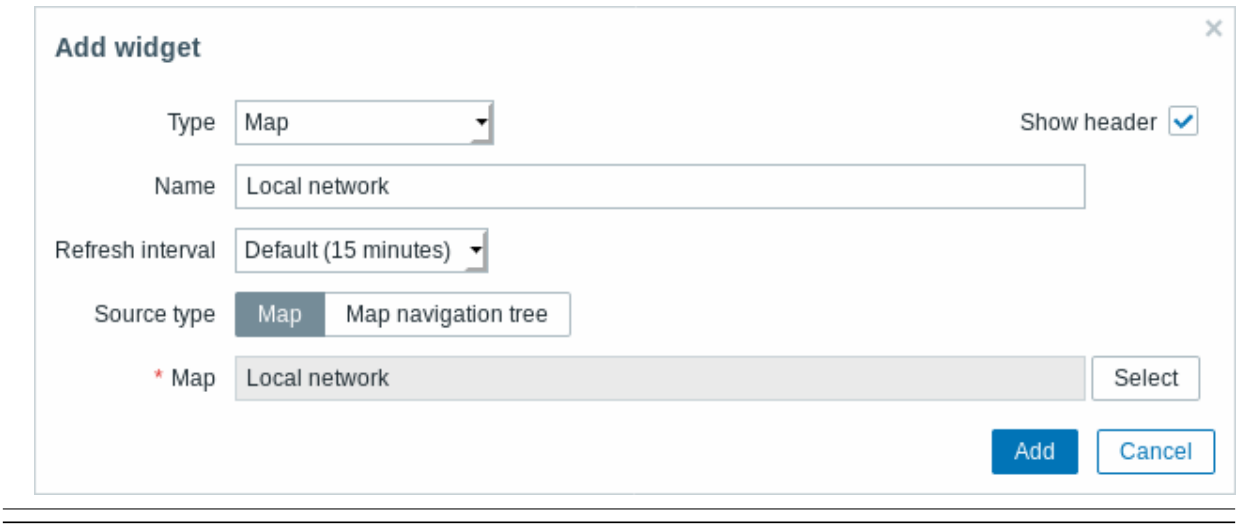
Host groups	Select host group(s). This field is auto-complete so starting to type the name of a group will offer a dropdown of matching groups. Scroll down to select. Click on 'x' to remove the selected.
Interface type	Select which host interfaces you want to see availability data for. Availability of all interfaces is displayed by default, if nothing is selected.
Layout	Select vertical or horizontal display.
Show hosts in maintenance	Include hosts that are in maintenance in the statistics.

Map

In the map widget you can display either:

- a single configured network map
- one of the configured network maps in the map navigation tree (when clicking on the map name in the tree).

To configure, select *Map* as type:



You may set the following specific options:

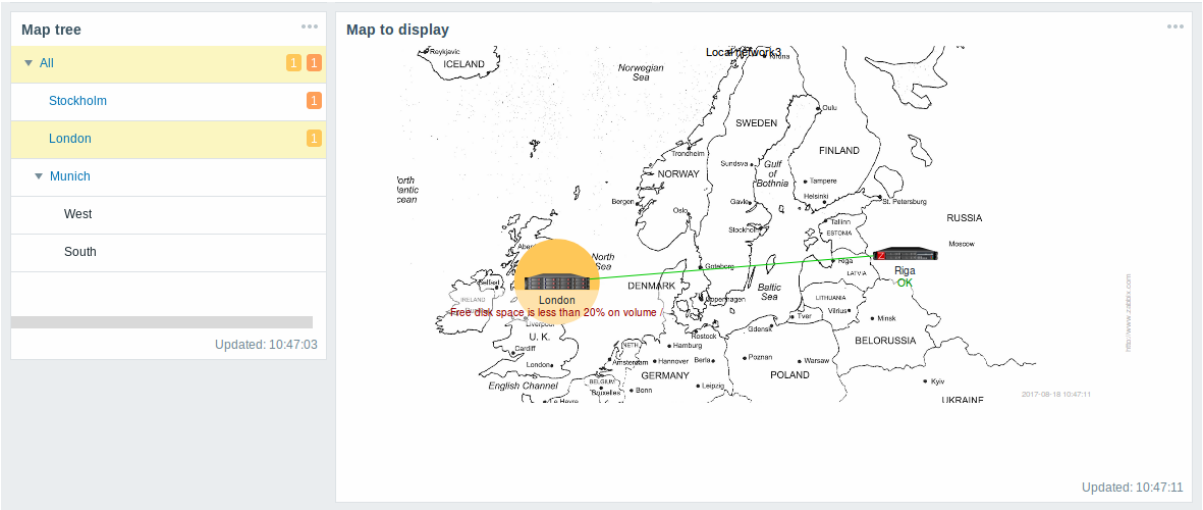
Source type	Select to display: **Map** - network map **Map navigation tree** - one of the maps in the selected map navigation tree
Map	Select the map to display. This option is available if 'Map' is selected as *Source type*.
Filter	Select the map navigation tree to display the maps of. This option is available if 'Map navigation tree' is selected as *Source type*.

See also: known issue with IE11

Map navigation tree

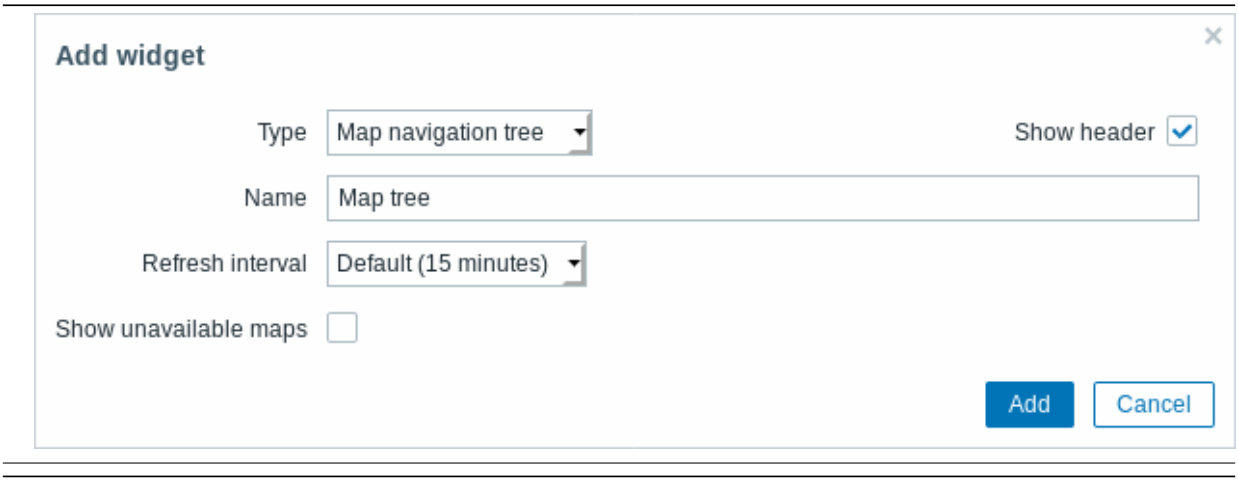
This widget allows to build a hierarchy of existing maps while also displaying problem statistics with each included map and map group.

It becomes even more powerful if you link the *Map* widget to the navigation tree. In this case, clicking on a map name in the navigation tree displays the map in full in the *Map* widget.



Statistics with the top level map in the hierarchy display a sum of problems of all submaps and its own problems.

To configure the navigation tree widget, select *Map navigation tree* as type:



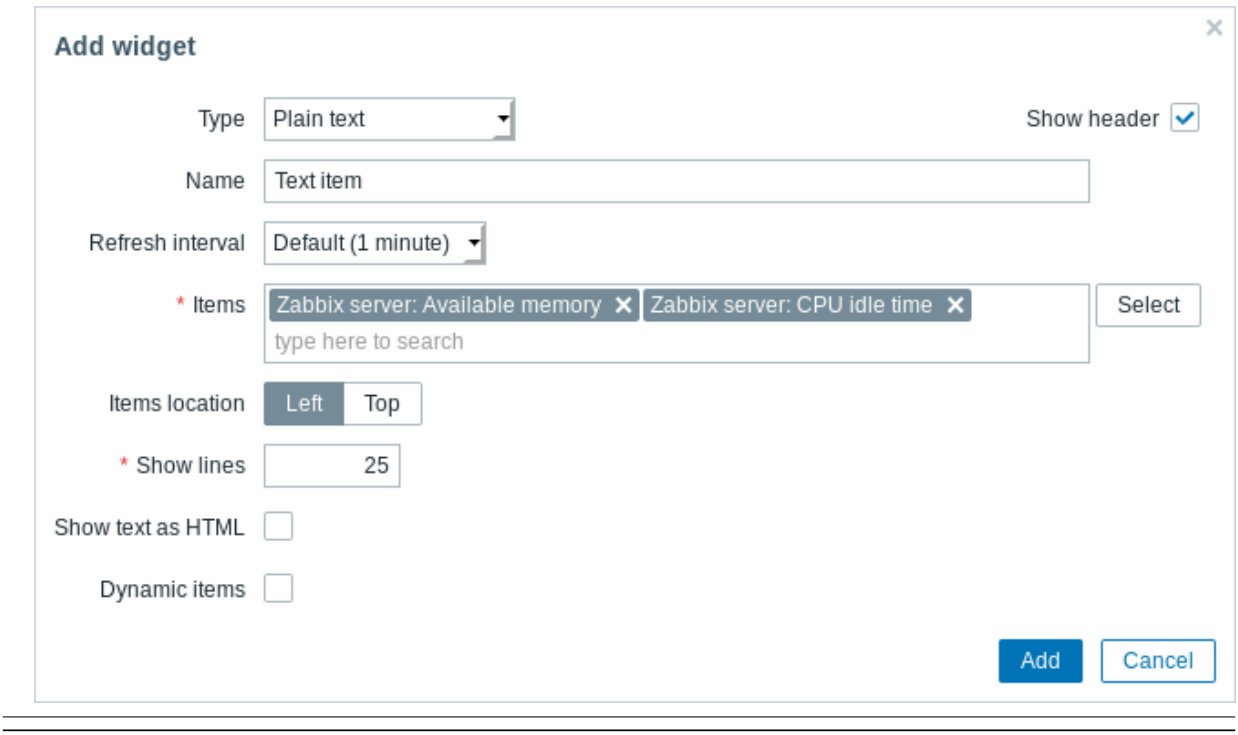
You may set the following specific options:

Show unavailable maps	Mark this checkbox to display maps that the user does not have read permission to. Unavailable maps in the navigation tree will be displayed with a greyed out icon. Note that if this checkbbox is marked, available submaps are displayed even if the parent level map is unavailbale. If unmarked, available submaps to an unavailable parent map will not be displayed at all. Problem count is calculated based on available maps and available map elements.

Plain text

In the plain text widget you can display latest item data in plain text.

To configure, select *Plain text* as type:



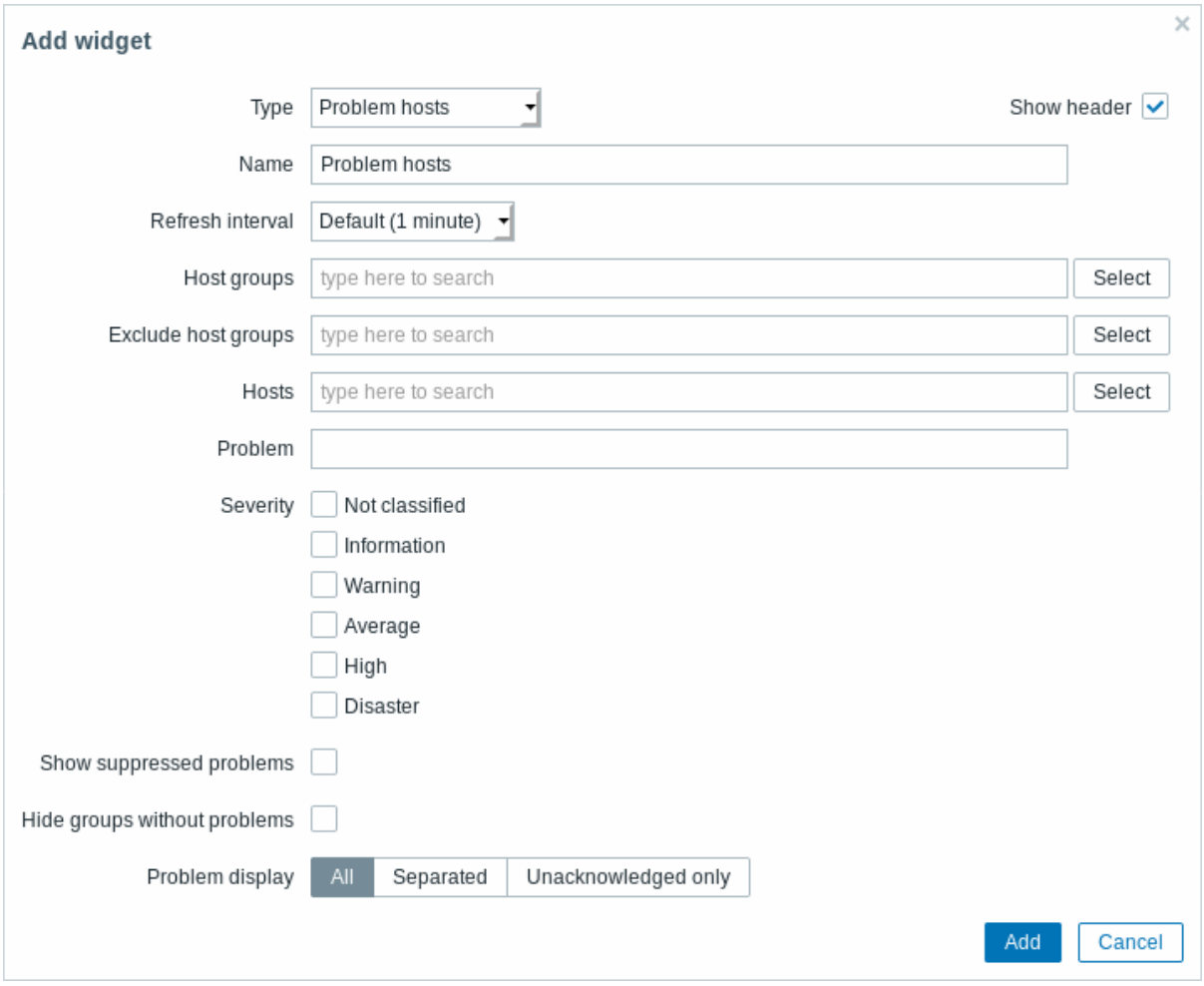
You may set the following specific options:

Items	Select the items.
Items location	Choose the location of selected items to be displayed in the widget.
Show lines	Set how many latest data lines will be displayed in the widget.
Show text as HTML	Set to display text as HTML.
Dynamic item	Set to display different data depending on the selected host.

Problem hosts

In the host information widget you can display high-level information about host availability.

To configure, select *Problem hosts* as type:



You may set the following specific options:

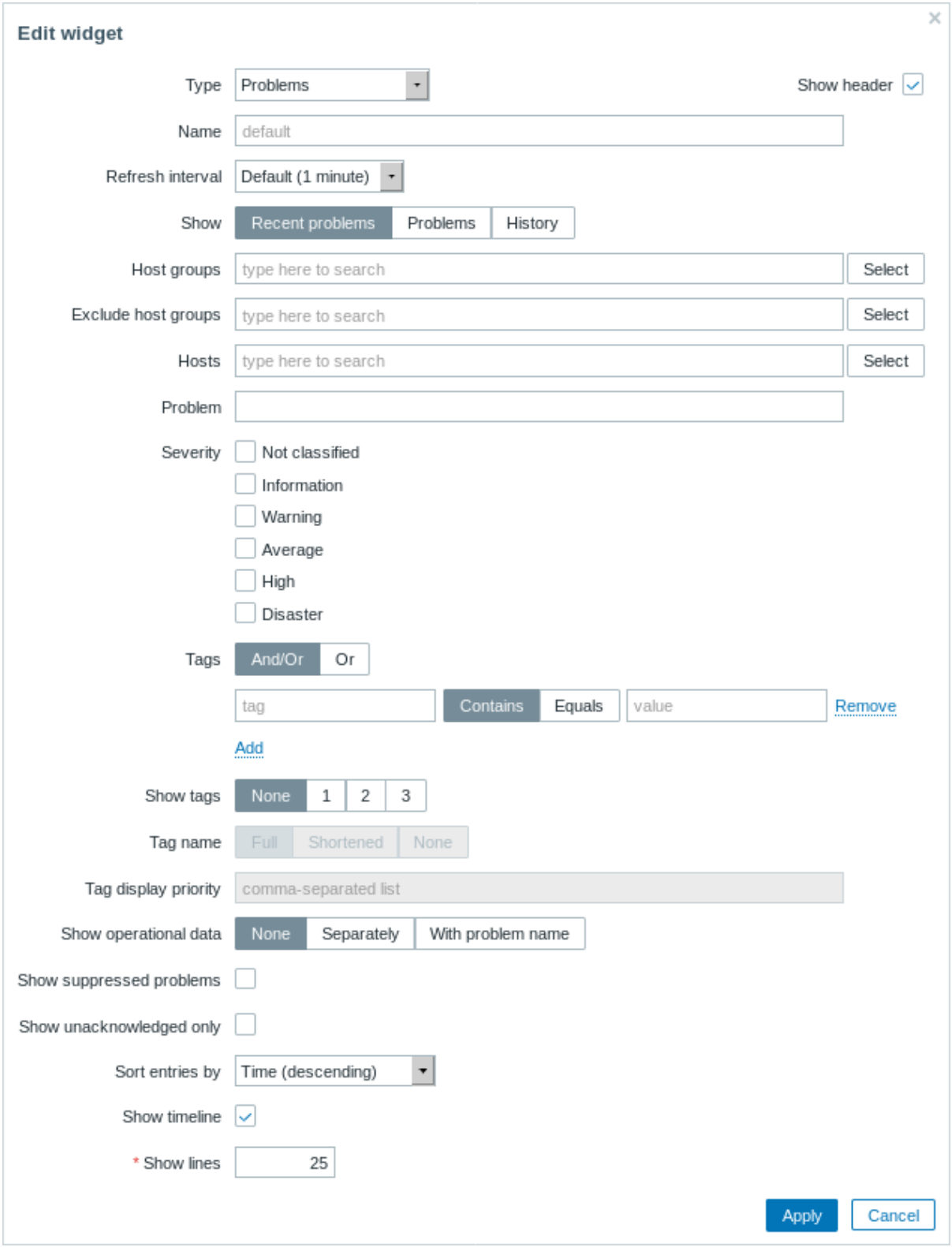
Parameter	Description
Host groups	Enter host groups to display in the widget. This field is auto-complete so starting to type the name of a group will offer a dropdown of matching groups. Specifying a parent host group implicitly selects all nested host groups. Host data from these host groups will be displayed in the widget. If no host groups are entered, all host groups will be displayed.

Parameter	Description
Exclude host groups	Enter host groups to hide from the widget. This field is auto-complete so starting to type the name of a group will offer a dropdown of matching groups. Specifying a parent host group implicitly selects all nested host groups. Host data from these host groups will not be displayed in the widget. For example, hosts 001, 002, 003 may be in Group A and hosts 002, 003 in Group B as well. If we select to *show* Group A and *exclude* Group B at the same time, only data from host 001 will be displayed in the Dashboard.
Hosts	Enter hosts to display in the widget. This field is auto-complete so starting to type the name of a host will offer a dropdown of matching hosts. If no hosts are entered, all hosts will be displayed.
Problem	You can limit the number of problem hosts displayed by the problem name. If you enter a string here, only those hosts with problems whose name contains the entered string will be displayed. Macros are not expanded.
Severity	Mark the problem severities to be displayed in the widget.
Show suppressed problems	Mark the checkbox to display problems which would otherwise be suppressed (not shown) because of host maintenance.
Hide groups without problems	Mark the *Hide groups without problems* option to hide data from host groups without problems in the widget.
Problem display	Display problem count as: **All** - full problem count will be displayed **Separated** - unacknowledged problem count will be displayed separated as a number of the total problem count **Unacknowledged only** - only the unacknowledged problem count will be displayed.

Problems

In this widget you can display current problems. The information in this widget is similar to *Monitoring* → *Problems*.

To configure, select *Problems* as type:



You can limit how many problems are displayed in the widget in various ways - by problem status, problem name, severity, host group, host, event tag, acknowledgement status, etc.

Parameter	Description
Show	Filter by problem status: **Recent problems** - unresolved and recently resolved problems are displayed (default) **Problems** - unresolved problems are displayed **History** - history of all events is displayed

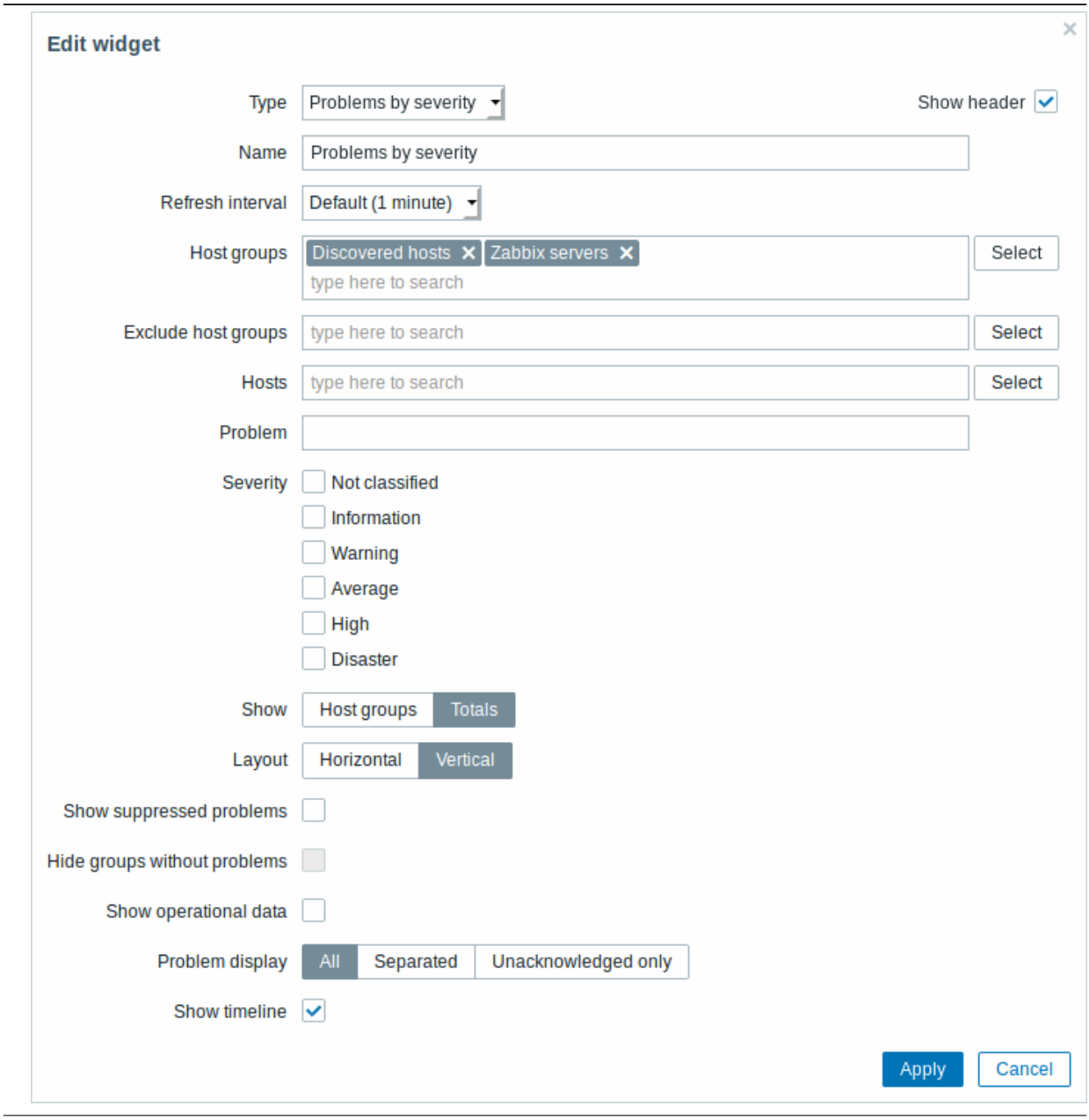
Parameter	Description
Host groups	Enter host groups to display problems of in the widget. This field is auto-complete so starting to type the name of a group will offer a dropdown of matching groups. Specifying a parent host group implicitly selects all nested host groups. Problems from these host groups will be displayed in the widget. If no host groups are entered, problems from all host groups will be displayed.
Exclude host groups	Enter host groups to hide problems of from the widget. This field is auto-complete so starting to type the name of a group will offer a dropdown of matching groups. Specifying a parent host group implicitly selects all nested host groups. Problems from these host groups will not be displayed in the widget. For example, hosts 001, 002, 003 may be in Group A and hosts 002, 003 in Group B as well. If we select to *show* Group A and *exclude* Group B at the same time, only problems from host 001 will be displayed in the widget.
Hosts	Enter hosts to display problems of in the widget. This field is auto-complete so starting to type the name of a host will offer a dropdown of matching hosts. If no hosts are entered, problems of all hosts will be displayed.
Problem	You can limit the number of problems displayed by their name. If you enter a string here, only those problems whose name contains the entered string will be displayed. Macros are not expanded.
Severity	Mark the problem severities to be displayed in the widget.
Tags	Specify event tag name and value to limit the number of problems displayed. To add more event tag names and values, click on *Add*. There are two calculation types for several conditions: **And/Or** - all conditions must be met, conditions having same tag name will be grouped by Or condition **Or** - enough if one condition is met There are two ways of matching the tag value: **Contains** - case-sensitive substring match (tag value contains the entered string) **Equals** - case-sensitive string match (tag value equals the entered string) When filtered, the tags specified here will be displayed first with the problem, unless overridden by the *Tag display priority* (see below) list.
Show tags	Select the number of displayed tags: **None** - no *Tags* column in *Monitoring* → *Problems* **1** - *Tags* column contains one tag **2** - *Tags* column contains two tags **3** - *Tags* column contains three tags To see all tags for the problem roll your mouse over the three dots icon.
Tag name	Select tag name display mode: **Full** - tag names and values are displayed in full **Shortened** - tag names are shortened to 3 symbols; tag values are displayed in full **None** - only tag values are displayed; no names
Tag display priority	Enter tag display priority for a problem, as a comma-separated list of tags (for example: `Services,Applications,Application`). Tag names only should be used, no values. The tags of this list will always be displayed first, overriding the natural ordering by alphabet.
Show operational data	Select the mode for displaying operational data: **None** - no operational data is displayed **Separately** - operational data is displayed in a separate column **With problem name** - append operational data to the problem name, using parentheses for the operational data

Parameter	Description
Show suppressed problems	Mark the checkbox to display problems which would otherwise be suppressed (not shown) because of host maintenance.
Show unacknowledged only	Mark the checkbox to display unacknowledged problems only.
Sort entries by	Sort entries by: **Time** (descending or ascending) **Severity** (descending or ascending) **Problem name** (descending or ascending) **Host** (descending or ascending).
Show timeline	Mark the checkbox to display a visual timeline.
Show lines	Specify the number of problem lines to display.

Problems by severity

In this widget you can display problems by severity. You can limit what hosts and triggers are displayed in the widget and define how the problem count is displayed.

To configure, select *Problems by severity* as type:



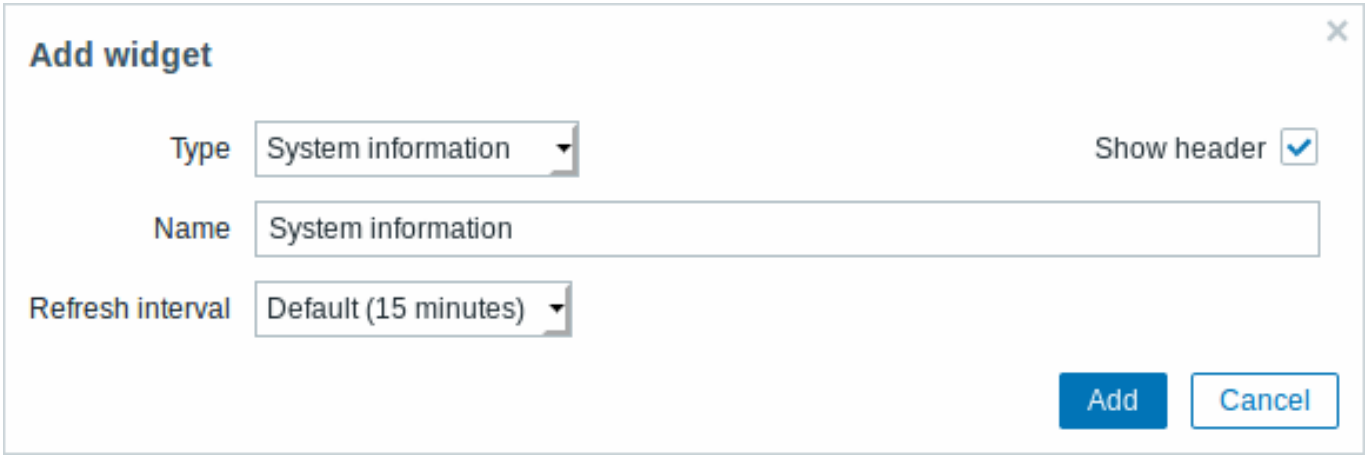
You may set the following specific options:

Parameter	Description
Host groups	Enter host groups to display in the widget. This field is auto-complete so starting to type the name of a group will offer a dropdown of matching groups. Specifying a parent host group implicitly selects all nested host groups. Host data from these host groups will be displayed in the widget. If no host groups are entered, all host groups will be displayed.
Exclude host groups	Enter host groups to hide from the widget. This field is auto-complete so starting to type the name of a group will offer a dropdown of matching groups. Specifying a parent host group implicitly selects all nested host groups. Host data from these host groups will not be displayed in the widget. For example, hosts 001, 002, 003 may be in Group A and hosts 002, 003 in Group B as well. If we select to *show* Group A and *exclude* Group B at the same time, only data from host 001 will be displayed in the Dashboard.
Hosts	Enter hosts to display in the widget. This field is auto-complete so starting to type the name of a host will offer a dropdown of matching hosts. If no hosts are entered, all hosts will be displayed.
Problem	You can limit the number of problem hosts displayed by the problem name. If you enter a string here, only those hosts with problems whose name contains the entered string will be displayed. Macros are not expanded.
Severity	Mark the problem severities to be displayed in the widget.
Show	Select the show option: **Host groups** - display problems per host group **Totals** - display a problem total for all selected host groups in coloured blocks corresponding to the problem severity.
Layout	Select the layout option: **Horizontal** - coloured blocks of totals will be displayed horizontally **Vertical** - coloured blocks of totals will be displayed vertically This field is available for editing if 'Totals' is selected as the *Show* option.
Show suppressed problems	Mark the checkbox to display problems which would otherwise be suppressed (not shown) because of host maintenance.
Hide groups without problems	Mark the *Hide groups without problems* option to hide data from host groups without problems in the widget.
Show operational data	Mark the checkbox to display operational data (see description of *Operational data* in *Monitoring* → *Problems*).
Problem display	Display problem count as: **All** - full problem count will be displayed **Separated** - unacknowledged problem count will be displayed separated as a number of the total problem count **Unacknowledged only** - only the unacknowledged problem count will be displayed.
Show timeline	Mark the checkbox to display a visual timeline.

System information

In the System information widget you can display high-level Zabbix and Zabbix server information.

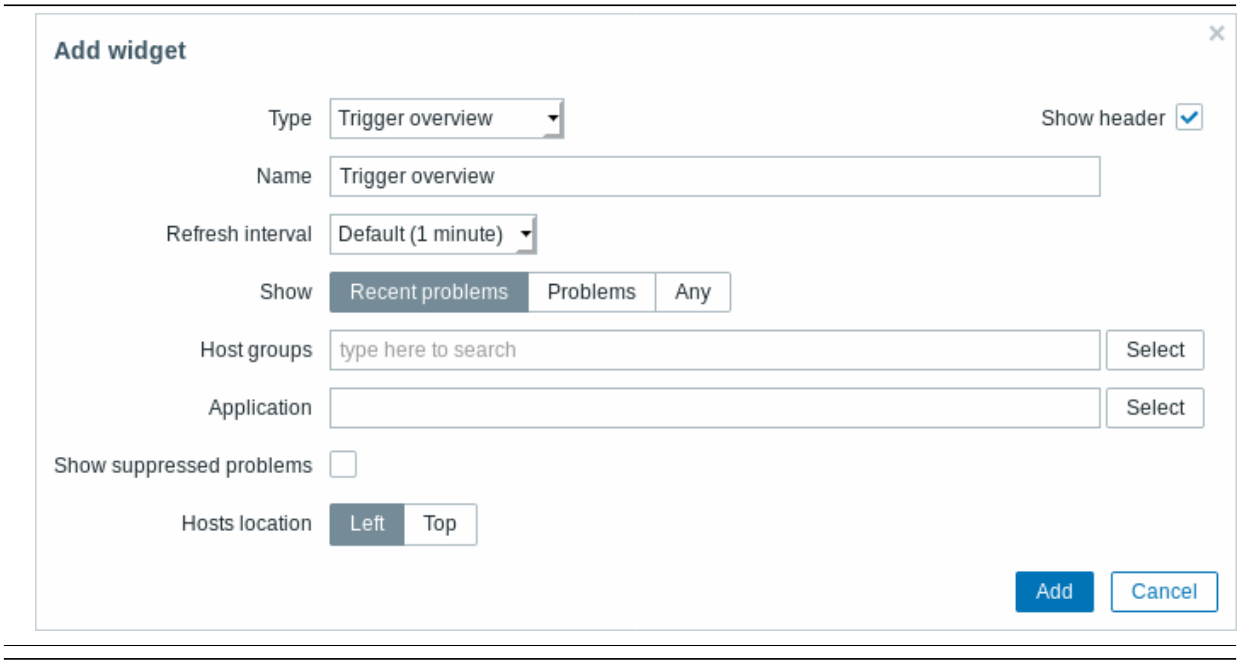
To configure, select *System information* as type:



Trigger overview

In the trigger overview widget you can display the trigger states for a group of hosts. It replicates information from *Monitoring* → *Overview* (when *Triggers* is selected as Type there).

To configure, select *Trigger overview* as type:



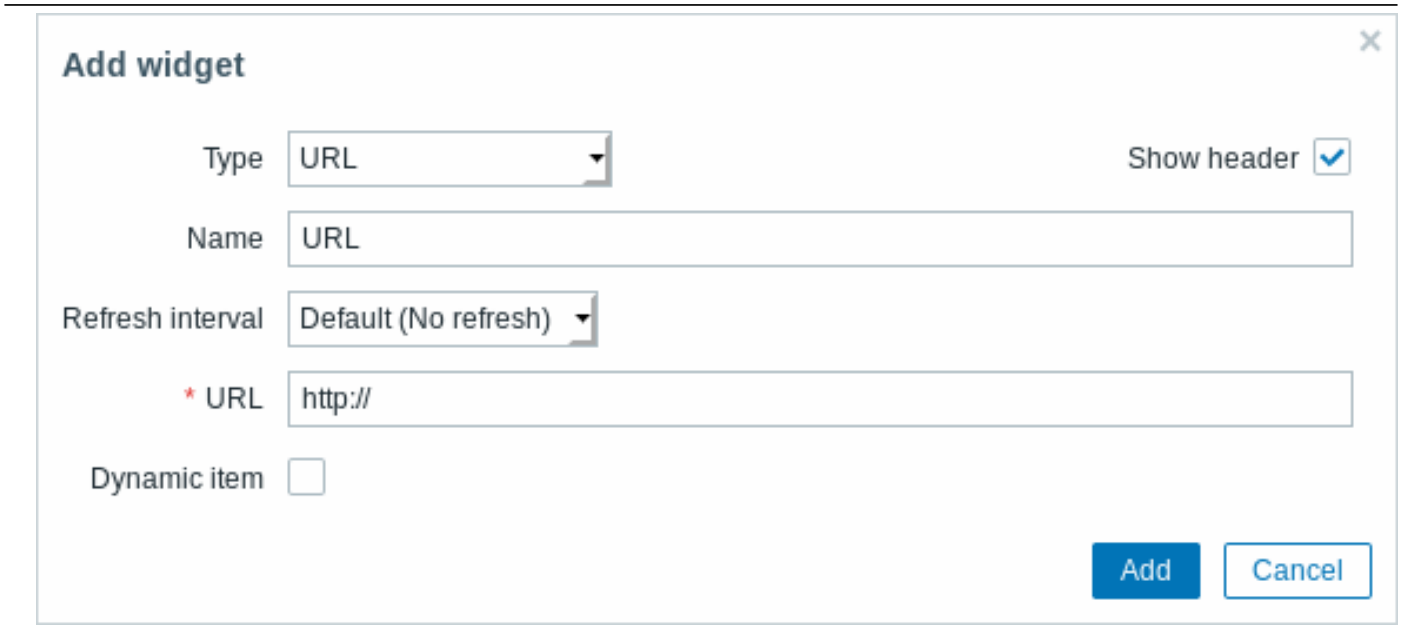
You may set the following specific options:

Show	Filter by problem status: **Recent problems** - unresolved and recently resolved problems are displayed (default) **Problems** - unresolved problems are displayed **Any** - history of all events is displayed
Host groups	Select the host group(s). This field is auto-complete so starting to type the name of a group will offer a dropdown of matching groups.
Application	Enter the application name.
Show suppressed problems	Mark the checkbox to display problems which would otherwise be suppressed (not shown) because of host maintenance.
Hosts location	Select host location - left or top.

URL

This widget displays the content retrieved from the specified URL.

To configure, select *URL* as type:



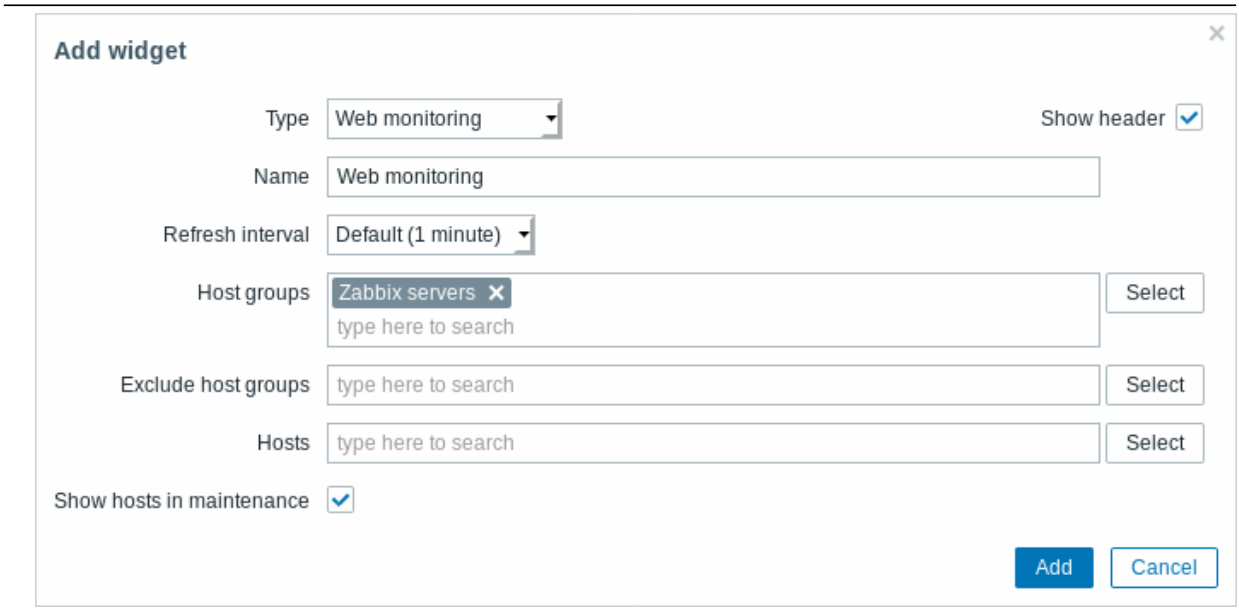
You may set the following specific options:

URL	Enter the URL to display. Relative paths are allowed since Zabbix 4.4.8. {HOST.*} macros are supported.
Dynamic item	Set to display different URL content depending on the selected host. This can work if {HOST.*} macros are used in the URL.

Attention:
Browsers might not load an HTTP page included in the widget, if Zabbix frontend is accessed over HTTPS.

Web monitoring

This widget displays a status summary of the active web monitoring scenarios.

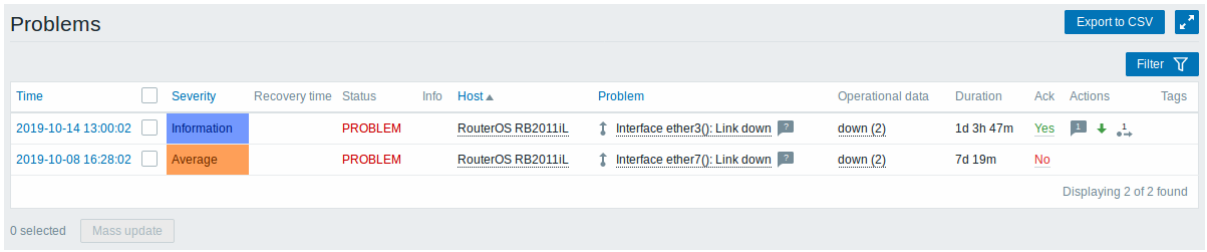


Note:
In cases when a user does not have permission to access certain widget elements, that element's name will appear as *Inaccessible* during the widget's configuration. This results in *Inaccessible Item, Inaccessible Host, Inaccessible Group, Inaccessible Map and Inaccessible Graph* appearing instead of the "real" name of the element.

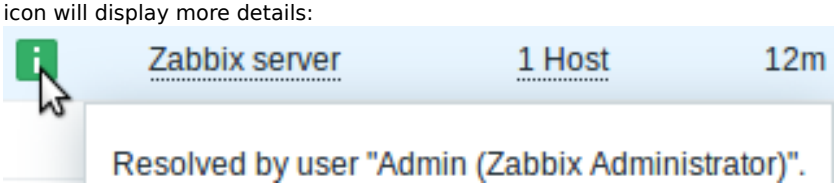
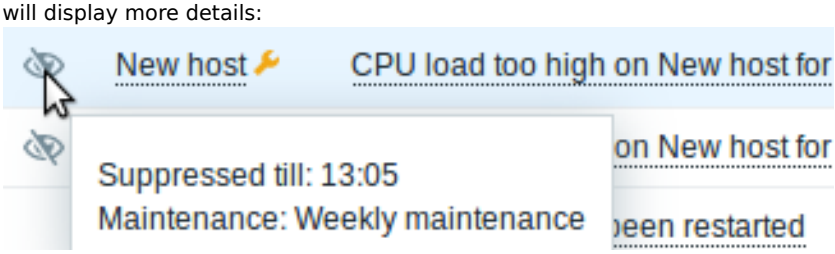
2 Problems

Overview

In *Monitoring* → *Problems* you can see what problems you currently have. Problems are those triggers that are in the "Problem" state.



Column	Description
Time	Problem start time is displayed.
Severity	Problem severity is displayed. Problem severity is originally based on the severity of the underlying problem trigger, however, after the event has happened it can be updated using the *Update problem* screen. Colour of the problem severity is used as cell background during problem time.
Recovery time	Problem resolution time is displayed.
Status	Problem status is displayed: **Problem** - unresolved problem **Resolved** - recently resolved problem. You can hide recently resolved problems using the filter. New and recently resolved problems blink for 2 minutes. Resolved problems are displayed for 5 minutes in total. Both of these values are configurable in *Administration* → *General* → *Trigger displaying options*.

Column	Description
Info	A green information icon is displayed if a problem is closed by global correlation or manually when updating the problem. Rolling a mouse over the icon will display more details:  The following icon is displayed if a suppressed problem is being shown (see *Show suppressed problems* option in the filter). Rolling a mouse over the icon will display more details: 
Host	Problem host is displayed.
Problem	Problem name is displayed. Problem name is based on the name of the underlying problem trigger. Macros in the trigger name are resolved at the time of the problem happening and the resolved values do not update any more. *Note* that it is possible to append the problem name with operational data showing some latest item values. Clicking on the problem name brings up the event menu. Hovering on the icon after the problem name will bring up the trigger description (for those problems that have it). (Note that resolved values of {ITEM.VALUE} and {ITEM.LASTVALUE} macros in trigger descriptions are truncated to 20 characters. To see the entire values you may use macro functions with these macros, e.g. `{{ITEM.VALUE}.regsub("(.*)", \1)}`, `{{ITEM.LASTVALUE}.regsub("(.*)", \1)}` as a workaround.)
Operational data	Operational data are displayed containing latest item values. Operational data can be a combination of text and item value macros, if configured on a trigger level. If no operational data is configured on a trigger level, latest values of all items from the expression are displayed. This column is only displayed if *Separately* is selected for *Show operational data* in the filter.
Duration	Problem duration is displayed. See also: Negative problem duration
Ack	The acknowledgement status of the problem is displayed: **Yes** - green text indicating that the problem is acknowledged. A problem is considered to be acknowledged if all events for it are acknowledged. **No** - a red link indicating unacknowledged events. If you click on the link you will be taken to the problem update screen where various actions can be taken on the problem, including commenting and acknowledging the problem.

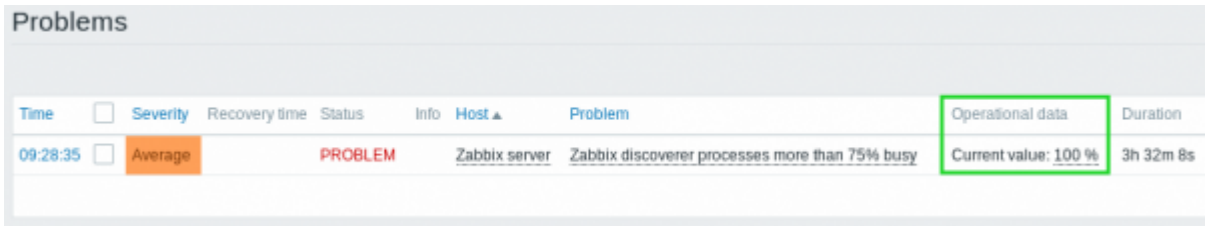
Column	Description
Actions	History of activities about the problem is displayed using symbolic icons:  - comments have been made. The number of comments is also displayed.  - problem severity has been increased (e.g. Information → Warning)  - problem severity has been decreased (e.g. Warning → Information)  - problem severity has been changed, but returned to the original level (e.g. Warning → Information → Warning)  - actions have been taken. The number of actions is also displayed.  - actions have been taken, at least one is in progress. The number of actions is also displayed.  - actions have been taken, at least one has failed. The number of actions is also displayed. When rolling the mouse over the icons, popups with details about the activity are displayed. See viewing details for the explanation on icons used in the popup for actions taken.
Tags	Event tags are displayed (if any). In addition, tags from an external ticketing system may also be displayed (see the *Process tags* option when configuring webhooks).

Operational data of problems

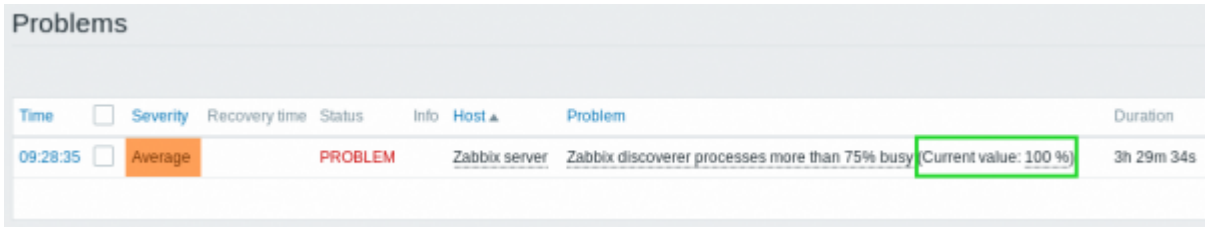
It is possible to display operational data for current problems, i.e. the latest item values as opposed to the item values at the time of the problem.

Operational data display can be configured in the filter of *Monitoring* → *Problems* or in the configuration of the respective dashboard widget, by selecting one of the three options:

- *None* - no operational data is displayed
- *Separately* - operational data is displayed in a separate column



- *With problem name* - operational data is appended to the problem name and in parentheses. Operational data are appended to the problem name only if the *Operational data* field is non-empty in the trigger configuration.



The content of operational data can be configured with each trigger, in the *Operational data* field. This field accepts an arbitrary string with macros, most importantly, the `{ITEM.LASTVALUE<1-9>}` macro.

`{ITEM.LASTVALUE<1-9>}` in this field will always resolve to the latest values of items in the trigger expression. `{ITEM.VALUE<1-9>}` in this field will resolve to the item values at the moment of trigger status change (i.e. change into problem, change into OK, being closed manually by user or being closed by correlation).

Negative problem duration

It is actually possible in some common situations to have negative problem duration i.e. when the problem resolution time is earlier than problem creation time, e. g.:

- If some host is monitored by proxy and a network error happens, leading to no data received from the proxy for a while, the item.nodata() trigger will be fired by the server. When the connection is restored, the server will receive item data from the proxy having a time from the past. Then, the item.nodata() problem will be resolved and it will have a negative problem duration;
- When item data that resolve the problem event are sent by Zabbix sender and contain a timestamp earlier than the problem creation time, a negative problem duration will also be displayed.

Note:
Negative problem duration is not affecting SLA calculation or Availability report of a particular trigger in any way; it neither reduces nor expands problem time.

Mass editing options

Buttons below the list offer some mass-editing options:

- *Mass update* - update the selected problems by navigating to the problem update screen

To use this option, mark the checkboxes before the respective problems, then click on the *Mass update* button.

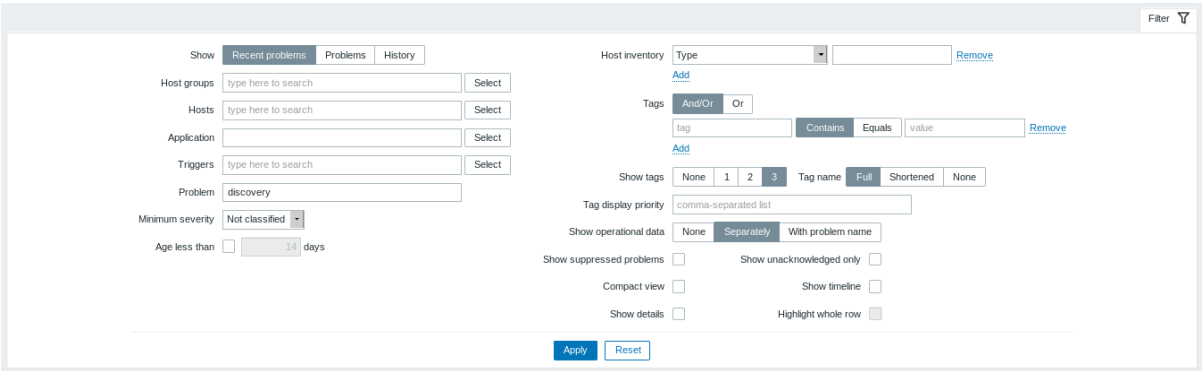
Buttons

Buttons to the right offer the following options:

Export to CSV	Export content from all pages to a CSV file. Note that before Zabbix 4.4.2 only the currently selected page is exported.
	Display page in fullscreen mode.
	Display page in kiosk mode. In this mode only page content is displayed. The kiosk mode button appears when the fullscreen mode is activated. To exit kiosk mode, move the mouse cursor until the  exit button appears and click on it. Note that you will be taken back to normal mode (not fullscreen mode).

Using filter

You can use the filter to display only the problems you are interested in. The filter is located above the table.

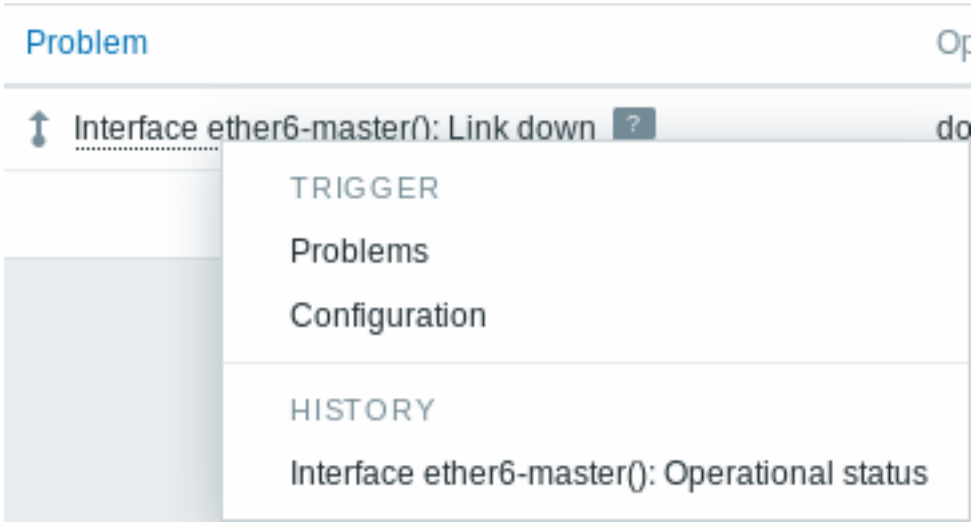


Parameter	Description
Show	Filter by problem status: **Recent problems** - unresolved and recently resolved problems are displayed (default) **Problems** - unresolved problems are displayed **History** - history of all events is displayed
Host groups	Filter by one or more host groups. Specifying a parent host group implicitly selects all nested host groups.
Hosts	Filter by one or more hosts.
Application	Filter by application name.
Triggers	Filter by one or more triggers.
Problem	Filter by problem name.
Minimum severity	Filter by minimum trigger (problem) severity.
Age less than	Filter by how old the problem is.
Host inventory	Filter by inventory type and value.
Tags	Filter by event tag name and value. Several conditions can be set. There are two calculation types for conditions: **And/Or** - all conditions must be met, conditions having same tag name will be grouped by Or condition **Or** - enough if one condition is met There are two ways of matching the tag value: **Contains** - case-sensitive substring match (tag value contains the entered string) **Equals** - case-sensitive string match (tag value equals the entered string) When filtered, the tags specified here will be displayed first with the problem, unless overridden by the *Tag display priority* (see below) list.
Show tags	Select the number of displayed tags: **None** - no *Tags* column in *Monitoring* → *Problems* **1** - *Tags* column contains one tag **2** - *Tags* column contains two tags **3** - *Tags* column contains three tags To see all tags for the problem roll your mouse over the three dots icon.
Tag name	Select tag name display mode: **Full** - tag names and values are displayed in full **Shortened** - tag names are shortened to 3 symbols; tag values are displayed in full **None** - only tag values are displayed; no names
Tag display priority	Enter tag display priority for a problem, as a comma-separated list of tags (for example: `Services,Applications,Application`). Tag names only should be used, no values. The tags of this list will always be displayed first, overriding the natural ordering by alphabet.
Show operational data	Select the mode for displaying operational data: **None** - no operational data is displayed **Separately** - operational data is displayed in a separate column **With problem name** - append operational data to the problem name, using parentheses for the operational data
Show suppressed problems	Mark the checkbox to display problems which would otherwise be suppressed (not shown) because of host maintenance.
Compact view	Mark the checkbox to enable compact view.
Show details	Mark the checkbox to display underlying trigger expressions of the problems. Disabled if *Compact view* checkbox is marked.
Show unacknowledged only	Mark the checkbox to display unacknowledged problems only.
Show timeline	Mark the checkbox to display the visual timeline and grouping. Disabled if *Compact view* checkbox is marked.

Parameter	Description
Highlight whole row	Mark the checkbox to highlight the full line for unresolved problems. The problem severity colour is used for the highlighting. Enabled only if the *Compact view* checkbox is marked in the standard blue and dark themes. *Highlight whole row* is not available in the high-contrast themes.

Event menu

Clicking on the problem name brings up the event menu:

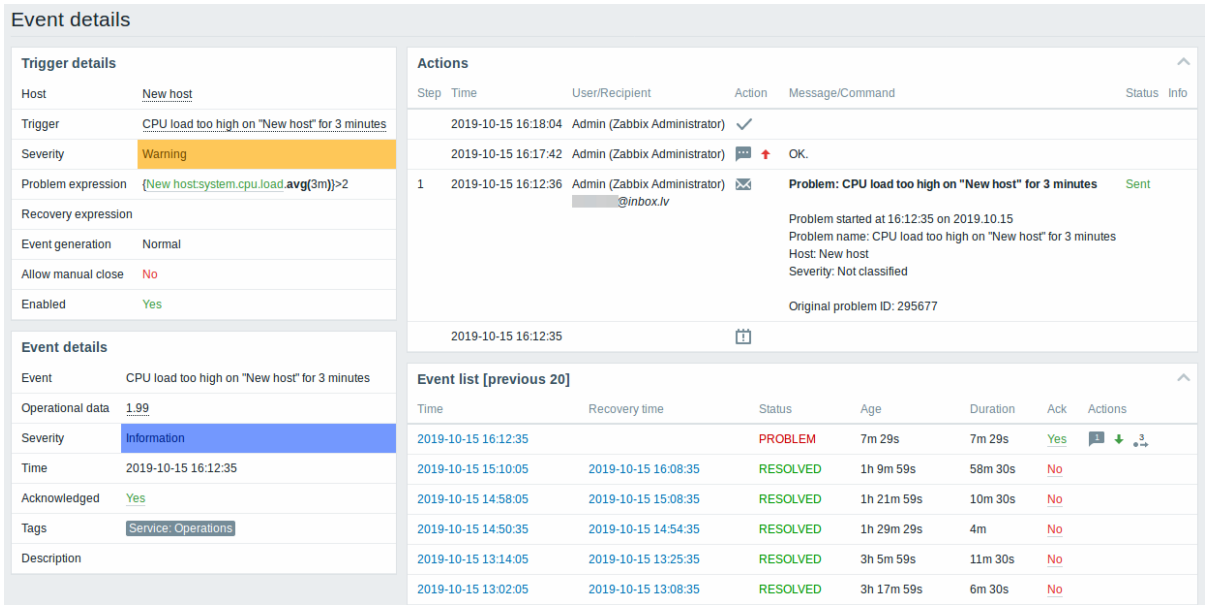


The event menu allows to:

- filter the problems of the trigger
- access the trigger configuration
- access a simple graph/item history of the underlying item(s)
- access an external ticket of the problem (if configured, see the *Include event menu entry* option when configuring webhooks)

Viewing details

The times for problem start and recovery in *Monitoring* → *Problems* are links. Clicking on them opens more details of the event.



Note how the problem severity differs for the trigger and the problem event - for the problem event it has been updated using the *Update problem* screen.

In the action list, the following icons are used to denote the activity type:

- - problem event generated

-  - message has been sent
-  - problem event acknowledged
-  - comment has been added
-  - problem severity has been increased (e.g. Information → Warning)
-  - problem severity has been decreased (e.g. Warning → Information)
-  - problem severity has been changed, but returned to the original level (e.g. Warning → Information → Warning)
-  - remote command has been executed
-  - problem event has recovered
-  - problem has been closed manually

3 Overview

Overview

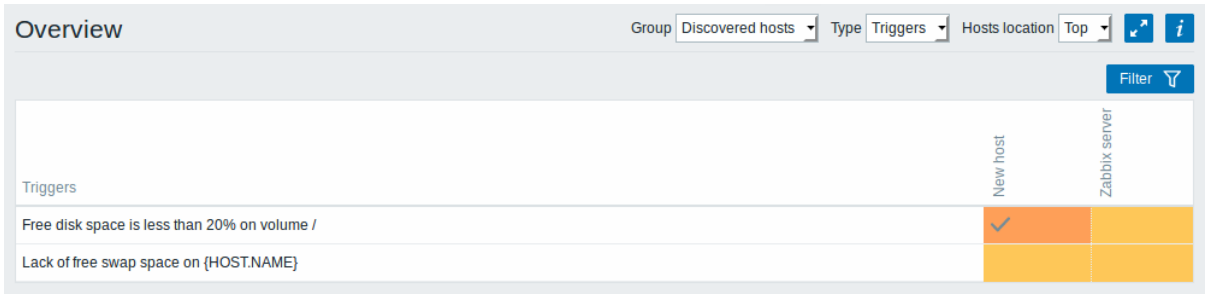
The *Monitoring* → *Overview* section offers an overview of trigger states or a comparison of data for various hosts at once.

The following display options are available:

- select all hosts or specific host groups in the *Group* dropdown
- choose what type of information to display (triggers or data) in the *Type* dropdown
- select horizontal or vertical display of information in the *Hosts location* dropdown

Overview of triggers

In the next screenshot Triggers are selected in the *Type* dropdown. As a result, trigger states of two local hosts are displayed as coloured blocks (the colour of problem triggers depends on the problem severity colour, which can be adjusted in the problem update screen):

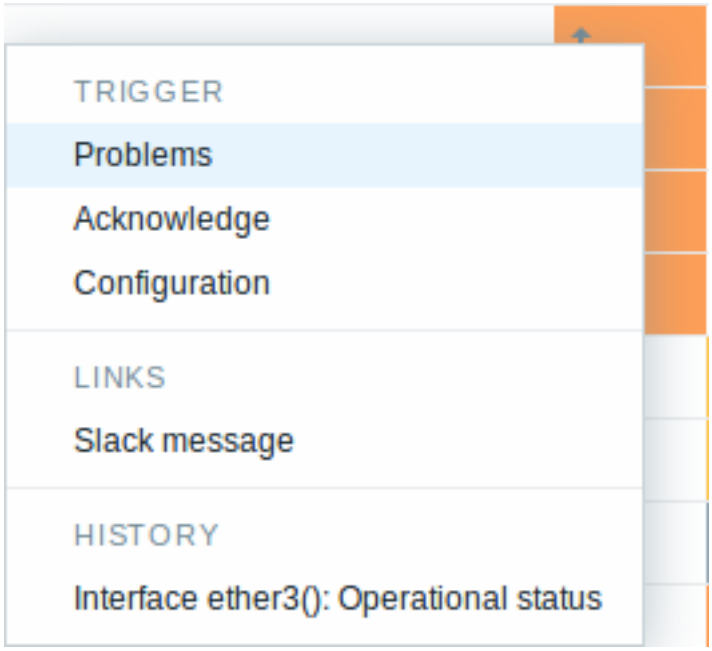


Note that recent trigger changes (within the last 2 minutes) will be displayed as blinking blocks.

Blue up and down arrows indicate triggers that have dependencies. On mouseover, dependency details are revealed.

A checkbox icon indicates acknowledged problems. All problems or resolved problems of the trigger must be acknowledged for this icon to be displayed. (Before 4.4.1 it was enough for the last problem to be acknowledged.)

Clicking on a trigger block provides context-dependent links to problem events of the trigger, the problem acknowledgement screen, trigger configuration, trigger URL or a simple graph/latest values list.



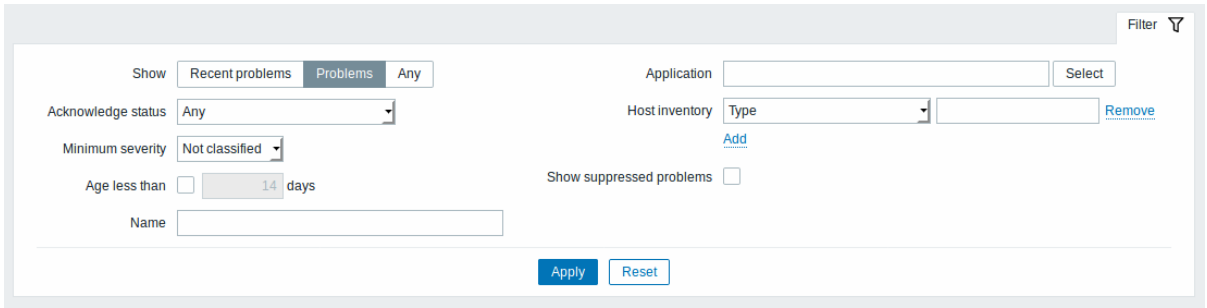
Buttons

Buttons to the right offer the following options:

	Display page in fullscreen mode.
	Display page in kiosk mode. In this mode only page content displayed. The kiosk mode button appears when the fullscreen mode is activated. To exit kiosk mode, move the mouse cursor until the exit button appears and click on it. Note that you will be taken back to normal mode (not fullscreen mode).
	Additional information on the page content is displayed if you roll the mouse over this button.

Using filter

You can use the filter to display only the problems you are interested in. The filter is located above the table.

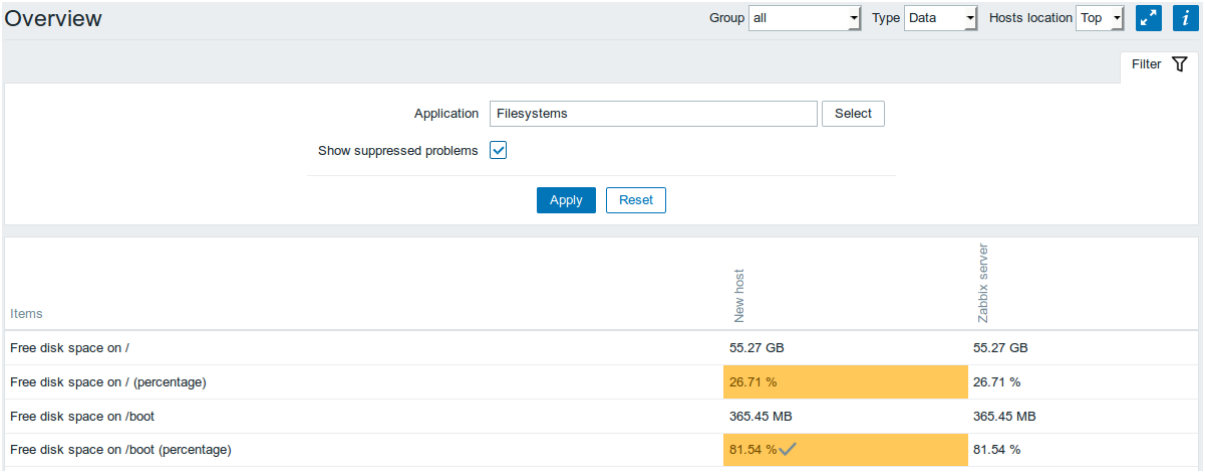


Parameter	Description
Show	Filter by problem status: **Recent problems** - unresolved and recently resolved problems are displayed (default) **Problems** - unresolved problems are displayed **Any** - history of all events is displayed

Parameter	Description
Acknowledge status	Filter by acknowledgement status: **Any** - acknowledged and unacknowledged problems are displayed (default) **With unacknowledged events** - problems with unacknowledged events are displayed **With last event unacknowledged** - problems with last event unacknowledged are displayed
Minimum severity	Filter by minimum problem severity.
Age (less than)	Mark the checkbox to filter by problem age.
Name	Filter by problem name.
Application	Filter by application.
Host inventory	Filter by inventory type and value.
Show suppressed problems	Mark the checkbox to display problems which would otherwise be suppressed (not shown) because of host maintenance.

Overview of data

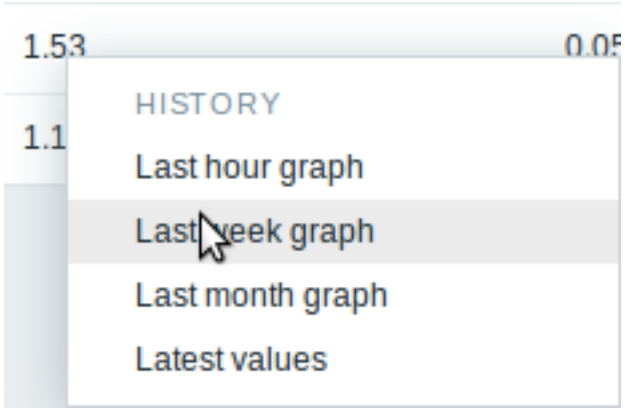
In the next screenshot Data is selected in the *Type* dropdown. As a result, performance item data of two local hosts are displayed.



The colour of problem items is based on the problem severity colour, which can be adjusted in the problem update screen.

Only values that fall within the last 24 hours are displayed by default. This limit has been introduced with the aim of improving initial loading times for large pages of latest data. It is also possible to change this limitation by changing the value of ZBX_HISTORY_PERIOD constant in *include/defines.inc.php*.

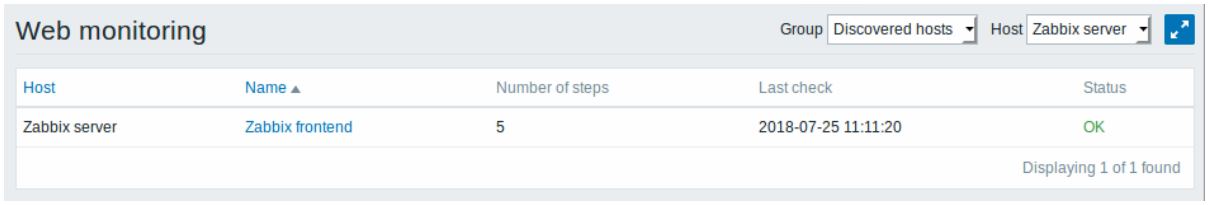
Clicking on a piece of data offers links to some predefined graphs or latest values.



4 Web

Overview

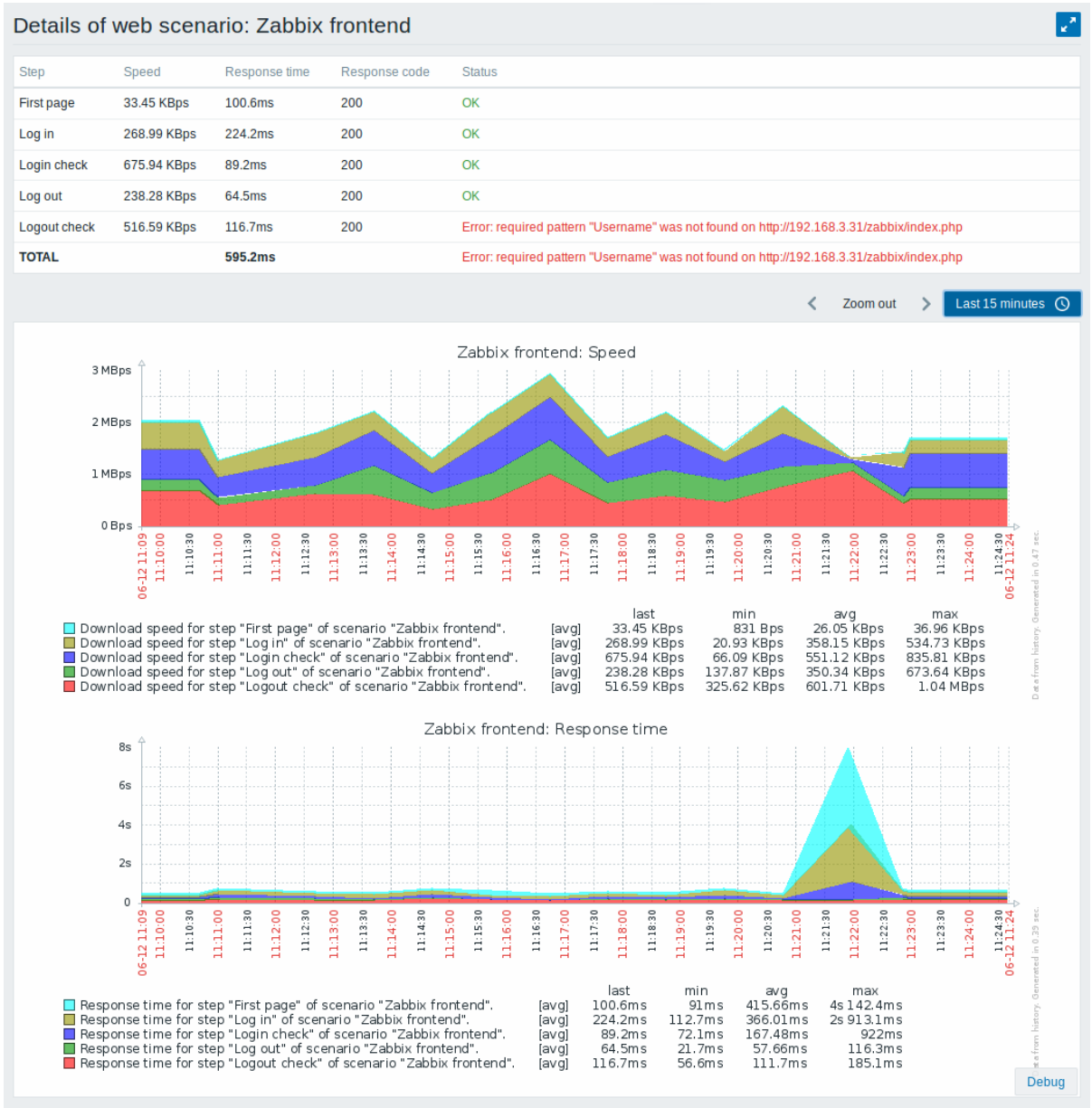
In the *Monitoring* → *Web* section current information about web scenarios is displayed.



Note: The name of a disabled host is displayed in red (in both the host dropdown and the list). Data of disabled hosts is accessible starting with Zabbix 2.2.0.

Only values that fall within the last 24 hours are displayed by default. This limit has been introduced with the aim of improving initial loading times for large pages of web monitoring. It is also possible to change this limitation by changing the value of ZBX_HISTORY_PERIOD constant in *include/defines.inc.php*.

The scenario name is link to more detailed statistics about it:



Buttons

Buttons to the right offer the following options:

	Display page in fullscreen mode.

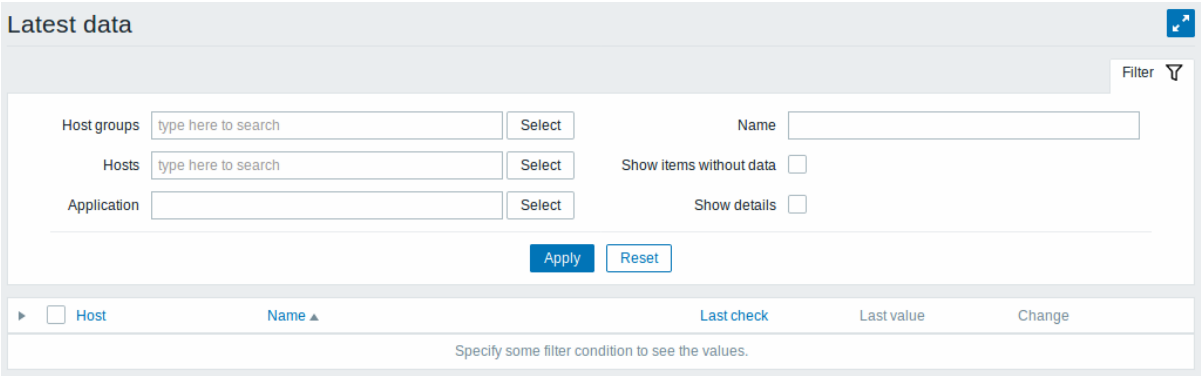
	Display page in kiosk mode. In this mode only page content displayed. The kiosk mode button appears when the fullscreen mode is activated. To exit kiosk mode, move the mouse cursor until the exit button appears and click on it. Note that you will be taken back to normal mode (not fullscreen mode).

5 Latest data

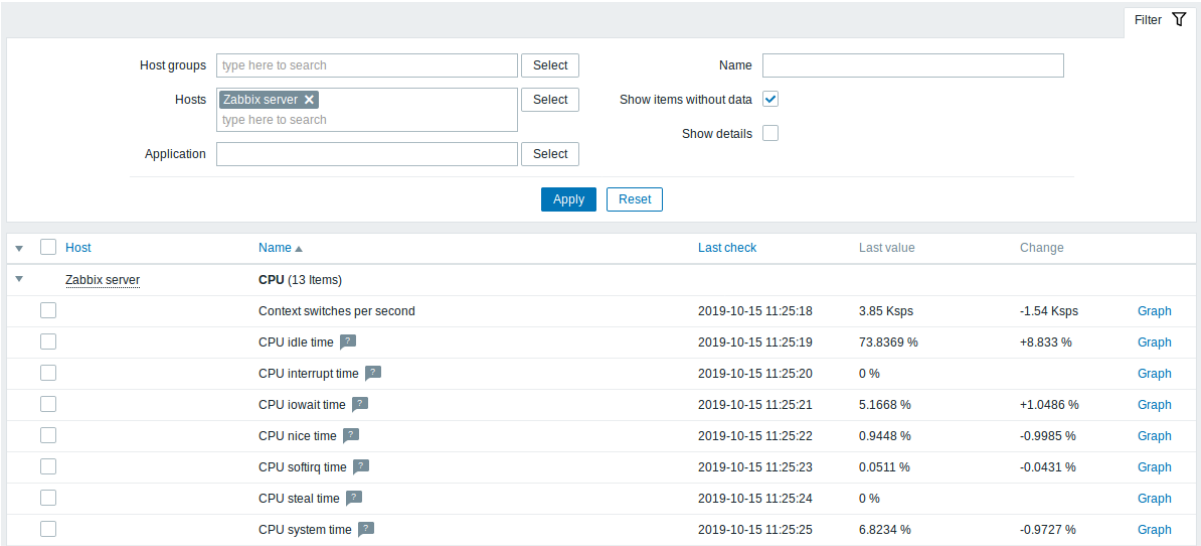
Overview

The section in *Monitoring* → *Latest data* can be used to view latest values gathered by items as well as to access various graphs for the items.

When you open this page for the first time, nothing is displayed.



To access data, you need to make selections in the filter such as host group, host, application or item name.



In the list displayed, click on before a host and the relevant application to reveal latest values of that host and application.

You can expand all hosts and all applications, thus revealing all items by clicking on in the header row.

Note: The name of a disabled host is displayed in red. Data of disabled hosts, including graphs and item value lists, is accessible in *Latest data* since Zabbix 2.2.0.

Items are displayed with their name, last check time, last value, change amount and a link to a simple graph/history of item values.

An icon with a question mark is displayed next to the item name for all items that have a description. If you position the mouse cursor on this icon, the item description is displayed as a tooltip.

Only values that fall within the last 24 hours are displayed by default. This limit has been introduced with the aim of improving initial loading times for large pages of latest data. It is also possible to change this limitation by changing the value of ZBX_HISTORY_PERIOD constant in *include/defines.inc.php*.

Attention:
For items with update frequency of 1 day or more the change amount will never be displayed (with the default setting).
Also in this case the last value will not be displayed at all if it was received more than 24 hours ago.

Buttons

Buttons to the right offer the following options:

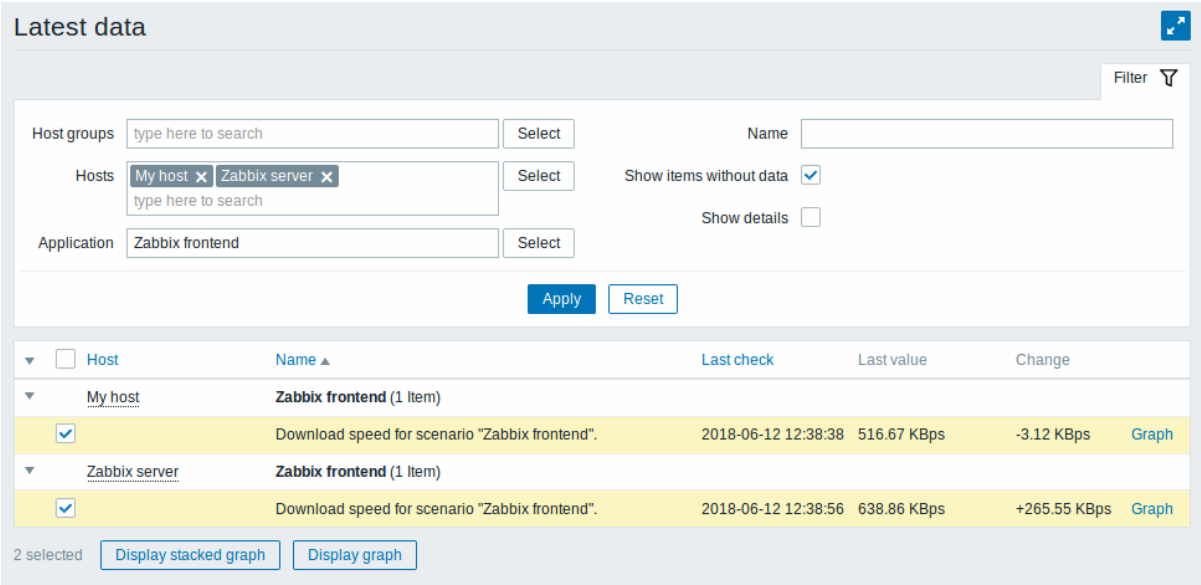
	Display page in fullscreen mode.
	Display page in kiosk mode. In this mode only page content displayed. The kiosk mode button appears when the fullscreen mode is activated. To exit kiosk mode, move the mouse cursor until the  exit button appears and click on it. Note that you will be taken back to normal mode (not fullscreen mode).

Using filter

You can use the filter to display only the items you are interested in. The *Filter* link is located above the table to the right. You can use it to filter items by host group, host, application, a string in the item name; you can also select to display items that have no data gathered.

Specifying a parent host group implicitly selects all nested host groups.

Show details allows to extend displayable information on the items. Such details as refresh interval, history and trends settings, item type and item errors (fine/unsupported) are displayed. A link to item configuration is also available.



By default, items without data are shown but details are not displayed.

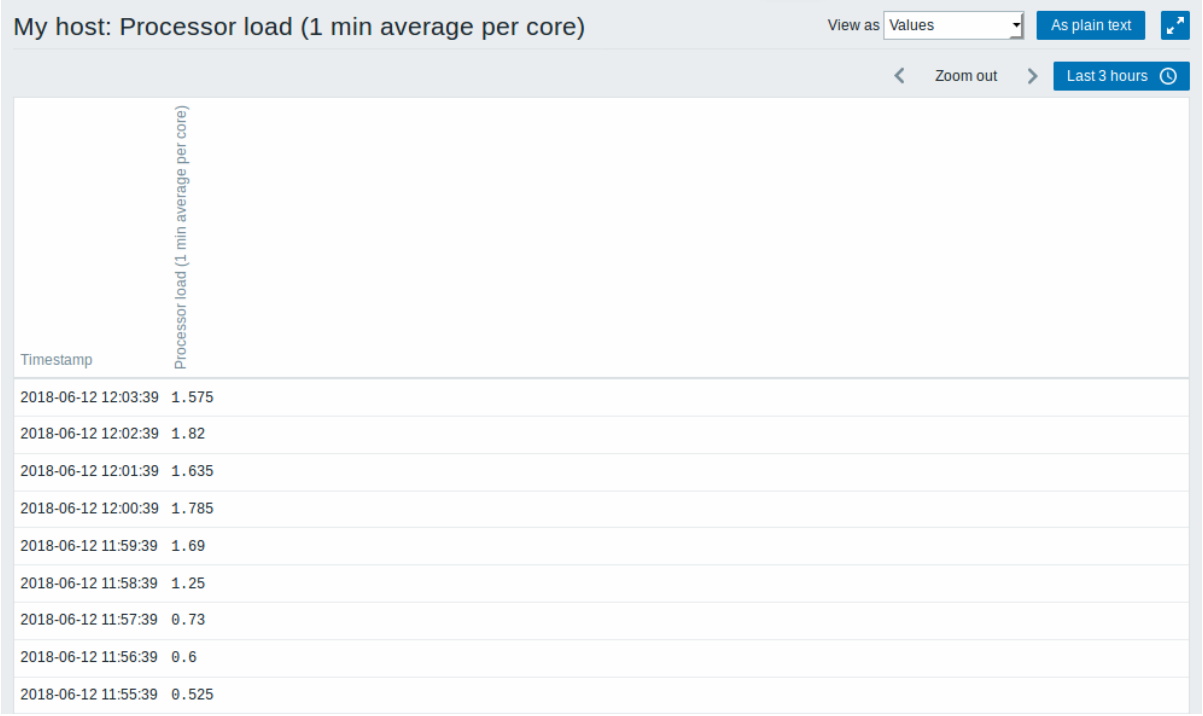
Ad-hoc graphs for comparing items

You may use the checkbox in the second column to select several items and then compare their data in a simple or stacked ad-hoc graph. To do that, select items of interest, then click on the required graph button below the table.

Links to value history/simple graph

The last column in the latest value list offers:

- a **History** link (for all textual items) - leading to listings (*Values/500 latest values*) displaying the history of previous item values.
- a **Graph** link (for all numeric items) - leading to a simple graph. However, once the graph is displayed, a dropdown on the upper right offers a possibility to switch to *Values/500 latest values* as well.



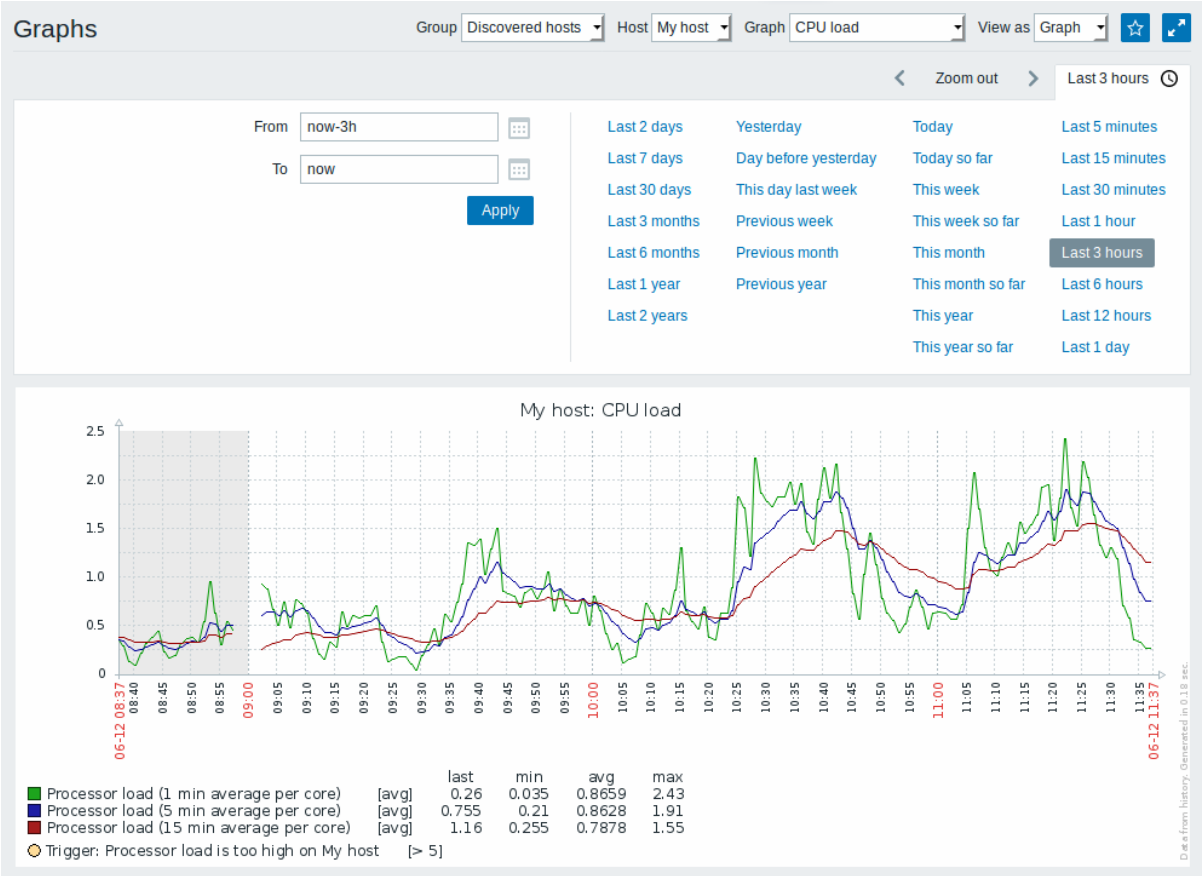
The values displayed in this list are ”raw”, that is, no postprocessing is applied.

Note:
The total amount of values displayed is defined by the value of *Limit for search and filter results* parameter, set in Administration → General.

6 Graphs

Overview

In the *Monitoring* → *Graphs* section any custom graph that has been configured can be displayed.



To display a graph, select the host group, host and then the graph from the dropdowns to the right.

Note: In the host dropdown, a disabled host is highlighted in red. Graphs for disabled hosts are accessible starting with Zabbix 2.2.0.

Time period selector

Take note of the time period selector above the graph. It allows to select often required periods with one mouse click.

See also: Time period selector

Buttons

Buttons to the right offer the following options:

	Add graph to the favourites widget in the Dashboard.
	The graph is in the favourites widget in the Dashboard. Click to remove graph from the favourites widget.
	Display page in fullscreen mode.
	Display page in kiosk mode. In this mode only page content displayed. The kiosk mode button appears when the fullscreen mode is activated. To exit kiosk mode, move the mouse cursor until the  exit button appears and click on it. Note that you will be taken back to normal mode (not fullscreen mode).

7 Screens

Overview

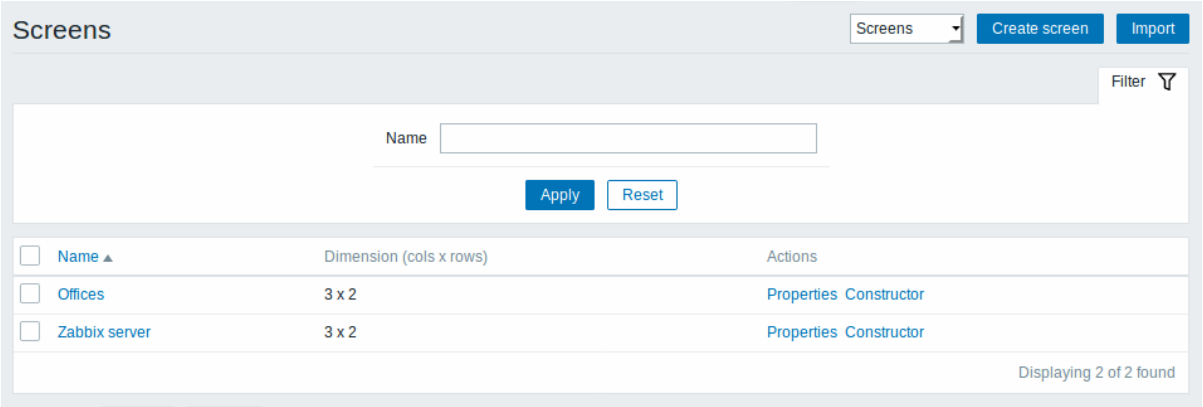
In the *Monitoring* → *Screens* section you can configure, manage and view Zabbix global screens and slide shows.

When you open this section, you will either see the last screen/slide show you accessed or a listing of all entities you have access to. Screen/slide show listing can be filtered by name.

Since Zabbix 3.0 all screens/slide shows can be either public or private. The public ones are available to all users, while private ones are accessible only to their owner and the users the entity is shared with.

Use the dropdown in the title bar to switch between screens and slide shows.

Screen listing



Displayed data:

Column	Description
Name	Name of the screen. Click on the name to view the screen.
Dimensions	The number of columns and rows of the screen.
Actions	Two actions are available: **Properties** - edit general screen properties (name and dimensions) **Constructor** - access the grid of screen elements for editing

To create a new screen, click on the *Create screen* button in the top right-hand corner. To import a screen from an XML file, click on the *Import* button in the top right-hand corner. The user who imports the screen will be set as its owner.

Mass editing options

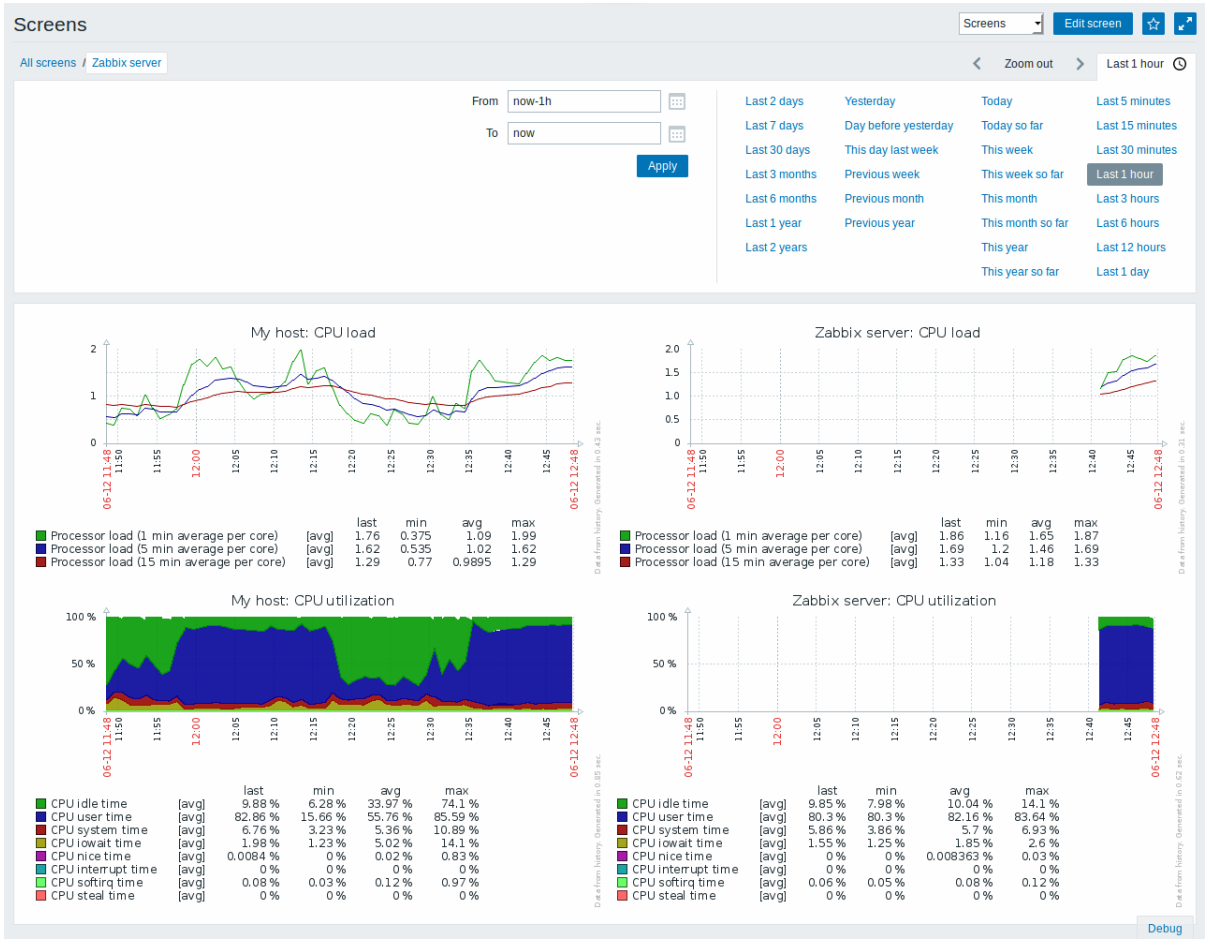
Buttons below the list offer some mass-editing options:

- *Export* - export the screens to an XML file
- *Delete* - delete the screens

To use these options, mark the checkboxes before the respective screens, then click on the required button.

Viewing screens

To view a screen, click on its name in the list of all screens.



Time period selector

Take note of the time period selector above the screen. It allows to select often required periods with one mouse click, affecting the data displayed in graphs etc.

See also: Time period selector

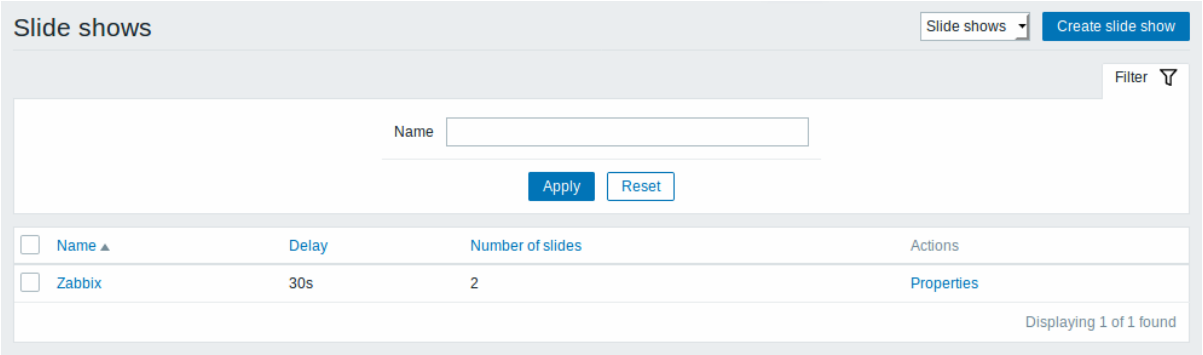
Buttons

Buttons to the right offer the following options:

Edit screen	Go to the screen constructor to edit the screen.
	Add screen to the favourites widget in the Dashboard.
	The screen is in the favourites widget in the Dashboard. Click to remove screen from the favourites widget.
	Display page in fullscreen mode.
	Display page in kiosk mode. In this mode only page content displayed. The kiosk mode button appears when the fullscreen mode is activated. To exit kiosk mode, move the mouse cursor until the  exit button appears and click on it. Note that you will be taken back to normal mode (not fullscreen mode).

Slide show listing

Use the dropdown in the title bar to switch from screens to slide shows.



Displayed data:

Column	Description
Name	Name of the slide show. Click on the name to view the slide show.
Delay	The default duration of showing one slide is displayed.
Number of slides	The number of slides in the slide show is displayed.
Actions	One action is available: **Properties** - edit slide show properties

To create a new slide show, click on the *Create slide show* button in the top right-hand corner.

Mass editing options

A button below the list offers one mass-editing option:

- *Delete* - delete the slide shows

To use this option, mark the checkboxes before the respective slide shows and click on *Delete*.

Viewing slide shows

To view a slide show, click on its name in the list of all slide shows.

Buttons

Buttons to the right offer the following options:

Edit slide show	Go to the slide show properties.
	Add slide show to the favourites widget in the Dashboard.
	The slide show is in the favourites widget in the Dashboard. Click to remove slide show from the favourites widget.
	Slow down or speed up a slide show.
	Display page in fullscreen mode.
	Display page in kiosk mode. In this mode only page content displayed. The kiosk mode button appears when the fullscreen mode is activated. To exit kiosk mode, move the mouse cursor until the exit button appears and click on it. Note that you will be taken back to normal mode (not fullscreen mode).

Referencing a screen

Screens can be referenced by both `elementid` and `screenname` GET parameters. For example,

`http://zabbix/zabbix/screens.php?screenname=Zabbix%20server`

will open the screen with that name (Zabbix server).

If both `elementid` (screen ID) and `screenname` (screen name) are specified, `screenname` has higher priority.

8 Maps

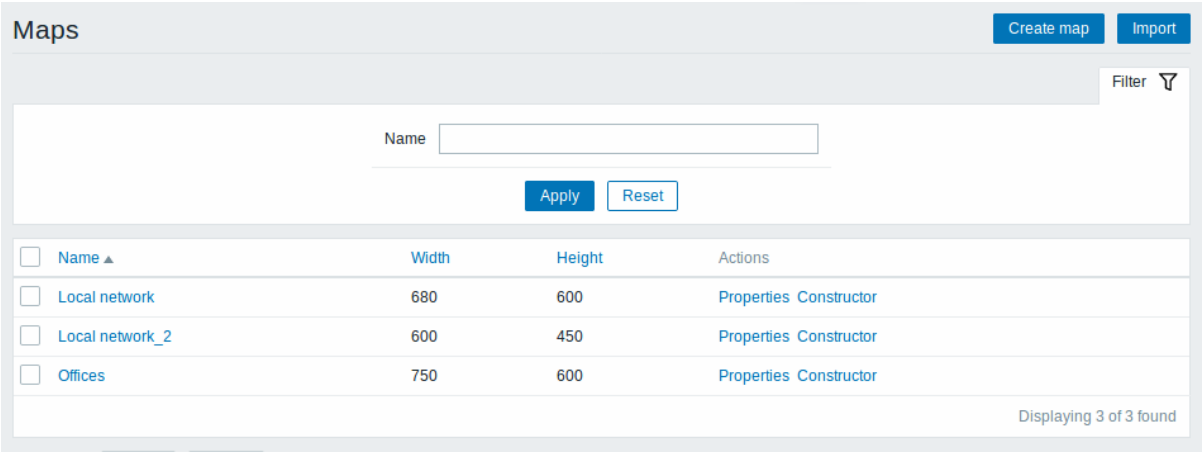
Overview

In the *Monitoring* → *Maps* section you can configure, manage and view network maps.

When you open this section, you will either see the last map you accessed or a listing of all maps you have access to. Map listing can be filtered by name.

Since Zabbix 3.0 all maps can be either public or private. Public maps are available to all users, while private maps are accessible only to their owner and the users the map is shared with.

Map listing



Displayed data:

Column	Description
Name	Name of the map. Click on the name to view the map.
Width	Map width is displayed.
Height	Map height is displayed.
Actions	Two actions are available: **Properties** - edit general map properties **Constructor** - access the grid for adding map elements

To configure a new map, click on the *Create map* button in the top right-hand corner. To import a map from an XML file, click on the *Import* button in the top right-hand corner. The user who imports the map will be set as its owner.

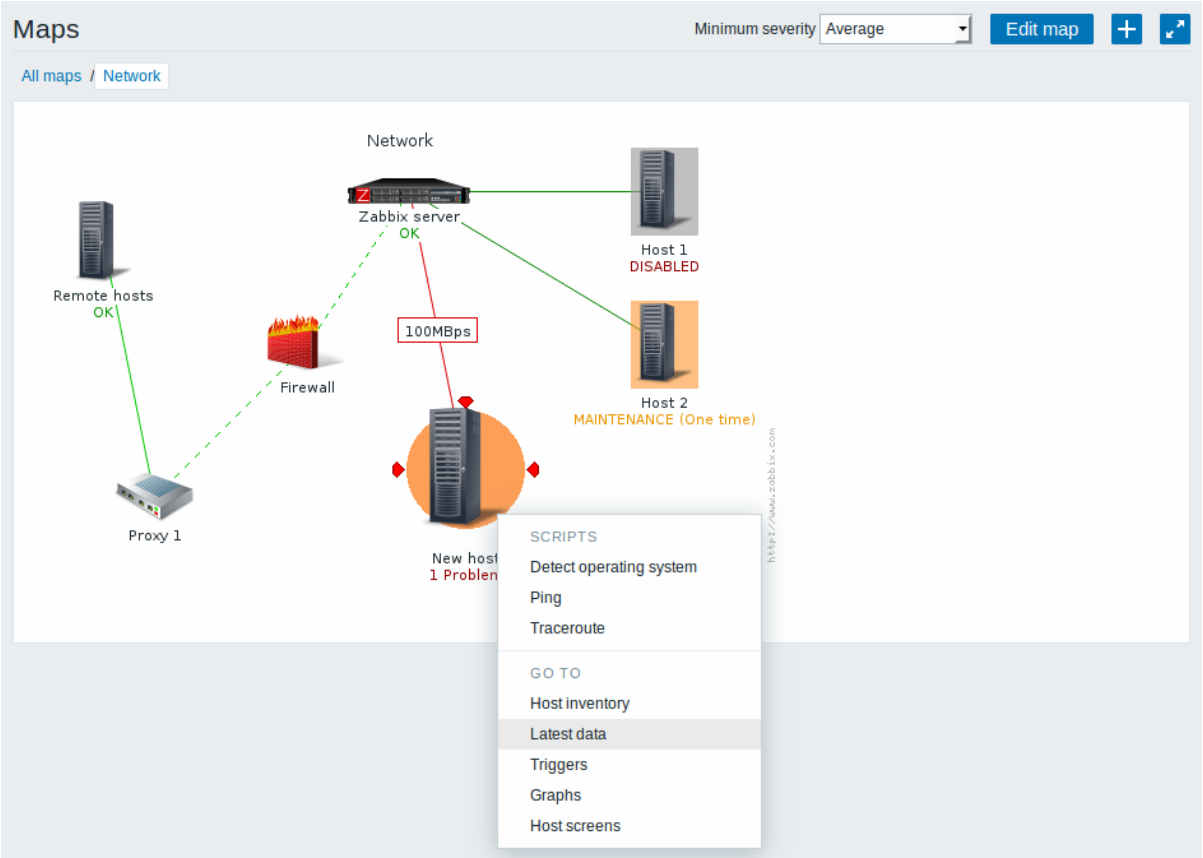
Two buttons below the list offer some mass-editing options:

- *Export* - export the maps to an XML file
- *Delete* - delete the maps

To use these options, mark the checkboxes before the respective maps, then click on the required button.

Viewing maps

To view a map, click on its name in the list of all maps.



You can use the dropdown in the map title bar to select the lowest severity level of the problem triggers to display. The severity marked as *default* is the level set in map configuration. If the map contains a submap, navigating to the submap will retain the higher-level map severity (except if it is *Not classified*, in this case it will not be passed to the submap).

Icon highlighting

If a map element is in problem status, it is highlighted with a round circle. The fill colour of the circle corresponds to the severity colour of the problem. Only problems on or above the selected severity level will be displayed with the element. If all problems are acknowledged, a thick green border around the circle is displayed.

Additionally:

- a host in maintenance is highlighted with an orange, filled square. Note that maintenance highlighting has priority over the problem severity highlighting.
- a disabled (not-monitored) host is highlighted with a grey, filled square.

Highlighting is displayed if the *Icon highlighting* check-box is marked in map configuration.

Recent change markers

Inward pointing red triangles around an element indicate a recent trigger status change - one that's happened within the last 30 minutes. These triangles are shown if the *Mark elements on trigger status change* check-box is marked in map configuration.

Links

Clicking on a map element opens a menu with some available links.

Buttons

Buttons to the right offer the following options:

Edit map	Go to map constructor to edit the map content.
	Add map to the favourites widget in the Dashboard.
	The map is in the favourites widget in the Dashboard. Click to remove map from the favourites widget.
	Display page in fullscreen mode.

Display page in kiosk mode. In this mode only page content displayed.
The kiosk mode button appears when the fullscreen mode is activated.

To exit kiosk mode, move the mouse cursor until the exit button appears and click on it. Note that you will be taken back to normal mode (not fullscreen mode).

Readable summary in maps

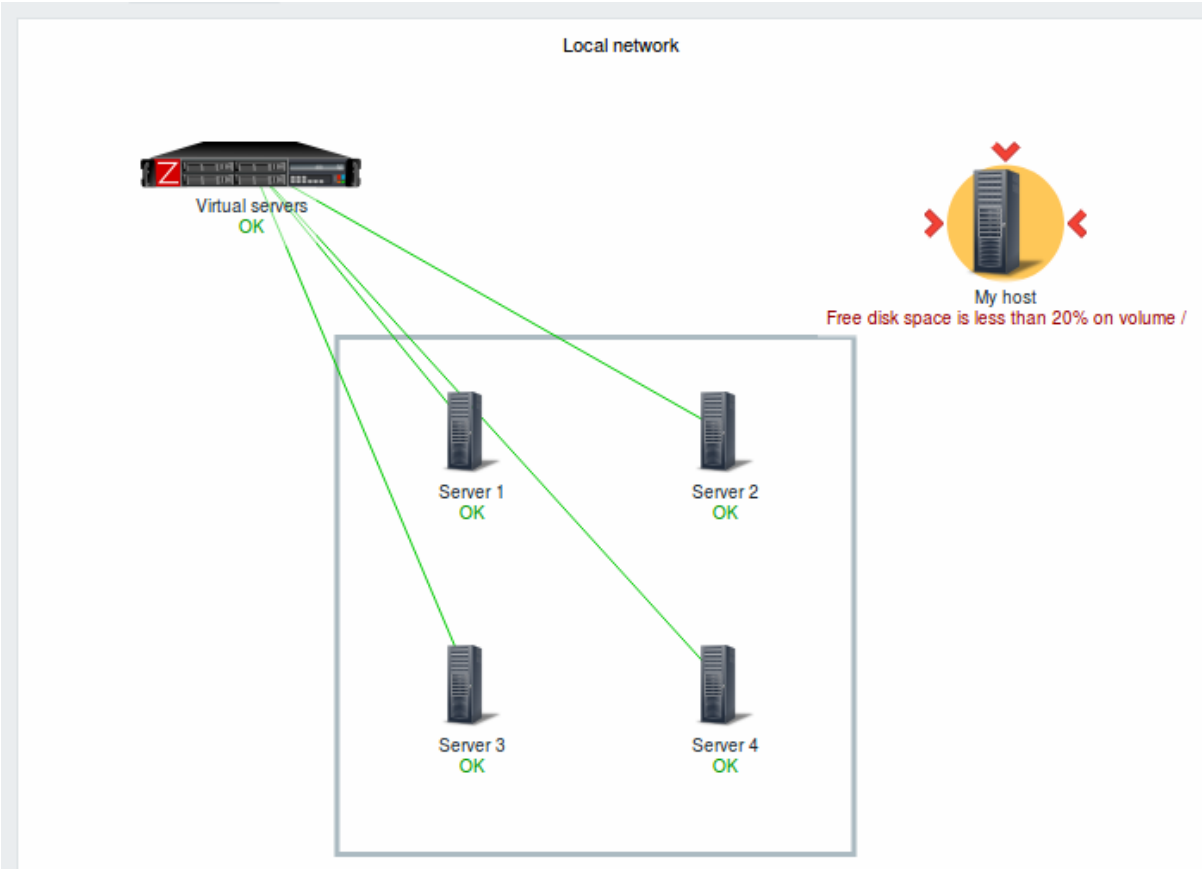
A hidden "aria-label" property is available allowing map information to be read with a screen reader. Both general map description and individual element description is available, in the following format:

- for map description: `<Map name>, <* of * items in problem state>, <* problems in total>.`
- for describing one element with one problem: `<Element type>, Status <Element status>, <Element name>, <Problem description>.`
- for describing one element with multiple problems: `<Element type>, Status <Element status>, <Element name>, <* problems>.`
- for describing one element without problems: `<Element type>, Status <Element status>, <Element name>.`

For example, this description is available:

```
'Local network, 1 of 6 elements in problem state, 1 problem in total. Host, Status problem, My host, Free
```

for the following map:



Referencing a network map

Network maps can be referenced by both `sysmapid` and `mapname` GET parameters. For example,

```
http://zabbix/zabbix/zabbix.php?action=map.view&mapname=Local%20network
```

will open the map with that name (Local network).

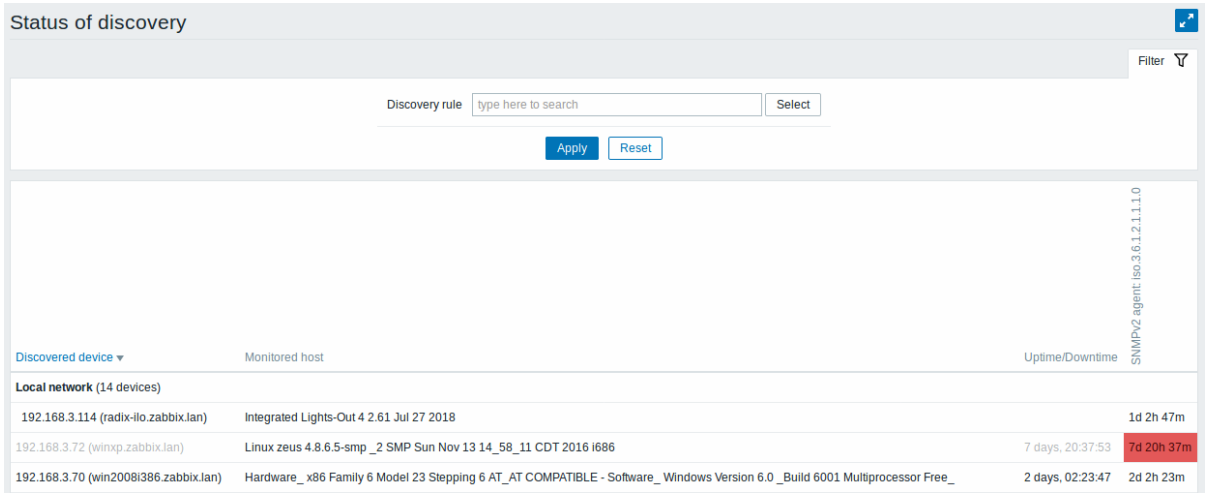
If both `sysmapid` (map ID) and `mapname` (map name) are specified, `mapname` has higher priority.

9 Discovery

Overview

In the *Monitoring* → *Discovery* section results of network discovery are shown. Discovered devices are sorted by the discovery rule.

With nothing selected in the filter, all enabled discovery rules are displayed. To select a specific discovery rule for display, start typing its name in the filter. All matching enabled discovery rules will be listed for selection. More than one discovery rule can be selected.



If a device is already monitored, the host name will be listed in the *Monitored host* column, and the duration of the device being discovered or lost after previous discovery is shown in the *Uptime/Downtime* column.

After that follow the columns showing the state of individual services for each discovered device (red cells show services that are down). Service uptime or downtime is included within the cell.

Attention:
Only those services that have been found on at least one device will have a column showing their state.

Buttons

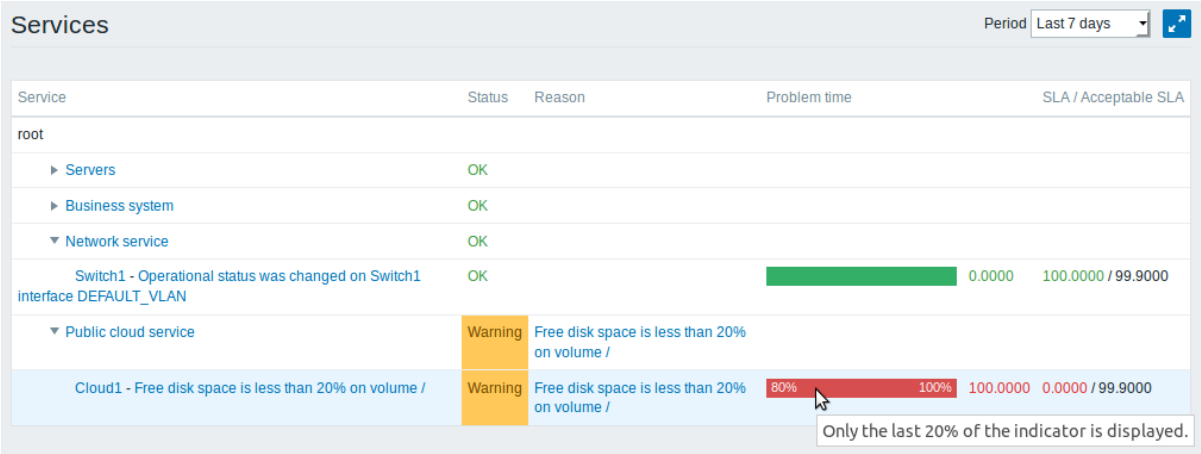
Buttons to the right offer the following options:

	Display page in fullscreen mode.
	Display page in kiosk mode. In this mode only page content displayed. The kiosk mode button appears when the fullscreen mode is activated. To exit kiosk mode, move the mouse cursor until the  exit button appears and click on it. Note that you will be taken back to normal mode (not fullscreen mode).

10 Services

Overview

In the *Monitoring* → *Services* section the status of IT infrastructure or business services is displayed.

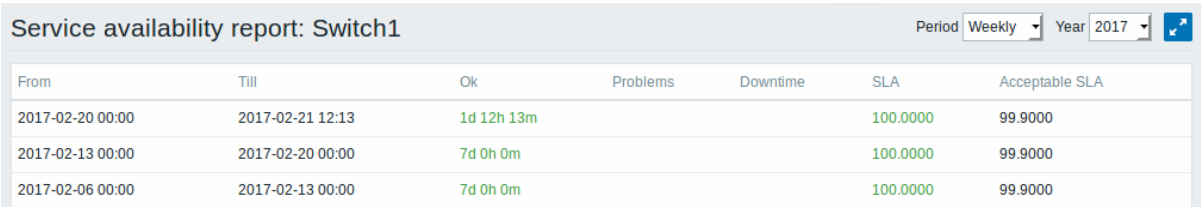


A list of the existing services is displayed along with data of their status and SLA. From the dropdown in the upper right corner you can select a desired period for display.

Displayed data:

Parameter	Description
Service	Service name.
Status	Status of service: **OK** - no problems **(trigger colour and severity)** - indicates a problem and its severity
Reason	Indicates the reason of problem (if any).
Problem time	Displays SLA bar. Green/red ratio indicates the proportion of availability/problems. The bar displays the last 20% of SLA (from 80% to 100%). The bar contains a link to a graph of availability data.
SLA/Acceptable SLA	Displays current SLA/expected SLA value. If current value is below the acceptable level, it is displayed in red.

You can also click on the service name to access the *Service availability report*.



Here you can assess service availability data over a longer period of time on daily/weekly/monthly/yearly basis.

Buttons

Buttons to the right offer the following options:

	Display page in fullscreen mode.
	Display page in kiosk mode. In this mode only page content displayed. The kiosk mode button appears when the fullscreen mode is activated. To exit kiosk mode, move the mouse cursor until the  exit button appears and click on it. Note that you will be taken back to normal mode (not fullscreen mode).

2 Inventory

Overview

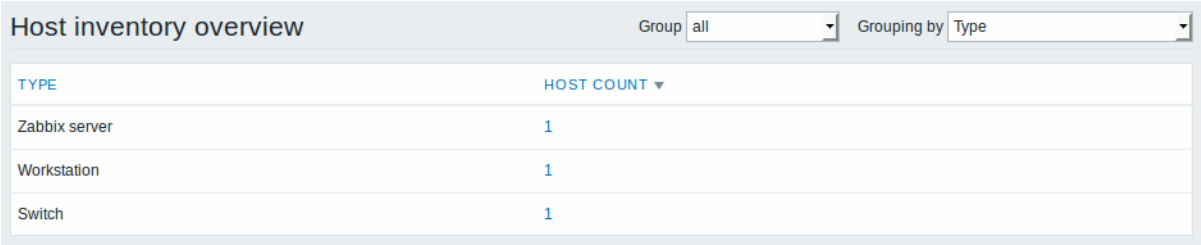
The Inventory menu features sections providing an overview of host inventory data by a chosen parameter as well as the ability to view host inventory details.

1 Overview

Overview

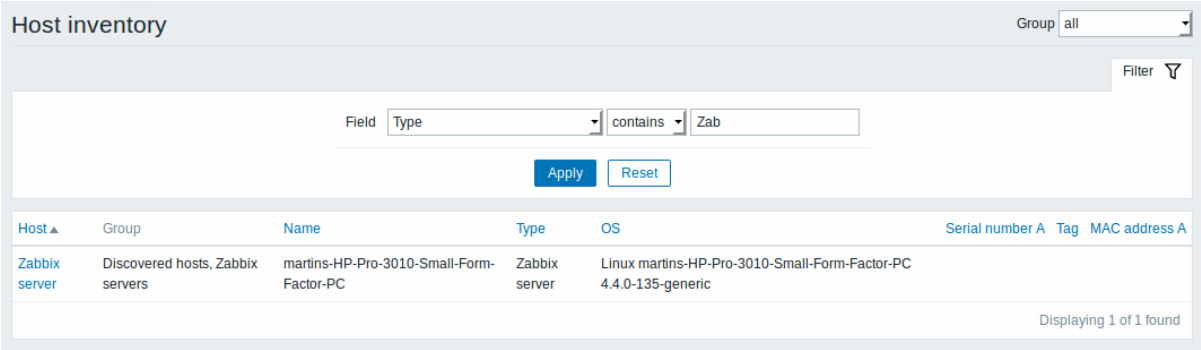
The *Inventory* → *Overview* section provides ways of having an overview of host inventory data.

For an overview to be displayed, choose a host group (or all groups) and the inventory field by which to display data. The number of hosts corresponding to each entry of the chosen field will be displayed.



The completeness of an overview depends on how much inventory information is maintained with the hosts.

Numbers in the *Host count* column are links; they lead to these hosts being filtered out in the *Host Inventories* table.

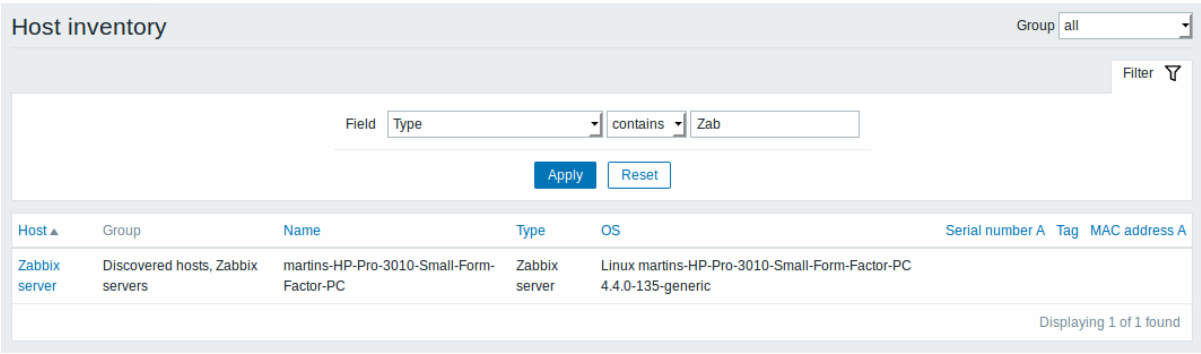


2 Hosts

Overview

In the *Inventory* → *Hosts* section inventory data of hosts are displayed.

Select a group from the dropdown in the upper right corner to display the inventory data of hosts in that group. You can also filter the hosts by any inventory field to display only the hosts you are interested in.

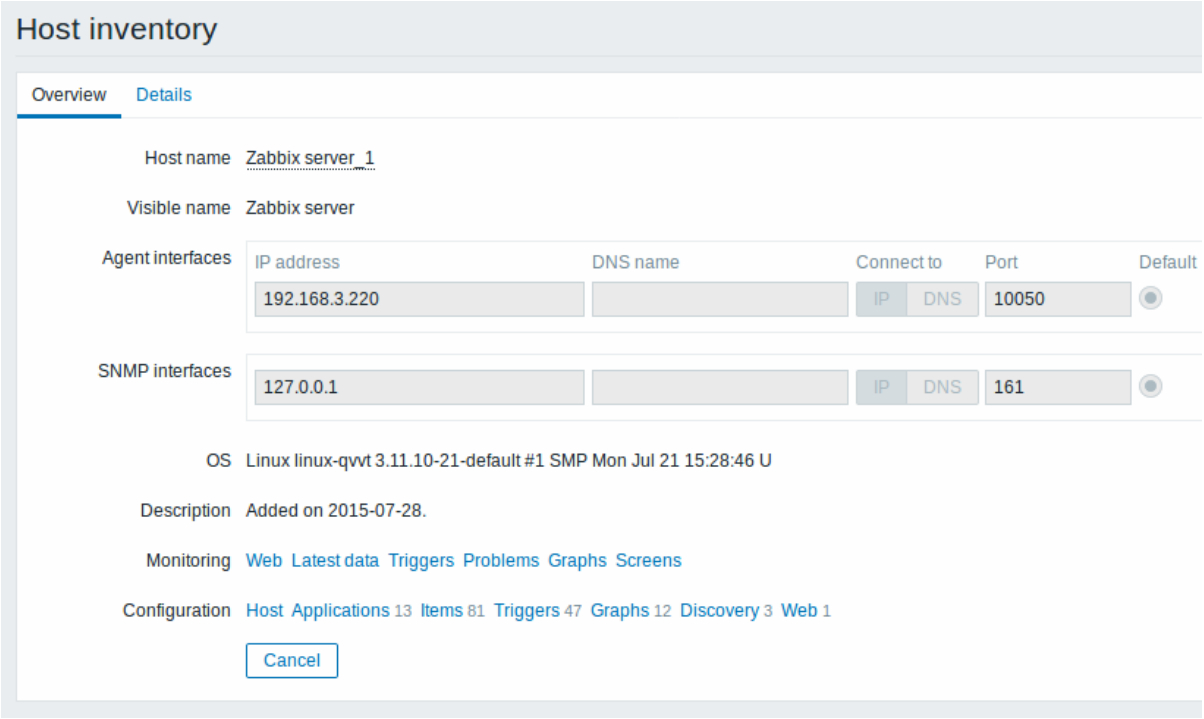


To display all host inventories, select ”all” in the group dropdown, clear the comparison field in the filter and press ”Filter”.

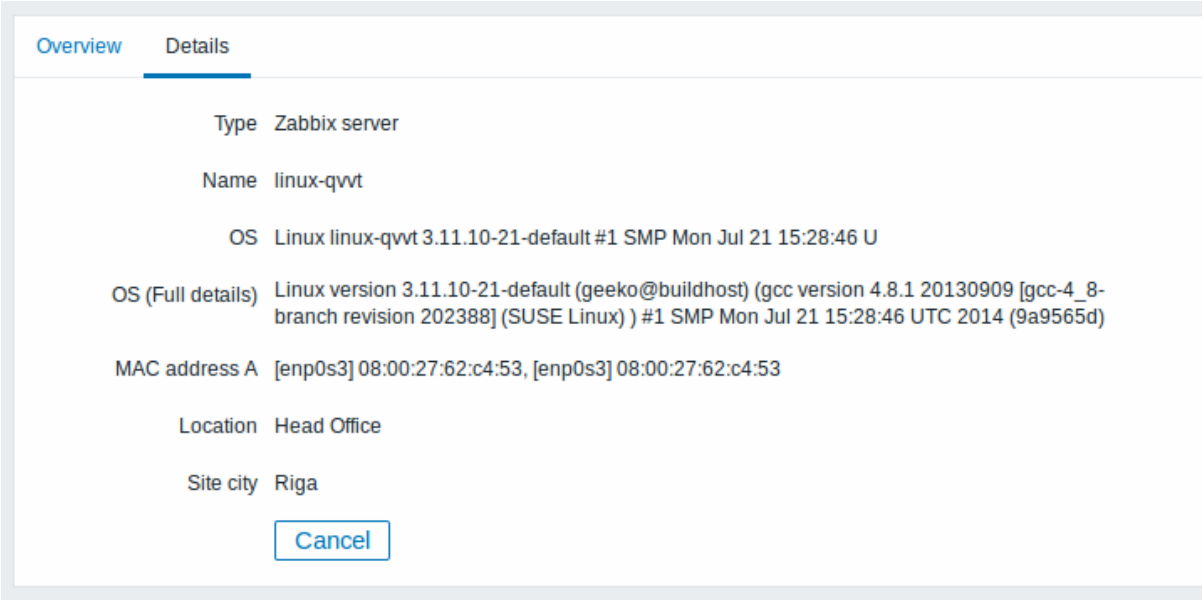
While only some key inventory fields are displayed in the table, you can also view all available inventory information for that host. To do that, click on the host name in the first column.

Inventory details

The **Overview** tab contains some general information about the host along with links to predefined scripts, latest monitoring data and host configuration options:



The **Details** tab contains all available inventory details for the host:



The completeness of inventory data depends on how much inventory information is maintained with the host. If no information is maintained, the *Details* tab is disabled.

3 Reports

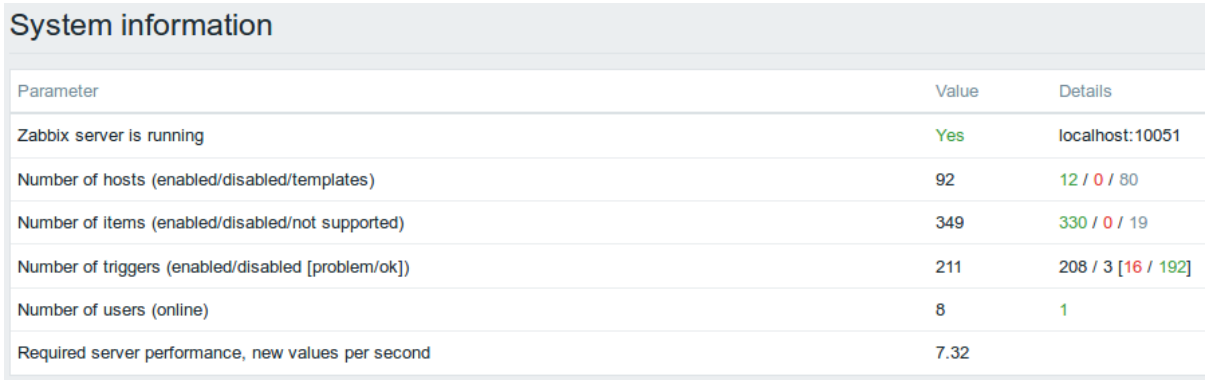
Overview

The Reports menu features several sections that contain a variety of predefined and user-customizable reports focused on displaying an overview of such parameters as system information, triggers and gathered data.

1 System information

Overview

In *Reports* → *System information* a summary of key system data is displayed.



System information

Parameter	Value	Details
Zabbix server is running	Yes	localhost:10051
Number of hosts (enabled/disabled/templates)	92	12 / 0 / 80
Number of items (enabled/disabled/not supported)	349	330 / 0 / 19
Number of triggers (enabled/disabled [problem/ok])	211	208 / 3 [16 / 192]
Number of users (online)	8	1
Required server performance, new values per second	7.32	

This report is also displayed as a widget in the Dashboard.

Displayed data

Parameter	Value	Details
Zabbix server is running	Status of Zabbix server: **Yes** - server is running **No** - server is not running *Note:* To display the rest of the information the web frontend needs the server to be running and there must be at least one trapper process started on the server (StartTrappers parameter in zabbix_server.conf file > 0).	Location and port of Zabbix server.
Number of hosts	Total number of hosts configured is displayed. Templates are counted as a type of host too.	Number of monitored hosts/not monitored hosts/templates.
Number of items	Total number of items is displayed.	Number of monitored/disabled/unsupported items. Items on disabled hosts are counted as disabled.
Number of triggers	Total number of triggers is displayed.	Number of enabled/disabled triggers. [Triggers in problem/ok state.] Triggers assigned to disabled hosts or depending on disabled items are counted as disabled.
Number of users	Total number of users configured is displayed.	Number of users online.
Required server performance, new values per second	The expected number of new values processed by Zabbix server per second is displayed.	*Required server performance* is an estimate and can be useful as a guideline. For precise numbers of values processed, use the `zabbix[wcache,values,all]` internal item. Enabled items from monitored hosts are included in the calculation. Log items are counted as one value per item update interval. Regular interval values are counted; flexible and scheduling interval values are not. The calculation is not adjusted during a "nodata" maintenance period. Trapper items are not counted.

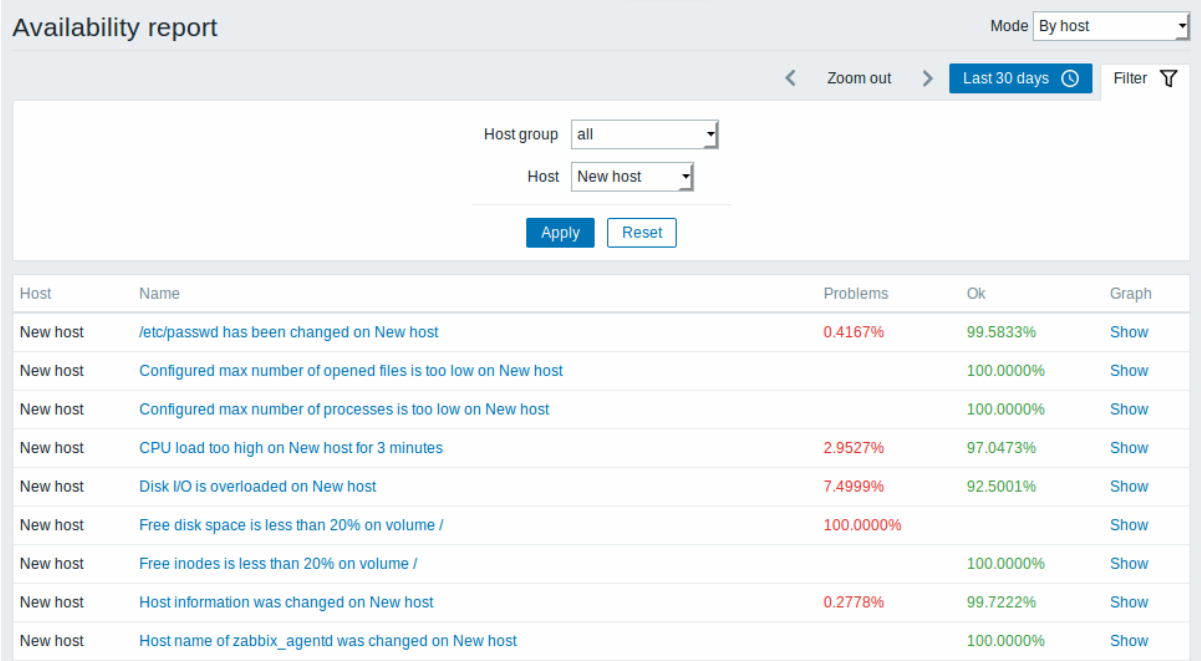
Starting with Zabbix 4.4.6, *System information* will also display an error message if the database used does not have the required character set or collation (UTF-8).

2 Availability report

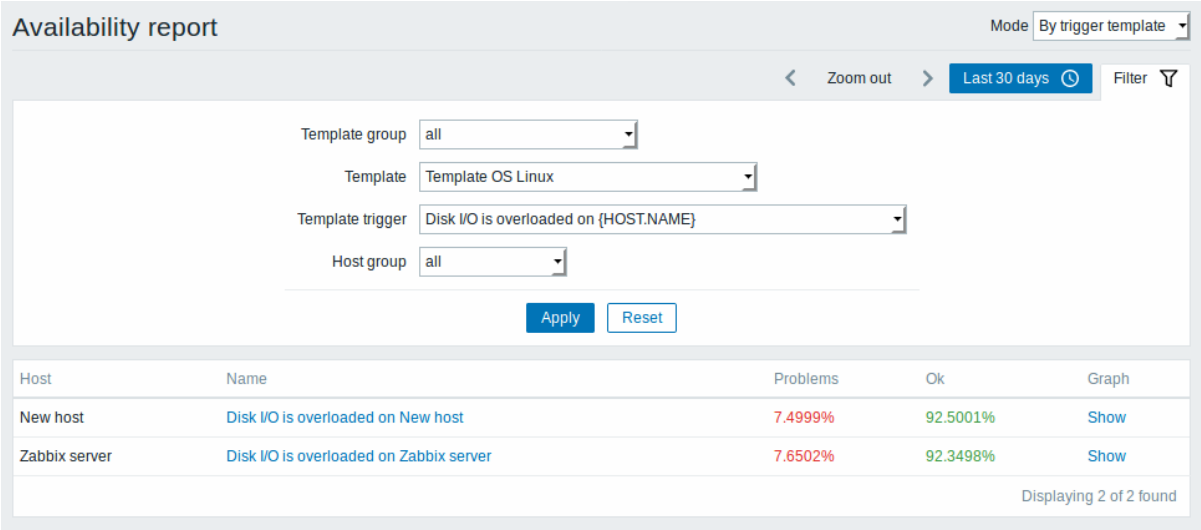
Overview

In *Reports* → *Availability report* you can see what proportion of time each trigger has been in problem/ok state. The percentage of time for each state is displayed.

Thus it is easy to determine the availability situation of various elements on your system.



From the dropdown in the upper right corner you can choose the selection mode - whether to display triggers by hosts or by triggers belonging to a template.



The name of the trigger is a link to the latest events of that trigger.

Using filter

Filter can help narrow down the number of hosts and/or triggers displayed. The filter is located below the *Availability report* bar. It can be opened and collapsed by clicking on the *Filter* tab on the left.

Filtering by trigger template

In the *by trigger template* mode results can be filtered by one or several parameters listed below.

Parameter	Description
Template group	Select all hosts with triggers from templates belonging to that group. Any host group that includes at least one template can be selected.
Template	Select hosts with triggers from chosen template and all nested templates. Only triggers inherited from the selected template will be displayed. If a nested template has additional own triggers, those triggers will not be displayed.
//Template trigger //	Select hosts with chosen trigger. Other triggers of the selected hosts will not be displayed.
Host group	Select hosts belonging to the group.

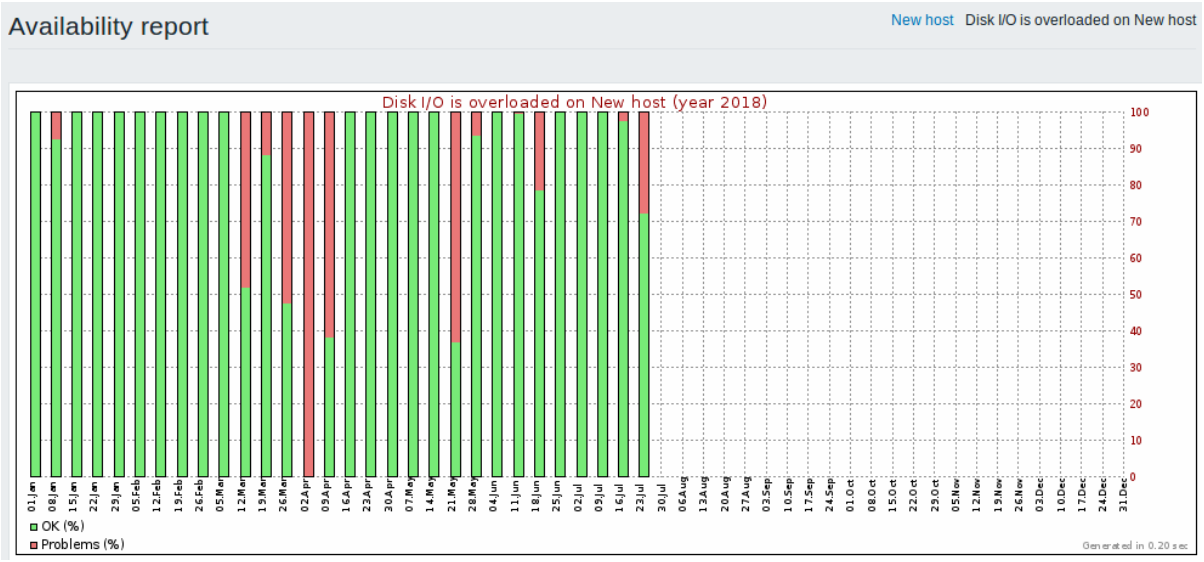
Filtering by host

In the *by host* mode results can be filtered by host or by host group. Specifying a parent host group implicitly selects all nested host groups.

Time period selector

The time period selector allows to select often required periods with one mouse click. The time period selector can be opened by clicking on the time period tab next to the filter.

Clicking on *Show* in the Graph column displays a bar graph where availability information is displayed in bar format each bar representing a past week of the current year.

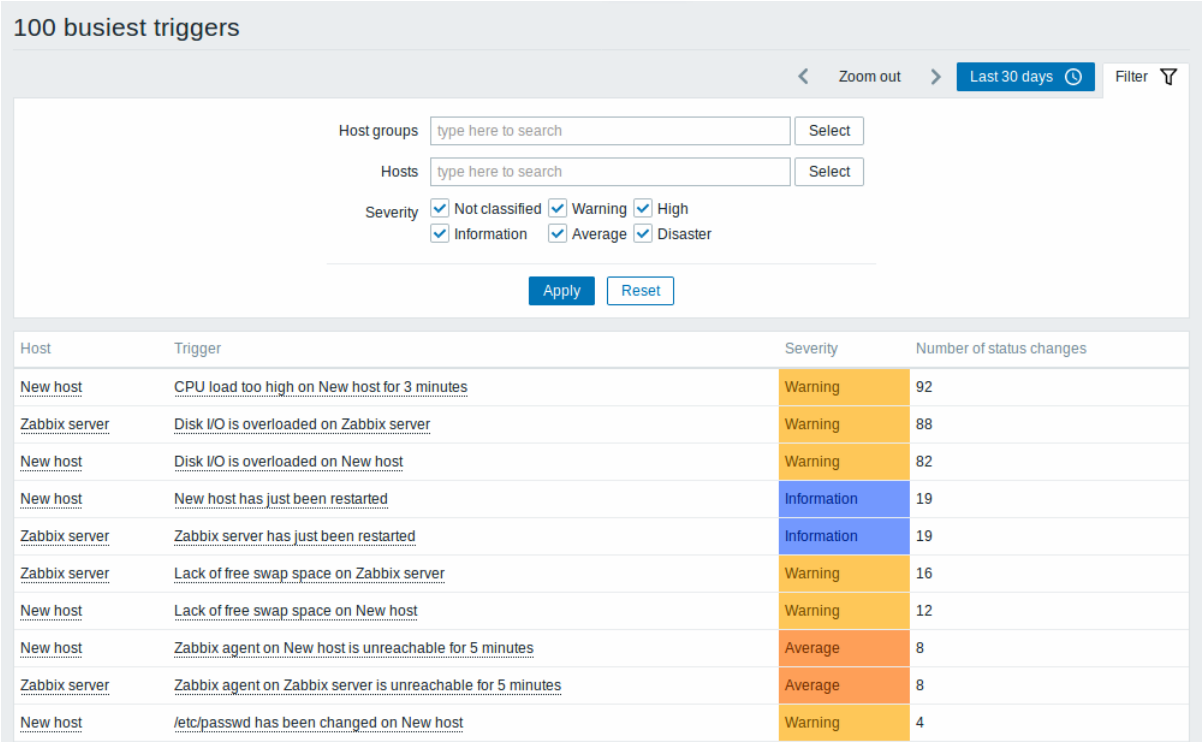


The green part of a bar stands for OK time and red for problem time.

3 Triggers top 100

Overview

In *Reports* → *Triggers top 100* you can see the triggers that have changed their state most often within the period of evaluation, sorted by the number of status changes.



Both host and trigger column entries are links that offer some useful options:

- for host - links to user-defined scripts, latest data, inventory, graphs and screens for the host
- for trigger - links to latest events, the trigger configuration form and a simple graph

Using filter

You may use the filter to display triggers by host group, host or trigger severity. Specifying a parent host group implicitly selects all nested host groups.

The filter is located below the *100 busiest triggers* bar. It can be opened and collapsed by clicking on the *Filter* tab on the left.

Time period selector

The time period selector allows to select often required periods with one mouse click. The time period selector can be opened by clicking on the time period tab next to the filter.

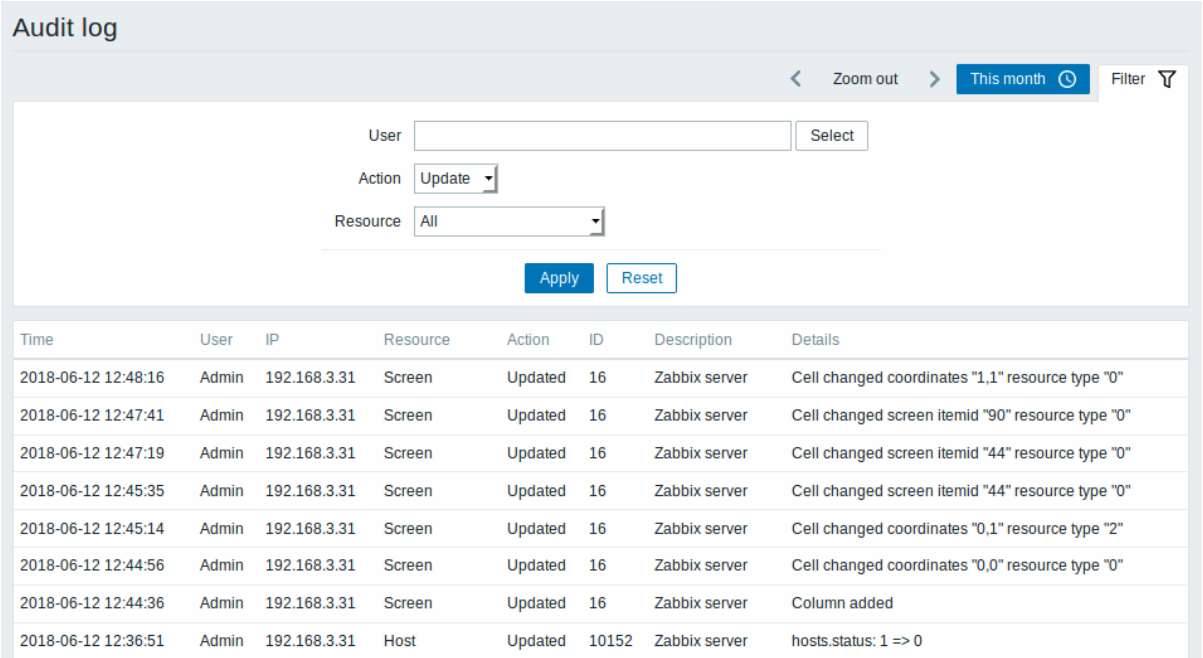
4 Audit

Overview

In the *Reports* → *Audit* section users can view records of changes made in the frontend.

Audit log

In this screen the audit log of various changes made in the frontend can be seen.



Displayed data:

Column	Description
Time	Timestamp of the audit record.
User	User of the activity.
IP	IP that was used in the activity.
Resource	Affected resource is displayed.
Action	Activity type is displayed - *Login, Logout, Added, Updated, Deleted, Enabled* or *Disabled*.
ID	ID of the affected resource is displayed.
Description	Description of the resource is displayed.
Details	Detailed information on the performed activity is displayed.

Using filter

You may use the filter to narrow down the records by user, activity type and affected resource.

The filter is located below the *Audit log* bar. It can be opened and collapsed by clicking on the *Filter* tab on the left.

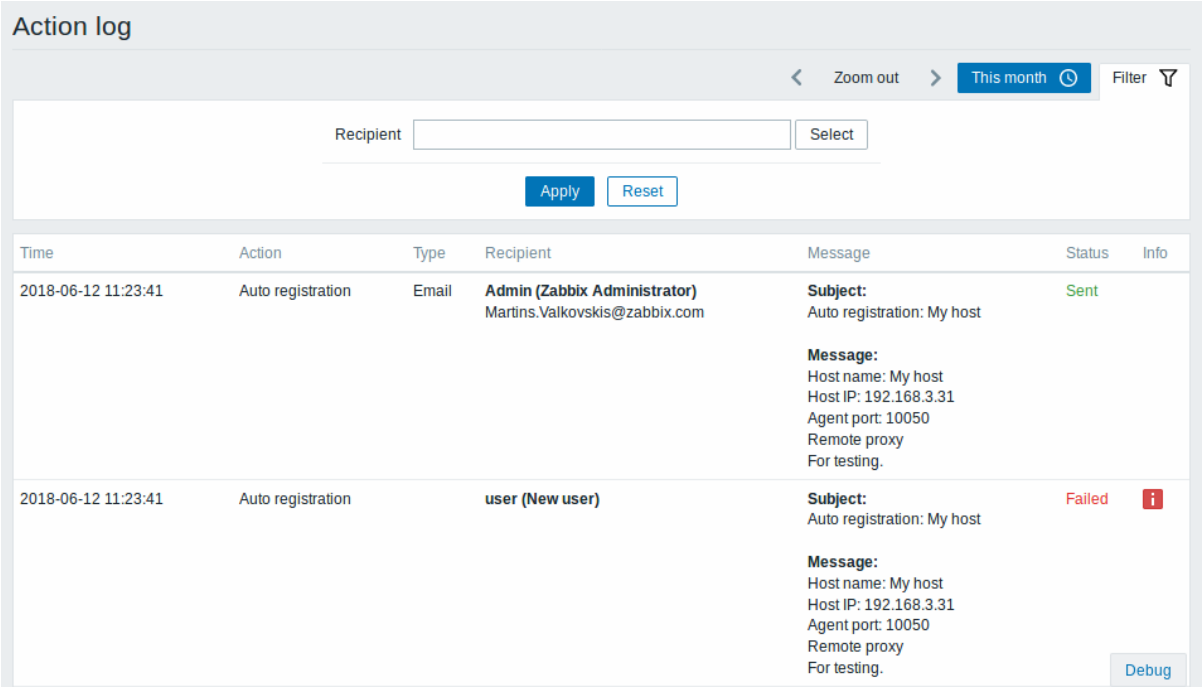
Time period selector

The time period selector allows to select often required periods with one mouse click. The time period selector can be opened by clicking on the time period tab next to the filter.

5 Action log

Overview

In this screen details of operations (notifications, remote commands) executed within an action are displayed.



Displayed data:

Column	Description
Time	Timestamp of the operation.
Action	Name of the action causing operations is displayed. Action name is displayed since Zabbix 2.4.0.
Type	Operation type is displayed - *Email* or *Command*.
Recipient(s)	User alias, name and surname (in parenthesis) and e-mail address of the notification recipient is displayed. User alias, name and surname are displayed since Zabbix 2.4.0.
Message	The content of the message/remote command is displayed. A remote command is separated from the target host with a colon symbol: `<host>:<command>`. If the remote command is executed on Zabbix server, then the information has the following format: `Zabbix server:<command>`
Status	Operation status is displayed: *In progress* - action is in progress For actions in progress the number of retries left is displayed - the remaining number of times the server will try to send the notification. *Sent* - notification has been sent *Executed* - command has been executed *Not sent* - action has not been completed.
Info	Error information (if any) regarding the action execution is displayed.

Using filter

You may use the filter to narrow down the records by the recipient of e-mail.

The filter is located below the *Action log* bar. It can be opened and collapsed by clicking on the *Filter* tab on the left.

Time period selector

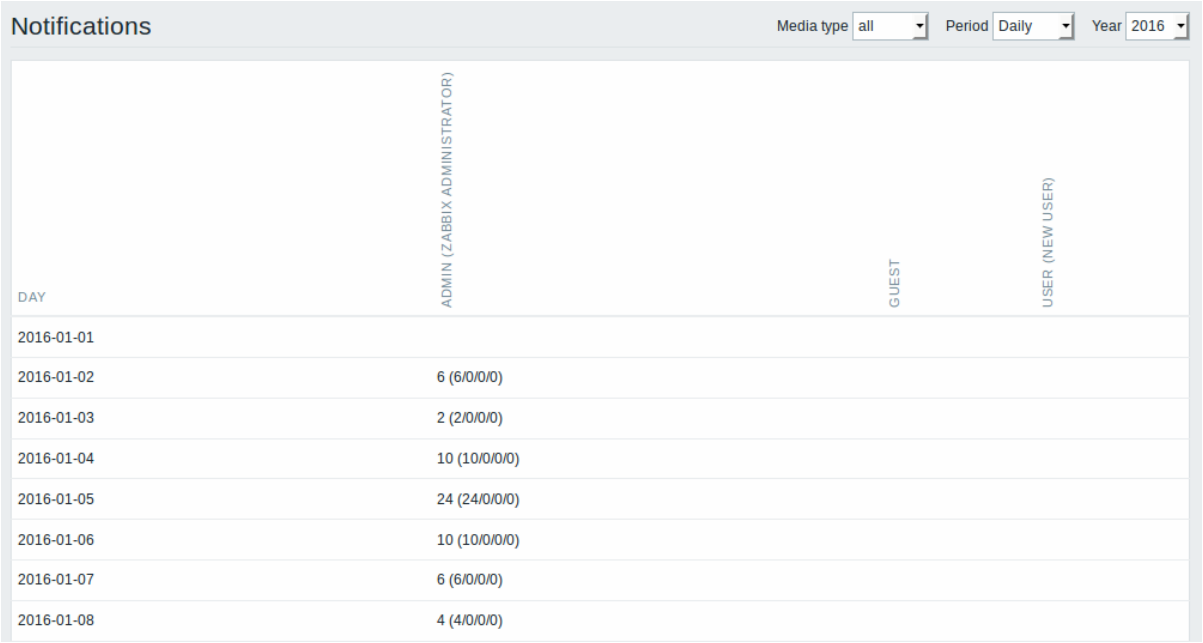
The time period selector allows to select often required periods with one mouse click. The time period selector can be opened by clicking on the time period tab next to the filter.

6 Notifications

Overview

In the *Reports* → *Notifications* section a report on the number of notifications sent to each user is displayed.

From the dropdowns in the top right-hand corner you can choose the media type (or all), period (data for each day/week/month/year) and year for the notifications sent.



Each column displays totals per one system user.

4 Configuration

Overview

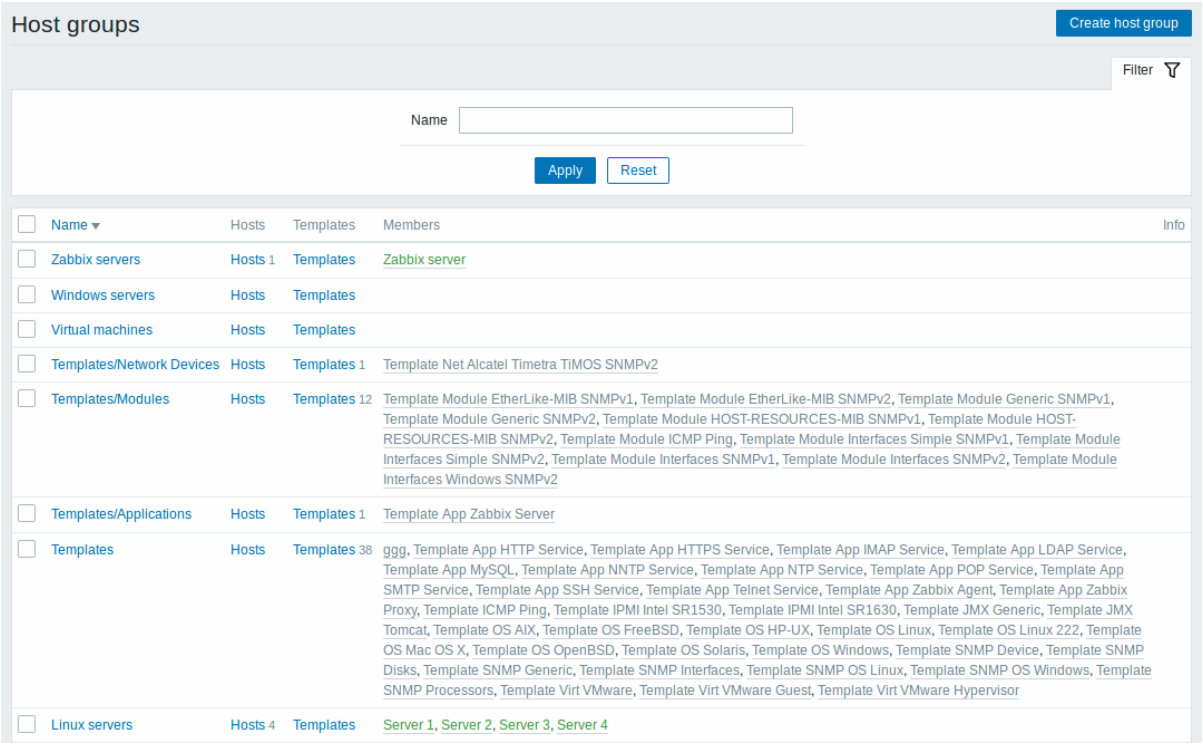
The Configuration menu contains sections for setting up major Zabbix functions, such as hosts and host groups, data gathering, data thresholds, sending problem notifications, creating data visualisation and others.

1 Host groups

Overview

In the *Configuration* → *Host groups* section users can configure and maintain host groups. A host group can contain both templates and hosts.

A listing of existing host groups with their details is displayed. You can search and filter host groups by name.



Displayed data:

Column	Description
Name	Name of the host group. Clicking on the group name opens the host group configuration form.
Hosts	Number of hosts in the group (displayed in grey). Clicking on ”Hosts” will, in the whole listing of hosts, filter out those that belong to the group.
Templates	Number of templates in the group (displayed in grey). Clicking on ”Templates” will, in the whole listing of templates, filter out those that belong to the group.
Members	Names of group members. Template names are displayed in grey, monitored host names in blue and non-monitored host names in red. Clicking on a name will open the template/host configuration form.
Info	Error information (if any) regarding the host group is displayed.

Mass editing options

Buttons below the list offer some mass-editing options:

- *Enable hosts* - change the status of all hosts in the group to ”Monitored”
- *Disable hosts* - change the status of all hosts in the group to ”Not monitored”
- *Delete* - delete the host groups

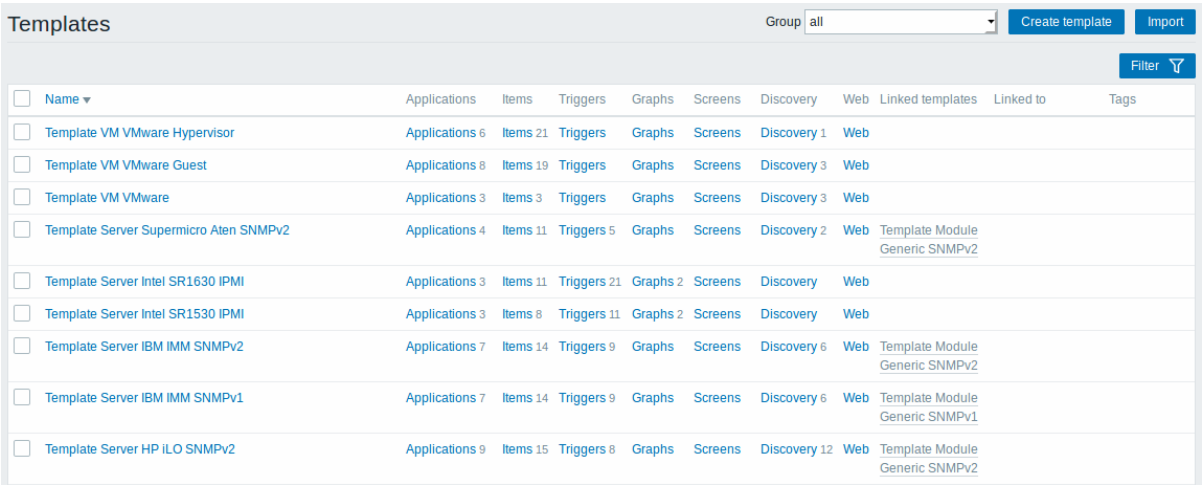
To use these options, mark the checkboxes before the respective host groups, then click on the required button.

2 Templates

Overview

In the *Configuration* → *Templates* section users can configure and maintain templates.

A listing of existing templates with their details is displayed.



From the dropdown to the right in the title bar you can choose whether to display all templates or only those belonging to a group.

Displayed data:

Column	Description
Templates	Name of the template. Clicking on the template name opens the template configuration form.
Entities (Applications, Items, Triggers, Graphs, Screens, Discovery, Web)	Number of the respective entities in the template (displayed in grey). Clicking on the entity name will, in the whole listing of that entity, filter out those that belong to the template.
Linked templates	Templates that are linked to the template, in a nested setup where the template will inherit all entities of the linked templates.
Linked to	The hosts and templates that the template is linked to.
Tags	Tags of the template, with macros unresolved.

To configure a new template, click on the *Create template* button in the top right-hand corner. To import a template from an XML file, click on the *Import* button in the top right-hand corner.

Mass editing options

Buttons below the list offer some mass-editing options:

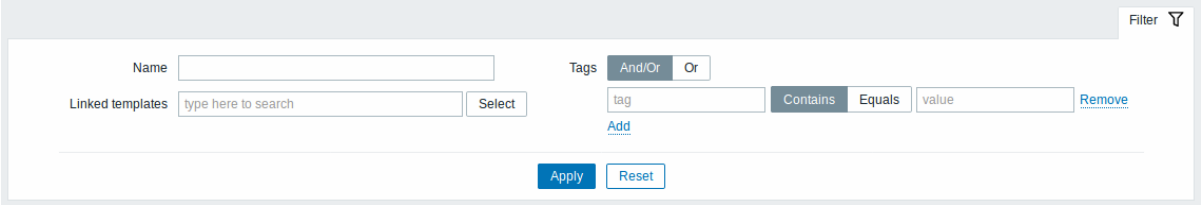
- *Export* - export the template to an XML file
- *Mass update* - update several properties for a number of templates at once
- *Delete* - delete the template while leaving its linked entities (items, triggers etc.) with the hosts
- *Delete and clear* - delete the template and its linked entities from the hosts

To use these options, mark the checkboxes before the respective templates, then click on the required button.

Filter

As the list may contain very many templates, it may be needed to filter out the ones you really need.

The *Filter* link is available above the list of templates. If you click on it, a filter becomes available where you can filter templates by name and directly linked templates.



Filtering is possible only by template-level tags (not inherited ones).

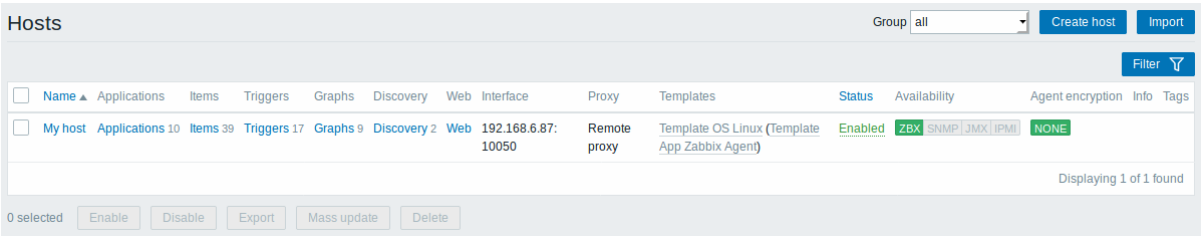
3 Hosts

Overview

In the *Configuration* → *Hosts* section users can configure and maintain hosts.

A listing of existing hosts with their details is displayed.

From the dropdown to the right in the *Hosts* bar you can choose whether to display all hosts or only those belonging to one particular group.



Displayed data:

Column	Description
Name	Name of the host. Clicking on the host name opens the host configuration form.
Elements (Applications, Items, Triggers, Graphs, Discovery, Web)	Clicking on the element name will display items, triggers etc. of the host. The number of the respective elements is displayed in gray.
Interface	The main interface of the host is displayed.
Proxy	Proxy name is displayed, if the host is monitored by a proxy. This column is only displayed if the *Monitored by* filter option is set to 'Any' or 'Proxy'.
Templates	The templates linked to the host are displayed. If other templates are contained in the linked template, those are displayed in parentheses, separated by a comma. Clicking on a template name will open its configuration form.
Status	Host status is displayed - *Enabled* or *Disabled*. By clicking on the status you can change it. An orange wrench icon before the host status indicates that this host is in maintenance. Maintenance details are displayed when the mouse pointer is positioned over the icon.

Column	Description
Availability	Availability of the host is displayed. Four icons each represent a supported interface (Zabbix agent, SNMP, IPMI, JMX). The current status of the interface is displayed by the respective colour: **Green** - available **Red** - not available (upon mouseover, details of why the interface cannot be reached are displayed) **Gray** - unknown or not configured Note that active Zabbix agent items do not affect host availability.
Agent encryption	Encryption status for connections to the host is displayed: **None** - no encryption **PSK** - using pre-shared key **Cert** - using certificate
Info	Error information (if any) regarding the host is displayed.
Tags	Tags of the host, with macros unresolved.

To configure a new host, click on the *Create host* button in the top right-hand corner. To import a host from an XML file, click on the *Import* button in the top right-hand corner.

Mass editing options

Buttons below the list offer some mass-editing options:

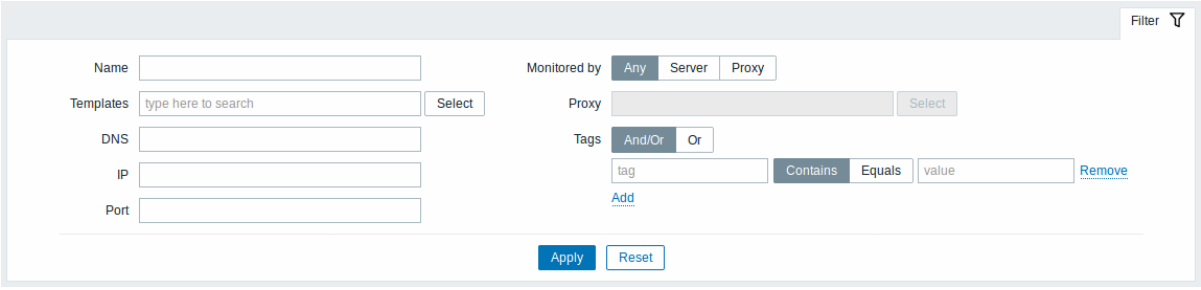
- *Enable* - change host status to *Monitored*
- *Disable* - change host status to *Not monitored*
- *Export* - export the hosts to an XML file
- *Mass update* - update several properties for a number of hosts at once
- *Delete* - delete the hosts

To use these options, mark the checkboxes before the respective hosts, then click on the required button.

Filter

As the list may contain very many hosts, it may be needed to filter out the ones you really need.

The *Filter* link is available above the list of hosts. If you click on it, a filter becomes available where you can filter hosts by name, linked templates, if they are monitored by server or by proxy, proxy name, DNS, IP or port number.



Reading host availability

Host availability icons reflect the current host interface status on Zabbix server. Therefore, in the frontend:

- If you disable a host, availability icons will not immediately turn gray (unknown status), because the server has to synchronize the configuration changes first;
- If you enable a host, availability icons will not immediately turn green (available), because the server has to synchronize the configuration changes and start polling the host first.

Unknown host status

Zabbix server sets the host availability icon to gray (unknown status) for the corresponding agent interface (Zabbix, SNMP, IPMI, JMX) if:

- there are no enabled items on the interface (they were removed or disabled);
- there are only active Zabbix agent items;
- host is disabled;
- host is set to be monitored by proxy, a different proxy or by server if it was monitored by proxy;

- host is monitored by a proxy that appears to be offline (no updates received from the proxy during the maximum heartbeat interval - 1 hour).

Setting host availability to unknown is done after server configuration cache synchronization. Restoring host availability (available/unavailable) on hosts monitored by proxies is done after proxy configuration cache synchronization.

See also more details about host unreachability.

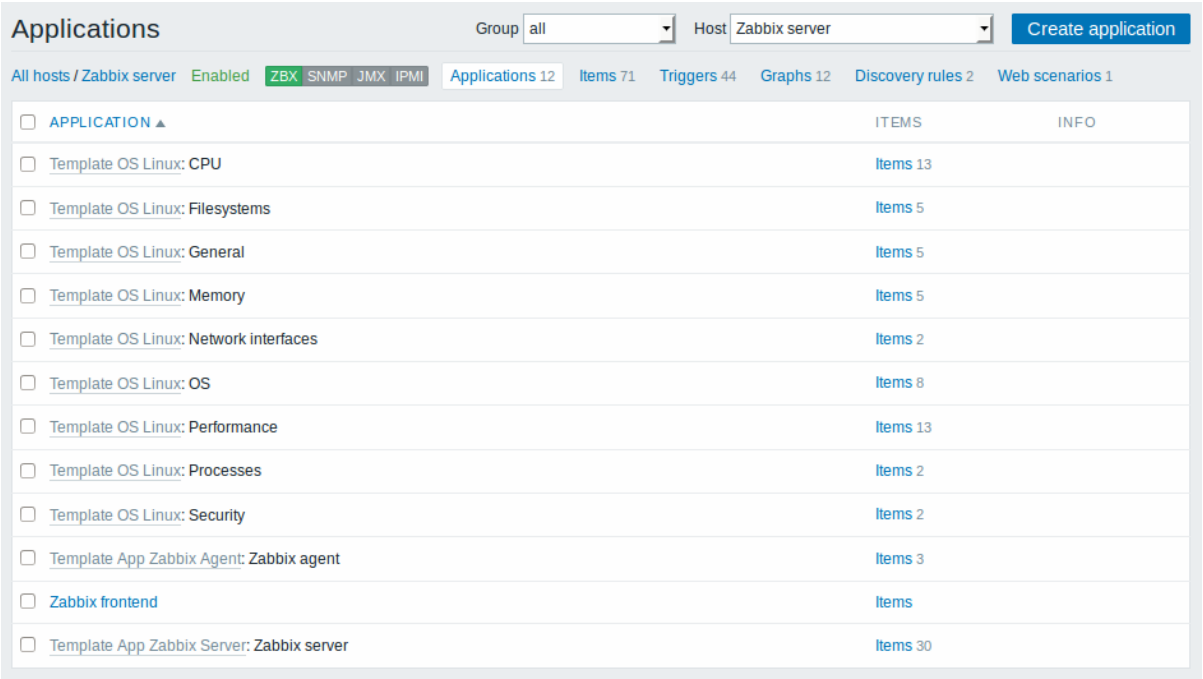
1 Applications

Overview

The application list for a template can be accessed from *Configuration* → *Templates* and then clicking on Applications for the respective template.

The application list for a host can be accessed from *Configuration* → *Hosts* and then clicking on Applications for the respective host.

A list of existing applications is displayed.



Displayed data:

Column	Description
Application	Name of the application, displayed as a blue link for directly created applications. Clicking on the application name link opens the application configuration form. If the host application belongs to a template, the template name is displayed before the application name, as a grey link. Clicking on the template link will open the application list on the template level.
Items	Click on Items to view the items contained in the application. The number of items is displayed in grey.
Info	Error information (if any) regarding the application is displayed.

To configure a new application, click on the *Create application* button in the top right-hand corner.

Mass editing options

Buttons below the list offer some mass-editing options:

- *Enable* - change application status to *Enabled*
- *Disable* - change application status to *Disabled*
- *Delete* - delete the applications

To use these options, mark the checkboxes before the respective applications, then click on the required button.

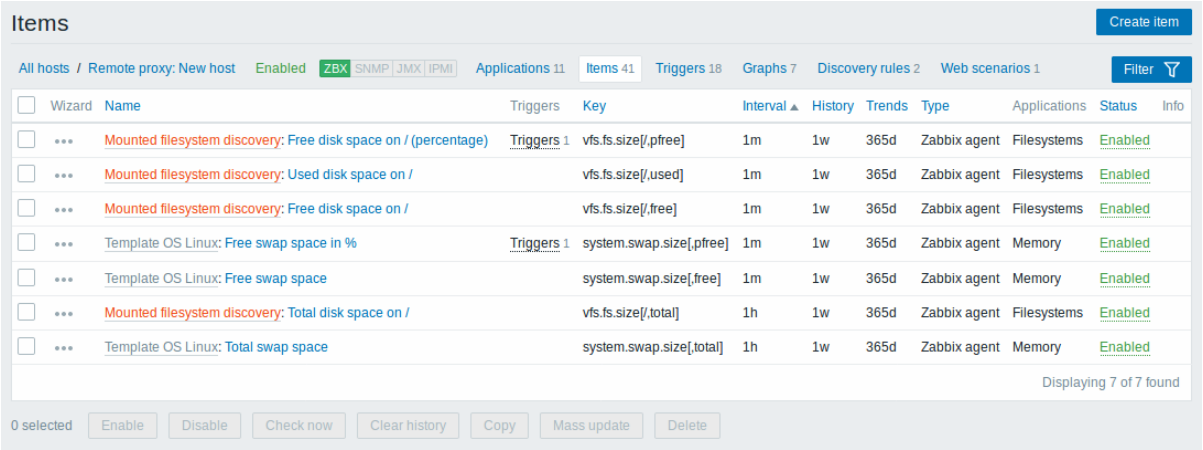
2 Items

Overview

The item list for a template can be accessed from *Configuration* → *Templates* and then clicking on Items for the respective template.

The item list for a host can be accessed from *Configuration* → *Hosts* and then clicking on Items for the respective host.

A list of existing items is displayed.



Displayed data:

Column	Description
Wizard	The wizard icon is a link to a wizard for creating a trigger based on the item.
Host	Host of the item. This column is displayed only if multiple hosts are selected in the filter.
Name	Name of the item, displayed as a blue link to item details. Clicking on the item name link opens the item configuration form. If the host item belongs to a template, the template name is displayed before the item name, as a grey link. Clicking on the template link will open the item list on the template level. If the item has been created from an item prototype, its name is preceded by the low level discovery rule name, in orange. Clicking on the discovery rule name will open the item prototype list.
Triggers	Moving the mouse over Triggers will display an info box displaying the triggers associated with the item. The number of the triggers is displayed in grey.
Key	Item key is displayed.
Interval	Frequency of the check is displayed. *Note* that passive items can also be checked immediately by pushing the *Check now* button.
History	How many days item data history will be kept is displayed.
Trends	How many days item trends history will be kept is displayed.
Type	Item type is displayed (Zabbix agent, SNMP agent, simple check, etc).
Applications	Item applications are displayed.
Status	Item status is displayed - *Enabled*, *Disabled* or *Not supported*. By clicking on the status you can change it - from Enabled to Disabled (and back); from Not supported to Disabled (and back).
Info	If everything is fine, no icon is displayed in this column. If there are errors, a red square icon with a cross is displayed. Move the mouse over the icon and you will see a tooltip with the error description.

To configure a new item, click on the *Create item* button in the top right-hand corner.

Mass editing options

Buttons below the list offer some mass-editing options:

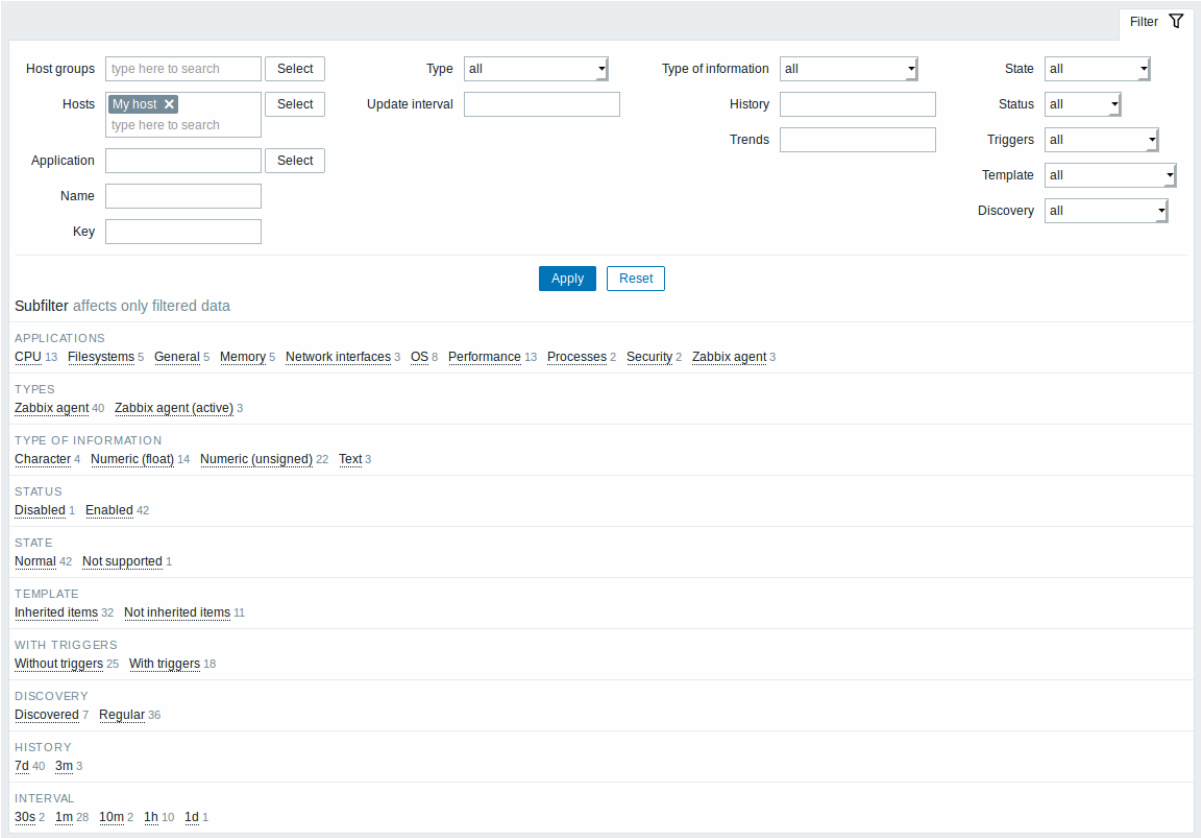
- *Enable* - change item status to *Enabled*
- *Disable* - change item status to *Disabled*
- *Check now* - execute a check for new item values immediately. Supported for **passive** checks only (see more details). Note that when checking for values immediately, configuration cache is not updated, thus the values will not reflect very recent changes to item configuration.
- *Clear history* - delete history and trend data for items
- *Copy* - copy the items to other hosts or templates
- *Mass update* - update several properties for a number of items at once
- *Delete* - delete the items

To use these options, mark the checkboxes before the respective items, then click on the required button.

Using filter

As the list may contain very many items, it may be needed to filter out the ones you really need.

The *Filter* link is available above the list. If you click on it, a filter becomes available where you can filter items by several properties.



Parameter	Description
Host groups	Filter by one or more host groups. Specifying a parent host group implicitly selects all nested host groups.
Hosts	Filter by one or more hosts.
Application	Filter by application.
Name	Filter by item name.
Key	Filter by item key.
Type	Filter by item type (Zabbix agent, SNMP agent, etc.).
Update interval	Filter by item update interval.
Type of information	Filter by type of information (Numeric unsigned, float, etc.).
History	Filter by how long item history is kept.
Trends	Filter by how long item trends are kept.
State	Filter by item state - *Normal* or *Not supported*.
Status	Filter by item status - *Enabled* or *Disabled*.
Triggers	Filter items with (or without) triggers.
Template	Filter items inherited (or not inherited) from a template.
Discovery	Filter items discovered (or not discovered) by low-level discovery.

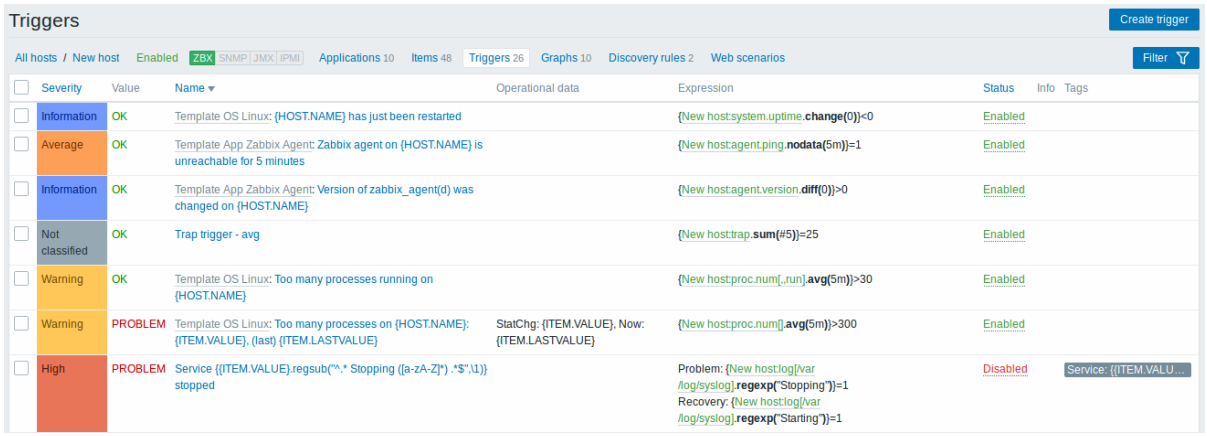
The **Subfilter** below the filter offers further filtering options (for the data already filtered). You can select groups of items with a common parameter value. If you click on a group it gets highlighted and only the items with this parameter value remain in the list.

3 Triggers

Overview

The trigger list for a template can be accessed from *Configuration* → *Templates* and then clicking on Triggers for the respective template.

The trigger list for a host can be accessed from *Configuration* → *Hosts* and then clicking on Triggers for the respective host.



Displayed data:

Column	Description
Severity	Severity of the trigger is displayed by both name and cell background colour.
Value	Trigger value is displayed: **OK** - trigger is in OK state **PROBLEM** - trigger is in problem state
Host	Host of the trigger. This column is displayed only if multiple hosts are selected in the filter.
Name	Name of the trigger, displayed as a blue link to trigger details. Clicking on the trigger name link opens the trigger configuration form. If the host trigger belongs to a template, the template name is displayed before the trigger name, as a grey link. Clicking on the template link will open the trigger list on the template level. If the trigger has been created from a trigger prototype, its name is preceded by the low level discovery rule name, in orange. Clicking on the discovery rule name will open the trigger prototype list.
Operational data	Operational data definition of the trigger, containing arbitrary strings and macros that will resolve dynamically in *Monitoring* → *Problems*.
Expression	Trigger expression is displayed. The host-item part of the expression is displayed as a link, leading to the item configuration form.
Status	Trigger status is displayed - *Enabled*, *Disabled* or *Unknown*. By clicking on the status you can change it - from Enabled to Disabled (and back); from Unknown to Disabled (and back).
Info	If everything is fine, no icon is displayed in this column. If there are errors, a red square icon with a cross is displayed. Move the mouse over the icon and you will see a tooltip with the error description.
Tags	If trigger contains tags, tag name and value are displayed in this column.

To configure a new trigger, click on the *Create trigger* button in the top right-hand corner.

Mass editing options

Buttons below the list offer some mass-editing options:

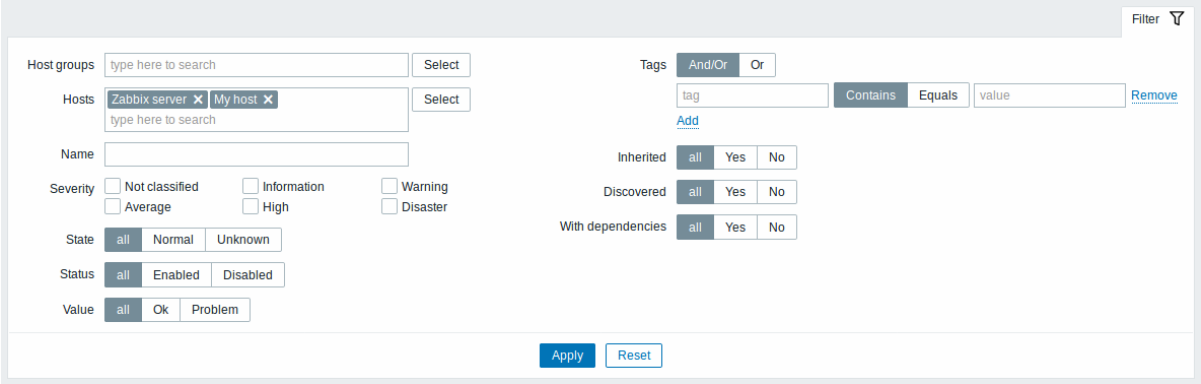
- *Enable* - change trigger status to *Enabled*

- *Disable* - change trigger status to *Disabled*
- *Copy* - copy the triggers to other hosts or templates
- *Mass update* - update several properties for a number of triggers at once
- *Delete* - delete the triggers

To use these options, mark the checkboxes before the respective triggers, then click on the required button.

Using filter

You can use the filter to display only the triggers you are interested in. The filter is located above the table.



Parameter	Description
Host groups	Filter by one or more host groups. Specifying a parent host group implicitly selects all nested host groups.
Hosts	Filter by one or more hosts. If host groups are already selected above, host selection is limited to those groups.
Name	Filter by trigger name.
Severity	Select to filter by one or several trigger severities.
State	Filter by trigger state.
Status	Filter by trigger status.
Value	Filter by trigger value.
Tags	Filter by trigger tag name and tag value. Several conditions can be set. There are two calculation types for conditions: **And/Or** - all conditions must be met, conditions having same tag name will be grouped by Or condition **Or** - enough if one condition is met There are two ways of matching the tag value: **Contains** - case-sensitive substring match (tag value contains the entered string) **Equals** - case-sensitive string match (tag value equals the entered string) When filtered, the tags specified here will be displayed first with the trigger. Macros and macro functions are supported both in tag name and tag value fields.
Inherited	Filter triggers inherited (or not inherited) from a template.
Discovered	Filter triggers discovered (or not discovered) by low-level discovery.
With dependencies	Filter triggers with (or without) dependencies.

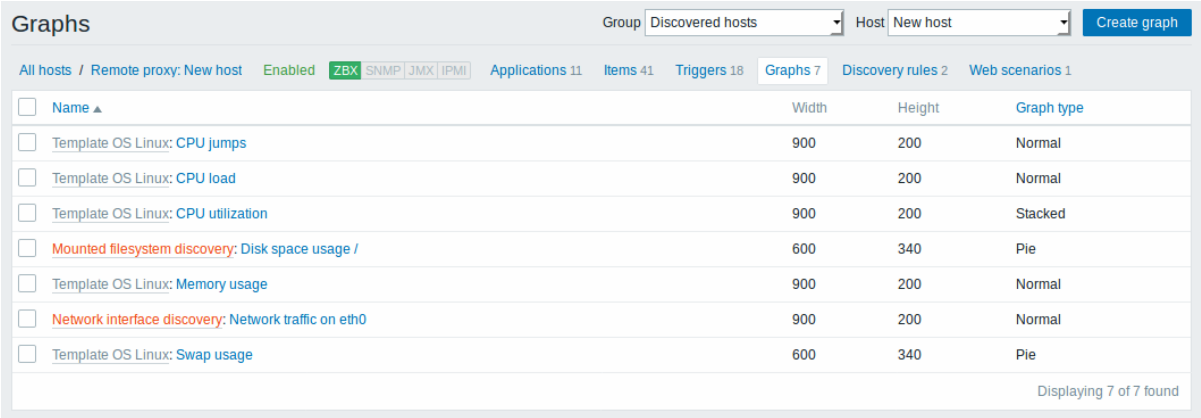
4 Graphs

Overview

The custom graph list for a template can be accessed from *Configuration* → *Templates* and then clicking on Graphs for the respective template.

The custom graph list for a host can be accessed from *Configuration* → *Hosts* and then clicking on Graphs for the respective host.

A list of existing graphs is displayed.



Displayed data:

Column	Description
Name	Name of the custom graph, displayed as a blue link to graph details. Clicking on the graph name link opens the graph configuration form. If the host graph belongs to a template, the template name is displayed before the graph name, as a grey link. Clicking on the template link will open the graph list on the template level. If the graph has been created from a graph prototype, its name is preceded by the low level discovery rule name, in orange. Clicking on the discovery rule name will open the graph prototype list.
Width	Graph width is displayed.
Height	Graph height is displayed.
Graph type	Graph type is displayed - *Normal*, *Stacked*, *Pie* or *Exploded*.

To configure a new graph, click on the *Create graph* button in the top right-hand corner.

Mass editing options

Buttons below the list offer some mass-editing options:

- *Copy* - copy the graphs to other hosts or templates
- *Delete* - delete the graphs

To use these options, mark the checkboxes before the respective graphs, then click on the required button.

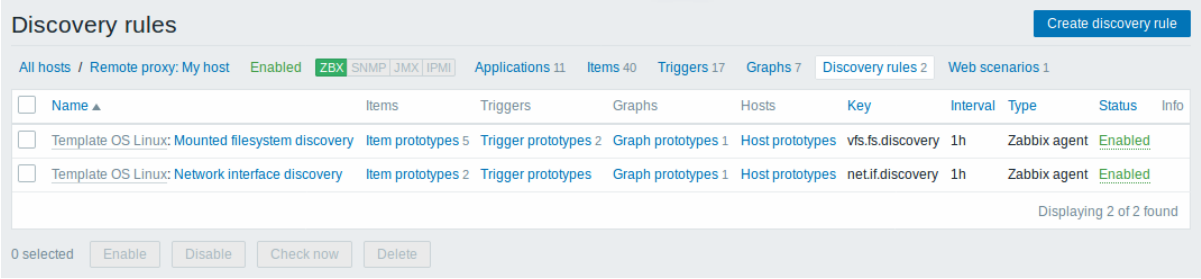
5 Discovery rules

Overview

The list of low-level discovery rules for a template can be accessed from *Configuration* → *Templates* and then clicking on Discovery for the respective template.

The list of low-level discovery rules for a host can be accessed from *Configuration* → *Hosts* and then clicking on Discovery for the respective host.

A list of existing low-level discovery rules is displayed.



Displayed data:

Column	Description
Name	Name of the rule, displayed as a blue link. Clicking on the rule name opens the low-level discovery rule configuration form. If the discovery rule belongs to a template, the template name is displayed before the rule name, as a grey link. Clicking on the template link will open the rule list on the template level.
Items	A link to the list of item prototypes is displayed. The number of existing item prototypes is displayed in grey.
Triggers	A link to the list of trigger prototypes is displayed. The number of existing trigger prototypes is displayed in grey.
Graphs	A link to the list of graph prototypes displayed. The number of existing graph prototypes is displayed in grey.
Hosts	A link to the list of host prototypes displayed. The number of existing host prototypes is displayed in grey.
Key	The item key used for discovery is displayed.
Interval	The frequency of performing discovery is displayed. *Note* that discovery can also be performed immediately by pushing the *Check now* button below the list.
Type	The item type used for discovery is displayed (Zabbix agent, SNMP agent, etc).
Status	Discovery rule status is displayed - *Enabled*, *Disabled* or *Not supported*. By clicking on the status you can change it - from Enabled to Disabled (and back); from Not supported to Disabled (and back).
Info	If everything is fine, no icon is displayed in this column. If there are errors, a red square icon with a cross is displayed. Move the mouse over the icon and you will see a tooltip with the error description.

To configure a new low-level discovery rule, click on the *Create discovery rule* button in the top right-hand corner.

Mass editing options

Buttons below the list offer some mass-editing options:

- *Enable* - change the low-level discovery rule status to *Enabled*
- *Disable* - change the low-level discovery rule status to *Disabled*
- *Check now* - perform discovery based on the discovery rules immediately. See more details. Note that when performing discovery immediately, the configuration cache is not updated, thus the result will not reflect very recent changes to discovery rule configuration
- *Delete* - delete the low-level discovery rules

To use these options, mark the checkboxes before the respective discovery rules, then click on the required button.

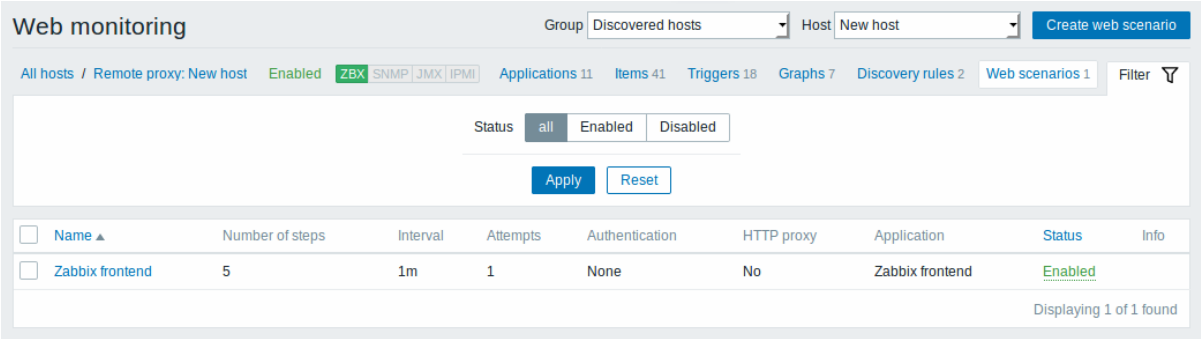
6 Web scenarios

Overview

The web scenario list for a template can be accessed from *Configuration* → *Templates* and then clicking on Web for the respective template.

The web scenario list for a host can be accessed from *Configuration* → *Hosts* and then clicking on Web for the respective host.

A list of existing web scenarios is displayed. From the dropdown to the right in the *Scenarios* bar you can choose whether to display all web scenarios or only those belonging to one particular group and host. Additionally you can choose to hide disabled scenarios (or show them again) by clicking on the respective link.



Displayed data:

Column	Description
Name	Name of the web scenario. Clicking on the web scenario name opens the web scenario configuration form.
Number of steps	The number of steps contained in the scenario.
Update interval	How often the scenario is performed.
Attempts	How many attempts for executing web scenario steps are performed.
Authentication	Authentication method is displayed - Basic, NTLM on None.
HTTP proxy	Displays HTTP proxy or 'No' if not used.
Application	Web scenario application is displayed.
Status	Web scenario status is displayed - *Enabled* or *Disabled*. By clicking on the status you can change it.
Info	If everything is fine, no icon is displayed in this column. If there are errors, a red square icon with a cross is displayed. Move the mouse over the icon and you will see a tooltip with the error description.

To configure a new web scenario, click on the *Create web scenario* button in the top right-hand corner.

Mass editing options

Buttons below the list offer some mass-editing options:

- *Enable* - change the scenario status to *Enabled*
- *Disable* - change the scenario status to *Disabled*
- *Clear history* - clear history and trend data for the scenarios
- *Delete* - delete the web scenarios

To use these options, mark the checkboxes before the respective web scenarios, then click on the required button.

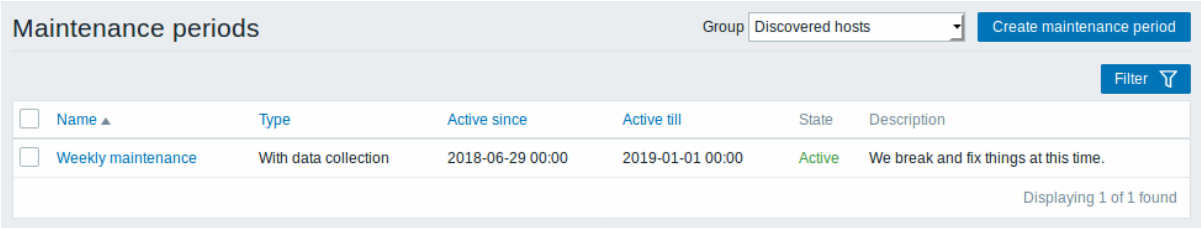
4 Maintenance

Overview

In the *Configuration* → *Maintenance* section users can configure and maintain maintenance periods for hosts.

A listing of existing maintenance periods with their details is displayed.

From the dropdown to the right in the *Maintenance periods* bar you can choose whether to display all maintenance periods or only those belonging to one particular group.



Displayed data:

Column	Description
Name	Name of the maintenance period. Clicking on the maintenance period name opens the maintenance period configuration form.
Type	The type of maintenance is displayed: *With data collection* or *No data collection*
Active since	The date and time when executing maintenance periods becomes active.
Active till	The date and time when executing maintenance periods stops being active.
State	The state of the maintenance period: **Approaching** - will become active soon **Active** - is active **Expired** - is not active any more
Description	Description of the maintenance period is displayed.

Name, *Type*, *Active since* and *Active till* are sortable columns that can be sorted in ascending/descending order. To sort, click on the column name.

To configure a new maintenance period, click on the *Create maintenance period* button in the top right-hand corner.

Mass editing options

A button below the list offers one mass-editing option:

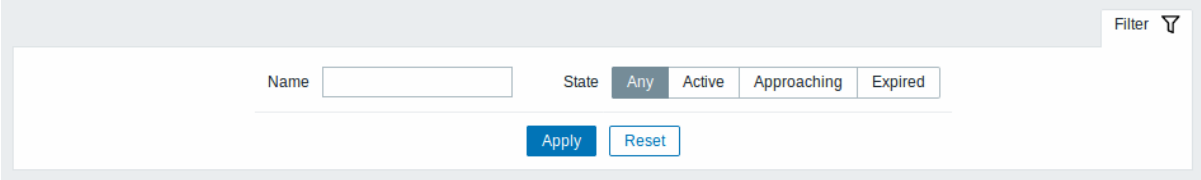
- *Delete* - delete the maintenance periods

To use this option, mark the checkboxes before the respective maintenance periods and click on *Delete*.

Filter

As the list may contain a number of maintenance periods, it may be needed to filter out the ones you really need.

The *Filter* link is available above the list of maintenance periods. If you click on it, a filter becomes available where you can filter maintenance periods by name and state.



5 Actions

Overview

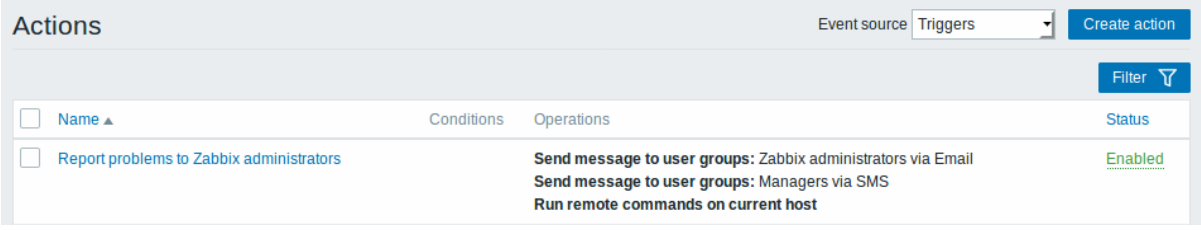
In the *Configuration* → *Actions* section users can configure and maintain actions.

A listing of existing actions with their details is displayed. The actions displayed are actions assigned to the selected event source (triggers, discovery, auto-registration).

To view actions assigned to a different event source, change the source from the dropdown to the right in the *Actions* bar.

For users without Super-admin rights actions are displayed according to permission settings. That means in some cases a user without Super-admin rights isn't able to view the complete action list because of certain permission restrictions. An action is displayed to the user without Super-admin rights if the following conditions are fulfilled:

- The user has read-write access to host groups, hosts, templates and triggers in action conditions
- The user has read-write access to host groups, hosts and templates in action operations, recovery operations and update operations
- The user has read access to user groups and users in action operations, recovery operations and update operations



Displayed data:

Column	Description
Name	Name of the action. Clicking on the action name opens the action configuration form.
Conditions	Action conditions are displayed.
Operations	Action operations are displayed. Since Zabbix 2.2, the operation list also displays the media type (e-mail, SMS or script) used for notification as well as the name and surname (in parentheses after the alias) of a notification recipient. Action operation can both be a notification or a remote command depending on the selected type of operation.
Status	Action status is displayed - *Enabled* or *Disabled*. By clicking on the status you can change it. See the Escalations section for more details as to what happens if an action is disabled during an escalation in progress.

To configure a new action, click on the *Create action* button in the top right-hand corner.

Mass editing options

Buttons below the list offer some mass-editing options:

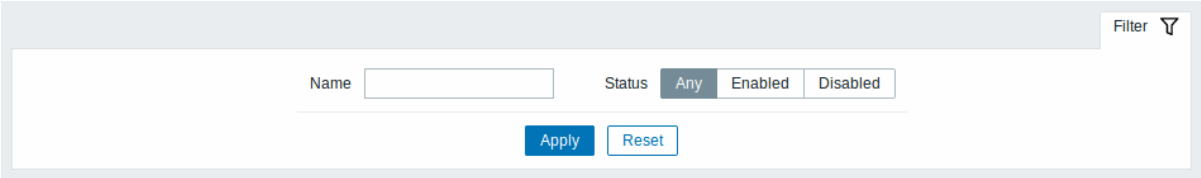
- *Enable* - change the action status to *Enabled*
- *Disable* - change the action status to *Disabled*
- *Delete* - delete the actions

To use these options, mark the checkboxes before the respective actions, then click on the required button.

Filter

As the list may contain a number of actions, it may be needed to filter out the ones you really need.

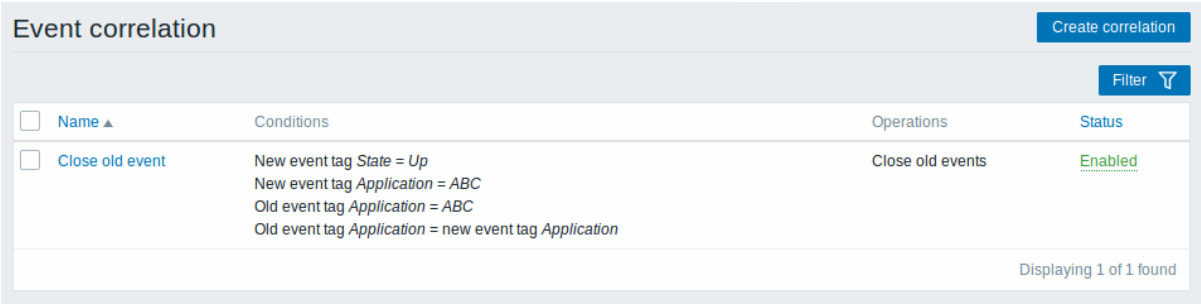
The *Filter* link is available above the list of actions. If you click on it, a filter becomes available where you can filter actions by name and status.



6 Event correlation

Overview

In the *Configuration* → *Event correlation* section users can configure and maintain global correlation rules for Zabbix events.



Displayed data:

Column	Description
Name	Name of the correlation rule. Clicking on the correlation rule name opens the rule configuration form.
Conditions	Correlation rule conditions are displayed.
Operations	Correlation rule operations are displayed.

Column	Description
Status	Correlation rule status is displayed - *Enabled* or *Disabled*. By clicking on the status you can change it.

To configure a new correlation rule, click on the *Create correlation* button in the top right-hand corner.

Mass editing options

Buttons below the list offer some mass-editing options:

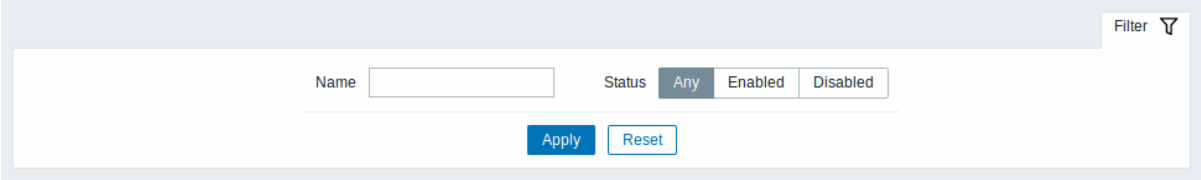
- *Enable* - change the correlation rule status to *Enabled*
- *Disable* - change the correlation rule status to *Disabled*
- *Delete* - delete the correlation rules

To use these options, mark the checkboxes before the respective correlation rules, then click on the required button.

Filter

As the list may contain a number of correlation rules, it may be needed to filter out the ones you really need.

The *Filter* link is available above the list of correlation rules. If you click on it, a filter becomes available where you can filter correlation rules by name and status.

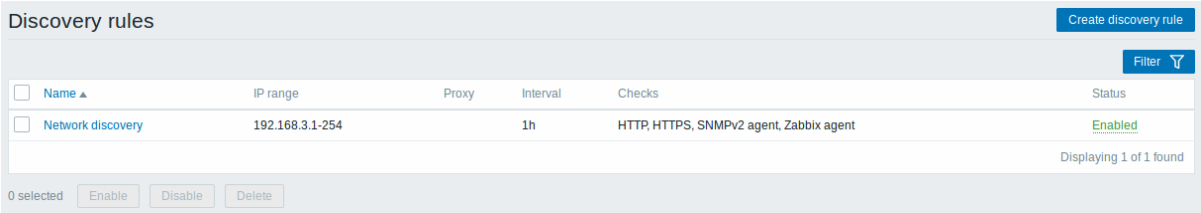


7 Discovery

Overview

In the *Configuration* → *Discovery* section users can configure and maintain discovery rules.

A listing of existing discovery rules with their details is displayed.



Displayed data:

Column	Description
Name	Name of the discovery rule. Clicking on the discovery rule name opens the discovery rule configuration form.
IP range	The range of IP addresses to use for network scanning is displayed.
Proxy	The proxy name is displayed, if discovery is performed by the proxy.
Interval	The frequency of performing discovery displayed.
Checks	The types of checks used for discovery are displayed.
Status	Action status is displayed - *Enabled* or *Disabled*. By clicking on the status you can change it.

To configure a new discovery rule, click on the *Create discovery rule* button in the top right-hand corner.

Mass editing options

Buttons below the list offer some mass-editing options:

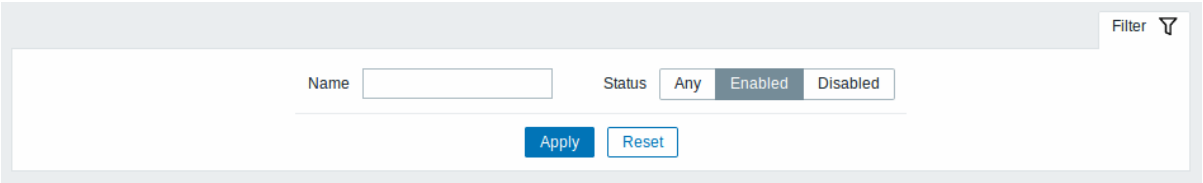
- *Enable* - change the discovery rule status to *Enabled*
- *Disable* - change the discovery rule status to *Disabled*
- *Delete* - delete the discovery rules

To use these options, mark the checkboxes before the respective discovery rules, then click on the required button.

Filter

As the list may contain a number of discovery rules, it may be needed to filter out the ones you really need.

The *Filter* link is available above the list of discovery rules. If you click on it, a filter becomes available where you can filter discovery rules by name and status.



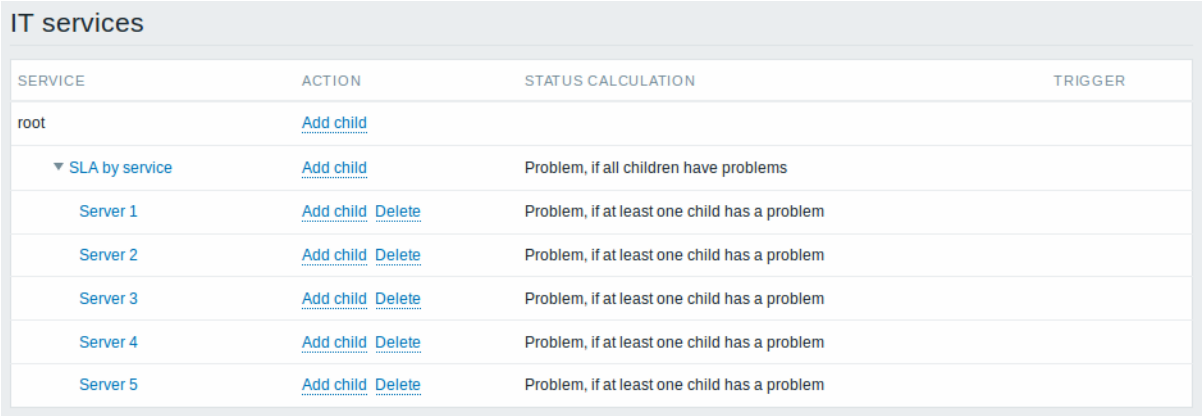
8 Services

Overview

In the *Configuration* → *Services* section users can configure and maintain an IT services hierarchy.

When you first open this section it only contains a *root* entry.

You can use it as a starting point of building the hierarchy of monitored infrastructure. Click on *Add child* to add services and then other services below the ones you have added.



For details on adding services, see the Service monitoring section.

5 Administration

Overview

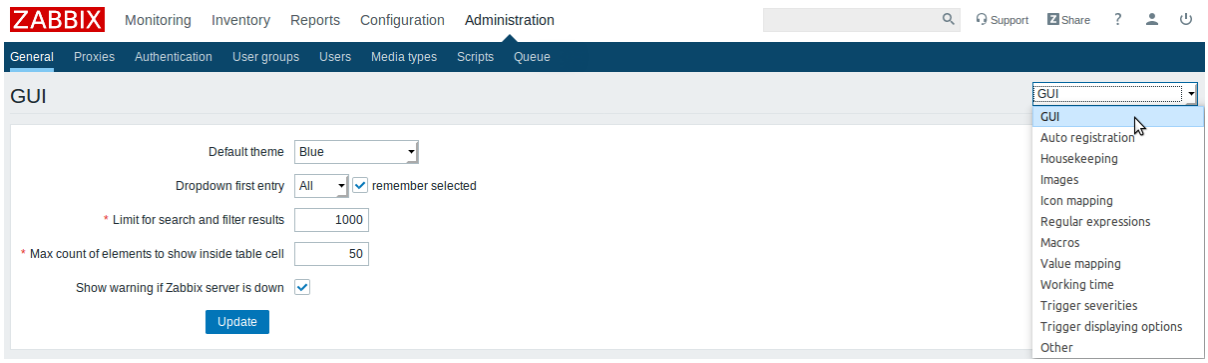
The Administration menu is for administrative functions of Zabbix. This menu is available to users of Super Administrators type only.

1 General

Overview

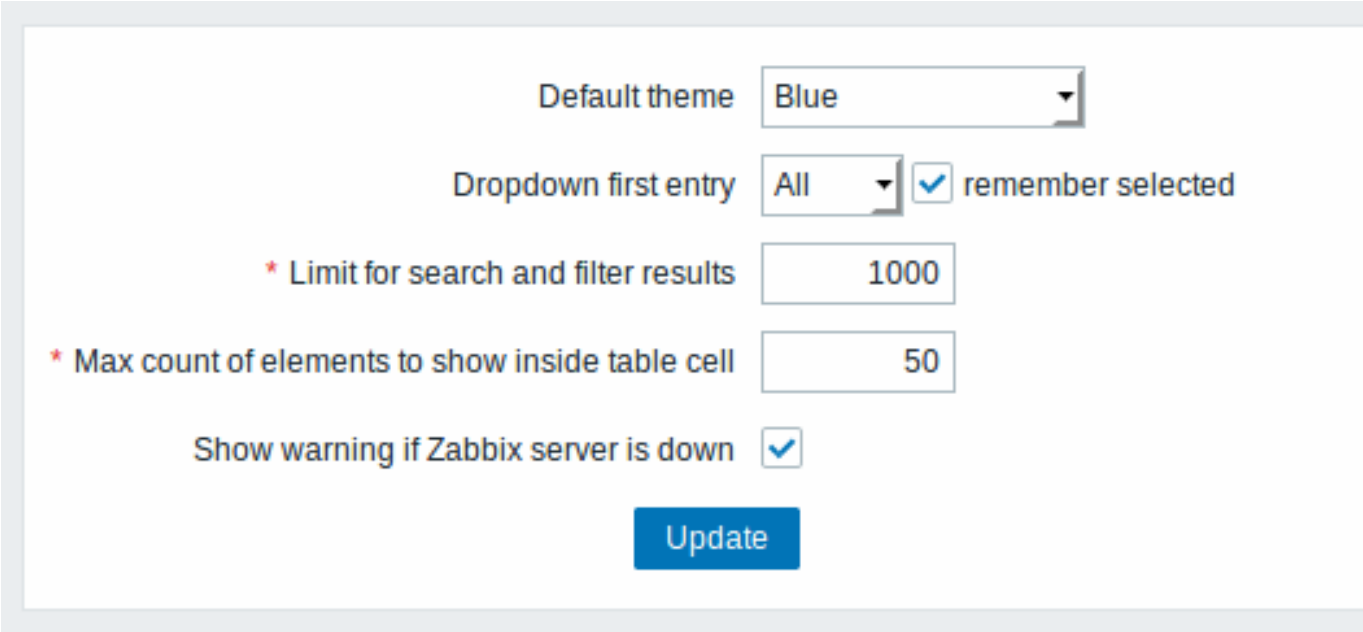
The *Administration* → *General* section contains a number of screens for setting frontend-related defaults and customizing Zabbix.

The dropdown to the right allows you to switch between different configuration screens.



1 GUI

This screen provides customization of several frontend-related defaults.

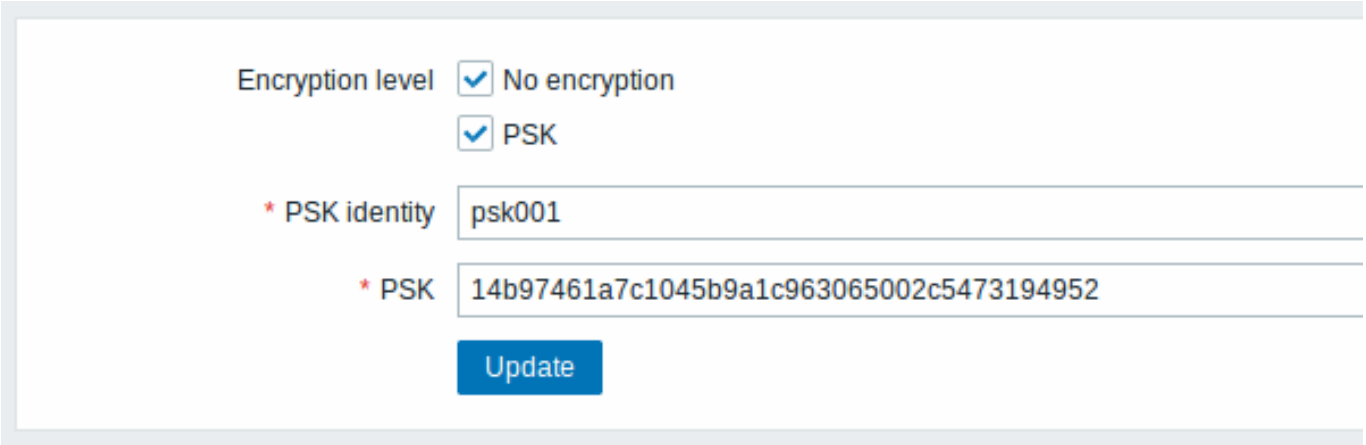


Configuration parameters:

Parameter	Description
Default theme	Default theme for users who have not set a specific one in their profiles.
Dropdown first entry	Whether first entry in element selection dropdowns should be *All* or *None*. With *remember selected* checked, the last selected element in the dropdown will be remembered (instead of the default) when navigating to another page.
Limit for search and filter results	Maximum amount of elements (rows) that will be displayed in a web-interface list, like, for example, in *Configuration* → *Hosts*. *Note*: If set to, for example, '50', only the first 50 elements will be displayed in all affected frontend lists. If some list contains more than fifty elements, the indication of that will be the '+' sign in *"Displaying 1 to 50 of **50+** found"*. Also, if filtering is used and still there are more than 50 matches, only the first 50 will be displayed.
Max count of elements to show inside table cell	For entries that are displayed in a single table cell, no more than configured here will be shown.
Show warning if Zabbix server is down	This parameter enables a warning message to be displayed in the browser window if Zabbix server cannot be reached (may be down). The message remains visible even if the user scrolls down the page. If the mouse is moved over it, the message is temporarily hidden to reveal the contents below. This parameter is supported since Zabbix 2.0.1.

2 Auto registration

In this screen you can configure the encryption level for active agent autoregistration.



Parameters marked with an asterisk are mandatory.

Configuration parameters:

Parameter	Description
Encryption level	Select one or both options for encryption level: **No encryption** - unencrypted connections are allowed **PSK** - TLS encrypted connections with a pre-shared key are allowed
PSK identity	Enter the pre-shared key identity string. This field is only available if 'PSK' is selected as *Encryption level*. Do not put sensitive information in the PSK identity, it is transmitted unencrypted over the network to inform a receiver which PSK to use.
PSK	Enter the pre-shared key (an even number of hexadecimal characters). Maximum length: 512 hex-digits (256-byte PSK) if Zabbix uses GnuTLS or OpenSSL library, 64 hex-digits (32-byte PSK) if Zabbix uses mbed TLS (PolarSSL) library. Example: 1f87b595725ac58dd977beef14b97461a7c1045b9a1c963065002c5473194952 This field is only available if 'PSK' is selected as *Encryption level*.

See also: Secure autoregistration

3 Housekeeper

The housekeeper is a periodical process, executed by Zabbix server. The process removes outdated information and information deleted by user.

Events and alerts

Enable internal housekeeping ☑

* Trigger data storage period: 365d

* Internal data storage period: 1d

* Network discovery data storage period: 1d

* Auto-registration data storage period: 1d

Services

Enable internal housekeeping ☑

* Data storage period: 365d

Audit

Enable internal housekeeping ☑

* Data storage period: 365d

User sessions

Enable internal housekeeping ☑

* Data storage period: 365d

History

Enable internal housekeeping ☑

Override item history period ☐

* Data storage period: 90d

Trends

Enable internal housekeeping ☑

Override item trend period ☐

* Data storage period: 365d

Update | Reset defaults

In this section housekeeping tasks can be enabled or disabled on a per-task basis separately for: events and alerts/IT services/audit/user sessions/history/trends. If housekeeping is enabled, it is possible to set for how many days data records will be kept before being removed by the housekeeper.

Deleting an item/trigger will also delete problems generated by that item/trigger.

Also, an event will only be deleted by the housekeeper if it is not associated with a problem in any way. This means that if an event is either a problem or recovery event, it will not be deleted until the related problem record is removed. The housekeeper will delete problems first and events after, to avoid potential problems with stale events or problem records.

For history and trends an additional option is available: *Override item history period* and *Override item trend period*. This option allows to globally set for how many days item history/trends will be kept, in this case overriding the values set for individual items in *History storage period/Trend storage period* fields in item configuration.

It is possible to override the history/trend storage period even if internal housekeeping is disabled. Thus, when using an external housekeeper, the history storage period could be set using the history *Data storage period* field.

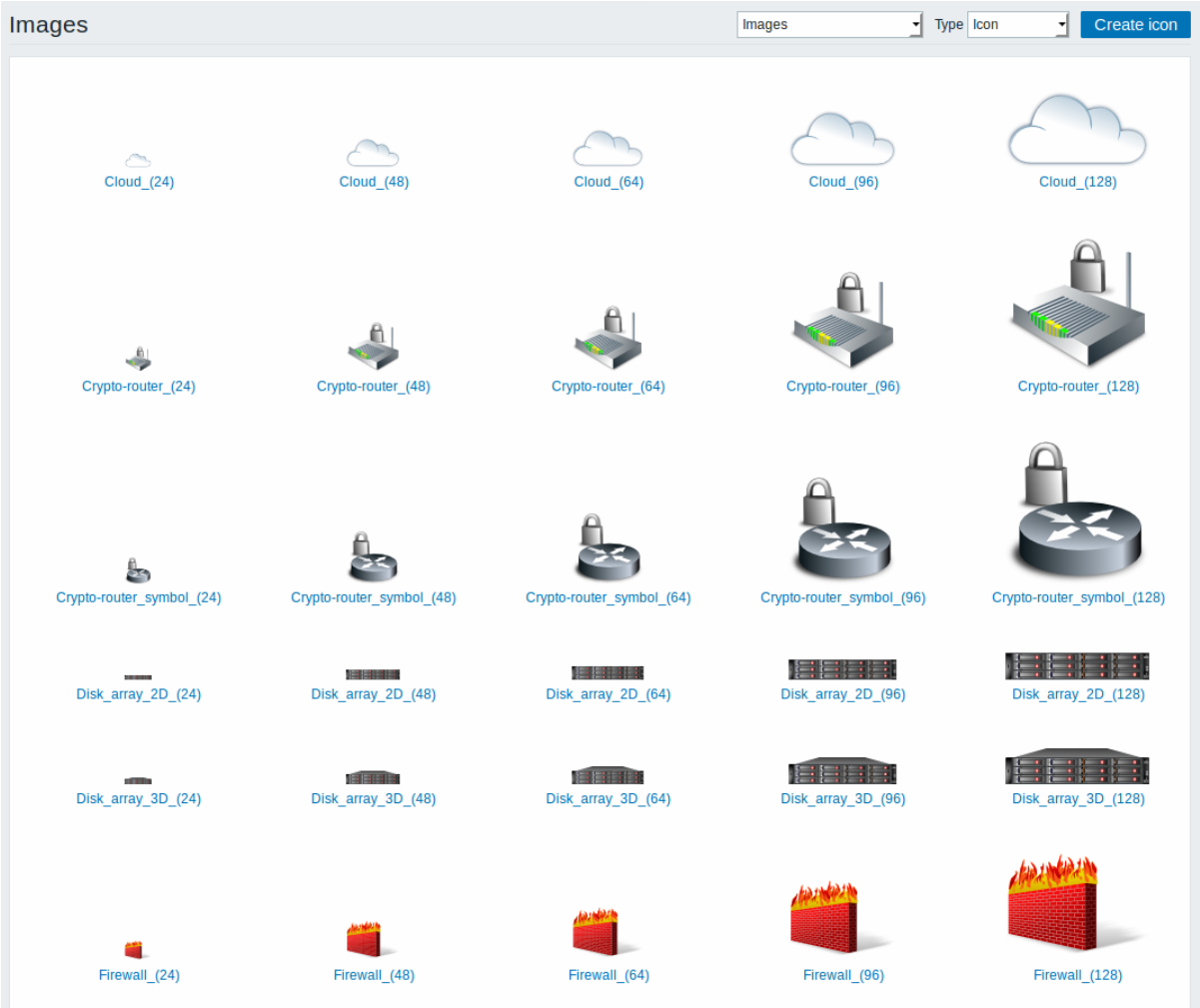
Attention:
If using TimescaleDB, in order to take full advantage of TimescaleDB automatic partitioning of history and trends tables, *Override item history period* and *Override item trend period* options must be enabled. Otherwise the data kept in these tables will still be stored in partitions, however, the housekeeper will be cleaning the history and trends by deleting individual records rather than by dropping outdated partitions.

Time suffixes are supported in the period fields, e.g. 1d (one day), 1w (one week). Minimum is 1 day (1 hour for history), maximum 25 years.

Reset defaults button allows to revert any changes made.

4 Images

The Images section displays all the images available in Zabbix. Images are stored in the database.



The *Type* dropdown allows you to switch between icon and background images:

- Icons are used to display network map elements

- Backgrounds are used as background images of network maps

Adding image

You can add your own image by clicking on the *Create icon* or *Create background* button in the top right corner.

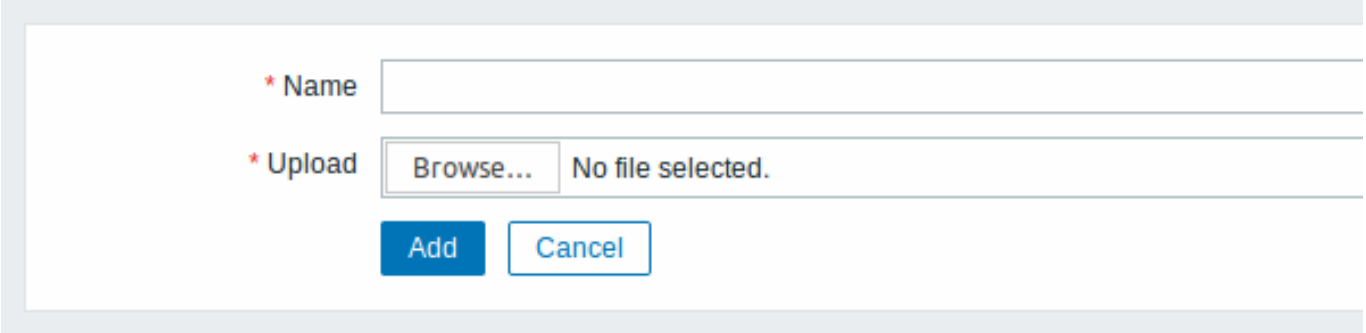


Image attributes:

Parameter	Description
Name	Unique name of an image.
Upload	Select the file (PNG, JPEG, GIF) from a local system to be uploaded to Zabbix. *Note* that it may be possible to upload other formats that will be converted to PNG during upload. GD library is used for image processing, therefore formats that are supported depend on the library version used (2.0.28 or higher is required by Zabbix).

Note:
Maximum size of the upload file is limited by value of ZBX_MAX_IMAGE_SIZE that is 1024x1024 bytes or 1 MB.

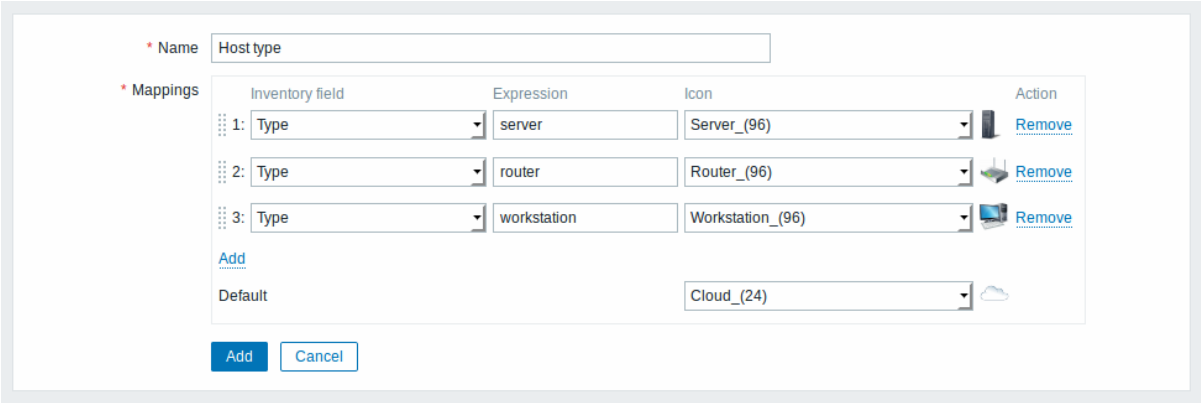
The upload of an image may fail if the image size is close to 1 MB and the `max_allowed_packet` MySQL configuration parameter is at a default of 1MB. In this case, increase the max_allowed_packet parameter.

5 Icon mapping

This section allows to create the mapping of certain hosts with certain icons. Host inventory field information is used to create the mapping.

The mappings can then be used in network map configuration to assign appropriate icons to matching hosts automatically.

To create a new icon map, click on *Create icon map* in the top right corner.



Configuration parameters:

Parameter	Description
Name	Unique name of icon map.
Mappings	A list of mappings. The order of mappings determines which one will have priority. You can move mappings up and down the list with drag-and-drop.

Parameter	Description
Inventory field	Host inventory field that will be looked into to seek a match.
Expression	Regular expression describing the match.
Icon	Icon to use if a match for the expression is found.
Default	Default icon to use.

6 Regular expressions

This section allows to create custom regular expressions that can be used in several places in the frontend. See Regular expressions section for details.

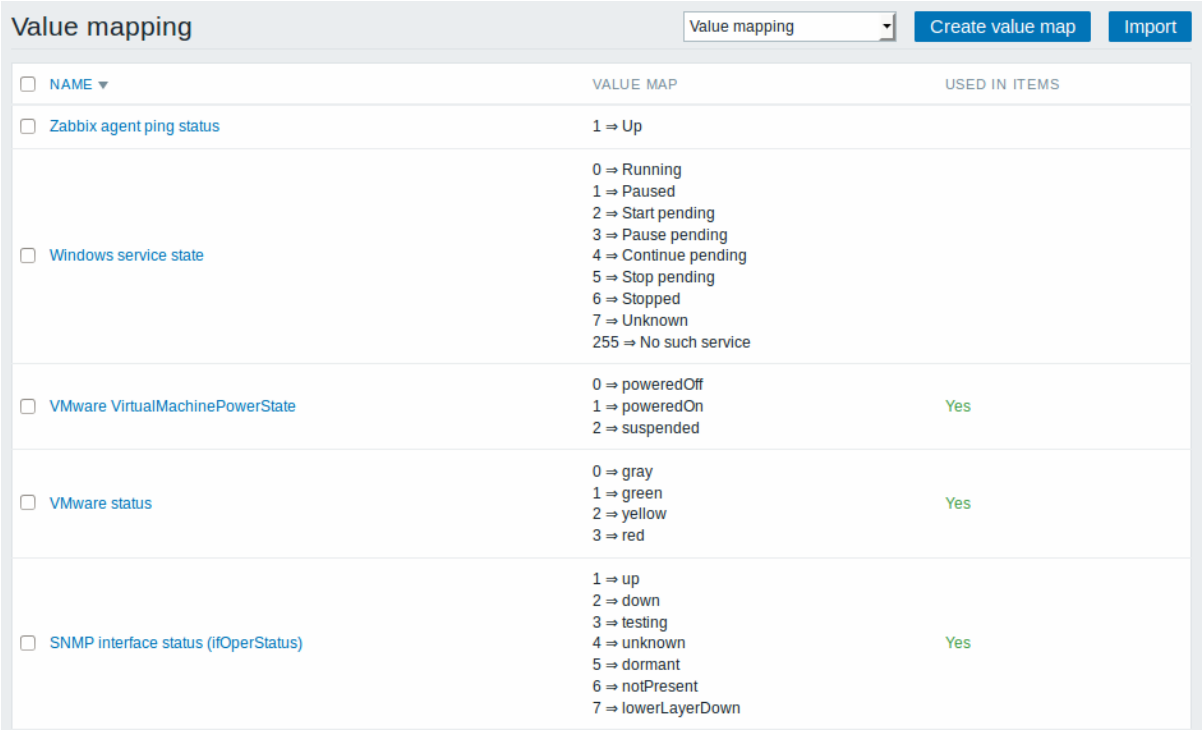
7 Macros

This section allows to define system-wide macros as macro-value pairs. Adding a description is also supported.

See User macros section for more details.

8 Value mapping

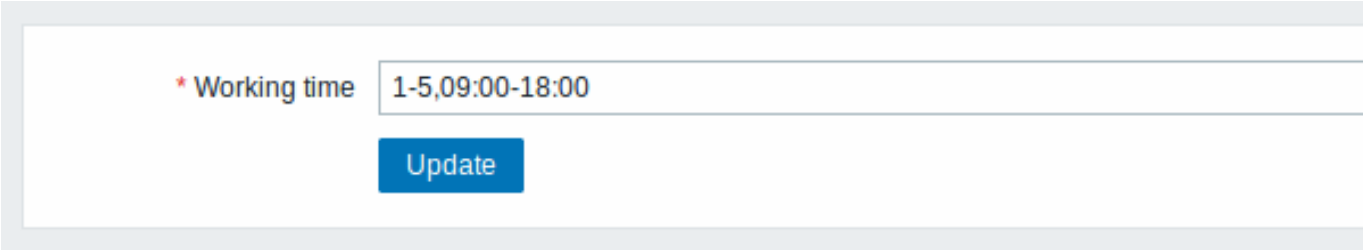
This section allows to manage value maps that are useful for human-readable representation of incoming data in Zabbix frontend.



See Value mapping section for more details.

9 Working time

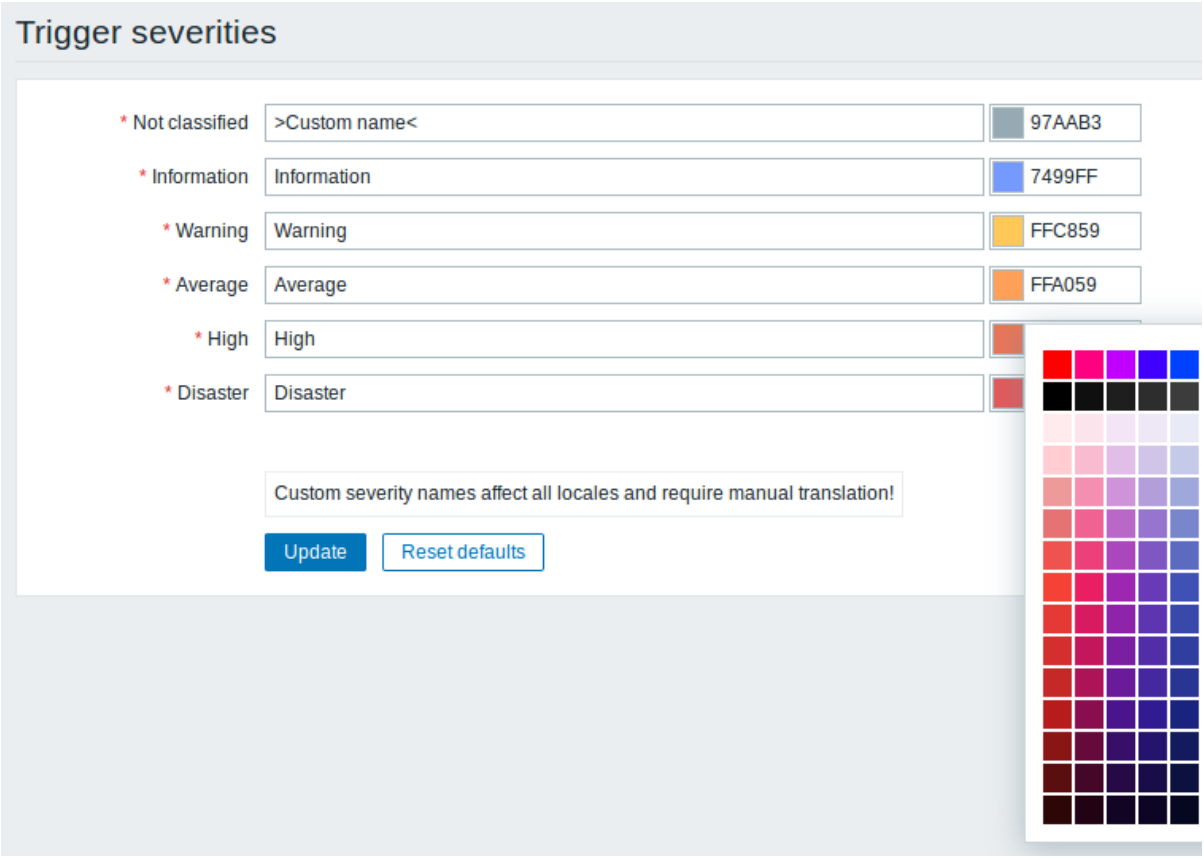
Working time is system-wide parameter, which defines working time. Working time is displayed as a white background in graphs, while non-working time is displayed in grey.



See Time period specification page for description of the time format. User macros are supported (since Zabbix 3.4.0).

10 Trigger severities

This section allows to customize trigger severity names and colors.

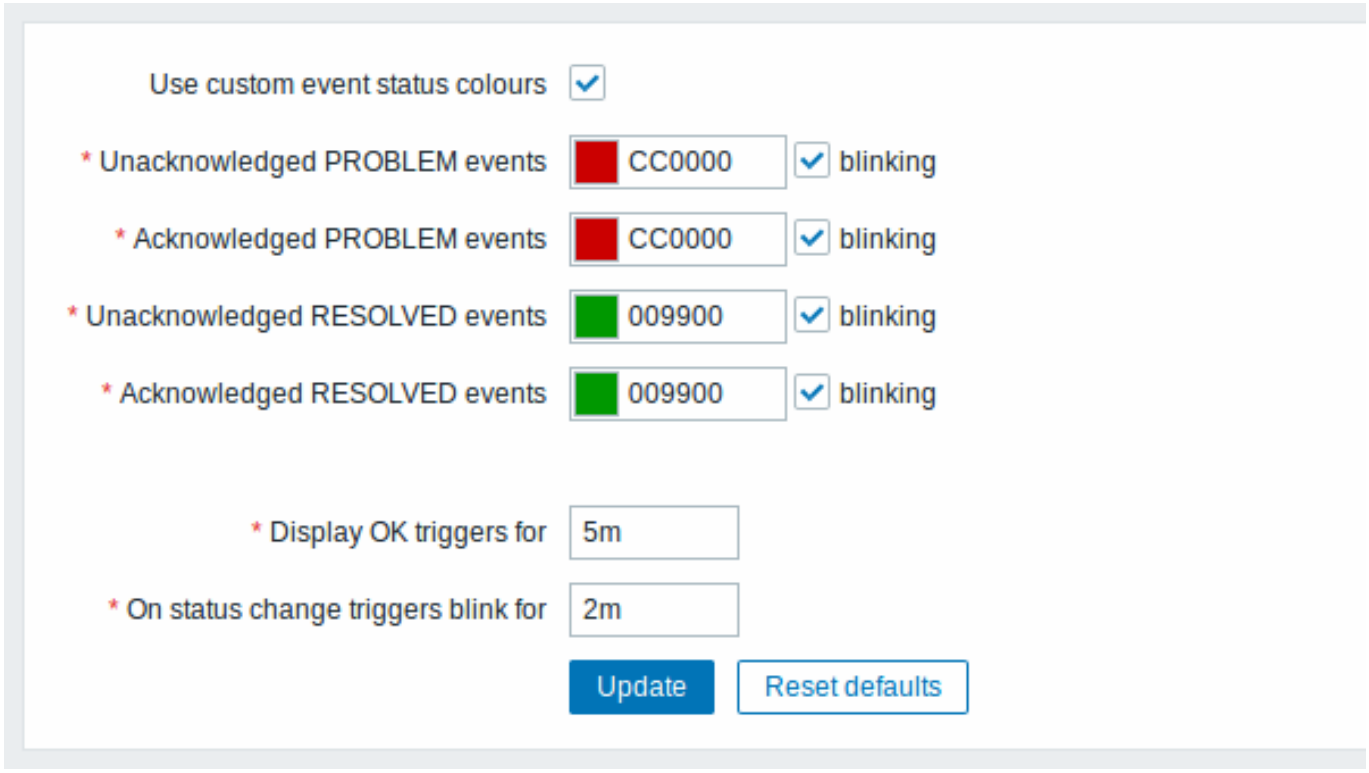


You can enter new names and color codes or click on the color to select another from the provided palette.

See Customising trigger severities page for more information.

11 Trigger displaying options

This section allows to customize how trigger status is displayed in the frontend.

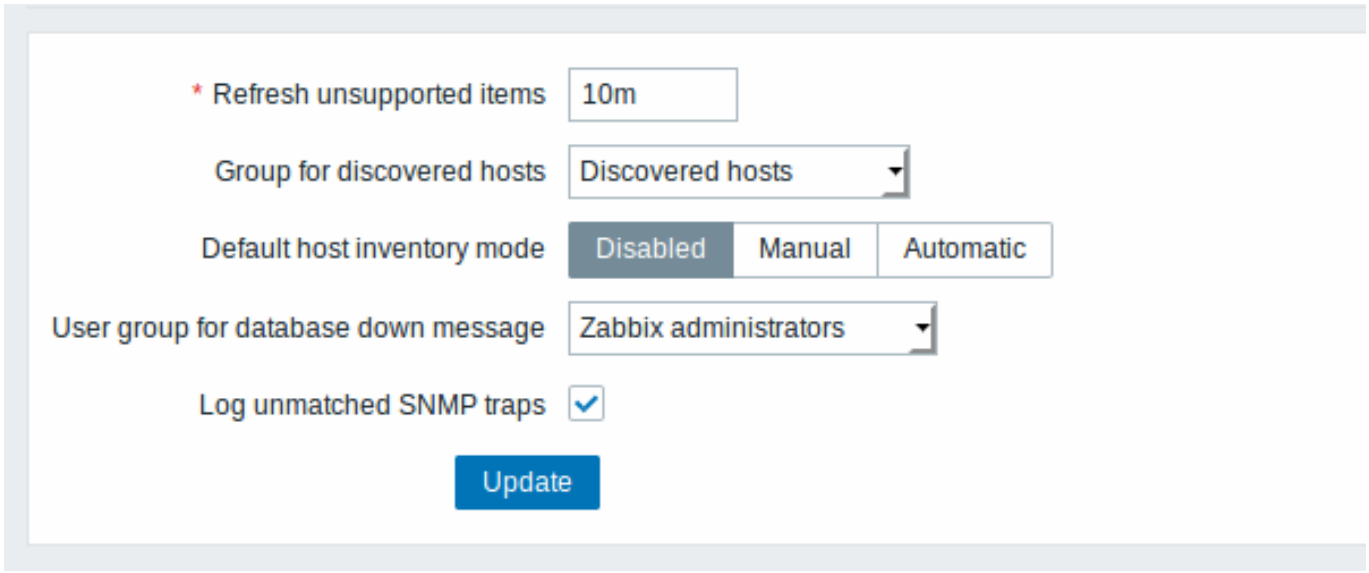


The *Use custom event status colours* option allows to turn on the customization of colours for acknowledged/unacknowledged problems.

Also the time period for displaying OK triggers and for blinking upon trigger status change can be customized. The maximum value is 86400 seconds (24 hours). Time suffixes are supported in the period fields, e.g. 5m, 2h, 1d.

12 Other parameters

This section allows to configure several other frontend parameters.



Parameter	Description
Refresh unsupported items	Some items may become unsupported due to errors in user parameters or because of an item not being supported by agent. Zabbix can be configured to periodically make unsupported items active. Zabbix server will activate unsupported item every N period set here (1 day maximum). If set to 0, the automatic activation will be disabled. Note that the first attempt to reactivate the unsupported item may occur earlier than the value configured here. Time suffixes are supported, e.g. 60s, 5m, 2h, 1d. The configured value also applies to how often Zabbix proxies reactivate unsupported items. This value is limited for active checks as it only postpones the item inclusion into the list of active checks, while afterwards the agent will poll that item according to the previously scheduled update interval. This value is not taken into account when items become unsupported because of a failed preprocessing step or data normalization.
Group for discovered hosts	Hosts discovered by network discovery and agent auto-registration will be automatically placed in the host group, selected here.

Parameter	Description	
Default host inventory mode	Default mode for host inventory. It will be followed whenever a new host or host prototype is created by server or frontend, unless overriden during host discovery/auto registration by the //Set host inventory mode *operation.* | |User group for database down message//	User group for sending alarm message or 'None'. Zabbix server depends on the availability of backend database. It cannot work without a database. If the database is down, selected users can be notified by Zabbix. Notifications will be sent to the user group set here using all configured user media en-

Parameter	Description
Log unmatched SNMP traps	Log SNMP trap if no corresponding SNMP interfaces have been found.

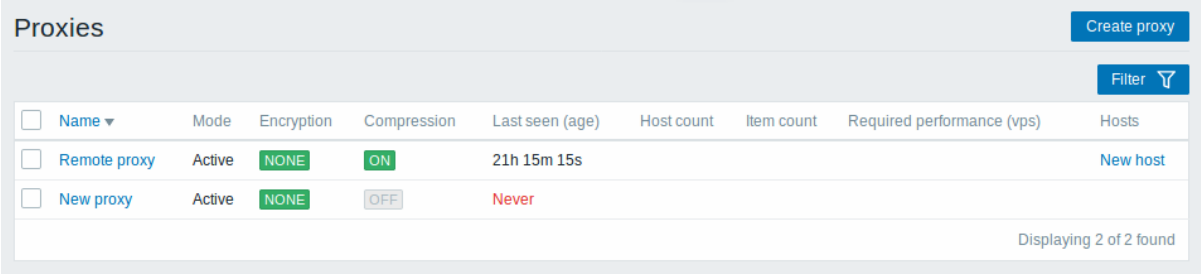
2 Proxies

Overview

In the *Administration* → *Proxies* section proxies for distributed monitoring can be configured in the Zabbix frontend.

Proxies

A listing of existing proxies with their details is displayed.



Displayed data:

Column	Description
Name	Name of the proxy. Clicking on the proxy name opens the proxy configuration form.
Mode	Proxy mode is displayed - *Active* or *Passive*.
Encryption	Encryption status for connections from the proxy is displayed: **None** - no encryption **PSK** - using pre-shared key **Cert** - using certificate
Last seen (age)	The time when the proxy was last seen by the server is displayed.
Host count	The number of enabled hosts assigned to the proxy is displayed.
Item count	The number of enabled items on enabled hosts assigned to the proxy is displayed.
Required performance (vps)	Required proxy performance is displayed (the number of values that need to be collected per second).
Hosts	All hosts monitored by the proxy are listed. Clicking on the host name opens the host configuration form.

To configure a new proxy, click on the *Create proxy* button in the top right-hand corner.

Mass editing options

Buttons below the list offer some mass-editing options:

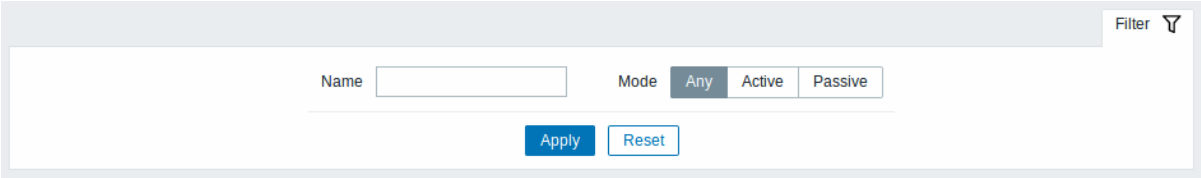
- *Enable hosts* - change the status of hosts monitored by the proxy to *Monitored*
- *Disable hosts* - change the status of hosts monitored by the proxy to *Not monitored*
- *Delete* - delete the proxies

To use these options, mark the checkboxes before the respective proxies, then click on the required button.

Filter

As the list may contain many proxies, it may be needed to filter out the ones you really need.

The *Filter* link is available above the list of proxies. If you click on it, a filter becomes available where you can filter proxies by name and mode.

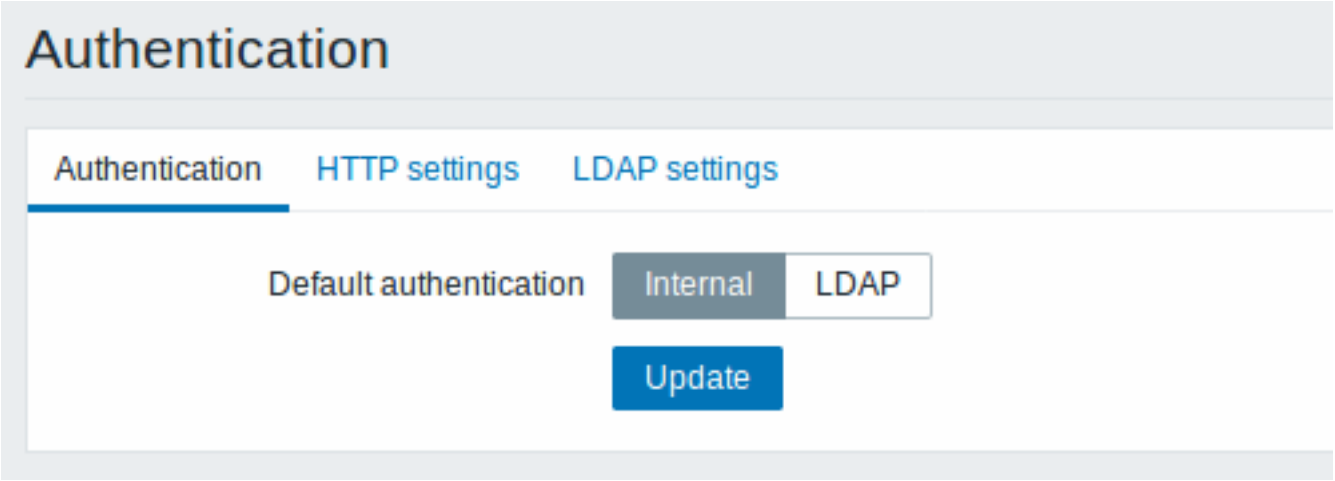


3 Authentication

Overview

In *Administration* → *Authentication* the global user authentication method to Zabbix can be specified. The available methods are internal, HTTP and LDAP authentication.

Note that the authentication method can be fine-tuned on the user group level.



By default, internal Zabbix authentication is used globally. To change:

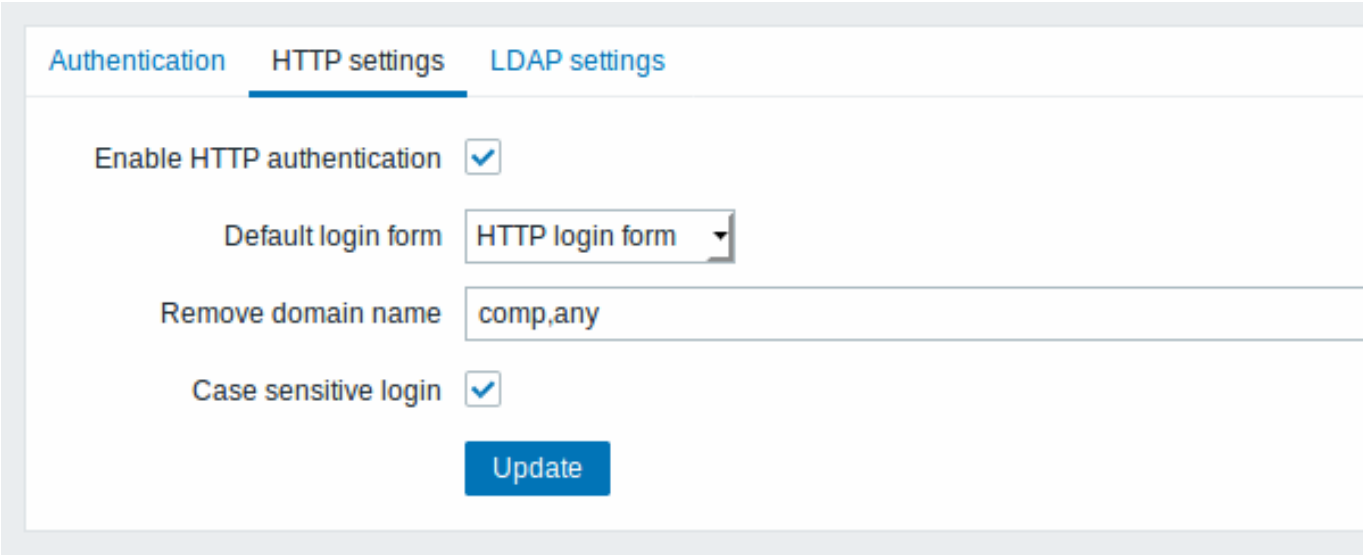
- to HTTP - navigate to the *HTTP settings* tab and enter authentication details;
- to LDAP - select LDAP as *Default authentication* and enter authentication details in the *LDAP settings* tab.

When done, click on *Update* at the bottom of the form.

HTTP authentication

HTTP or web server-based authentication (for example: Basic Authentication, NTLM/Kerberos) can be used to check user names and passwords. Note that a user must exist in Zabbix as well, however its Zabbix password will not be used.

Attention:
Be careful! Make sure that web server authentication is configured and works properly before switching it on.



Configuration parameters:

Parameter	Description
Enable HTTP authentication	Mark the checkbox to enable HTTP authentication.
Default login form	Specify whether to direct non-authenticated users to: **Zabbix login form** - standard Zabbix login page. **HTTP login form** - HTTP login page. It is recommended to enable web-server based authentication for the `index_http.php` page only. If *Default login form* is set to 'HTTP login page' the user will be logged in automatically if web server authentication module will set valid user login in the `$_SERVER` variable. Supported `$_SERVER` keys are `PHP_AUTH_USER`, `REMOTE_USER`, `AUTH_USER`.
Remove domain name	A comma-delimited list of domain names that should be removed from the username. E.g. `comp,any` - if username is 'Admin@any', 'comp\Admin', user will be logged in as 'Admin'; if username is 'notacompany\Admin', login will be denied.
Case sensitive login	Unmark the checkbox to disable case-sensitive login (enabled by default) for usernames. E.g. disable case-sensitive login and log in with, for example, 'ADMIN' user even if the Zabbix user is 'Admin'. *Note* that with case-sensitive login disabled the login will be denied if multiple users exist in Zabbix database with similar alias (e.g. Admin, admin).

Note:
In case of web server authentication all users (even with frontend access set to Internal) will be authenticated by the web server, not by Zabbix!

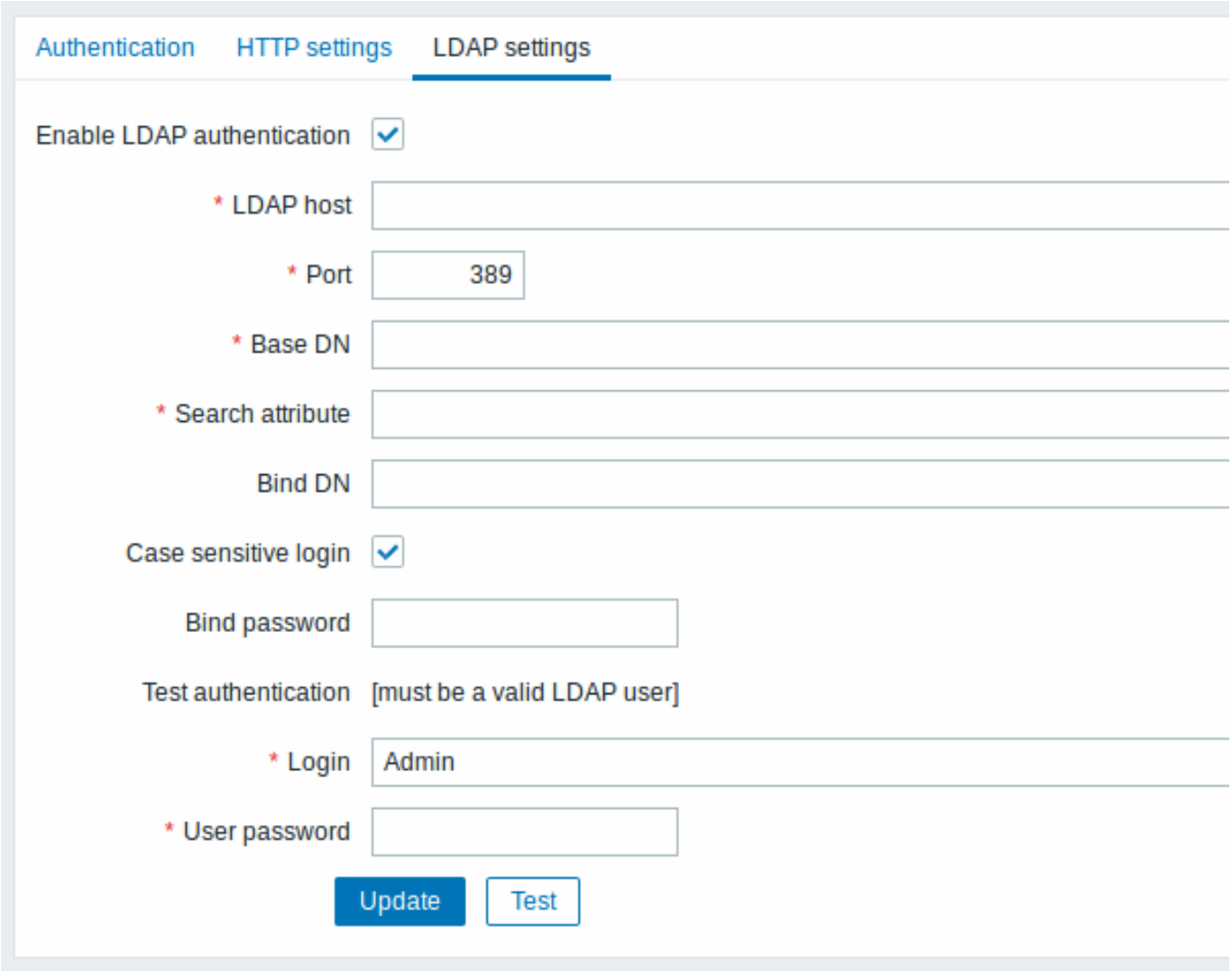
Note:
For internal users who are unable to log in using HTTP credentials (with HTTP login form set as default) leading to the 401 error, you may want to add a `ErrorDocument 401 /index.php?form=default` line to basic authentication directives, which will redirect to the regular Zabbix login form.

LDAP authentication

External LDAP authentication can be used to check user names and passwords. Note that a user must exist in Zabbix as well, however its Zabbix password will not be used.

While LDAP authentication is set globally, some user groups can still be authenticated by Zabbix. These groups must have frontend access set to Internal. Vice versa, if internal authentication is used globally, LDAP authentication details can be specified and used for specific user groups whose frontend access is set to LDAP.

Zabbix LDAP authentication works at least with Microsoft Active Directory and OpenLDAP.



Configuration parameters:

Parameter	Description
Enable LDAP authentication	Mark the checkbox to enable LDAP authentication.
LDAP host	Name of LDAP server. For example: ldap://ldap.zabbix.com For secure LDAP server use *ldaps* protocol. ldaps://ldap.zabbix.com With OpenLDAP 2.x.x and later, a full LDAP URI of the form ldap://hostname:port or ldaps://hostname:port may be used.
Port	Port of LDAP server. Default is 389. For secure LDAP connection port number is normally 636. Not used when using full LDAP URIs.
Base DN	Base path to search accounts: ou=Users,ou=system (for OpenLDAP), DC=company,DC=com (for Microsoft Active Directory)
Search attribute	LDAP account attribute used for search: uid (for OpenLDAP), sAMAccountName (for Microsoft Active Directory)
Bind DN	LDAP account for binding and searching over the LDAP server, examples: uid=ldap_search,ou=system (for OpenLDAP), CN=ldap_search,OU=user_group,DC=company,DC=com (for Microsoft Active Directory) Anonymous binding is also supported.

Parameter	Description
Case-sensitive login	Unmark the checkbox to disable case-sensitive login (enabled by default) for usernames. E.g. disable case-sensitive login and log in with, for example, 'ADMIN' user even if the Zabbix user is 'Admin'. *Note* that with case-sensitive login disabled the login will be denied if multiple users exist in Zabbix database with similar alias (e.g. Admin, admin).
Bind password	LDAP password of the account for binding and searching over the LDAP server.
Test authentication	Header of a section for testing
Login	Name of a test user (which is currently logged in the Zabbix frontend). This user name must exist in the LDAP server. Zabbix will not activate LDAP authentication if it is unable to authenticate the test user.
User password	LDAP password of the test user.

Warning:
In case of trouble with certificates, to make a secure LDAP connection (ldaps) work you may need to add a `TLS_REQCERT allow` line to the /etc/openldap/ldap.conf configuration file. It may decrease the security of connection to the LDAP catalog.

Note:
It is recommended to create a separate LDAP account (*Bind DN*) to perform binding and searching over the LDAP server with minimal privileges in the LDAP instead of using real user accounts (used for logging in the Zabbix frontend).
Such an approach provides more security and does not require changing the *Bind password* when the user changes his own password in the LDAP server.
In the table above it's *ldap_search* account name.

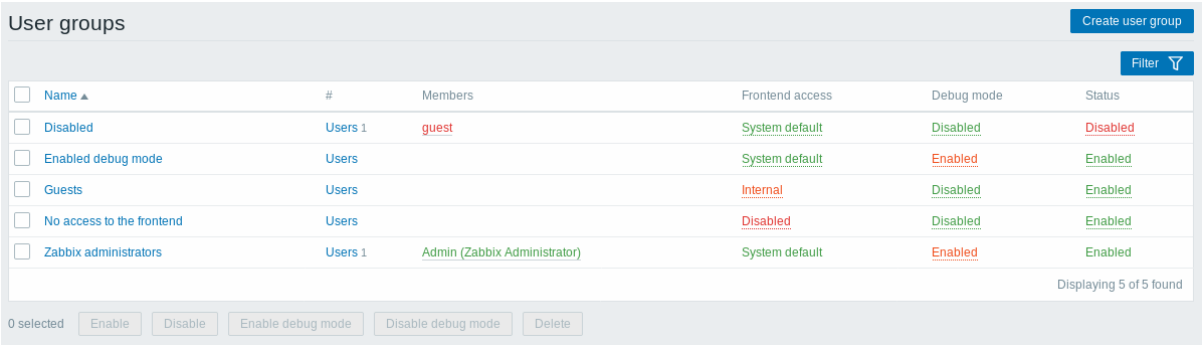
4 User groups

Overview

In the *Administration* → *User groups* section user groups of the system are maintained.

User groups

A listing of existing user groups with their details is displayed.



Displayed data:

Column	Description
Name	Name of the user group. Clicking on the user group name opens the user group configuration form.
#	The number of users in the group. Clicking on *Users* will display the respective users filtered out in the user list.
Members	Aliases of individual users in the user group (with name and surname in parentheses). Clicking on the alias will open the user configuration form. Users from disabled groups are displayed in red.

Column	Description
Frontend access	Frontend access level is displayed: **System default** - Zabbix, LDAP or HTTP authentication; depending on the chosen authentication method **Internal** - the user is authenticated by Zabbix regardless of system settings **Disabled** - frontend access for this user is disabled. By clicking on the current level you can change it.
Debug mode	Debug mode status is displayed - *Enabled* or *Disabled*. By clicking on the status you can change it.
Status	User group status is displayed - *Enabled* or *Disabled*. By clicking on the status you can change it.

To configure a new user group, click on the *Create user group* button in the top right-hand corner.

Mass editing options

Buttons below the list offer some mass-editing options:

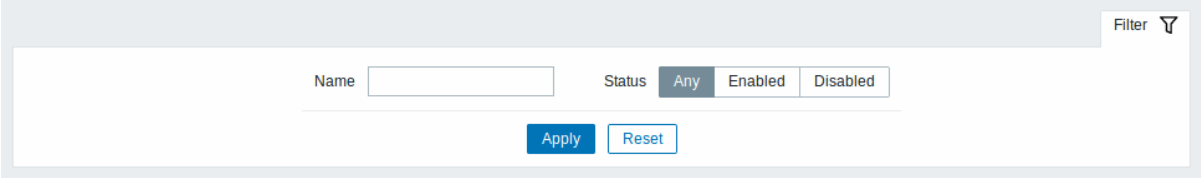
- *Enable* - change the user group status to *Enabled*
- *Disable* - change the user group status to *Disabled*
- *Enable debug mode* - enable debug mode for the user groups
- *Disable debug mode* - disable debug mode for the user groups
- *Delete* - delete the user groups

To use these options, mark the checkboxes before the respective user groups, then click on the required button.

Filter

As the list may contain many user groups, it may be needed to filter out the ones you really need.

The *Filter* link is available above the list of user groups. If you click on it, a filter becomes available where you can filter user groups by name and status.



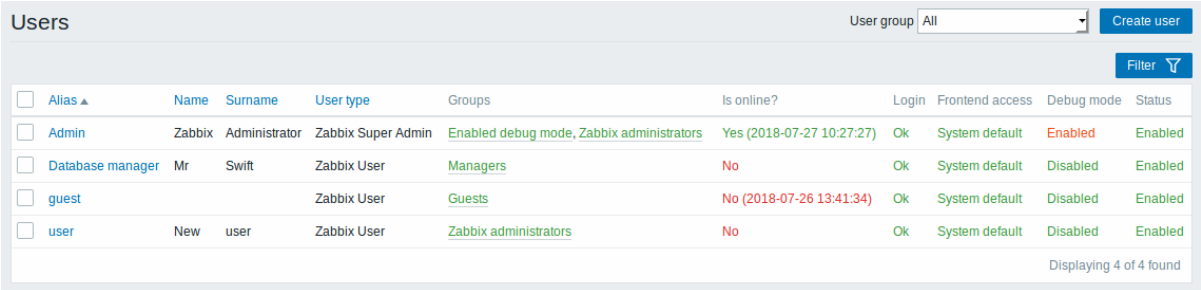
5 Users

Overview

In the *Administration* → *Users* section users of the system are maintained.

Users

A listing of existing users with their details is displayed.



From the dropdown to the right in the *Users* bar you can choose whether to display all users or those belonging to one particular group.

Displayed data:

Column	Description
Alias	Alias of the user, used for logging into Zabbix. Clicking on the alias opens the user configuration form.
Name	First name of the user.
Surname	Second name of the user.
User type	User type is displayed - *Zabbix Super Admin*, *Zabbix Admin* or *Zabbix User*.
Groups	Groups that the user is member of are listed. Clicking on the user group name opens the user group configuration form. Disabled groups are displayed in red.
Is online?	The on-line status of the user is displayed - *Yes* or *No*. The time of last user activity is displayed in parentheses.
Login	The login status of the user is displayed - *Ok* or *Blocked*. A user can become temporarily blocked upon more than five unsuccessful login attempts. By clicking on *Blocked* you can unblock the user.
Frontend access	Frontend access level is displayed - *System default*, *Internal* or *Disabled*, depending on the one set for the whole user group.
Debug mode	Debug mode status is displayed - *Enabled* or *Disabled*, depending on the one set for the whole user group.
Status	User status is displayed - *Enabled* or *Disabled*, depending on the one set for the whole user group.

To configure a new user, click on the *Create user* button in the top right-hand corner.

Mass editing options

Buttons below the list offer some mass-editing options:

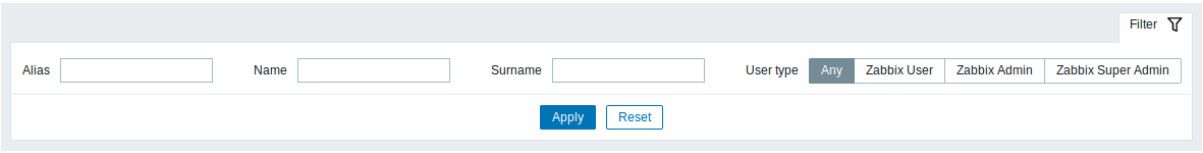
- *Unblock* - re-enable system access to blocked users
- *Delete* - delete the users

To use these options, mark the check-boxes before the respective users, then click on the required button.

Filter

As the list may contain many users, it may be needed to filter out the ones you really need.

The *Filter* link is available above the list of users. If you click on it, a filter becomes available where you can filter users by alias, name, surname and user type.



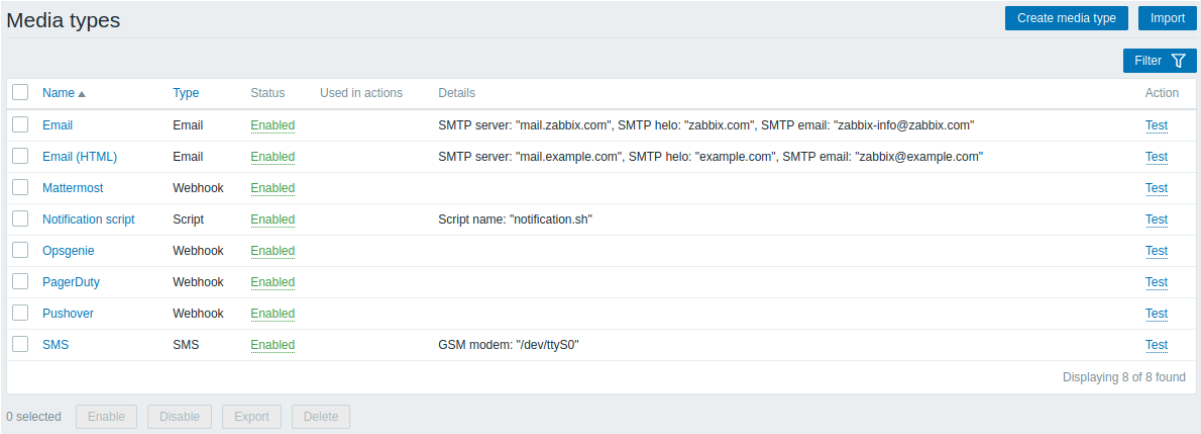
6 Media types

Overview

In the *Administration* → *Media types* section users can configure and maintain media type information.

Media type information contains general instructions for using a medium as delivery channel for notifications. Specific details, such as the individual e-mail addresses to send a notification to are kept with individual users.

A listing of existing media types with their details is displayed.



Displayed data:

Column	Description
Name	Name of the media type. Clicking on the name opens the media type configuration form.
Type	Type of the media (e-mail, SMS, etc) is displayed.
Status	Media type status is displayed - *Enabled* or *Disabled*. By clicking on the status you can change it.
Used in actions	All actions where the media type is used directly (selected in the *Send only to* dropdown) are displayed. Clicking on the action name opens the action configuration form.
Details	Detailed information of the media type is displayed.
Actions	The following action is available: **Test** - click to open a testing form where you can enter media type parameters (e.g. a recipient address with test subject and body) and send a test message to verify that the configured media type works. See also: Media type testing.

To configure a new media type, click on the *Create media type* button in the top right-hand corner.

To import a media type from XML, click on the *Import* button in the top right-hand corner.

Mass editing options

Buttons below the list offer some mass-editing options:

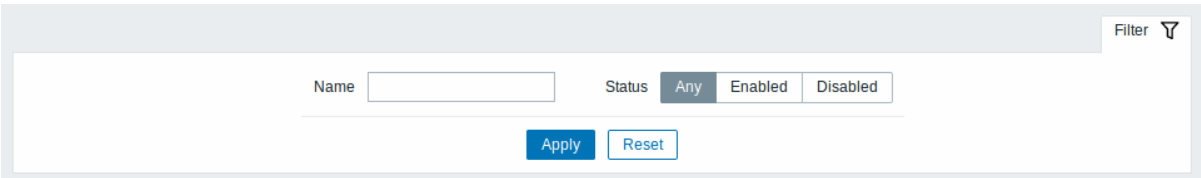
- *Enable* - change the media type status to *Enabled*
- *Disable* - change the media type status to *Disabled*
- *Export* - export the media types to an XML file
- *Delete* - delete the media types

To use these options, mark the checkboxes before the respective media types, then click on the required button.

Filter

As the list may contain a number of media types, it may be needed to filter out the ones you really need.

The *Filter* link is available above the list of media types. If you click on it, a filter becomes available where you can filter media types by name and status.



7 Scripts

Overview

In the *Administration* → *Scripts* section user-defined global scripts can be configured and maintained.

These scripts, depending on the set user permissions, then become available for execution by clicking on the host in various frontend locations (*Dashboard*, *Problems*, *Latest data*, *Maps*) and can also be run as an action operation. The scripts are executed on the Zabbix server or agent.

A listing of existing scripts with their details is displayed.

Displayed data:

Column	Description
Name	Name of the script. Clicking on the script name opens the script configuration form.
Type	Script type is displayed - *Script* or *IPMI* command.
Execute on	It is displayed whether the script will be executed on Zabbix server or agent.
Commands	All commands to be executed within the script are displayed.
User group	The user group that the script is available to is displayed (or *All* for all user groups).
Host group	The host group that the script is available for is displayed (or *All* for all host groups).
Host access	The permission level for the host group is displayed - *Read* or *Write*. Only users with the required permission level will have access to executing the script.

To configure a new script, click on the *Create script* button in the top right-hand corner.

Mass editing options

A button below the list offers one mass-editing option:

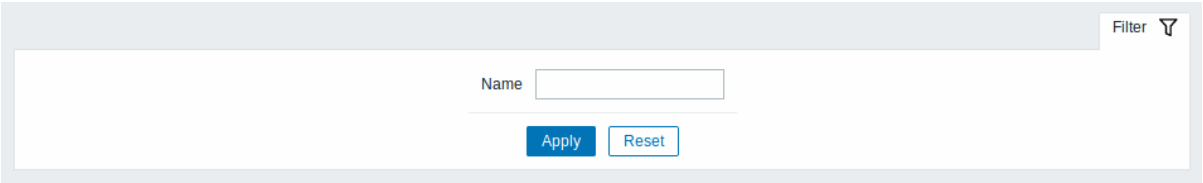
- *Delete* - delete the scripts

To use this option, mark the checkboxes before the respective scripts and click on *Delete*.

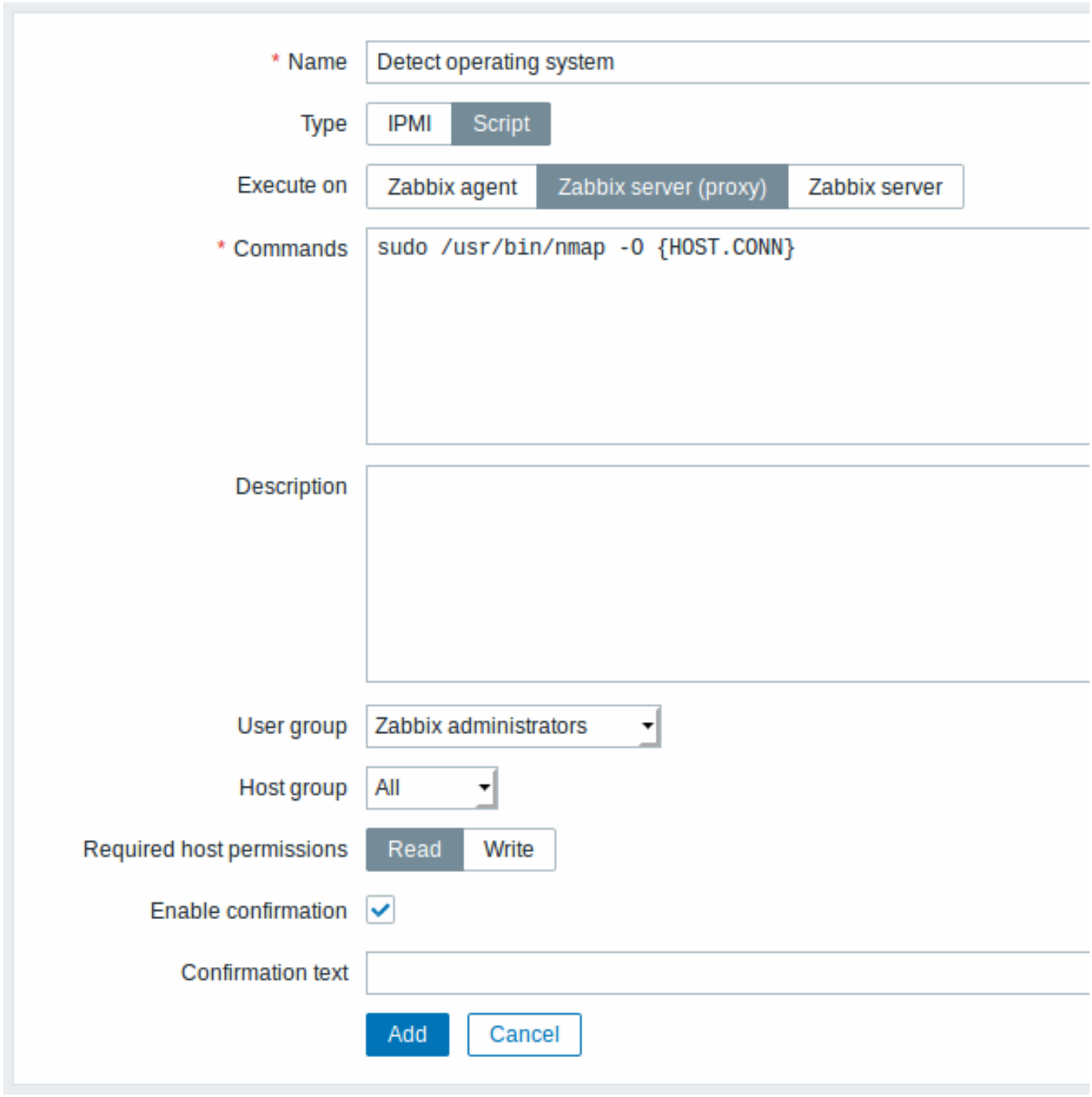
Filter

As the list may contain a number of scripts, it may be needed to filter out the ones you really need.

The *Filter* link is available above the list of scripts. If you click on it, a filter becomes available where you can filter scripts by name.



Configuring a global script



Script attributes:

Parameter	Description
Name	Unique name of the script. Since Zabbix 2.2 the name can be prefixed with the desired path, for example, `Default/`, putting the script into the respective directory. When accessing scripts through the menu in monitoring sections, they will be organized according to the given directories. A script cannot have the same name as an existing directory (and vice versa). A script name must be unique within its directory. Unescaped script names are validated for uniqueness, i.e. "Ping" and "\Ping" cannot be added in the same folder. A single backslash escapes any symbol directly after it. For example, characters '/' and '\' can be escaped by backslash, i.e. \/ or \\.
Type	Click the respective button to select script type - IPMI command or Script.

Parameter	Description
Execute on	Click the respective button to execute the script on: **Zabbix agent** - the script will be executed by Zabbix agent on the host **Zabbix server (proxy)** - the script will be executed by Zabbix server or proxy - depending on whether the host is monitored by server or proxy **Zabbix server** - the script will be executed by Zabbix server only The option to execute scripts on Zabbix agent is available since Zabbix 2.0 version (providing remote commands are enabled in the EnableRemoteCommands parameter in Zabbix agent configuration file).
Commands	Enter full path to the commands to be executed within the script. The following macros are supported in the commands: {HOST.CONN}, {HOST.IP}, {HOST.DNS}, {HOST.HOST}, {HOST.NAME}. If a macro may resolve to a value with spaces (for example, host name), don't forget to quote as needed. Since Zabbix 2.2, user macros are supported in script commands.
Description	Enter a description for the script.
User group	Select the user group that the script will be available to (or *All* for all user groups).
Host group	Select the host group that the script will be available for (or *All* for all host groups).
Required host permissions	Select the permission level for the host group - *Read* or *Write*. Only users with the required permission level will have access to executing the script.
Enable confirmation	Mark the checkbox to display a confirmation message before executing the script. This feature might be especially useful with potentially dangerous operations (like a reboot script) or ones that might take a long time.
Confirmation text	Enter a custom confirmation text for the confirmation popup enabled with the checkbox above (for example, *Remote system will be rebooted. Are you sure?*). To see how the text will look like, click on *Test confirmation* next to the field. Since Zabbix 2.2, the confirmation text will expand host name macros - {HOST.HOST}, {HOST.NAME}, host connection macros - {HOST.IP}, {HOST.DNS}, {HOST.CONN} and user macros. *Note:* The macros will not be expanded when testing the confirmation message.

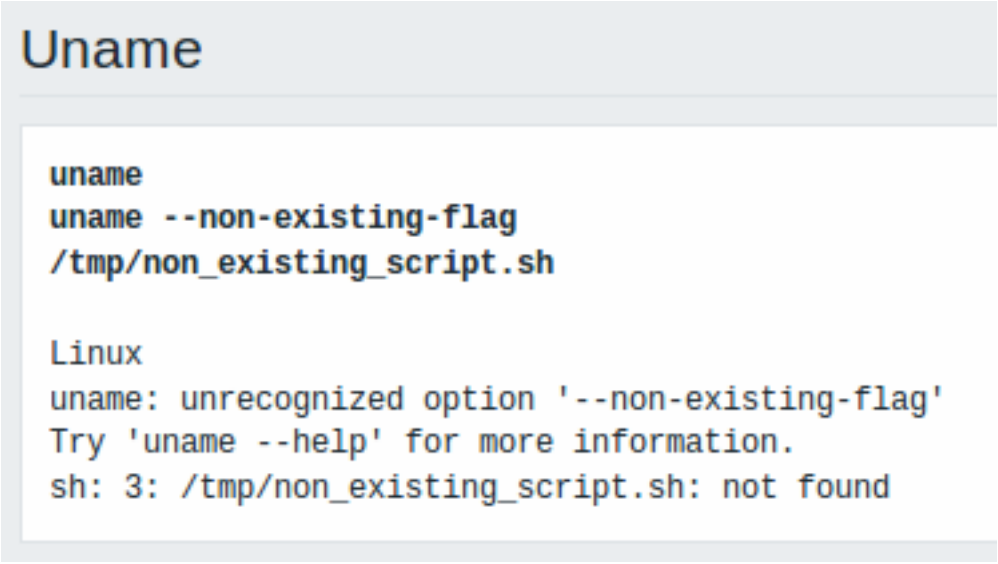
Script execution and result

Scripts run by Zabbix server are executed by the order described in Command execution section including exit code checking. The script result will be displayed in a pop-up window that will appear after the script is run.

Note: The return value of the script is standard output together with standard error.

See example of a script and the result window below:

```
uname
uname --non-existing-flag
/tmp/non_existing_script.sh
```

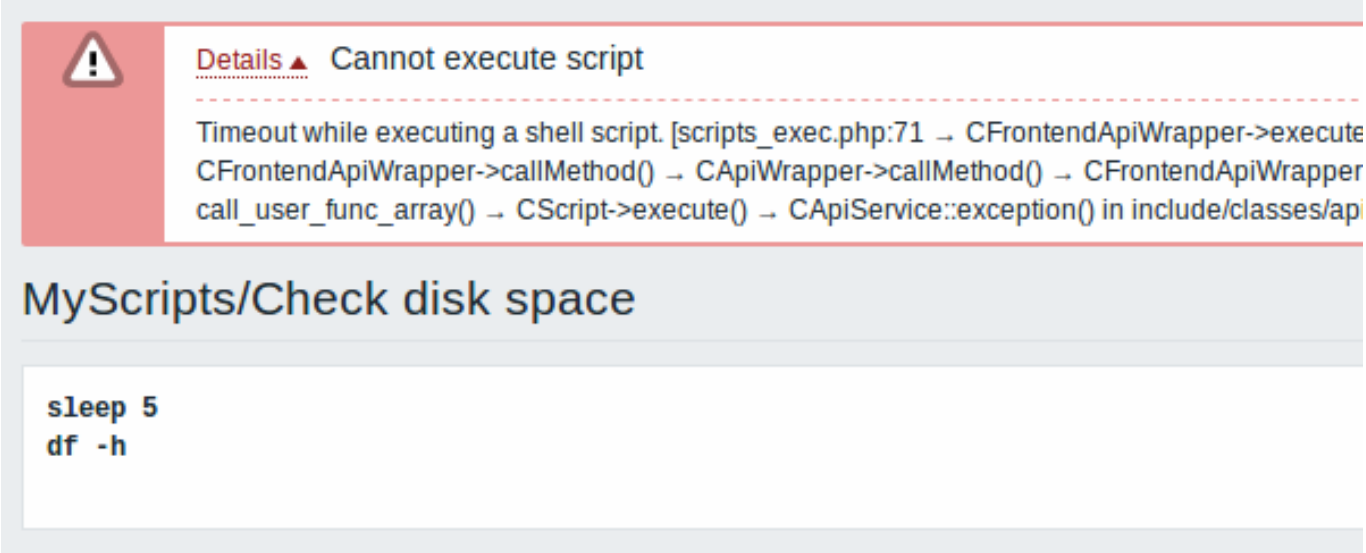


Script timeout

Zabbix agent

You may encounter a situation when timeout occurs while executing a script.

See example of a script running on Zabbix agent and the result window below:



Error message in this case is the following:

```
Timeout while executing a shell script.
```

In order to avoid such a situation, it is advised to optimize the script itself (instead of adjusting Timeout parameter to a corresponding value (in our case, > '5') by modifying the Zabbix agent configuration and Zabbix server configuration).

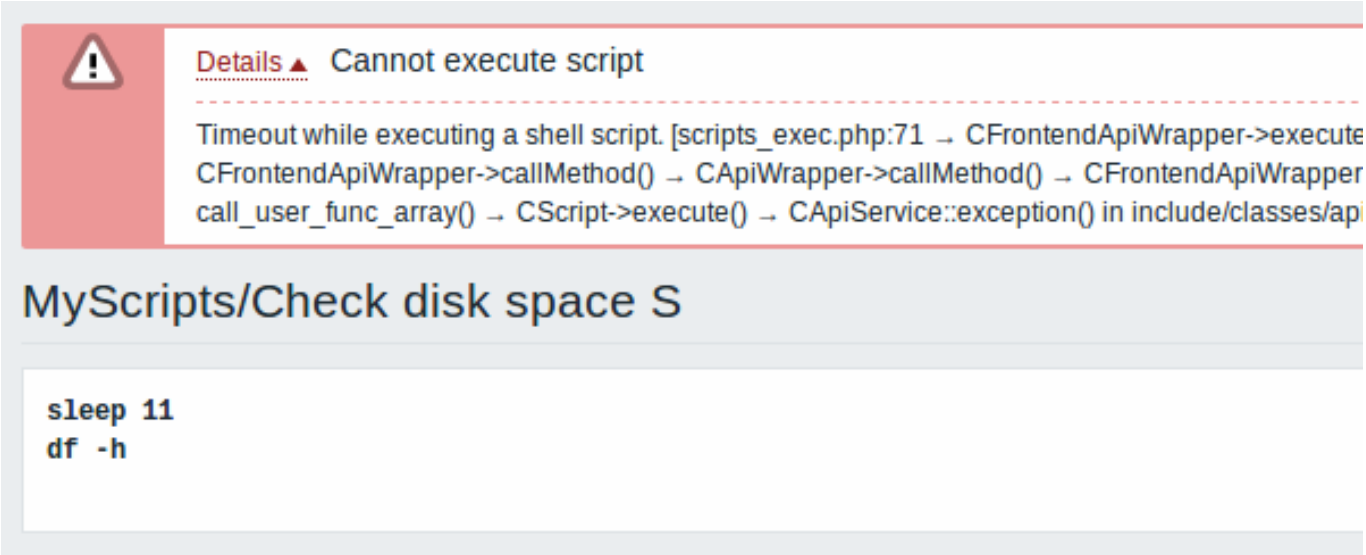
In case still the Timeout parameter is changed in Zabbix agent configuration following error message appears:

```
Get value from agent failed: ZBX_TCP_READ() timed out.
```

It means that modification was made in Zabbix agent configuration and it is required to modify Timeout setting also in Zabbix server configuration.

Zabbix server/proxy

See example of a script running on Zabbix server and the result window below:



It is also advised to optimize the script itself (instead of adjusting TrapperTimeout parameter to a corresponding value (in our case, > '11') by modifying the Zabbix server configuration).

8 Queue

Overview

In the *Administration* → *Queue* section items that are waiting to be updated are displayed.

Ideally, when you open this section it should all be "green" meaning no items in the queue. If all items are updated without delay, there are none waiting. However, due to lacking server performance, connection problems or problems with agents, some items may get delayed and the information is displayed in this section. For more details, see the Queue section.

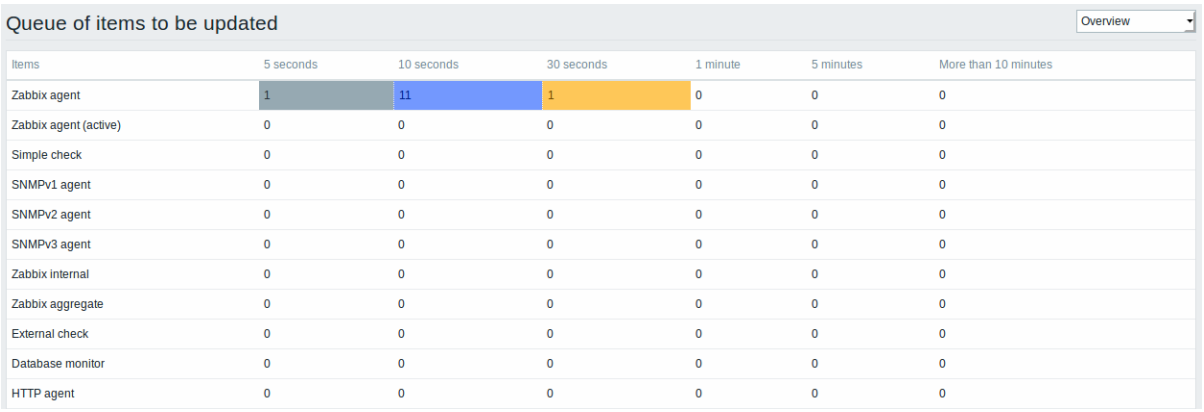
Note:
Queue is available only if Zabbix server is running.

From the dropdown in the upper right corner you can select:

- queue overview by item type
- queue overview by proxy
- list of delayed items

Overview by item type

In this screen it is easy to locate if the problem is related to one or several item types.

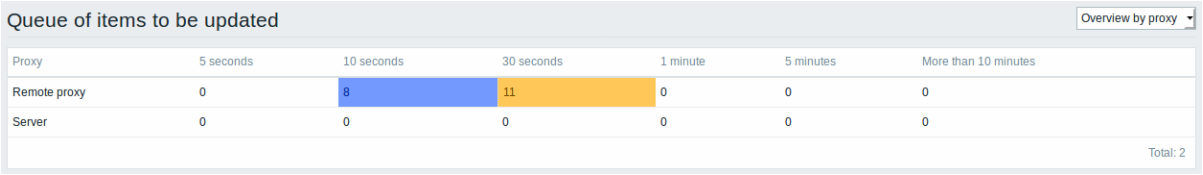


Items	5 seconds	10 seconds	30 seconds	1 minute	5 minutes	More than 10 minutes
Zabbix agent	1	11	1	0	0	0
Zabbix agent (active)	0	0	0	0	0	0
Simple check	0	0	0	0	0	0
SNMPv1 agent	0	0	0	0	0	0
SNMPv2 agent	0	0	0	0	0	0
SNMPv3 agent	0	0	0	0	0	0
Zabbix internal	0	0	0	0	0	0
Zabbix aggregate	0	0	0	0	0	0
External check	0	0	0	0	0	0
Database monitor	0	0	0	0	0	0
HTTP agent	0	0	0	0	0	0

Each line contains an item type. Each column shows the number of waiting items - waiting for 5-10 seconds/10-30 seconds/30-60 seconds/1-5 minutes/5-10 minutes or over 10 minutes respectively.

Overview by proxy

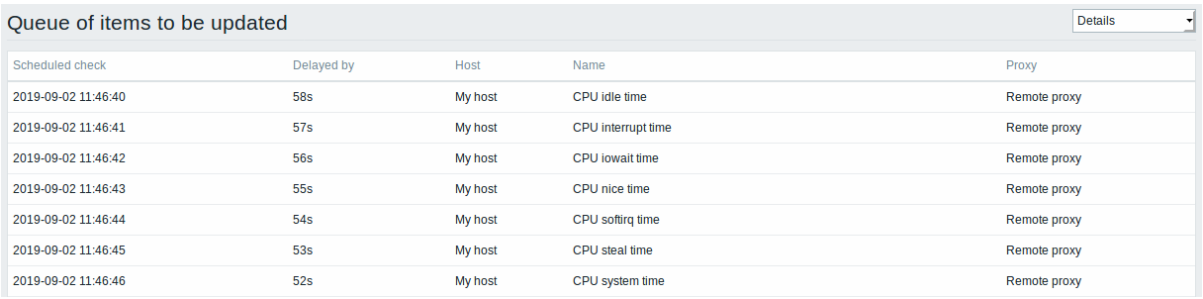
In this screen it is easy to locate if the problem is related to one of the proxies or the server.



Each line contains a proxy, with the server last in the list. Each column shows the number of waiting items - waiting for 5-10 seconds/10-30 seconds/30-60 seconds/1-5 minutes/5-10 minutes or over 10 minutes respectively.

List of waiting items

In this screen, each waiting item is listed.



Displayed data:

Column	Description
Scheduled check	The time when the check was due is displayed.
Delayed by	The length of the delay is displayed.
Host	Host of the item is displayed.
Name	Name of the waiting item is displayed.
Proxy	The proxy name is displayed, if the host is monitored by proxy.

Possible error messages

You may encounter a situation when no data is displayed and the following error message appears:

Error message in this case is the following:

```
Cannot display item queue. Permission denied
```

This happens when PHP configuration parameters $ZBX_SERVER_PORT or $ZBX_SERVER in zabbix.conf.php point to existing Zabbix server which uses different database.

2 User profile

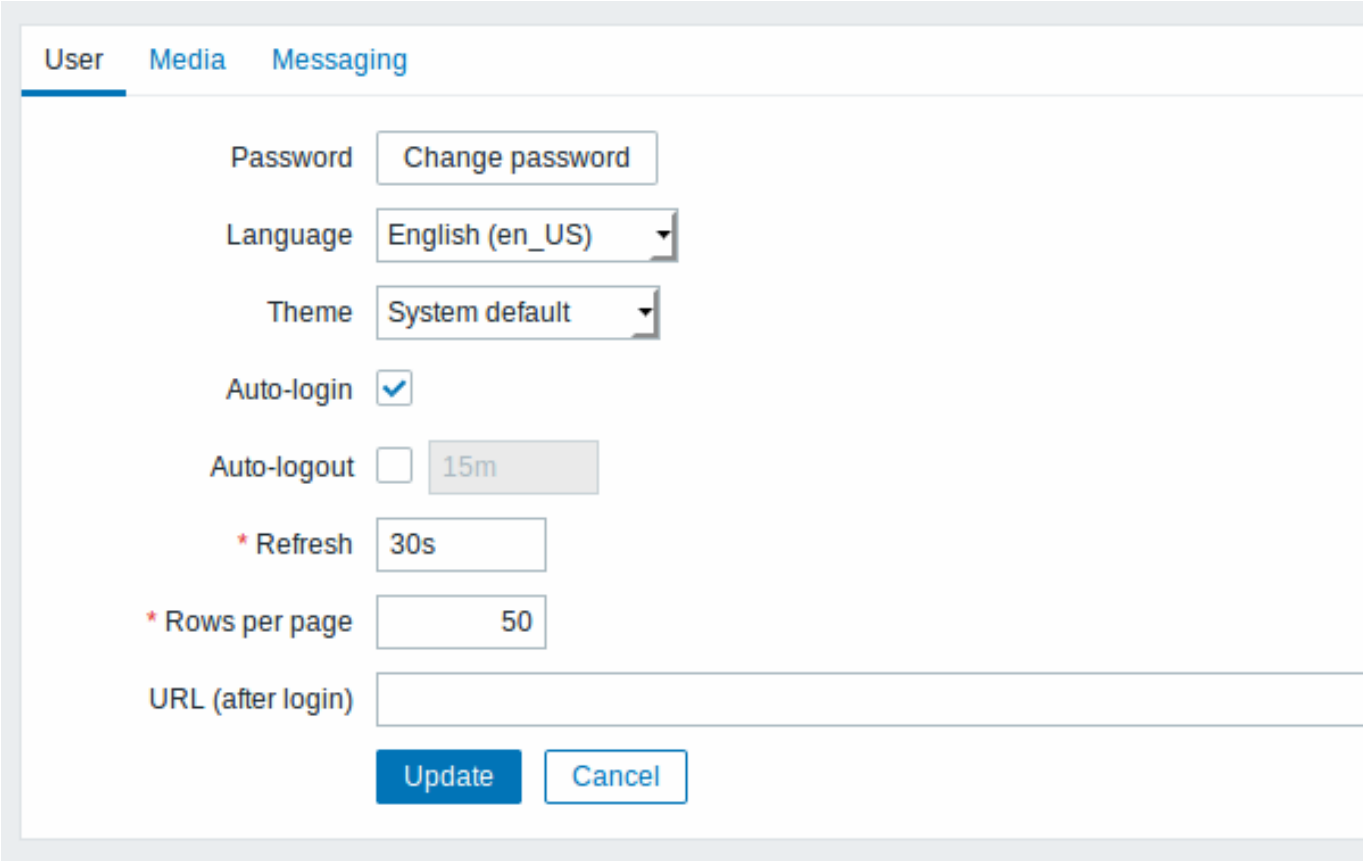
Overview

In the user profile you can customize some Zabbix frontend features, such as the interface language, color theme, number of rows displayed in the lists etc. The changes made here will apply for the user only.

To access the user profile configuration form, click on the user profile link in the upper right corner of Zabbix window.

Configuration

The **User** tab allows you to set various user preferences.

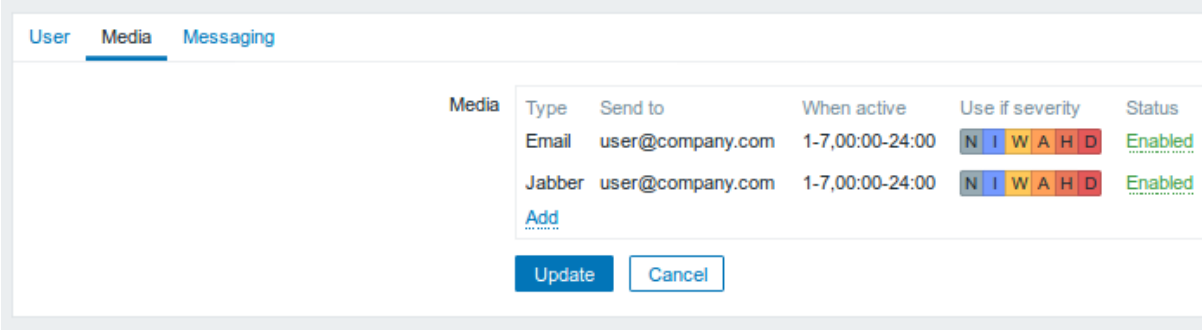


Parameter	Description
Password	Click on the link to display two fields for entering a new password.
Language	Select the interface language of your choice. The php gettext extension is required for the translations to work.
Theme	Select a color theme specifically for your profile: **System default** - use default system settings **Blue** - standard blue theme **Dark** - alternative dark theme **High-contrast light** - light theme with high contrast **High-contrast dark** - dark theme with high contrast
Auto-login	Mark this checkbox to make Zabbix remember you and log you in automatically for 30 days. Browser cookies are used for this.
Auto-logout	With this checkbox marked you will be logged out automatically, after the set amount of seconds (minimum 90 seconds, maximum 1 day). Time suffixes are supported, e.g. 90s, 5m, 2h, 1d. Note that this option will not work: * If the "Show warning if Zabbix server is down" global configuration option is enabled and Zabbix frontend is kept open; * When Monitoring menu pages perform background information refreshes. In case pages refreshing data in a specific time interval (dashboards, graphs, screens, latest data, etc.) are left open session lifetime is extended, respectively disabling auto-logout feature; * If logging in with the *Remember me for 30 days* option checked. Auto-logout can accept 0, meaning that Auto-logout becomes disabled after profile settings update.
Refresh	You can set how often the information in the pages will be refreshed on the Monitoring menu, except for Dashboard, which uses its own refresh parameters for every widget. Time suffixes are supported, e.g. 30s, 5m, 2h, 1d.
Rows per page	You can set how many rows will be displayed per page in the lists. Fewer rows (and fewer records to display) mean faster loading times.

Parameter	Description
URL (after login)	You can set a specific URL to be displayed after the login. Instead of the default *Monitoring* → *Dashboard* it can be, for example, the URL of *Monitoring* → *Triggers*.

Note:
If some language is not available for selection in the user profile it means that a locale for it is not installed on the web server. See the link at the bottom of this page to find out how to install them.

The **Media** tab allows you to specify the media details for the user, such as the types, the addresses to use and when to use them to deliver notifications.



Note:
Only admin level users (Admin and Super Admin) can change their own media details.

The **Messaging** tab allows you to set global notifications.

See also

1. How to install additional locales to be able to select unavailable languages in the user profile

1 Global notifications

Overview

Global notifications are a way of displaying issues that are currently happening right on the screen you're at in Zabbix frontend.

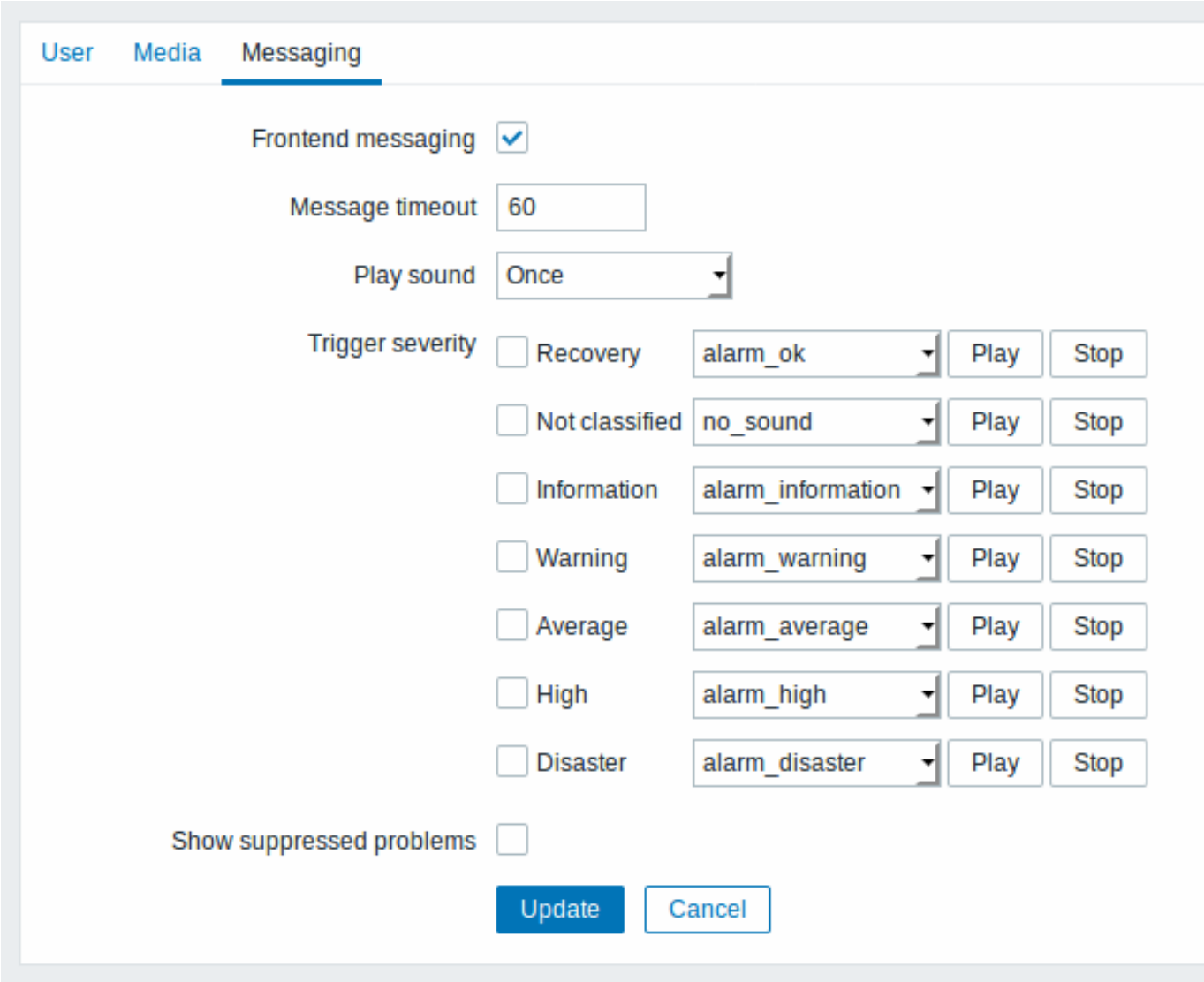
Without global notifications, working in some other location than *Problems* or the *Dashboard* would not show any information regarding issues that are currently happening. Global notifications will display this information regardless of where you are.

Global notifications involve both showing a message and playing a sound.

Attention:
The auto play of sounds may be disabled in recent browser versions by default. In this case, you need to change this setting manually.

Configuration

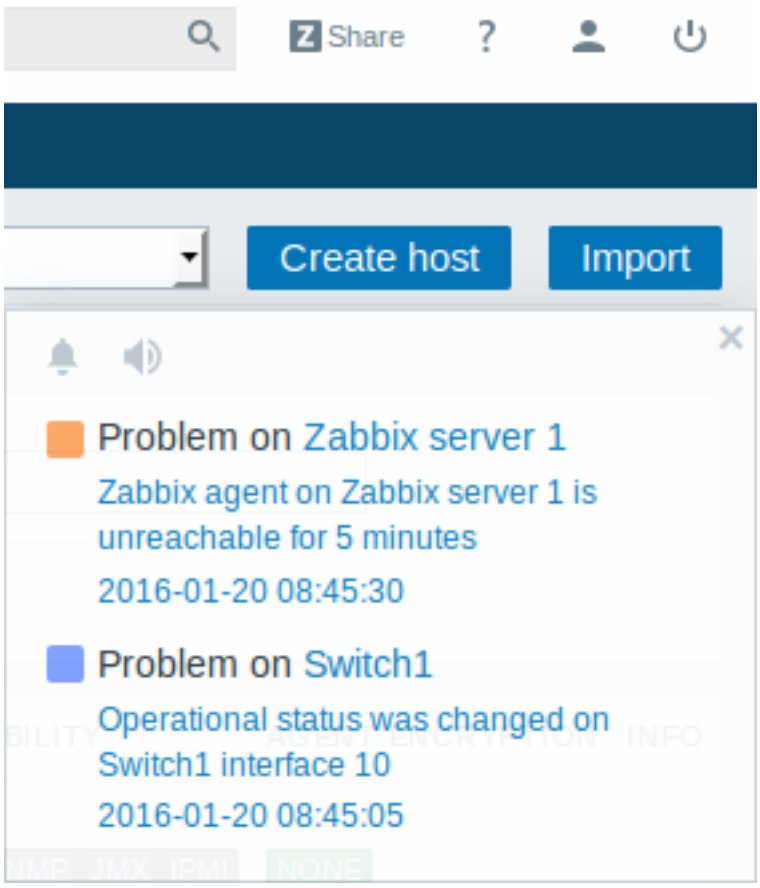
Global notifications can be enabled per user in the *Messaging* tab of profile configuration.



Parameter	Description
Frontend messaging	Mark the checkbox to enable global notifications.
Message timeout	You can set for how long the message will be displayed. By default, messages will stay on screen for 60 seconds. Time suffixes are supported, e.g. 30s, 5m, 2h, 1d.
Play sound	You can set how long the sound will be played. **Once** - sound is played once and fully. **10 seconds** - sound is repeated for 10 seconds. **Message timeout** - sound is repeated while the message is visible.
Trigger severity	You can set the trigger severities that global notifications and sounds will be activated for. You can also select the sounds appropriate for various severities. If no severity is marked then no messages will be displayed at all. Also, recovery messages will only be displayed for those severities that are marked. So if you mark *Recovery* and *Disaster*, global notifications will be displayed for the problems and the recoveries of disaster severity triggers.
Show suppressed problems	Mark the checkbox to display notifications for problems which would otherwise be suppressed (not shown) because of host maintenance.

Global messages displayed

As the messages arrive, they are displayed in a floating section on the right hand side. This section can be repositioned freely by dragging the section header.



For this section, several controls are available:

- **Snooze** button silences the currently active alarm sound;
- **Mute/Unmute** button switches between playing and not playing the alarm sounds at all.

2 Sound in browsers

Overview

For the sounds to be played in Zabbix frontend, *Frontend messaging* must be enabled in the user profile *Messaging* tab, with all trigger severities checked, and sounds should also be enabled in the global notification pop-up window.

If for some reasons audio cannot be played on the device, the button in the global notification popup window will permanently remain in the ”mute” state and the message ”Cannot support notification audio for this device.” will be displayed upon hovering over the button.

Default audio clips are in MP3 format.

Note that since 4.4.4 sounds are supported in MP3 format only.

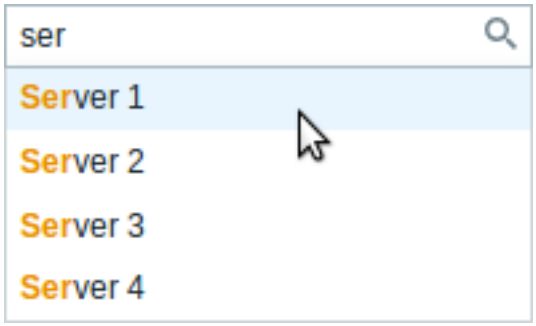
The sounds of Zabbix frontend have been successfully tested in recent Firefox/Opera browsers on Linux and Chrome, Firefox, Internet Explorer, Opera and Safari browsers on Windows.

Attention:
The auto play of sounds may be disabled in recent browser versions by default. In this case, you need to change this setting manually.

3 Global search

It is possible to search Zabbix frontend for hosts, host groups and templates.

The search input box is located in the upper right corner. The search can be started by pressing *Enter* or clicking on the search icon.



If there is a host that contains the entered string in any part of the name, a dropdown will appear, listing all such hosts (with the matching part highlighted in orange). The dropdown will also list a host if that host's visible name is a match to the technical name entered as a search string; the matching host will be listed, but without any highlighting.

Properties searched

Hosts can be searched by the following properties:

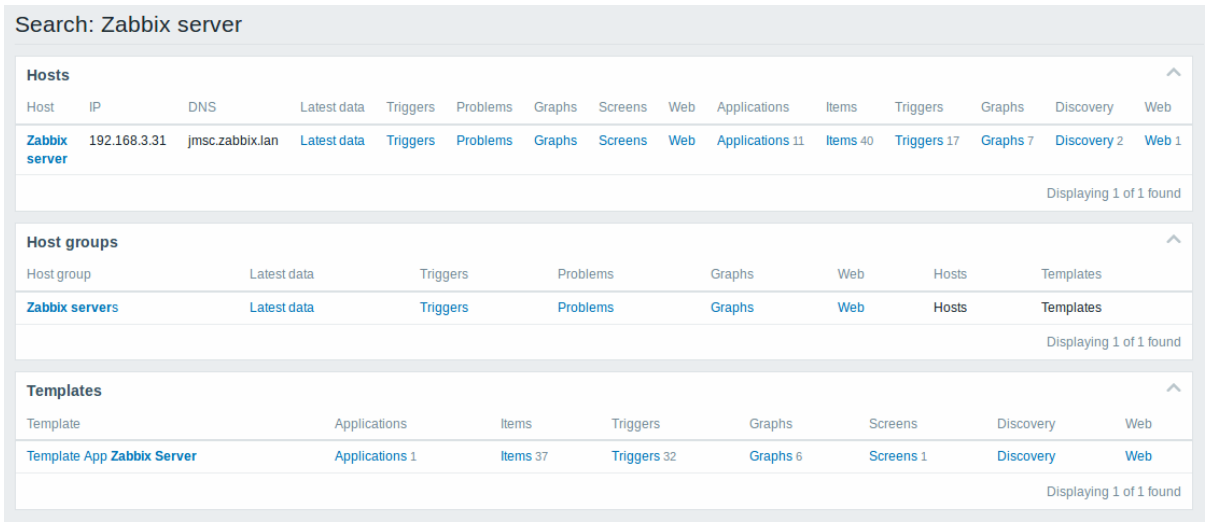
- Host name
- Visible name
- IP address
- DNS name

Host groups can be searched by name. Specifying a parent host group implicitly selects all nested host groups.

Templates can be searched by name or visible name. If you search by a name that is different from the visible name (of a template/host), in the search results it is displayed below the visible name in parentheses.

Search results

Search results consist of three separate blocks for hosts, host groups and templates.



It is possible to collapse/expand each individual block. The entry count is displayed at the bottom of each block, for example, *Displaying 13 of 13 found*. Total entries displayed within one block are limited to 100.

Each entry provides links to monitoring and configuration data. See links available.

For all configuration data (such as items, triggers, graphs) the amount of entities found is displayed by a number next to the entity name, in grey. **Note** that if there are zero entities, no number is displayed.

Enabled hosts are displayed in blue, disabled hosts in red.

Links available

For each entry the following links are available:

- Hosts
  - Monitoring
    - Latest data

        * Triggers
        * Problems
        * Graphs
        * Host screens
        * Web scenarios
    - Configuration
        * Host properties
        * Applications
        * Items
        * Triggers
        * Graphs
        * Discovery rules
        * Web scenarios

- Host groups
    - Monitoring
        * Latest data
        * Triggers
        * Problems
        * Graphs
        * Web scenarios
    - Configuration
        * Host group properties
        * Host group members (hosts and templates)

- Templates
    - Configuration
        * Template properties
        * Applications
        * Items
        * Triggers
        * Graphs
        * Template screens
        * Discovery rules
        * Web scenarios

4 Frontend maintenance mode

Overview

Zabbix web frontend can be temporarily disabled in order to prohibit access to it. This can be useful for protecting the Zabbix database from any changes initiated by users, thus protecting the integrity of database.

Zabbix database can be stopped and maintenance tasks can be performed while Zabbix frontend is in maintenance mode.

Users from defined IP addresses will be able to work with the frontend normally during maintenance mode.

Configuration

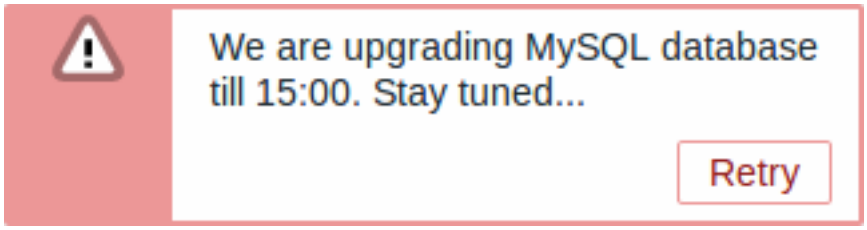
In order to enable maintenance mode, the `maintenance.inc.php` file (located in /conf of the Zabbix HTML document directory on the webserver) must be modified to uncomment the following lines:

```
// Maintenance mode.
define('ZBX_DENY_GUI_ACCESS', 1);

// Array of IP addresses, which are allowed to connect to frontend (optional).
$ZBX_GUI_ACCESS_IP_RANGE = array('127.0.0.1');

// Message shown on warning screen (optional).
$ZBX_GUI_ACCESS_MESSAGE = 'We are upgrading MySQL database till 15:00. Stay tuned...';
```

Parameter	Details
ZBX_DENY_GUI_ACCESS	Enable maintenance mode: 1 – maintenance mode is enabled, disabled otherwise
ZBX_GUI_ACCESS_IP_RANGE	Array of IP addresses, which are allowed to connect to frontend (optional). For example: `array('192.168.1.1', '192.168.1.2')`
ZBX_GUI_ACCESS_MESSAGE	A message you can enter to inform users about the maintenance (optional).

Display

The following screen will be displayed when trying to access the Zabbix frontend while in maintenance mode. The screen is refreshed every 30 seconds in order to return to a normal state without user intervention when the maintenance is over.



IP addresses defined in ZBX_GUI_ACCESS_IP_RANGE will be able to access the frontend as always.

5 Page parameters

Overview

Most Zabbix web interface pages support various HTTP GET parameters that control what will be displayed. They may be passed by specifying parameter=value pairs after the URL, separated from the URL by a question mark (?) and from each other by ampersands (&).

Monitoring → Problems

The following parameters are supported:

- `sort` - sort column: clock, host, severity, name
- `sortorder` - sort order or results: DESC - descending, ASC - ascending
- `filter_set` - should be 'filter_set=1' to use "filter_*" parameters
- `filter_rst` - should be 'filter_rst=1' to reset filter elements
- `filter_show` - filter option "Show": 1 - recent problems, 2 - all, 3 - in problem state
- `filter_groupids` - filter option "Host groups": array of host groups IDs
- `filter_hostids` - filter option "Hosts": array of host IDs
- `filter_application` - filter option "Application": freeform string
- `filter_triggerids` - filter option "Triggers": array of trigger IDs
- `filter_name` - filter option "Problem": freeform string
- `filter_severity` - filter option "Minimum severity": 0 - not classified, 1 - information, 2 - warning, 3 - average, 4 - high, 5 - disaster
- `filter_age_state` - filter option "Age less than": should be 'filter_age_state=1' to enable 'filter_age'. Is used only when 'filter_show' equals 3.
- `filter_age` - filter option "Age less than": days
- `filter_inventory` - filter option "Host inventory": array of inventory fields: [field], [value]
- `filter_evaltype` - filter option "Tags", tag filtering strategy: 0 - And/Or, 2 - Or
- `filter_tags` - filter option "Tags": array of defined tags: [tag], [operator], [value]
- `filter_show_tags` - filter option "Show tags": 0 - none, 1 - one, 2 - two, 3 - three
- `filter_tag_name_format` - filter option "Tag name": 0 - full name, 1 - shortened, 2 - none
- `filter_tag_priority` - filter option "Tag display priority": comma-separated string of tag display priority
- `filter_show_suppressed` - filter option "Show suppressed problems": should be 'filter_show_suppressed=1' to show
- `filter_unacknowledged` - filter option "Show unacknowledged only": should be 'filter_unacknowledged=1' to show
- `filter_compact_view` - filter option "Compact view": should be 'filter_compact_view=1' to show
- `filter_show_timeline` - filter option "Show timeline": should be 'filter_show_timeline=1' to show

- `filter_details` - filter option "Show details": should be 'filter_details=1' to show
- `filter_highlight_row` - filter option "Highlight whole row" (use problem colour as background colour for every problem row): should be '1' to highlight; can be set only when 'filter_compact_view' is set
- `from` - date range start, can be 'relative' (e.g.: now-1m)
- `to` - date range end, can be 'relative' (e.g.: now-1m)

Fullscreen/kiosk mode

Fullscreen and kiosk modes in supported frontend pages can be activated using URL parameters. For example, in dashboards:

- `/zabbix.php?action=dashboard.view&fullscreen=1` - activate fullscreen mode
- `/zabbix.php?action=dashboard.view&kiosk=1` - activate kiosk mode
- `/zabbix.php?action=dashboard.view&fullscreen=0` - activate normal mode

6 Definitions

Overview

While many things in the frontend can be configured using the frontend itself, some customisations are currently only possible by editing a definitions file.

This file is `defines.inc.php` located in /include of the Zabbix HTML document directory.

Parameters

Parameters in this file that could be of interest to users:

- ZBX_LOGIN_ATTEMPTS

Number of unsuccessful login attempts that is allowed to an existing system user before a login block in applied (see ZBX_LOGIN_BLOCK). By default 5 attempts. Once the set number of login attempts is tried unsuccessfully, each additional unsuccessful attempt results in a login block. Used with internal authentication only.

- ZBX_LOGIN_BLOCK

Number of seconds for blocking a user from accessing Zabbix frontend after a number of unsuccessful login attempts (see ZBX_LOGIN_ATTEMPTS). By default 30 seconds. Used with internal authentication only.

- ZBX_PERIOD_DEFAULT

Default graph period, in seconds. One hour by default.

- ZBX_MIN_PERIOD

Minimum graph period, in seconds. One minute by default.

- ZBX_MAX_PERIOD

Maximum graph period, in seconds. Two years by default since 1.6.7, one year before that.

- ZBX_HISTORY_PERIOD

The maximum period to display history data in *Latest data*, *Web*, *Overview* pages and *Data overview* screen element in seconds. By default set to 86400 seconds (24 hours). Unlimited period, if set to 0 seconds. This constant value also affects how far in the past the value is searched when {ITEM.VALUE} macro in trigger name is resolved.

- GRAPH_YAXIS_SIDE_DEFAULT

Default location of Y axis in simple graphs and default value for drop down box when adding items to custom graphs. Possible values: 0 - left, 1 - right.

Default: 0

- SCREEN_REFRESH_RESPONSIVENESS (available since 2.0.4)

Used in screens and defines the number of seconds after which query skipping will be switched off. Otherwise, if a screen element is in update status all queries on update are skipped until a response is received. With this parameter in use, another update query might be sent after N seconds without having to wait for the response to the first one.

Default: 10

- QUEUE_DETAIL_ITEM_COUNT

Defines retrieval limit of the total items queued. Since Zabbix 3.2.4 may be set higher than default value.

Default: 500

- ZBX_SHOW_SQL_ERRORS (available since 3.4.0)

Show SQL errors in the frontend, if 'true'. If changed to 'false' then SQL errors will still be displayed to all users with *Debug mode* enabled. With *Debug mode* disabled, only Zabbix Super Admin users will see SQL errors. Others will see a generic message: "SQL error. Please contact Zabbix administrator."

Default: true

- VALIDATE_URI_SCHEMES (available since 3.4.5)

Validate a URI against the scheme whitelist defined in ZBX_URI_VALID_SCHEMES.

Default: true

- ZBX_URI_VALID_SCHEMES (available since 3.4.2)

A comma-separated list of allowed URI schemes. Affects all places in the frontend where URIs are used, for example, in map element URLs.

Default: http,https,ftp,file,mailto,tel,ssh

- ZBX_SHOW_TECHNICAL_ERRORS (available since 3.4.4)

Show technical errors (PHP/SQL) to non-Zabbix Super admin users and to users that are not part of user groups with debug mode enabled.

Default: false

- ZBX_SESSION_NAME (available since 4.0.0)

String used as the name of the Zabbix frontend session cookie.

Default: zbx_sessionid

7 Creating your own theme

Overview

By default, Zabbix provides a number of predefined themes. You may follow the step-by-step procedure provided here in order to create your own. Feel free to share the result of your work with Zabbix community if you created something nice.

Step 1

To define your own theme you'll need to create a CSS file and save it in the `assets/styles/` folder (for example, *custom-theme.css*). You can either copy the files from a different theme and create your theme based on it or start from scratch.

Step 2

Add your theme to the list of themes returned by the Z::getThemes() method. You can do this by overriding the ZBase::getThemes() method in the Z class. This can be done by adding the following code before the closing brace in *include/classes/core/Z.php*:

```
public static function getThemes() {
    return array_merge(parent::getThemes(), array(
        'custom-theme' => _('Custom theme')
    ));
}
```

Attention:
Note that the name you specify within the first pair of quotes must match the name of the theme file without extension.

To add multiple themes, just list them under the first theme, for example:

```
public static function getThemes() {
    return array_merge(parent::getThemes(), array(
        'custom-theme' => _('Custom theme'),
        'anothertheme' => _('Another theme'),
        'onemoretheme' => _('One more theme')
    ));
```

```
}
```

Note that every theme except the last one must have a trailing comma.

Note:
To change graph colours, the entry must be added in the *graph_theme* database table.

Step 3

Activate the new theme.

In Zabbix frontend, you may either set this theme to be the default one or change your theme in the user profile.

Enjoy the new look and feel!

8 Debug mode

Overview

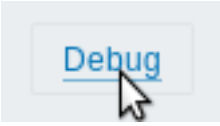
Debug mode may be used to diagnose performance problems with frontend pages.

Configuration

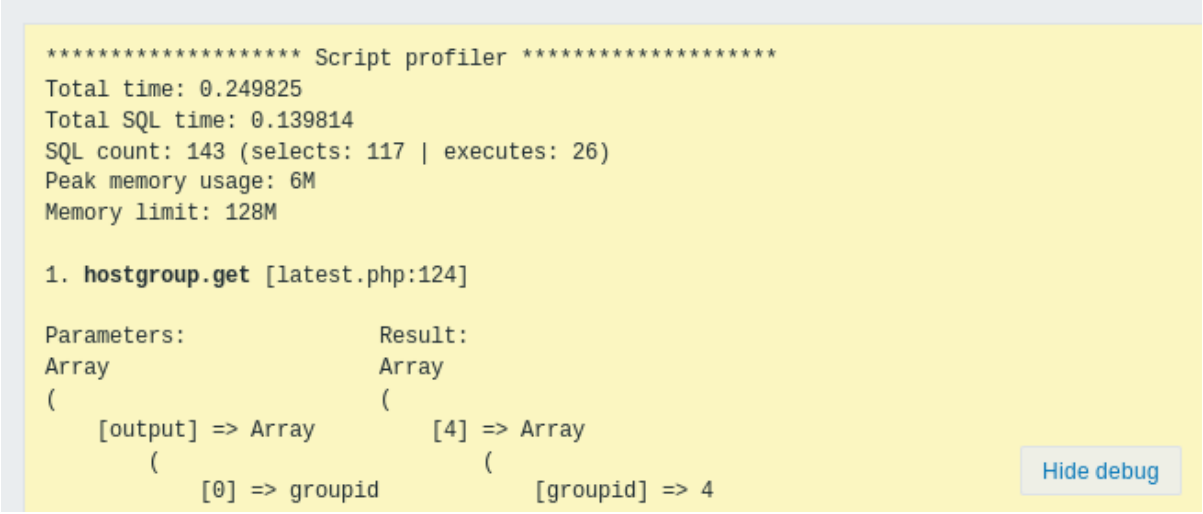
Debug mode can be activated for individual users who belong to a user group:

- when configuring a user group;
- when viewing configured user groups.

When *Debug mode* is enabled for a user group, its users will see a *Debug* button in the lower right corner of the browser window:



Clicking on the *Debug* button opens a new window below the page contents which contains the SQL statistics of the page, along with a list of API calls and individual SQL statements:



In case of performance problems with the page, this window may be used to search for the root cause of the problem.

Warning:
Enabled *Debug mode* negatively affects frontend performance.

9 Cookies used by Zabbix

Overview

This page provides a list of cookies used by Zabbix.

Name	Description	Values	Expires/Max-Age	HttpOnly[a]	Secure[a]
PHPSESSID	Unique PHP session ID. The length can be set in *php.ini - session.sid_length*.	Example: kvlp5pu2ru1a2bcwf0g52ms87a	Session (expires when the browsing session ends)	+	+ (only if HTTPS is enabled on a web server)
ZBX_SESSION_NAME (available since 4.0.0). String used as the name of the Zabbix frontend session cookie. Default: zbx_sessionid	Unique session cookie ID - a 32 character string.	Example: 004bc0213e7e8bca87f3c3919eca5270	Current date and time +1 month (31 days)	+	+ (only if HTTPS is enabled on a web server)
tab	Active tab number; this cookie is only used on pages with multiple tabs (e.g. *Host*, *Trigger* or *Action* configuration page) and is created, when a user navigates from a primary tab to another tab (such as *Tags* or *Dependencies* tab). 0 is used for the primary tab.	Example: 1	Session (expires when the browsing session ends)	-	-
browserwarning_ignore	Whether a warning about using an outdated browser should be ignored.	yes	Session (expires when the browsing session ends)	-	-

[a] (HttpOnly) According to specification these are voltages on chip pins and generally speaking may need scaling.

[a] (Secure) `Secure` indicates that the cookie should only be transmitted over a secure HTTPS connection from the client. When set to 'true', the cookie will only be set if a secure connection exists.

Note:
Forcing 'HttpOnly' flag on Zabbix cookies by a webserver directive is not supported.

19. API

Overview Zabbix API allows you to programmatically retrieve and modify the configuration of Zabbix and provides access to historical data. It is widely used to:

- Create new applications to work with Zabbix;
- Integrate Zabbix with third party software;
- Automate routine tasks.

The Zabbix API is a web based API and is shipped as part of the web frontend. It uses the JSON-RPC 2.0 protocol which means two things:

- The API consists of a set of separate methods;
- Requests and responses between the clients and the API are encoded using the JSON format.

More info about the protocol and JSON can be found in the JSON-RPC 2.0 specification and the JSON format homepage.

Structure The API consists of a number of methods that are nominally grouped into separate APIs. Each of the methods performs one specific task. For example, the `host.create` method belongs to the *host* API and is used to create new hosts. Historically, APIs are sometimes referred to as "classes".

> **Note:**
> Most APIs contain at least four methods: `get`, `create`, `update` and `delete` for retrieving, creating, updating and deleting data respectively, but some of the APIs may provide a totally different set of methods.

Performing requests Once you've set up the frontend, you can use remote HTTP requests to call the API. To do that you need to send HTTP POST requests to the `api_jsonrpc.php` file located in the frontend directory. For example, if your Zabbix frontend is installed under *http://company.com/zabbix*, the HTTP request to call the `apiinfo.version` method may look like this:

```
POST http://company.com/zabbix/api_jsonrpc.php HTTP/1.1
Content-Type: application/json-rpc

{"jsonrpc":"2.0","method":"apiinfo.version","id":1,"auth":null,"params":{}}
```

The request must have the `Content-Type` header set to one of these values: `application/json-rpc`, `application/json` or `application/jsonrequest`.

> **Note:**
> You can use any HTTP client or a JSON-RPC testing tool to perform API requests manually, but for developing applications we suggest you use one of the community maintained libraries.

Example workflow The following section will walk you through some usage examples in more detail.

Authentication Before you can access any data inside of Zabbix you'll need to log in and obtain an authentication token. This can be done using the user.login method. Let us suppose that you want to log in as a standard Zabbix Admin user. Then your JSON request will look like this:

```
{
    "jsonrpc": "2.0",
    "method": "user.login",
    "params": {
        "user": "Admin",
        "password": "zabbix"
    },
    "id": 1,
    "auth": null
}
```

Let's take a closer look at the request object. It has the following properties:

- `jsonrpc` - the version of the JSON-RPC protocol used by the API; the Zabbix API implements JSON-RPC version 2.0;
- `method` - the API method being called;
- `params` - parameters that will be passed to the API method;

- `id` - an arbitrary identifier of the request;
- `auth` - a user authentication token; since we don't have one yet, it's set to `null`.

If you provided the credentials correctly, the response returned by the API will contain the user authentication token:

```
{
    "jsonrpc": "2.0",
    "result": "0424bd59b807674191e7d77572075f33",
    "id": 1
}
```

The response object in turn contains the following properties:

- `jsonrpc` - again, the version of the JSON-RPC protocol;
- `result` - the data returned by the method;
- `id` - identifier of the corresponding request.

Retrieving hosts We now have a valid user authentication token that can be used to access the data in Zabbix. For example, let's use the host.get method to retrieve the IDs, host names and interfaces of all configured hosts:

```
{
    "jsonrpc": "2.0",
    "method": "host.get",
    "params": {
        "output": [
            "hostid",
            "host"
        ],
        "selectInterfaces": [
            "interfaceid",
            "ip"
        ]
    },
    "id": 2,
    "auth": "0424bd59b807674191e7d77572075f33"
}
```

Attention:
Note that the `auth` property is now set to the authentication token we've obtained by calling `user.login`.

The response object will contain the requested data about the hosts:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "hostid": "10084",
            "host": "Zabbix server",
            "interfaces": [
                {
                    "interfaceid": "1",
                    "ip": "127.0.0.1"
                }
            ]
        }
    ],
    "id": 2
}
```

Note:
For performance reasons we recommend to always list the object properties you want to retrieve and avoid retrieving everything.

Creating a new item Let's create a new item on "Zabbix server" using the data we've obtained from the previous `host.get` request. This can be done by using the item.create method:

```
{
    "jsonrpc": "2.0",
    "method": "item.create",
    "params": {
        "name": "Free disk space on $1",
        "key_": "vfs.fs.size[/home/joe/,free]",
        "hostid": "10084",
        "type": 0,
        "value_type": 3,
        "interfaceid": "1",
        "delay": 30
    },
    "auth": "0424bd59b807674191e7d77572075f33",
    "id": 3
}
```

A successful response will contain the ID of the newly created item, which can be used to reference the item in the following requests:

```
{
    "jsonrpc": "2.0",
    "result": {
        "itemids": [
            "24759"
        ]
    },
    "id": 3
}
```

Note:
The `item.create` method as well as other create methods can also accept arrays of objects and create multiple items with one API call.

Creating multiple triggers So if create methods accept arrays, we can add multiple triggers like so:

```
{
    "jsonrpc": "2.0",
    "method": "trigger.create",
    "params": [
        {
            "description": "Processor load is too high on {HOST.NAME}",
            "expression": "{Linux server:system.cpu.load[percpu,avg1].last()}>5",
        },
        {
            "description": "Too many processes on {HOST.NAME}",
            "expression": "{Linux server:proc.num[].avg(5m)}>300",
        }
    ],
    "auth": "0424bd59b807674191e7d77572075f33",
    "id": 4
}
```

A successful response will contain the IDs of the newly created triggers:

```
{
    "jsonrpc": "2.0",
    "result": {
        "triggerids": [
            "17369",
            "17370"
        ]
    },
```

```
    "id": 4
}
```

Updating an item Enable an item, that is, set its status to "0":

```
{
    "jsonrpc": "2.0",
    "method": "item.update",
    "params": {
        "itemid": "10092",
        "status": 0
    },
    "auth": "0424bd59b807674191e7d77572075f33",
    "id": 5
}
```

A successful response will contain the ID of the updated item:

```
{
    "jsonrpc": "2.0",
    "result": {
        "itemids": [
            "10092"
        ]
    },
    "id": 5
}
```

Note:
The `item.update` method as well as other update methods can also accept arrays of objects and update multiple items with one API call.

Updating multiple triggers Enable multiple triggers, that is, set their status to 0:

```
{
    "jsonrpc": "2.0",
    "method": "trigger.update",
    "params": [
        {
            "triggerid": "13938",
            "status": 0
        },
        {
            "triggerid": "13939",
            "status": 0
        }
    ],
    "auth": "0424bd59b807674191e7d77572075f33",
    "id": 6
}
```

A successful response will contain the IDs of the updated triggers:

```
{
    "jsonrpc": "2.0",
    "result": {
        "triggerids": [
            "13938",
            "13939"
        ]
    },
    "id": 6
}
```

Note:
This is the preferred method of updating. Some API methods like `host.massupdate` allow to write more simple code, but it's not recommended to use those methods, since they will be removed in the future releases.

Error handling Up to that point everything we've tried has worked fine. But what happens if we try to make an incorrect call to the API? Let's try to create another host by calling host.create but omitting the mandatory `groups` parameter.

```
{
    "jsonrpc": "2.0",
    "method": "host.create",
    "params": {
        "host": "Linux server",
        "interfaces": [
            {
                "type": 1,
                "main": 1,
                "useip": 1,
                "ip": "192.168.3.1",
                "dns": "",
                "port": "10050"
            }
        ]
    },
    "id": 7,
    "auth": "0424bd59b807674191e7d77572075f33"
}
```

The response will then contain an error message:

```
{
    "jsonrpc": "2.0",
    "error": {
        "code": -32602,
        "message": "Invalid params.",
        "data": "No groups for host \"Linux server\"."
    },
    "id": 7
}
```

If an error occurred, instead of the `result` property, the response object will contain an `error` property with the following data:

- `code` - an error code;
- `message` - a short error summary;
- `data` - a more detailed error message.

Errors can occur in different cases, such as, using incorrect input values, a session timeout or trying to access unexisting objects. Your application should be able to gracefully handle these kinds of errors.

API versions To simplify API versioning, since Zabbix 2.0.4, the version of the API matches the version of Zabbix itself. You can use the apiinfo.version method to find out the version of the API you're working with. This can be useful for adjusting your application to use version-specific features.

We guarantee feature backward compatibility inside of a major version. When making backward incompatible changes between major releases, we usually leave the old features as deprecated in the next release, and only remove them in the release after that. Occasionally, we may remove features between major releases without providing any backward compatibility. It is important that you never rely on any deprecated features and migrate to newer alternatives as soon as possible.

Note:
You can follow all of the changes made to the API in the API changelog.

Further reading You now know enough to start working with the Zabbix API, but don't stop here. For further reading we suggest you have a look at the list of available APIs.

Method reference

This section provides an overview of the functions provided by the Zabbix API and will help you find your way around the available classes and methods.

Monitoring The Zabbix API allows you to access history and other data gathered during monitoring.

History

Retrieve historical values gathered by Zabbix monitoring processes for presentation or further processing.

History API

Trends

Retrieve trend values calculated by Zabbix server for presentation or further processing.

Trend API

Events

Retrieve events generated by triggers, network discovery and other Zabbix systems for more flexible situation management or third-party tool integration.

Event API

Problems

Retrieve problems according to the given parameters.

Problem API

Service monitoring

Retrieve detailed service layer availability information about any service.

Service SLA calculation

Tasks

Task manager allows to check items or low-level discovery rules without config reload.

Task API

Configuration The Zabbix API allows you to manage the configuration of your monitoring system.

Hosts and host groups

Manage host groups, hosts and everything related to them, including host interfaces, host macros and maintenance periods.

Host API | Host group API | Host interface API | User macro API | Maintenance API

Items and applications

Define items to monitor. Create or remove applications and assign items to them.

Item API | Application API

Triggers

Configure triggers to notify you about problems in your system. Manage trigger dependencies.

Trigger API

Graphs

Edit graphs or separate graph items for better presentation of the gathered data.

Graph API | Graph item API

Templates

Manage templates and link them to hosts or other templates.

Template API

Export and import

Export and import Zabbix configuration data for configuration backups, migration or large-scale configuration updates.

Configuration API

Low-level discovery

Configure low-level discovery rules as well as item, trigger and graph prototypes to monitor dynamic entities.

LLD rule API | Item prototype API | Trigger prototype API | Graph prototype API | Host prototype API

Event correlation

Create custom event correlation rules.

Correlation API

Actions and alerts

Define actions and operations to notify users about certain events or automatically execute remote commands. Gain access to information about generated alerts and their receivers.

Action API | Alert API

Services

Manage services for service-level monitoring and retrieve detailed SLA information about any service.

Service API

Dashboards

Manage dashboards.

Dashboard API

Screens

Edit global and template-level screens or each screen item individually.

Screen API | Screen item API | Template screen API | Template screen item API

Maps

Configure maps to create detailed dynamic representations of your IT infrastructure.

Map API

Web monitoring

Configure web scenarios to monitor your web applications and services.

Web scenario API

Network discovery

Manage network-level discovery rules to automatically find and monitor new hosts. Gain full access to information about discovered services and hosts.

Discovery rule API | Discovery check API | Discovery host API | Discovery service API

Administration With the Zabbix API you can change administration settings of your monitoring system.

Users

Add users that will have access to Zabbix, assign them to user groups and grant permissions. Configure media types and the ways users will receive alerts.

User API | User group API | Media type API

General

Change certain global configuration options.

Auto registration API | Icon map API | Image API | User macro API | Value map API

Proxies

Manage the proxies used in your distributed monitoring setup.

Proxy API

Scripts

Configure and execute scripts to help you with your daily tasks.

Script API

API information Retrieve the version of the Zabbix API so that your application could use version-specific features.

API info API

Action

This class is designed to work with actions.

Object references:

- Action
- Action condition
- Action operation

Available methods:

- action.create - create new actions
- action.delete - delete actions
- action.get - retrieve actions
- action.update - update actions

> Action object

The following objects are directly related to the `action` API.

Action

The action object has the following properties.

Property	Type	Description
actionid	string	*(readonly)* ID of the action.
esc_period (required)	string	Default operation step duration. Must be greater than 60 seconds. Accepts seconds, time unit with suffix and user macro.
eventsource (required)	integer	*(constant)* Type of events that the action will handle. Refer to the event "source" property for a list of supported event types.
name (required)	string	Name of the action.
def_longdata	string	Problem message text.
def_shortdata	string	Problem message subject.
r_longdata	string	Recovery message text.
r_shortdata	string	Recovery message subject.
ack_longdata	string	Update operation message text.
ack_shortdata	string	Update operation message subject.
status	integer	Whether the action is enabled or disabled. Possible values: 0 - *(default)* enabled; 1 - disabled.
pause_suppressed	integer	Whether to pause escalation during maintenance periods or not. Possible values: 0 - Don't pause escalation; 1 - *(default)* Pause escalation.

Action operation

The action operation object defines an operation that will be performed when an action is executed. It has the following properties.

Property	Type	Description
operationid	string	*(readonly)* ID of the action operation.
operationtype (required)	integer	Type of operation. Possible values: 0 - send message; 1 - remote command; 2 - add host; 3 - remove host; 4 - add to host group; 5 - remove from host group; 6 - link to template; 7 - unlink from template; 8 - enable host; 9 - disable host; 10 - set host inventory mode.
actionid	string	ID of the action that the operation belongs to.
esc_period	string	Duration of an escalation step in seconds. Must be greater than 60 seconds. Accepts seconds, time unit with suffix and user macro. If set to 0 or 0s, the default action escalation period will be used. Default: 0s.
esc_step_from	integer	Step to start escalation from. Default: 1.
esc_step_to	integer	Step to end escalation at. Default: 1.
evaltype	integer	Operation condition evaluation method. Possible values: 0 - *(default)* AND / OR; 1 - AND; 2 - OR.
opcommand	object	Object containing the data about the command run by the operation. The operation command object is described in detail below. Required for remote command operations.
opcommand_grp	array	Host groups to run remote commands on. Each object has the following properties: `opcommand_grpid` - *(string, readonly)* ID of the object; `operationid` - *(string)* ID of the operation; `groupid` - *(string)* ID of the host group. Required for remote command operations if `opcommand_hst` is not set.
opcommand_hst	array	Host to run remote commands on. Each object has the following properties: `opcommand_hstid` - *(string, readonly)* ID of the object; `operationid` - *(string)* ID of the operation; `hostid` - *(string)* ID of the host; if set to 0 the command will be run on the current host. Required for remote command operations if `opcommand_grp` is not set.

Property	Type	Description
opconditions	array	Operation conditions used for trigger actions. The operation condition object is described in detail below.
opgroup	array	Host groups to add hosts to. Each object has the following properties: `operationid` - *(string)* ID of the operation; `groupid` - *(string)* ID of the host group. Required for ”add to host group” and ”remove from host group” operations.
opmessage	object	Object containing the data about the message sent by the operation. The operation message object is described in detail below. Required for message operations.
opmessage_grp	array	User groups to send messages to. Each object has the following properties: `operationid` - *(string)* ID of the operation; `usrgrpid` - *(string)* ID of the user group. Required for message operations if `opmessage_usr` is not set.
opmessage_usr	array	Users to send messages to. Each object has the following properties: `operationid` - *(string)* ID of the operation; `userid` - *(string)* ID of the user. Required for message operations if `opmessage_grp` is not set.
optemplate	array	Templates to link the hosts to to. Each object has the following properties: `operationid` - *(string)* ID of the operation; `templateid` - *(string)* ID of the template. Required for ”link to template” and ”unlink from template” operations.
opinventory	object	Inventory mode set host to. Object has the following properties: `operationid` - *(string)* ID of the operation; `inventory_mode` - *(string)* Inventory mode. Required for ”Set host inventory mode” operations.

Action operation command

The operation command object contains data about the command that will be run by the operation.

Property	Type	Description
operationid	string	*(readonly)* ID of the operation.
command	string	Command to run. Required when type IN (0,1,2,3)

Property	Type	Description
type (required)	integer	Type of operation command. Possible values: 0 - custom script; 1 - IPMI; 2 - SSH; 3 - Telnet; 4 - global script.
authtype	integer	Authentication method used for SSH commands. Possible values: 0 - password; 1 - public key. Required for SSH commands.
execute_on	integer	Target on which the custom script operation command will be executed. Possible values: 0 - Zabbix agent; 1 - Zabbix server; 2 - Zabbix server (proxy). Required for custom script commands.
password	string	Password used for SSH commands with password authentication and Telnet commands.
port	string	Port number used for SSH and Telnet commands.
privatekey	string	Name of the private key file used for SSH commands with public key authentication. Required for SSH commands with public key authentication.
publickey	string	Name of the public key file used for SSH commands with public key authentication. Required for SSH commands with public key authentication.
scriptid	string	ID of the script used for global script commands. Required for global script commands.
username	string	User name used for authentication. Required for SSH and Telnet commands.

Action operation message

The operation message object contains data about the message that will be sent by the operation.

Property	Type	Description
operationid	string	*(readonly)* ID of the action operation.
default_msg	integer	Whether to use the default action message text and subject. Possible values: 0 - *(default)* use the data from the operation; 1 - use the data from the action.
mediatypeid	string	ID of the media type that will be used to send the message.
message	string	Operation message text.
subject	string	Operation message subject.

Action operation condition

The action operation condition object defines a condition that must be met to perform the current operation. It has the following properties.

Property	Type	Description
opconditionid	string	*(readonly)* ID of the action operation condition
conditiontype (required)	integer	Type of condition. Possible values: 14 - event acknowledged.
value (required)	string	Value to compare with.
operationid	string	*(readonly)* ID of the operation.
operator	integer	Condition operator. Possible values: 0 - *(default)* =.

The following operators and values are supported for each operation condition type.

Condition	Condition name	Supported operators	Expected value
14	Event acknowledged	=	Whether the event is acknowledged. Possible values: 0 - not acknowledged; 1 - acknowledged.

Action recovery operation

The action recovery operation object defines an operation that will be performed when a problem is resolved. Recovery operations are possible for trigger actions and internal actions. It has the following properties.

Property	Type	Description
operationid	string	*(readonly)* ID of the action operation.
operationtype (required)	integer	Type of operation. Possible values for trigger actions: 0 - send message; 1 - remote command; 11 - notify all involved. Possible values for internal actions: 0 - send message; 11 - notify all involved.
actionid	string	ID of the action that the recovery operation belongs to.
opcommand	object	Object containing the data about the command run by the recovery operation. The operation command object is described in detail above. Required for remote command operations.

Property	Type	Description
opcommand_grp	array	Host groups to run remote commands on. Each object has the following properties: `opcommand_grpid` - *(string, readonly)* ID of the object; `operationid` - *(string)* ID of the operation; `groupid` - *(string)* ID of the host group. Required for remote command operations if `opcommand_hst` is not set.
opcommand_hst	array	Host to run remote commands on. Each object has the following properties: `opcommand_hstid` - *(string, readonly)* ID of the object; `operationid` - *(string)* ID of the operation; `hostid` - *(string)* ID of the host; if set to 0 the command will be run on the current host. Required for remote command operations if `opcommand_grp` is not set.
opmessage	object	Object containing the data about the message sent by the recovery operation. The operation message object is described in detail above. Required for message operations.
opmessage_grp	array	User groups to send messages to. Each object has the following properties: `operationid` - *(string)* ID of the operation; `usrgrpid` - *(string)* ID of the user group. Required for message operations if `opmessage_usr` is not set.
opmessage_usr	array	Users to send messages to. Each object has the following properties: `operationid` - *(string)* ID of the operation; `userid` - *(string)* ID of the user. Required for message operations if `opmessage_grp` is not set.

Action update operation

The action update operation object defines an operation that will be performed when a problem is updated (commented upon, acknowledged, severity changed, or manually closed). Update operations are possible for trigger actions. It has the following properties.

Property	Type	Description
operationid	string	*(readonly)* ID of the action operation.
operationtype (required)	integer	Type of operation. Possible values for trigger actions: 0 - send message; 1 - remote command; 12 - notify all involved.

Property	Type	Description
opcommand	object	Object containing the data about the command run by the recovery operation. The operation command object is described in detail above.
opcommand_grp	array	Required for remote command operations. Host groups to run remote commands on. Each object has the following properties: `groupid` - *(string)* ID of the host group.
opcommand_hst	array	Required for remote command operations if `opcommand_hst` is not set. Host to run remote commands on. Each object has the following properties: `hostid` - *(string)* ID of the host; if set to 0 the command will be run on the current host.
opmessage	object	Required for remote command operations if `opcommand_grp` is not set. Object containing the data about the message sent by the recovery operation. The operation message object is described in detail above.
opmessage_grp	array	User groups to send messages to. Each object has the following properties: `usrgrpid` - *(string)* ID of the user group. Required only for `send message` operations if `opmessage_usr` is not set. Is ignored for `send update message` operations.
opmessage_usr	array	Users to send messages to. Each object has the following properties: `userid` - *(string)* ID of the user. Required only for `send message` operations if `opmessage_grp` is not set. Is ignored for `send update message` operations.

Action filter

The action filter object defines a set of conditions that must be met to perform the configured action operations. It has the following properties.

Property	Type	Description
conditions (required)	array	Set of filter conditions to use for filtering results.
evaltype (required)	integer	Filter condition evaluation method. Possible values: 0 - and/or; 1 - and; 2 - or; 3 - custom expression.

Property	Type	Description
eval_formula	string	*(readonly)* Generated expression that will be used for evaluating filter conditions. The expression contains IDs that reference specific filter conditions by its `formulaid`. The value of `eval_formula` is equal to the value of `formula` for filters with a custom expression.
formula	string	User-defined expression to be used for evaluating conditions of filters with a custom expression. The expression must contain IDs that reference specific filter conditions by its `formulaid`. The IDs used in the expression must exactly match the ones defined in the filter conditions: no condition can remain unused or omitted. Required for custom expression filters.

Action filter condition

The action filter condition object defines a specific condition that must be checked before running the action operations.

Property	Type	Description
conditionid	string	*(readonly)* ID of the action condition.
conditiontype (required)	integer	Type of condition. Possible values for trigger actions: 0 - host group; 1 - host; 2 - trigger; 3 - trigger name; 4 - trigger severity; 6 - time period; 13 - host template; 15 - application; 16 - problem is suppressed; 25 - event tag; 26 - event tag value. Possible values for discovery actions: 7 - host IP; 8 - discovered service type; 9 - discovered service port; 10 - discovery status; 11 - uptime or downtime duration; 12 - received value; 18 - discovery rule; 19 - discovery check; 20 - proxy; 21 - discovery object. Possible values for auto-registration actions: 20 - proxy; 22 - host name; 24 - host metadata. Possible values for internal actions: 0 - host group; 1 - host; 13 - host template; 15 - application; 23 - event type.

Property	Type	Description
value (required)	string	Value to compare with.
value2	string	Secondary value to compare with. Required for trigger actions when condition type is *26*.
actionid	string	*(readonly)* ID of the action that the condition belongs to.
formulaid	string	Arbitrary unique ID that is used to reference the condition from a custom expression. Can only contain capital-case letters. The ID must be defined by the user when modifying filter conditions, but will be generated anew when requesting them afterward.
operator	integer	Condition operator. Possible values: 0 - *(default)* equals; 1 - does not equal; 2 - contains; 3 - does not contain; 4 - in; 5 - is greater than or equals; 6 - is less than or equals; 7 - not in; 8 - matches; 9 - does not match; 10 - Yes; 11 - No.

Note:
To better understand how to use filters with various types of expressions, see examples on the action.get and action.create method pages.

The following operators and values are supported for each condition type.

Condition	Condition name	Supported operators	Expected value
0	Host group	equals, does not equal	Host group ID.
1	Host	equals, does not equal	Host ID.
2	Trigger	equals, does not equal	Trigger ID.
3	Trigger name	contains, does not contain	Trigger name.
4	Trigger severity	equals, does not equal, is greater than or equals, is less than or equals	Trigger severity. Refer to the trigger "severity" property for a list of supported trigger severities.
5	Trigger value	equals	Trigger value. Refer to the trigger "value" property for a list of supported trigger values.
6	Time period	in, not in	Time when the event was triggered as a time period.
7	Host IP	equals, does not equal	One or several IP ranges to check separated by commas. Refer to the network discovery configuration section for more information on supported formats of IP ranges.

Condition	Condition name	Supported operators	Expected value
8	Discovered service type	equals, does not equal	Type of discovered service. The type of service matches the type of the discovery check used to detect the service. Refer to the discovery check "type" property for a list of supported types.
9	Discovered service port	equals, does not equal	One or several port ranges separated by commas.
10	Discovery status	equals	Status of a discovered object. Possible values: 0 - host or service up; 1 - host or service down; 2 - host or service discovered; 3 - host or service lost.
11	Uptime or downtime duration	is greater than or equals, is less than or equals	Time indicating how long has the discovered object been in the current status in seconds.
12	Received values	equals, does not equal, is greater than or equals, is less than or equals, contains, does not contain	Value returned when performing a Zabbix agent, SNMPv1, SNMPv2 or SNMPv3 discovery check.
13	Host template	equals, does not equal	Linked template ID.
15	Application	equals, contains, does not contain	Name of the application.
16	Problem is suppressed	Yes, No	No value required: using the "Yes" operator means that problem must be suppressed, "No" - not suppressed.
18	Discovery rule	equals, does not equal	ID of the discovery rule.
19	Discovery check	equals, does not equal	ID of the discovery check.
20	Proxy	equals, does not equal	ID of the proxy.
21	Discovery object	equals	Type of object that triggered the discovery event. Possible values: 1 - discovered host; 2 - discovered service.
22	Host name	contains, does not contain, matches, does not match	Host name. Using a regular expression is supported for operators *matches* and *does not match* in auto-registration conditions.

Condition	Condition name	Supported operators	Expected value
23	Event type	equals	Specific internal event. Possible values: 0 - item in ”not supported” state; 1 - item in ”normal” state; 2 - LLD rule in ”not supported” state; 3 - LLD rule in ”normal” state; 4 - trigger in ”unknown” state; 5 - trigger in ”normal” state.
24	Host metadata	contains, does not contain, matches, does not match	Metadata of the auto-registered host. Using a regular expression is supported for operators *matches* and *does not match*.
25	Tag	equals, does not equal, contains, does not contain	Event tag.
26	Tag value	equals, does not equal, contains, does not contain	Event tag value.

action.create

Description

`object action.create(object/array actions)`

This method allows to create new actions.

Parameters

`(object/array)` Actions to create.

Additionally to the standard action properties, the method accepts the following parameters.

Parameter	Type	Description
filter	object	Action filter object for the action.
operations	array	Action operations to create for the action.
recovery_operations	array	Action recovery operations to create for the action.
acknowledge_operations	array	Action update operations to create for the action.

Return values

`(object)` Returns an object containing the IDs of the created actions under the `actionids` property. The order of the returned IDs matches the order of the passed actions.

Examples

Create a trigger action

Create an action that will be run when a trigger from host ”30045” that has the word ”memory” in its name goes into problem state. The action must first send a message to all users in user group ”7”. If the event is not resolved in 4 minutes, it will run script ”3” on all hosts in group ”2”. On trigger recovery it will notify all users who received any messages regarding the problem before. On trigger update, message with custom subject and body will be sent to all who left acknowledgements and comments via all media types.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "action.create",
    "params": {
        "name": "Trigger action",
        "eventsource": 0,
        "status": 0,
        "esc_period": "2m",
        "def_shortdata": "{TRIGGER.NAME}: {TRIGGER.STATUS}",
        "def_longdata": "{TRIGGER.NAME}: {TRIGGER.STATUS}\r\nLast value: {ITEM.LASTVALUE}\r\n\r\n{TRIGGER.
        "filter": {
            "evaltype": 0,
            "conditions": [
                {
                    "conditiontype": 1,
                    "operator": 0,
                    "value": "10084"
                },
                {
                    "conditiontype": 3,
                    "operator": 2,
                    "value": "memory"
                }
            ]
        },
        "operations": [
            {
                "operationtype": 0,
                "esc_period": "0s",
                "esc_step_from": 1,
                "esc_step_to": 2,
                "evaltype": 0,
                "opmessage_grp": [
                    {
                        "usrgrpid": "7"
                    }
                ],
                "opmessage": {
                    "default_msg": 1,
                    "mediatypeid": "1"
                }
            },
            {
                "operationtype": 1,
                "esc_step_from": 3,
                "esc_step_to": 4,
                "evaltype": 0,
                "opconditions": [
                    {
                        "conditiontype": 14,
                        "operator": 0,
                        "value": "0"
                    }
                ],
                "opcommand_grp": [
                    {
                        "groupid": "2"
                    }
                ],
                "opcommand": {
                    "type": 4,
                    "scriptid": "3"
```

```
                }
            }
        ],
        "recovery_operations": [
            {
                "operationtype": "11",
                "opmessage": {
                    "default_msg": 1
                }
            }
        ],
        "acknowledge_operations": [
            {
                "operationtype": "12",
                "opmessage": {
                    "message": "Custom update operation message body",
                    "subject": "Custom update operation message subject"
                }
            }
        ]
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "actionids": [
            "17"
        ]
    },
    "id": 1
}
```

Create a discovery action

Create an action that will link discovered hosts to template ”30085”.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "action.create",
    "params": {
        "name": "Discovery action",
        "eventsource": 1,
        "status": 0,
        "esc_period": "0s",
        "filter": {
            "evaltype": 0,
            "conditions": [
                {
                    "conditiontype": 21,
                    "value": "1"
                },
                {
                    "conditiontype": 10,
                    "value": "2"
                }
            ]
        },
        "operations": [
```

```
            {
                "esc_step_from": 1,
                "esc_period": "0s",
                "optemplate": [
                    {
                        "templateid": "10091"
                    }
                ],
                "operationtype": 6,
                "esc_step_to": 1
            }
        ]
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "actionids": [
            "18"
        ]
    },
    "id": 1
}
```

Using a custom expression filter

Create a trigger action that will use a custom filter condition. The action must send a message for each trigger with severity higher or equal to ”Warning” for hosts ”10084” and ”10106”. The formula IDs ”A”, ”B” and ”C” have been chosen arbitrarily.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "action.create",
    "params": {
        "name": "Trigger action",
        "eventsource": 0,
        "status": 0,
        "esc_period": "2m",
        "def_shortdata": "{TRIGGER.NAME}: {TRIGGER.STATUS}",
        "def_longdata": "{TRIGGER.NAME}: {TRIGGER.STATUS}\r\nLast value: {ITEM.LASTVALUE}\r\n\r\n{TRIGGER.
        "filter": {
            "evaltype": 3,
            "formula": "A and (B or C)",
            "conditions": [
                {
                    "conditiontype": 4,
                    "operator": 5,
                    "value": "2",
                    "formulaid": "A"
                },
                {
                    "conditiontype": 1,
                    "operator": 0,
                    "value": "10084",
                    "formulaid": "B"
                },
                {
                    "conditiontype": 1,
                    "operator": 0,
```

```
                    "value": "10106",
                    "formulaid": "C"
                }
            ]
        },
        "operations": [
            {
                "operationtype": 0,
                "esc_period": "0s",
                "esc_step_from": 1,
                "esc_step_to": 2,
                "evaltype": 0,
                "opmessage_grp": [
                    {
                        "usrgrpid": "7"
                    }
                ],
                "opmessage": {
                    "default_msg": 1,
                    "mediatypeid": "1"
                }
            }
        ]
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "actionids": [
            "18"
        ]
    },
    "id": 1
}
```

See also

- Action filter
- Action operation

Source

CAction::create() in *frontends/php/include/classes/api/services/CAction.php*.

action.delete

Description

`object action.delete(array actionIds)`

This method allows to delete actions.

Parameters

`(array)` IDs of the actions to delete.

Return values

`(object)` Returns an object containing the IDs of the deleted actions under the `actionids` property.

Examples

Delete multiple actions

Delete two actions.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "action.delete",
    "params": [
        "17",
        "18"
    ],
    "auth": "3a57200802b24cda67c4e4010b50c065",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "actionids": [
            "17",
            "18"
        ]
    },
    "id": 1
}
```

Source

CAction::delete() in *frontends/php/include/classes/api/services/CAction.php*.

action.get

Description

`integer/array action.get(object parameters)`

The method allows to retrieve actions according to the given parameters.

Parameters

`(object)` Parameters defining the desired output.

The method supports the following parameters.

Parameter	Type	Description
actionids	string/array	Return only actions with the given IDs.
groupids	string/array	Return only actions that use the given host groups in action conditions.
hostids	string/array	Return only actions that use the given hosts in action conditions.
triggerids	string/array	Return only actions that use the given triggers in action conditions.
mediatypeids	string/array	Return only actions that use the given media types to send messages.
usrgrpids	string/array	Return only actions that are configured to send messages to the given user groups.
userids	string/array	Return only actions that are configured to send messages to the given users.
scriptids	string/array	Return only actions that are configured to run the given scripts.
selectFilter	query	Return a filter property with the action condition filter.
selectOperations	query	Return an operations property with action operations.
selectRecoveryOperations	query	Return a recoveryOperations property with action recovery operations.

Parameter	Type	Description
selectAcknowledgeOperations	query	Return an acknowledgeOperations property with action update operations.
sortfield	string/array	Sort the result by the given properties. Possible values are: `actionid`, `name` and `status`.
countOutput	boolean	These parameters being common for all `get` methods are described in the reference commentary.
editable	boolean	
excludeSearch	boolean	
filter	object	
limit	integer	
output	query	
preservekeys	boolean	
search	object	
searchByAny	boolean	
searchWildcardsEnabled	boolean	
sortorder	string/array	
startSearch	boolean	

Return values

`(integer/array)` Returns either:

- an array of objects;
- the count of retrieved objects, if the `countOutput` parameter has been used.

Examples

Retrieve discovery actions

Retrieve all configured discovery actions together with action conditions and operations. The filter uses the "and" evaluation type, so the `formula` property is empty and `eval_formula` is generated automatically.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "action.get",
    "params": {
        "output": "extend",
        "selectOperations": "extend",
        "selectRecoveryOperations": "extend",
        "selectFilter": "extend",
        "filter": {
            "eventsource": 1
        }
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "actionid": "2",
            "name": "Auto discovery. Linux servers.",
            "eventsource": "1",
            "status": "1",
            "esc_period": "0s",
            "def_shortdata": "",
            "def_longdata": "",
            "r_shortdata": "",
```

```
        "r_longdata": "",
        "pause_suppressed": "1",
        "filter": {
            "evaltype": "0",
            "formula": "",
            "conditions": [
                {
                    "conditiontype": "10",
                    "operator": "0",
                    "value": "0",
                    "value2": "",
                    "formulaid": "B"
                },
                {
                    "conditiontype": "8",
                    "operator": "0",
                    "value": "9",
                    "value2": "",
                    "formulaid": "C"
                },
                {
                    "conditiontype": "12",
                    "operator": "2",
                    "value": "Linux",
                    "value2": "",
                    "formulaid": "A"
                }
            ],
            "eval_formula": "A and B and C"
        },
        "operations": [
            {
                "operationid": "1",
                "actionid": "2",
                "operationtype": "6",
                "esc_period": "0s",
                "esc_step_from": "1",
                "esc_step_to": "1",
                "evaltype": "0",
                "opconditions": [],
                "optemplate": [
                    {
                        "operationid": "1",
                        "templateid": "10001"
                    }
                ]
            },
            {
                "operationid": "2",
                "actionid": "2",
                "operationtype": "4",
                "esc_period": "0s",
                "esc_step_from": "1",
                "esc_step_to": "1",
                "evaltype": "0",
                "opconditions": [],
                "opgroup": [
                    {
                        "operationid": "2",
                        "groupid": "2"
                    }
                ]
```

```
            }
        ],
        "recoveryOperations": [
            {
                "operationid": "585",
                "actionid": "2",
                "operationtype": "11",
                "evaltype": "0",
                "opconditions": [],
                "opmessage": {
                    "operationid": "585",
                    "default_msg": "1",
                    "subject": "{TRIGGER.STATUS}: {TRIGGER.NAME}",
                    "message": "Trigger: {TRIGGER.NAME}\r\nTrigger status: {TRIGGER.STATUS}\r\nTrigger
                    "mediatypeid": "0"
                }
            }
        ],
        "acknowledgeOperations": [
            {
                "operationid": "585",
                "operationtype": "12",
                "evaltype": "0",
                "opmessage": {
                    "default_msg": "1",
                    "subject": "Updated: {TRIGGER.NAME}",
                    "message": "{USER.FULLNAME} updated problem at {EVENT.UPDATE.DATE} {EVENT.UPDATE.T
                    "mediatypeid": "0"
                }
            },
            {
                "operationid": "586",
                "operationtype": "0",
                "evaltype": "0",
                "opmessage": {
                    "default_msg": "1",
                    "subject": "Updated: {TRIGGER.NAME}",
                    "message": "{USER.FULLNAME} updated problem at {EVENT.UPDATE.DATE} {EVENT.UPDATE.T
                    "mediatypeid": "0"
                },
                "opmessage_grp": [
                    {
                        "usrgrpid": "7"
                    }
                ],
                "opmessage_usr": []
            },
            {
                "operationid": "587",
                "operationtype": "1",
                "evaltype": "0",
                "opcommand": {
                    "type": "0",
                    "scriptid": "0",
                    "execute_on": "0",
                    "port": "",
                    "authtype": "0",
                    "username": "",
                    "password": "",
                    "publickey": "",
                    "privatekey": "",
                    "command": "notify.sh"
```

```
                    },
                    "opcommand_hst": [
                        {
                            "hostid": "0"
                        }
                    ],
                    "opcommand_grp": []
                }
            ]
        }
    ],
    "id": 1
}
```


See also

- Action filter
- Action operation

Source

CAction::get() in *frontends/php/include/classes/api/services/CAction.php*.

action.update

Description

`object action.update(object/array actions)`

This method allows to update existing actions.

Parameters

`(object/array)` Action properties to be updated.

The `actionid` property must be defined for each action, all other properties are optional. Only the passed properties will be updated, all others will remain unchanged.

Additionally to the standard action properties, the method accepts the following parameters.

Parameter	Type	Description
filter	object	Action filter object to replace the current filter.
operations	array	Action operations to replace existing operations.
recovery_operations	array	Action recovery operations to replace existing recovery operations.
acknowledge_operations	array	Action update operations to replace existing update operations.

Return values

`(object)` Returns an object containing the IDs of the updated actions under the `actionids` property.

Examples

Disable action

Disable action, that is, set its status to "1".

Request:


```
{
    "jsonrpc": "2.0",
    "method": "action.update",
    "params": {
        "actionid": "2",
        "status": "1"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
```

```
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "actionids": [
            "2"
        ]
    },
    "id": 1
}
```

See also

- Action filter
- Action operation

Source

CAction::update() in *frontends/php/include/classes/api/services/CAction.php*.

Alert

This class is designed to work with alerts.

Object references:

- Alert

Available methods:

- alert.get - retrieve alerts

> Alert object

The following objects are directly related to the `alert` API.

Alert

Note:
Alerts are created by the Zabbix server and cannot be modified via the API.

The alert object contains information about whether certain action operations have been executed successfully. It has the following properties.

Property	Type	Description
alertid	string	ID of the alert.
actionid	string	ID of the action that generated the alert.
alerttype	integer	Alert type. Possible values: 0 - message; 1 - remote command.
clock	timestamp	Time when the alert was generated.
error	string	Error text if there are problems sending a message or running a command.
esc_step	integer	Action escalation step during which the alert was generated.
eventid	string	ID of the event that triggered the action.
mediatypeid	string	ID of the media type that was used to send the message.
message	text	Message text. Used for message alerts.

Property	Type	Description
retries	integer	Number of times Zabbix tried to send the message.
sendto	string	Address, user name or other identifier of the recipient. Used for message alerts.
status	integer	Status indicating whether the action operation has been executed successfully. Possible values for message alerts: 0 - message not sent. 1 - message sent. 2 - failed after a number of retries. 3 - new alert is not yet processed by alert manager. Possible values for command alerts: 0 - command not run. 1 - command run. 2 - tried to run the command on the Zabbix agent but it was unavailable.
subject	string	Message subject. Used for message alerts.
userid	string	ID of the user that the message was sent to.
p_eventid	string	ID of problem event, which generated the alert.
acknowledgeid	string	ID of acknowledgement, which generated the alert.

alert.get

Description

`integer/array alert.get(object parameters)`

The method allows to retrieve alerts according to the given parameters.

Parameters

`(object)` Parameters defining the desired output.

The method supports the following parameters.

Parameter	Type	Description
alertids	string/array	Return only alerts with the given IDs.
actionids	string/array	Return only alerts generated by the given actions.
eventids	string/array	Return only alerts generated by the given events.
groupids	string/array	Return only alerts generated by objects from the given host groups.
hostids	string/array	Return only alerts generated by objects from the given hosts.
mediatypeids	string/array	Return only message alerts that used the given media types.
objectids	string/array	Return only alerts generated by the given objects
userids	string/array	Return only message alerts that were sent to the given users.
eventobject	integer	Return only alerts generated by events related to objects of the given type. See event "object" for a list of supported object types. Default: 0 - trigger.
eventsource	integer	Return only alerts generated by events of the given type. See event "source" for a list of supported event types. Default: 0 - trigger events.

Parameter	Type	Description
time_from	timestamp	Return only alerts that have been generated after the given time.
time_till	timestamp	Return only alerts that have been generated before the given time.
selectHosts	query	Return a hosts property with data of hosts that triggered the action operation.
selectMediatypes	query	Return a mediatypes property with an array of the media types that were used for the message alert.
selectUsers	query	Return a users property with an array of the users that the message was addressed to.
sortfield	string/array	Sort the result by the given properties. Possible values are: `alertid`, `clock`, `eventid`, `mediatypeid`, `sendto` and `status`.
countOutput	boolean	These parameters being common for all `get` methods are described in the reference commentary.
editable	boolean	
excludeSearch	boolean	
filter	object	
limit	integer	
output	query	
preservekeys	boolean	
search	object	
searchByAny	boolean	
searchWildcardsEnabled	boolean	
sortorder	string/array	
startSearch	boolean	

Return values

`(integer/array)` Returns either:

- an array of objects;
- the count of retrieved objects, if the `countOutput` parameter has been used.

Examples

Retrieve alerts by action ID

Retrieve all alerts generated by action "3".

Request:

```
{
    "jsonrpc": "2.0",
    "method": "alert.get",
    "params": {
        "output": "extend",
        "actionids": "3"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "alertid": "1",
            "actionid": "3",
            "eventid": "21243",
            "userid": "1",
            "clock": "1362128008",
```

```
            "mediatypeid": "1",
            "sendto": "support@company.com",
            "subject": "PROBLEM: Zabbix agent on Linux server is unreachable for 5 minutes: ",
            "message": "Trigger: Zabbix agent on Linux server is unreachable for 5 minutes: \nTrigger stat
            "status": "0",
            "retries": "3",
            "error": "",
            "esc_step": "1",
            "alerttype": "0",
            "p_eventid": "0",
            "acknowledgeid": "0"
        }
    ],
    "id": 1
}
```


See also

- Host
- Media type
- User

Source

CAlert::get() in *frontends/php/include/classes/api/services/CAlert.php*.

API info

This class is designed to retrieve meta information about the API.

Available methods:

- apiinfo.version - retrieving the version of the Zabbix API

apiinfo.version

Description

`string apiinfo.version(array)`

This method allows to retrieve the version of the Zabbix API.

Parameters

> **Attention:**
> This method is available to unauthenticated users and must be called without the `auth` parameter in the JSON-RPC request.

`(array)` The method accepts an empty array.

Return values

`(string)` Returns the version of the Zabbix API.

> **Note:**
> Starting from Zabbix 2.0.4 the version of the API matches the version of Zabbix.

Examples

Retrieving the version of the API

Retrieve the version of the Zabbix API.

Request:


```
{
    "jsonrpc": "2.0",
    "method": "apiinfo.version",
```

```
    "params": [],
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": "4.0.0",
    "id": 1
}
```

Source

CAPIInfo::version() in *frontends/php/include/classes/api/services/CAPIInfo.php*.

Application

This class is designed to work with applications.

Object references:

- Application

Available methods:

- application.create - creating new applications
- application.delete - deleting applications
- application.get - retrieving application
- application.massadd - updating application
- application.update - adding items to applications

> Application object

The following objects are directly related to the `application` API.

Application

The application object has the following properties.

Property	Type	Description
applicationid	string	*(readonly)* ID of the application.
hostid (required)	string	ID of the host that the application belongs to. Cannot be updated.
name (required)	string	Name of the application
flags	integer	*(readonly)* Origin of the application. Possible values: 0 - a plain application; 4 - a discovered application.
templateids	array	*(readonly)* IDs of the parent template applications.

application.create

Description

`object application.create(object/array applications)`

This method allows to create new applications.

Parameters

(object/array) Applications to create.

The method accepts applications with the standard application properties.

Return values

(object) Returns an object containing the IDs of the created applications under the applicationids property. The order of the returned IDs matches the order of the passed applications.

Examples

Creating an application

Create an application to store SNMP items.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "application.create",
    "params": {
        "name": "SNMP Items",
        "hostid": "10050"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "applicationids": [
            "356"
        ]
    },
    "id": 1
}
```

Source

CApplication::create() in *frontends/php/include/classes/api/services/CApplication.php*.

application.delete

Description

`object application.delete(array applicationIds)`

This method allows to delete applications.

Parameters

(array) IDs of the applications to delete.

Return values

(object) Returns an object containing the IDs of the deleted applications under the applicationids property.

Examples

Deleting multiple applications

Delete two applications.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "application.delete",
    "params": [
        "356",
```

```
        "358"
    ],
    "auth": "3a57200802b24cda67c4e4010b50c065",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "applicationids": [
            "356",
            "358"
        ]
    },
    "id": 1
}
```

Source

CApplication::delete() in *frontends/php/include/classes/api/services/CApplication.php*.

application.get

Description

`integer/array application.get(object parameters)`

The method allows to retrieve applications according to the given parameters.

Parameters

`(object)` Parameters defining the desired output.

The method supports the following parameters.

Parameter	Type	Description
applicationids	string/array	Return only applications with the given IDs.
groupids	string/array	Return only applications that belong to hosts from the given host groups.
hostids	string/array	Return only applications that belong to the given hosts.
inherited	boolean	If set to `true` return only applications inherited from a template.
itemids	string/array	Return only applications that contain the given items.
templated	boolean	If set to `true` return only applications that belong to templates.
templateids	string/array	Return only applications that belong to the given templates.
selectHost	query	Return a host property with the host that the application belongs to.
selectItems	query	Return an items property with the items contained in the application.
selectDiscoveryRule	query	Return a discoveryRule property with the LLD rule that created the application.
selectApplicationDiscovery	query	Return an `applicationDiscovery` property with the application discovery object.
sortfield	string/array	Sort the result by the given properties. Possible values are: `applicationid` and `name`.
countOutput	boolean	These parameters being common for all `get` methods are described in detail in the reference commentary page.
editable	boolean	
excludeSearch	boolean	

Parameter	Type	Description
filter	object	
limit	integer	
output	query	
preservekeys	boolean	
search	object	
searchByAny	boolean	
searchWildcardsEnabled	boolean	
sortorder	string/array	
startSearch	boolean	

Return values

`(integer/array)` Returns either:

- an array of objects;
- the count of retrieved objects, if the `countOutput` parameter has been used.

Examples

Retrieving applications from a host

Retrieve all applications from a host sorted by name.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "application.get",
    "params": {
        "output": "extend",
        "hostids": "10001",
        "sortfield": "name"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "applicationid": "13",
            "hostid": "10001",
            "name": "CPU",
            "templateids": []
        },
        {
            "applicationid": "5",
            "hostid": "10001",
            "name": "Filesystems",
            "templateids": []
        },
        {
            "applicationid": "21",
            "hostid": "10001",
            "name": "General",
            "templateids": []
        },
        {
            "applicationid": "15",
            "hostid": "10001",
            "name": "Memory",
            "templateids": []
```

```
        },
    ],
    "id": 1
}
```

See also

- Host
- Item

Source

CApplication::get() in *frontends/php/include/classes/api/services/CApplication.php*.

application.massadd

Description

`object application.massadd(object parameters)`

This method allows to simultaneously add multiple items to the given applications.

Parameters

`(object)` Parameters containing the IDs of the applications to update and the items to add to the applications.

The method accepts the following parameters.

Parameter	Type	Description
applications (required)	array/object	Applications to be updated. The applications must have the `applicationid` property defined.
items	array/object	Items to add to the given applications. The items must have the `itemid` property defined.

Return values

`(object)` Returns an object containing the IDs of the updated applications under the `applicationids` property.

Examples

Adding items to multiple applications

Add the given items to two applications.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "application.massadd",
    "params": {
        "applications": [
            {
                "applicationid": "247"
            },
            {
                "applicationid": "246"
            }
        ],
        "items": [
            {
                "itemid": "22800"
            },
            {
                "itemid": "22801"
            }
```

```
        ]
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "applicationids": [
            "247",
            "246"
        ]
    },
    "id": 1
}
```

See also

- Item

Source

CApplication::massAdd() in *frontends/php/include/classes/api/services/CApplication.php*.

application.update

Description

`object application.update(object/array applications)`

This method allows to update existing applications.

Parameters

`(object/array)` Application properties to be updated.

The `applicationid` property must be defined for each application, all other properties are optional. Only the passed properties will be updated, all others will remain unchanged.

Return values

`(object)` Returns an object containing the IDs of the updated applications under the `applicationids` property.

Examples

Changing the name of an application

Change the name of the application to ”Processes and performance”.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "application.update",
    "params": {
        "applicationid": "13",
        "name": "Processes and performance"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "applicationids": [
```

```
            "13"
        ]
    },
    "id": 1
}
```

Source

CApplication::update() in *frontends/php/include/classes/api/services/CApplication.php*.

Auto registration

This class is designed to work with autoregistration.

Object references:

- Auto registration

Available methods:

- autoregistration.get - retrieve autoregistration
- autoregistration.update - update autoregistration

> Autoregistration object

The following objects are directly related to the `autoregistration` API.

Autoregistration

The autoregistration object has the following properties.

Property	Type	Description
tls_accept	integer	Type of allowed incoming connections for autoregistration. Possible values: 1 - allow unsecure connections; 2 - allow TLS with PSK. 3 - allow both unsecure and TLS with PSK connections.
tls_psk_identity	string	*(writeonly)* PSK identity string. Do not put sensitive information in the PSK identity, it is transmitted unencrypted over the network to inform a receiver which PSK to use.
tls_psk	string	*(writeonly)* PSK value string (an even number of hexadecimal characters).

autoregistration.get

Description

`object autoregistration.get(object parameters)`

The method allows to retrieve autoregistration object according to the given parameters.

Parameters

`(object)` Parameters defining the desired output.

The method supports only one parameter.

Parameter	Type	Description
output	query	This parameter being common for all get methods described in the reference commentary.

Return values

(object) Returns autoregistration object.

Examples

Request:

```
{
   "jsonrpc": "2.0",
    "method": "autoregistration.get",
    "params": {
        "output": "extend"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "tls_accept": "3"
    },
    "id": 1
}
```

Source

CAutoregistration::get() in *frontends/php/include/classes/api/services/CAutoregistration.php*.

autoregistration.update

Description

object autoregistration.update(object autoregistration)

This method allows to update existing autoregistration.

Parameters

(object) Autoregistration properties to be updated.

Return values

(boolean) Returns boolean true as result on successful update.

Examples

Request:

```
{
    "jsonrpc": "2.0",
    "method": "autoregistration.update",
    "params": {
        "tls_accept": "3",
        "tls_psk_identity": "PSK 001",
        "tls_psk": "11111595725ac58dd977beef14b97461a7c1045b9a1c923453302c5473193478"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": true,
    "id": 1
}
```

Source

CAutoregistration::update() in *frontends/php/include/classes/api/services/CAutoregistration.php*.

Configuration

This class is designed to export and import Zabbix configuration data.

Available methods:

- configuration.export - exporting the configuration
- configuration.import - importing the configuration

configuration.export

Description

`string configuration.export(object parameters)`

This method allows to export configuration data as a serialized string.

Parameters

`(object)` Parameters defining the objects to be exported and the format to use.

Parameter	Type	Description
format (required)	string	Format in which the data must be exported. Possible values: `json` - JSON; `xml` - XML.
options (required)	object	Objects to be exported. The `options` object has the following parameters: `groups` - `(array)` IDs of host groups to export; `hosts` - `(array)` IDs of hosts to export; `images` - `(array)` IDs of images to export; `maps` - `(array)` IDs of maps to export; `mediaTypes` - `(array)` IDs of media types to export; `screens` - `(array)` IDs of screens to export; `templates` - `(array)` IDs of templates to export; `valueMaps` - `(array)` IDs of value maps to export.

Return values

`(string)` Returns a serialized string containing the requested configuration data.

Examples

Exporting a host

Export the configuration of a host as an XML string.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "configuration.export",
```

```
    "params": {
        "options": {
            "hosts": [
                "10161"
            ]
        },
        "format": "xml"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": "<?xml version=\"1.0\" encoding=\"UTF-8\"?>\n<zabbix_export><version>4.0</version><date>2018
    "id": 1
}
```

Source

CConfiguration::export() in *frontends/php/include/classes/api/services/CConfiguration.php*.

configuration.import

Description

`boolean configuration.import(object parameters)`

This method allows to import configuration data from a serialized string.

Parameters

`(object)` Parameters containing the data to import and rules how the data should be handled.

Parameter	Type	Description
format (required)	string	Format of the serialized string. Possible values: `json` - JSON; `xml` - XML.
source (required)	string	Serialized string containing the configuration data.
rules (required)	object	Rules on how new and existing objects should be imported. The `rules` parameter is described in detail in the table below.

Note:
If no rules are given, the configuration will not be updated.

The `rules` object supports the following parameters.

Parameter	Type	Description
applications	object	Rules on how to import applications. Supported parameters: `createMissing` - `(boolean)` if set to `true`, new applications will be created; default: `false`; `deleteMissing` - `(boolean)` if set to `true`, applications not present in the imported data will be deleted from the database; default: `false`.
discoveryRules	object	Rules on how to import LLD rules. Supported parameters: `createMissing` - `(boolean)` if set to `true`, new LLD rules will be created; default: `false`; `updateExisting` - `(boolean)` if set to `true`, existing LLD rules will be updated; default: `false`; `deleteMissing` - `(boolean)` if set to `true`, LLD rules not present in the imported data will be deleted from the database; default: `false`.
graphs	object	Rules on how to import graphs. Supported parameters: `createMissing` - `(boolean)` if set to `true`, new graphs will be created; default: `false`; `updateExisting` - `(boolean)` if set to `true`, existing graphs will be updated; default: `false`; `deleteMissing` - `(boolean)` if set to `true`, graphs not present in the imported data will be deleted from the database; default: `false`.
groups	object	Rules on how to import host groups. Supported parameters: `createMissing` - `(boolean)` if set to `true`, new host groups will be created; default: `false`.
hosts	object	Rules on how to import hosts. Supported parameters: `createMissing` - `(boolean)` if set to `true`, new hosts will be created; default: `false`; `updateExisting` - `(boolean)` if set to `true`, existing hosts will be updated; default: `false`.
httptests	object	Rules on how to import web scenarios. Supported parameters: `createMissing` - `(boolean)` if set to `true`, new web scenarios will be created; default: `false`; `updateExisting` - `(boolean)` if set to `true`, existing web scenarios will be updated; default: `false`; `deleteMissing` - `(boolean)` if set to `true`, web scenarios not present in the imported data will be deleted from the database; default: `false`.
images	object	Rules on how to import images. Supported parameters: `createMissing` - `(boolean)` if set to `true`, new images will be created; default: `false`; `updateExisting` - `(boolean)` if set to `true`, existing images will be updated; default: `false`.

Parameter	Type	Description
items	object	Rules on how to import items. Supported parameters: `createMissing` - `(boolean)` if set to `true`, new items will be created; default: `false`; `updateExisting` - `(boolean)` if set to `true`, existing items will be updated; default: `false`; `deleteMissing` - `(boolean)` if set to `true`, items not present in the imported data will be deleted from the database; default: `false`.
maps	object	Rules on how to import maps. Supported parameters: `createMissing` - `(boolean)` if set to `true`, new maps will be created; default: `false`; `updateExisting` - `(boolean)` if set to `true`, existing maps will be updated; default: `false`.
mediaTypes	object	Rules on how to import media types. Supported parameters: `createMissing` - `(boolean)` if set to `true`, new media types will be created; default: `false`; `updateExisting` - `(boolean)` if set to `true`, existing media types will be updated; default: `false`.
screens	object	Rules on how to import screens. Supported parameters: `createMissing` - `(boolean)` if set to `true`, new screens will be created; default: `false`; `updateExisting` - `(boolean)` if set to `true`, existing screens will be updated; default: `false`.
templateLinkage	object	Rules on how to import template links. Supported parameters: `createMissing` - `(boolean)` if set to `true`, new links between templates and host will be created; default: `false`; `deleteMissing` - `(boolean)` if set to `true`, template links not present in the imported data will be deleted from the database; default: `false`.
templates	object	Rules on how to import templates. Supported parameters: `createMissing` - `(boolean)` if set to `true`, new templates will be created; default: `false`; `updateExisting` - `(boolean)` if set to `true`, existing templates will be updated; default: `false`.
templateScreens	object	Rules on how to import template screens. Supported parameters: `createMissing` - `(boolean)` if set to `true`, new template screens will be created; default: `false`; `updateExisting` - `(boolean)` if set to `true`, existing template screens will be updated; default: `false`; `deleteMissing` - `(boolean)` if set to `true`, template screens not present in the imported data will be deleted from the database; default: `false`.

Parameter	Type	Description
triggers	object	Rules on how to import triggers. Supported parameters: `createMissing` - `(boolean)` if set to `true`, new triggers will be created; default: `false`; `updateExisting` - `(boolean)` if set to `true`, existing triggers will be updated; default: `false`; `deleteMissing` - `(boolean)` if set to `true`, triggers not present in the imported data will be deleted from the database; default: `false`.
valueMaps	object	Rules on how to import value maps. Supported parameters: `createMissing` - `(boolean)` if set to `true`, new value maps will be created; default: `false`; `updateExisting` - `(boolean)` if set to `true`, existing value maps will be updated; default: `false`.

Return values

`(boolean)` Returns `true` if importing has been successful.

Examples

Importing hosts and items

Import the host and items contained in the XML string. If any items in XML are missing, they will be deleted from the database, and everything else will be left unchanged.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "configuration.import",
    "params": {
        "format": "xml",
        "rules": {
            "applications": {
                "createMissing": true,
                "deleteMissing": false
            },
            "valueMaps": {
                "createMissing": true,
                "updateExisting": false
            },
            "hosts": {
                "createMissing": true,
                "updateExisting": true
            },
            "items": {
                "createMissing": true,
                "updateExisting": true,
                "deleteMissing": true
            }
        },
        "source": "<?xml version=\"1.0\" encoding=\"UTF-8\"?><zabbix_export><version>4.0</version><date>20
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": true,
    "id": 1
}
```

Source

CConfiguration::import() in *frontends/php/include/classes/api/services/CConfiguration.php*.

Correlation

This class is designed to work with correlations.

Object references:

- Correlation

Available methods:

- correlation.create - creating new correlations
- correlation.delete - deleting correlations
- correlation.get - retrieving correlations
- correlation.update - updating correlations

> Correlation object

The following objects are directly related to the `correlation` API.

Correlation

The correlation object has the following properties.

Property	Type	Description
correlationid	string	*(readonly)* ID of the correlation.
name (required)	string	Name of the correlation.
description	string	Description of the correlation.
status	integer	Whether the correlation is enabled or disabled. Possible values are: 0 - *(default)* enabled; 1 - disabled.

Correlation operation

The correlation operation object defines an operation that will be performed when a correlation is executed. It has the following properties.

Property	Type	Description
type (required)	integer	Type of operation. Possible values: 0 - close old events; 1 - close new event.

Correlation filter

The correlation filter object defines a set of conditions that must be met to perform the configured correlation operations. It has the following properties.

Property	Type	Description
evaltype (required)	integer	Filter condition evaluation method. Possible values: 0 - and/or; 1 - and; 2 - or; 3 - custom expression.
conditions (required)	array	Set of filter conditions to use for filtering results.
eval_formula	string	*(readonly)* Generated expression that will be used for evaluating filter conditions. The expression contains IDs that reference specific filter conditions by its `formulaid`. The value of `eval_formula` is equal to the value of `formula` for filters with a custom expression.
formula	string	User-defined expression to be used for evaluating conditions of filters with a custom expression. The expression must contain IDs that reference specific filter conditions by its `formulaid`. The IDs used in the expression must exactly match the ones defined in the filter conditions: no condition can remain unused or omitted. Required for custom expression filters.

Correlation filter condition

The correlation filter condition object defines a specific condition that must be checked before running the correlation operations.

Property	Type	Description
type (required)	integer	Type of condition. Possible values: 0 - old event tag; 1 - new event tag; 2 - new event host group; 3 - event tag pair; 4 - old event tag value; 5 - new event tag value.
tag	string	Event tag (old or new). Required when type of condition is: 0, 1, 4, 5.
groupid	string	Host group ID. Required when type of condition is: 2.
oldtag	string	Old event tag. Required when type of condition is: 3.
newtag	string	Old event tag. Required when type of condition is: 3.
value	string	Event tag (old or new) value. Required when type of condition is: 4, 5.
formulaid	string	Arbitrary unique ID that is used to reference the condition from a custom expression. Can only contain capital-case letters. The ID must be defined by the user when modifying filter conditions, but will be generated anew when requesting them afterward.
operator	integer	Condition operator. Required when type of condition is: 2, 4, 5.

Note:
To better understand how to use filters with various types of expressions, see examples on the correlation.get and correlation.create method pages.

The following operators and values are supported for each condition type.

Condition	Condition name	Supported operators	Expected value
2	Host group	=, <>	Host group ID.
4	Old event tag value	=, <>, like, not like	string
5	New event tag value	=, <>, like, not like	string

correlation.create

Description

`object correlation.create(object/array correlations)`

This method allows to create new correlations.

Parameters

`(object/array)` Correlations to create.

Additionally to the standard correlation properties, the method accepts the following parameters.

Parameter	Type	Description
operations (required)	array	Correlation operations to create for the correlation.
filter (required)	object	Correlation filter object for the correlation.

Return values

`(object)` Returns an object containing the IDs of the created correlations under the `correlationids` property. The order of the returned IDs matches the order of the passed correlations.

Examples

Create a new event tag correlation

Create a correlation using evaluation method `AND/OR` with one condition and one operation. By default the correlation will be enabled.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "correlation.create",
    "params": {
        "name": "new event tag correlation",
        "filter": {
            "evaltype": 0,
            "conditions": [
                {
                    "type": 1,
                    "tag": "ok"
                }
            ]
        },
        "operations": [
            {
                "type": 0
            }
        ]
    },
    "auth": "343baad4f88b4106b9b5961e77437688",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "correlationids": [
            "1"
        ]
    },
    "id": 1
}
```

Using a custom expression filter

Create a correlation that will use a custom filter condition. The formula IDs "A" or "B" have been chosen arbitrarily. Condition type will be "Host group" with operator "<>".

Request:

```
{
    "jsonrpc": "2.0",
    "method": "correlation.create",
    "params": {
        "name": "new host group correlation",
        "description": "a custom description",
        "status": 0,
        "filter": {
            "evaltype": 3,
            "formula": "A or B",
            "conditions": [
                {
                    "type": 2,
                    "operator": 1,
                    "formulaid": "A"
                },
                {
                    "type": 2,
                    "operator": 1,
                    "formulaid": "B"
                }
            ]
        },
        "operations": [
            {
                "type": 1
            }
        ]
    },
    "auth": "343baad4f88b4106b9b5961e77437688",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "correlationids": [
            "2"
        ]
    },
    "id": 1
}
```

See also

- Correlation filter
- Correlation operation

Source

CCorrelation::create() in *frontends/php/include/classes/api/services/CCorrelation.php*.

correlation.delete

Description

`object correlation.delete(array correlationids)`

This method allows to delete correlations.

Parameters

`(array)` IDs of the correlations to delete.

Return values

`(object)` Returns an object containing the IDs of the deleted correlations under the `correlationids` property.

Example

Delete multiple correlations

Delete two correlations.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "correlation.delete",
    "params": [
        "1",
        "2"
    ],
    "auth": "343baad4f88b4106b9b5961e77437688",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "correlaionids": [
            "1",
            "2"
        ]
    },
    "id": 1
}
```

Source

CCorrelation::delete() in *frontends/php/include/classes/api/services/CCorrelation.php*.

correlation.get

Description

`integer/array correlation.get(object parameters)`

The method allows to retrieve correlations according to the given parameters.

Parameters

`(object)` Parameters defining the desired output.

The method supports the following parameters.

Parameter	Type	Description
correlationids	string/array	Return only correlations with the given IDs.
selectFilter	query	Return a filter property with the correlation conditions.
selectOperations	query	Return an operations property with the correlation operations.
sortfield	string/array	Sort the result by the given properties. Possible values are: `correlationid`, `name` and `status`.
countOutput	boolean	These parameters being common for all `get` methods are described in the reference commentary.
editable	boolean	
excludeSearch	boolean	
filter	object	
limit	integer	
output	query	
preservekeys	boolean	
search	object	
searchByAny	boolean	
searchWildcardsEnabled	boolean	
sortorder	string/array	
startSearch	boolean	

Return values

`(integer/array)` Returns either:

- an array of objects;
- the count of retrieved objects, if the `countOutput` parameter has been used.

Examples

Retrieve correlations

Retrieve all configured correlations together with correlation conditions and operations. The filter uses the ”and/or” evaluation type, so the `formula` property is empty and `eval_formula` is generated automatically.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "correlation.get",
    "params": {
        "output": "extend",
        "selectOperations": "extend",
        "selectFilter": "extend"
    },
    "auth": "343baad4f88b4106b9b5961e77437688",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "correlationid": "1",
            "name": "Correlation 1",
            "description": "",
            "status": "0",
            "filter": {
                "evaltype": "0",
                "formula": "",
                "conditions": [
                    {
```

```
                        "type": "3",
                        "oldtag": "error",
                        "newtag": "ok",
                        "formulaid": "A"
                    }
                ],
                "eval_formula": "A"
            },
            "operations": [
                {
                    "type": "0"
                }
            ]
        }
    ],
    "id": 1
}
```

See also

- Correlation filter
- Correlation operation

Source

CCorrelation::get() in *frontends/php/include/classes/api/services/CCorrelation.php*.

correlation.update

Description

`object correlation.update(object/array correlations)`

This method allows to update existing correlations.

Parameters

`(object/array)` Correlation properties to be updated.

The `correlationid` property must be defined for each correlation, all other properties are optional. Only the passed properties will be updated, all others will remain unchanged.

Additionally to the standard correlation properties, the method accepts the following parameters.

Parameter	Type	Description
filter	object	Correlation filter object to replace the current filter.
operations	array	Correlation operations to replace existing operations.

Return values

`(object)` Returns an object containing the IDs of the updated correlations under the `correlationids` property.

Examples

Disable correlation

Request:

```
{
    "jsonrpc": "2.0",
    "method": "correlation.update",
    "params": {
        "correlationid": "1",
        "status": "1"
    },
    "auth": "343baad4f88b4106b9b5961e77437688",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "correlationids": [
            "1"
        ]
    },
    "id": 1
}
```

Replace conditions, but keep the evaluation method

Request:

```
{
    "jsonrpc": "2.0",
    "method": "correlation.update",
    "params": {
        "correlationid": "1",
        "filter": {
            "conditions": [
                {
                    "type": 3,
                    "oldtag": "error",
                    "newtag": "ok"
                }
            ]
        }
    },
    "auth": "343baad4f88b4106b9b5961e77437688",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "correlationids": [
            "1"
        ]
    },
    "id": 1
}
```

See also

- Correlation filter
- Correlation operation

Source

CCorrelation::update() in *frontends/php/include/classes/api/services/CCorrelation.php*.

Dashboard

This class is designed to work with dashboards.

Object references:

- Dashboard
- Dashboard widget
- Dashboard widget field
- Dashboard user group
- Dashboard user

Available methods:

- dashboard.create - creating new dashboards
- dashboard.delete - deleting dashboards
- dashboard.get - retrieving dashboards
- dashboard.update - updating dashboards

> Dashboard object

The following objects are directly related to the `dashboard` API.

Dashboard

The dashboard object has the following properties:

Property	Type	Description
dashboardid	string	*(readonly)* ID of the dashboard.
name (required)	string	Name of the dashboard.
userid	string	Dashboard owner user ID.
private	integer	Type of dashboard sharing. Possible values: 0 - public dashboard; 1 - *(default)* private dashboard.

Dashboard widget

The dashboard widget object has the following properties:

Property	Type	Description
widgetid	string	*(readonly)* ID of the dashboard widget.
type (required)	string	Type of the dashboard widget. Possible values: actionlog - Action log; clock - Clock; dataover - Data overview; discovery - Discovery status; favgraphs - Favourite graphs; favmaps - Favourite maps; favscreens - Favourite screens; graph - Graph (classic); graphprototype - Graph prototype; hostavail - Host availability; map - Map; navtree - Map Navigation Tree; plaintext - Plain text; problemhosts - Problem hosts; problems - Problems; problemsbysv - Problems by severity; svggraph - Graph; systeminfo - System information; trigover - Trigger overview; url - URL; web - Web monitoring;
name	string	Custom widget name.
x	integer	A horizontal position from the left side of the dashboard. Valid values range from 0 to 23.

Property	Type	Description
y	integer	A vertical position from the top of the dashboard. Valid values range from 0 to 62.
width	integer	The widget width. Valid values range from 1 to 24.
height	integer	The widget height. Valid values range from 2 to 32.
view_mode	integer	The widget view mode. Possible values: 0 - (default) default widget view; 1 - with hidden header;
fields	array	Array of the dashboard widget field objects.

Dashboard widget field

The dashboard widget field object has the following properties:

Property	Type	Description
type (required)	integer	Type of the widget field. Possible values: 0 - Integer; 1 - String; 2 - Host group; 3 - Host; 4 - Item; 5 - Item prototype; 6 - Graph; 7 - Graph prototype; 8 - Map.
name	string	Widget field name.
value (required)	mixed	Widget field value depending of type.

Dashboard user group

List of dashboard permissions based on user groups. It has the following properties:

Property	Type	Description
usrgrpid (required)	string	User group ID.
permission (required)	integer	Type of permission level. Possible values: 2 - read only; 3 - read-write;

Dashboard user

List of dashboard permissions based on users. It has the following properties:

Property	Type	Description
userid (required)	string	User ID.

Property	Type	Description
permission (required)	integer	Type of permission level. Possible values: 2 - read only; 3 - read-write;

dashboard.create

Description

`object dashboard.create(object/array dashboards)`

This method allows to create new dashboards.

Parameters

`(object/array)` Dashboards to create.

Additionally to the standard dashboard properties, the method accepts the following parameters.

Parameter	Type	Description
widgets	array	Dashboard widgets to be created for the dashboard.
users	array	Dashboard user shares to be created on the dashboard.
userGroups	array	Dashboard user group shares to be created on the dashboard.

Return values

`(object)` Returns an object containing the IDs of the created dashboards under the `dashboardids` property. The order of the returned IDs matches the order of the passed dashboards.

Examples

Creating a dashboard

Create a dashboard named "My dashboard" with one Problems widget with tags and using two types of sharing (user group and user).

Request:

```
{
    "jsonrpc": "2.0",
    "method": "dashboard.create",
    "params": {
        "name": "My dashboard",
        "widgets": [
            {
                "type": "problems",
                "x": 0,
                "y": 0,
                "width": 12,
                "height": 5,
                "view_mode": 0,
                "fields": [
                    {
                        "type": 1,
                        "name": "tags.tag.0",
                        "value": "service"
                    },
                    {
                        "type": 0,
                        "name": "tags.operator.0",
                        "value": 1
```

```
                    },
                    {
                        "type": 1,
                        "name": "tags.value.0",
                        "value": "zabbix_server"
                    }
                ]
            }
        ],
        "userGroups": [
            {
                "usrgrpid": "7",
                "permission": "2"
            }
        ],
        "users": [
            {
                "userid": "4",
                "permission": "3"
            }
        ]
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "dashboardids": [
            "2"
        ]
    },
    "id": 1
}
```

See also

- Dashboard widget
- Dashboard widget field
- Dashboard user
- Dashboatd user group

Source

CDashboard::create() in *frontends/php/include/classes/api/services/CDashboard.php*.

dashboard.delete

Description

`object dashboard.delete(array dashboardids)`

This method allows to delete dashboards.

Parameters

`(array)` IDs of the dashboards to delete.

Return values

`(object)` Returns an object containing the IDs of the deleted dashboards under the `dashboardids` property.

Examples

Deleting multiple dashboards

Delete two dashboards.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "dashboard.delete",
    "params": [
        "2",
        "3"
    ],
    "auth": "3a57200802b24cda67c4e4010b50c065",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "dashboardids": [
            "2",
            "3"
        ]
    },
    "id": 1
}
```

Source

CDashboard::delete() in *frontends/php/include/classes/api/services/CDashboard.php*.

dashboard.get

Description

`integer/array dashboard.get(object parameters)`

The method allows to retrieve dashboards according to the given parameters.

Parameters

`(object)` Parameters defining the desired output.

The method supports the following parameters.

Parameter	Type	Description
dashboardids	string/array	Return only dashboards with the given IDs.
selectWidgets	query	Return a widgets property with the dashboard widgets that are used in the dashboard.
selectUsers	query	Return a users property with users that the dashboard is shared with.
selectUserGroups	query	Return a userGroups property with user groups that the dashboard is shared with.
sortfield	string/array	Sort the result by the given properties. Possible value is: `dashboardid`.
countOutput	boolean	These parameters being common for all `get` methods are described in detail in the reference commentary page.
editable	boolean	
excludeSearch	boolean	
filter	object	
limit	integer	
output	query	
preservekeys	boolean	
search	object	

Parameter	Type	Description
searchByAny	boolean	
searchWildcardsEnabled	boolean	
sortorder	string/array	
startSearch	boolean	

Return values

`(integer/array)` Returns either:

- an array of objects;
- the count of retrieved objects, if the `countOutput` parameter has been used.

Examples

Retrieving a dashboard by ID

Retrieve all data about dashboards "1" and "2".

Request:

```
{
    "jsonrpc": "2.0",
    "method": "dashboard.get",
    "params": {
        "output": "extend",
        "selectWidgets": "extend",
        "selectUsers": "extend",
        "selectUserGroups": "extend",
        "dashboardids": [
            "1",
            "2"
        ]
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "dashboardid": "1",
            "name": "Dashboard",
            "userid": "1",
            "private": "0",
            "users": [],
            "userGroups": [],
            "widgets": [
                {
                    "widgetid": "9",
                    "type": "systeminfo",
                    "name": "",
                    "x": "12",
                    "y": "8",
                    "width": "12",
                    "height": "5",
                    "view_mode": 0,
                    "fields": []
                },
                {
                    "widgetid": "8",
                    "type": "problemsbysv",
                    "name": "",
```

```
            "x": "12",
            "y": "4",
            "width": "12",
            "height": "4",
            "view_mode": 0,
            "fields": []
        },
        {
            "widgetid": "7",
            "type": "problemhosts",
            "name": "",
            "x": "12",
            "y": "0",
            "width": "12",
            "height": "4",
            "view_mode": 0,
            "fields": []
        },
        {
            "widgetid": "6",
            "type": "discovery",
            "name": "",
            "x": "6",
            "y": "9",
            "width": "6",
            "height": "4",
            "view_mode": 0,
            "fields": []
        },
        {
            "widgetid": "5",
            "type": "web",
            "name": "",
            "x": "0",
            "y": "9",
            "width": "6",
            "height": "4",
            "view_mode": 0,
            "fields": []
        },
        {
            "widgetid": "4",
            "type": "problems",
            "name": "",
            "x": "0",
            "y": "3",
            "width": "12",
            "height": "6",
            "view_mode": 0,
            "fields": []
        },
        {
            "widgetid": "3",
            "type": "favmaps",
            "name": "",
            "x": "8",
            "y": "0",
            "width": "4",
            "height": "3",
            "view_mode": 0,
            "fields": []
        },
```

```
            {
                "widgetid": "2",
                "type": "favscreens",
                "name": "",
                "x": "4",
                "y": "0",
                "width": "4",
                "height": "3",
                "view_mode": 0,
                "fields": []
            },
            {
                "widgetid": "1",
                "type": "favgraphs",
                "name": "",
                "x": "0",
                "y": "0",
                "width": "4",
                "height": "3",
                "view_mode": 0,
                "fields": []
            }
        ]
    },
    {
        "dashboardid": "2",
        "name": "My dashboard",
        "userid": "1",
        "private": "1",
        "users": [
            {
                "userid": "4",
                "permission": "3"
            }
        ],
        "userGroups": [
            {
                "usrgrpid": "7",
                "permission": "2"
            }
        ],
        "widgets": [
            {
                "widgetid": "10",
                "type": "problems",
                "name": "",
                "x": "0",
                "y": "0",
                "width": "12",
                "height": "5",
                "view_mode": 0,
                "fields": [
                    {
                        "type": "2",
                        "name": "groupids",
                        "value": "4"
                    }
                ]
            }
        ]
    }
],
```

```
    "id": 1
}
```

See also

- Dashboard widget
- Dashboard widget field
- Dashboard user
- Dashboard user group

Source

CDashboard::get() in *frontends/php/include/classes/api/services/CDashboard.php*.

dashboard.update

Description

`object dashboard.update(object/array dashboards)`

This method allows to update existing dashboards.

Parameters

`(object/array)` Dashboard properties to be updated.

The `dashboardid` property must be defined for each dashboard, all other properties are optional. Only the passed properties will be updated, all others will remain unchanged.

Additionally to the standard dashboard properties, the method accepts the following parameters.

Parameter	Type	Description
widgets	array	Dashboard widgets to replace existing dashboard widgets. Dashboard widgets are updated by `widgetid` property. Widgets without `widgetid` property will be created.
users	array	Dashboard user shares to replace the existing elements.
userGroups	array	Dashboard user group shares to replace the existing elements.

Return values

`(object)` Returns an object containing the IDs of the updated dashboards under the `dashboardids` property.

Examples

Renaming a dashboard

Rename a dashboard to ”SQL server status”.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "dashboard.update",
    "params": {
        "dashboardid": "2",
        "name": "SQL server status"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "dashboardids": [
            "2"
        ]
    },
    "id": 1
}
```

Change dashboard owner

Available only for admins and super admins.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "dashboard.update",
    "params": {
        "dashboardid": "2",
        "userid": "1"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 2
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "dashboardids": [
            "2"
        ]
    },
    "id": 2
}
```

See also

- Dashboard widget
- Dashboard widget field
- Dashboard user
- Dashboard user group

Source

CDashboard::update() in *frontends/php/include/classes/api/services/CDashboard.php*.

Discovered host

This class is designed to work with discovered hosts.

Object references:

- Discovered host

Available methods:

- dhost.get - retrieve discovered hosts

> Discovered host object

The following objects are directly related to the `dhost` API.

Discovered host

Note:
Discovered host are created by the Zabbix server and cannot be modified via the API.

The discovered host object contains information about a host discovered by a network discovery rule. It has the following properties.

Property	Type	Description
dhostid	string	ID of the discovered host.
druleid	string	ID of the discovery rule that detected the host.
lastdown	timestamp	Time when the discovered host last went down.
lastup	timestamp	Time when the discovered host last went up.
status	integer	Whether the discovered host is up or down. A host is up if it has at least one active discovered service. Possible values: 0 - host up; 1 - host down.

dhost.get

Description

`integer/array dhost.get(object parameters)`

The method allows to retrieve discovered hosts according to the given parameters.

Parameters

`(object)` Parameters defining the desired output.

The method supports the following parameters.

Parameter	Type	Description
dhostids	string/array	Return only discovered hosts with the given IDs.
druleids	string/array	Return only discovered hosts that have been created by the given discovery rules.
dserviceids	string/array	Return only discovered hosts that are running the given services.
selectDRules	query	Return a drules property with an array of the discovery rules that detected the host.
selectDServices	query	Return a dservices property with the discovered services running on the host. Supports `count`.
limitSelects	integer	Limits the number of records returned by subselects. Applies to the following subselects: `selectDServices` - results will be sorted by `dserviceid`.
sortfield	string/array	Sort the result by the given properties. Possible values are: `dhostid` and `druleid`.
countOutput	boolean	These parameters being common for all `get` methods are described in detail in the reference commentary.
editable	boolean	
excludeSearch	boolean	
filter	object	
limit	integer	
output	query	
preservekeys	boolean	
search	object	
searchByAny	boolean	

Parameter	Type	Description
searchWildcardsEnabled	boolean	
sortorder	string/array	
startSearch	boolean	

Return values

`(integer/array)` Returns either:

- an array of objects;
- the count of retrieved objects, if the `countOutput` parameter has been used.

Examples

Retrieve discovered hosts by discovery rule

Retrieve all hosts and the discovered services they are running that have been detected by discovery rule "4".

Request:

```
{
    "jsonrpc": "2.0",
    "method": "dhost.get",
    "params": {
        "output": "extend",
        "selectDServices": "extend",
        "druleids": "4"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "dservices": [
                {
                    "dserviceid": "1",
                    "dhostid": "1",
                    "type": "4",
                    "key_": "",
                    "value": "",
                    "port": "80",
                    "status": "0",
                    "lastup": "1337697227",
                    "lastdown": "0",
                    "dcheckid": "5",
                    "ip": "192.168.1.1",
                    "dns": "station.company.lan"
                }
            ],
            "dhostid": "1",
            "druleid": "4",
            "status": "0",
            "lastup": "1337697227",
            "lastdown": "0"
        },
        {
            "dservices": [
                {
                    "dserviceid": "2",
                    "dhostid": "2",
                    "type": "4",
```

```
                "key_": "",
                "value": "",
                "port": "80",
                "status": "0",
                "lastup": "1337697234",
                "lastdown": "0",
                "dcheckid": "5",
                "ip": "192.168.1.4",
                "dns": "john.company.lan"
            }
        ],
        "dhostid": "2",
        "druleid": "4",
        "status": "0",
        "lastup": "1337697234",
        "lastdown": "0"
    },
    {
        "dservices": [
            {
                "dserviceid": "3",
                "dhostid": "3",
                "type": "4",
                "key_": "",
                "value": "",
                "port": "80",
                "status": "0",
                "lastup": "1337697234",
                "lastdown": "0",
                "dcheckid": "5",
                "ip": "192.168.1.26",
                "dns": "printer.company.lan"
            }
        ],
        "dhostid": "3",
        "druleid": "4",
        "status": "0",
        "lastup": "1337697234",
        "lastdown": "0"
    },
    {
        "dservices": [
            {
                "dserviceid": "4",
                "dhostid": "4",
                "type": "4",
                "key_": "",
                "value": "",
                "port": "80",
                "status": "0",
                "lastup": "1337697234",
                "lastdown": "0",
                "dcheckid": "5",
                "ip": "192.168.1.7",
                "dns": "mail.company.lan"
            }
        ],
        "dhostid": "4",
        "druleid": "4",
        "status": "0",
        "lastup": "1337697234",
        "lastdown": "0"
```

```
        }
    ],
    "id": 1
}
```

See also

- Discovered service
- Discovery rule

Source

CDHost::get() in *frontends/php/include/classes/api/services/CDHost.php*.

Discovered service

This class is designed to work with discovered services.

Object references:

- Discovered service

Available methods:

- dservice.get - retrieve discovered services

> Discovered service object

The following objects are directly related to the `dservice` API.

Discovered service

Note:
Discovered services are created by the Zabbix server and cannot be modified via the API.

The discovered service object contains information about a service discovered by a network discovery rule on a host. It has the following properties.

Property	Type	Description
dserviceid	string	ID of the discovered service.
dcheckid	string	ID of the discovery check used to detect the service.
dhostid	string	ID of the discovered host running the service.
dns	string	DNS of the host running the service.
ip	string	IP address of the host running the service.
lastdown	timestamp	Time when the discovered service last went down.
lastup	timestamp	Time when the discovered service last went up.
port	integer	Service port number.
status	integer	Status of the service. Possible values: 0 - service up; 1 - service down.
value	string	Value returned by the service when performing a Zabbix agent, SNMPv1, SNMPv2 or SNMPv3 discovery check.

dservice.get

Description

`integer/array dservice.get(object parameters)`

The method allows to retrieve discovered services according to the given parameters.

Parameters

`(object)` Parameters defining the desired output.

The method supports the following parameters.

Parameter	Type	Description
dserviceids	string/array	Return only discovered services with the given IDs.
dhostids	string/array	Return only discovered services that belong to the given discovered hosts.
dcheckids	string/array	Return only discovered services that have been detected by the given discovery checks.
druleids	string/array	Return only discovered services that have been detected by the given discovery rules.
selectDRules	query	Return a drules property with an array of the discovery rules that detected the service.
selectDHosts	query	Return a dhosts property with an array the discovered hosts that the service belongs to.
selectHosts	query	Return a hosts property with the hosts with the same IP address and proxy as the service. Supports `count`.
limitSelects	integer	Limits the number of records returned by subselects. Applies to the following subselects: `selectHosts` - result will be sorted by `hostid`.
sortfield	string/array	Sort the result by the given properties. Possible values are: `dserviceid`, `dhostid` and `ip`.
countOutput	boolean	These parameters being common for all `get` methods are described in detail in the reference commentary.
editable	boolean	
excludeSearch	boolean	
filter	object	
limit	integer	
output	query	
preservekeys	boolean	
search	object	
searchByAny	boolean	
searchWildcardsEnabled	boolean	
sortorder	string/array	
startSearch	boolean	

Return values

`(integer/array)` Returns either:

- an array of objects;
- the count of retrieved objects, if the `countOutput` parameter has been used.

Examples

Retrieve services discovered on a host

Retrieve all discovered services detected on discovered host ”11”.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "dservice.get",
    "params": {
        "output": "extend",
        "dhostids": "11"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
```

```
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "dserviceid": "12",
            "dhostid": "11",
            "value": "",
            "port": "80",
            "status": "1",
            "lastup": "0",
            "lastdown": "1348650607",
            "dcheckid": "5",
            "ip": "192.168.1.134",
            "dns": "john.local"
        },
        {
            "dserviceid": "13",
            "dhostid": "11",
            "value": "",
            "port": "21",
            "status": "1",
            "lastup": "0",
            "lastdown": "1348650610",
            "dcheckid": "6",
            "ip": "192.168.1.134",
            "dns": "john.local"
        }
    ],
    "id": 1
}
```

See also

- Discovered host
- Discovery check
- Host

Source

CDService::get() in *frontends/php/include/classes/api/services/CDService.php*.

Discovery check

This class is designed to work with discovery checks.

Object references:

- Discovery check

Available methods:

- dcheck.get - retrieve discovery checks

> Discovery check object

The following objects are directly related to the `dcheck` API.

Discovery check

The discovery check object defines a specific check performed by a network discovery rule. It has the following properties.

Property	Type	Description
dcheckid	string	*(readonly)* ID of the discovery check.
druleid	string	*(readonly)* ID of the discovery rule that the check belongs to.
key_	string	The value of this property differs depending on the type of the check: - key to query for Zabbix agent checks, required; - SNMP OID for SNMPv1, SNMPv2 and SNMPv3 checks, required.
ports	string	One or several port ranges to check separated by commas. Used for all checks except for ICMP. Default: 0.
snmp_community	string	SNMP community. Required for SNMPv1 and SNMPv2 agent checks.
snmpv3_authpassphrase	string	Authentication passphrase used for SNMPv3 agent checks with security level set to *authNoPriv* or *authPriv*.
snmpv3_authprotocol	integer	Authentication protocol used for SNMPv3 agent checks with security level set to *authNoPriv* or *authPriv*. Possible values: 0 - *(default)* MD5; 1 - SHA.
snmpv3_contextname	string	SNMPv3 context name. Used only by SNMPv3 checks.
snmpv3_privpassphrase	string	Privacy passphrase used for SNMPv3 agent checks with security level set to *authPriv*.
snmpv3_privprotocol	integer	Privacy protocol used for SNMPv3 agent checks with security level set to *authPriv*. Possible values: 0 - *(default)* DES; 1 - AES.
snmpv3_securitylevel	string	Security level used for SNMPv3 agent checks. Possible values: 0 - noAuthNoPriv; 1 - authNoPriv; 2 - authPriv.
snmpv3_securityname	string	Security name used for SNMPv3 agent checks.
type (required)	integer	Type of check. Possible values: 0 - SSH; 1 - LDAP; 2 - SMTP; 3 - FTP; 4 - HTTP; 5 - POP; 6 - NNTP; 7 - IMAP; 8 - TCP; 9 - Zabbix agent; 10 - SNMPv1 agent; 11 - SNMPv2 agent; 12 - ICMP ping; 13 - SNMPv3 agent; 14 - HTTPS; 15 - Telnet.

Property	Type	Description
uniq	integer	Whether to use this check as a device uniqueness criteria. Only a single unique check can be configured for a discovery rule. Used for Zabbix agent, SNMPv1, SNMPv2 and SNMPv3 agent checks. Possible values: 0 - *(default)* do not use this check as a uniqueness criteria; 1 - use this check as a uniqueness criteria.
host_source	integer	Source for host name. Possible values: 1 - *(default)* DNS; 2 - IP; 3 - discovery value of this check.
name_source	integer	Source for visible name. Possible values: 0 - *(default)* not specified; 1 - DNS; 2 - IP; 3 - discovery value of this check.

dcheck.get

Description

`integer/array dcheck.get(object parameters)`

The method allows to retrieve discovery checks according to the given parameters.

Parameters

`(object)` Parameters defining the desired output.

The method supports the following parameters.

Parameter	Type	Description
dcheckids	string/array	Return only discovery checks with the given IDs.
druleids	string/array	Return only discovery checks that belong to the given discovery rules.
dserviceids	string/array	Return only discovery checks that have detected the given discovered services.
sortfield	string/array	Sort the result by the given properties. Possible values are: `dcheckid` and `druleid`.
countOutput	boolean	These parameters being common for all `get` methods are described in detail in the reference commentary.
editable	boolean	
excludeSearch	boolean	
filter	object	
limit	integer	
output	query	
preservekeys	boolean	
search	object	
searchByAny	boolean	
searchWildcardsEnabled	boolean	
sortorder	string/array	
startSearch	boolean	

Return values

(integer/array) Returns either:

- an array of objects;
- the count of retrieved objects, if the countOutput parameter has been used.

Examples

Retrieve discovery checks for a discovery rule

Retrieve all discovery checks used by discovery rule "6".

Request:

```
{
    "jsonrpc": "2.0",
    "method": "dcheck.get",
    "params": {
        "output": "extend",
        "dcheckids": "6"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "dcheckid": "6",
            "druleid": "4",
            "type": "3",
            "key_": "",
            "snmp_community": "",
            "ports": "21",
            "snmpv3_securityname": "",
            "snmpv3_securitylevel": "0",
            "snmpv3_authpassphrase": "",
            "snmpv3_privpassphrase": "",
            "uniq": "0",
            "snmpv3_authprotocol": "0",
            "snmpv3_privprotocol": "0",
            "host_source": "1",
            "name_source": "0"
        }
    ],
    "id": 1
}
```

Source

CDCheck::get() in *frontends/php/include/classes/api/services/CDCheck.php*.

Discovery rule

This class is designed to work with network discovery rules.

> **Note:**
> This API is meant to work with network discovery rules. For the low-level discovery rules see the LLD rule API.

Object references:

- Discovery rule

Available methods:

- drule.create - create new discovery rules
- drule.delete - delete discovery rules
- drule.get - retrieve discovery rules
- drule.update - update discovery rules

> Discovery rule object

The following objects are directly related to the `drule` API.

Discovery rule

The discovery rule object defines a network discovery rule. It has the following properties.

Property	Type	Description
druleid	string	*(readonly)* ID of the discovery rule.
iprange (required)	string	One or several IP ranges to check separated by commas. Refer to the network discovery configuration section for more information on supported formats of IP ranges.
name (required)	string	Name of the discovery rule.
delay	string	Execution interval of the discovery rule. Accepts seconds, time unit with suffix and user macro. Default: 1h.
nextcheck	timestamp	*(readonly)* Time when the discovery rule will be executed next.
proxy_hostid	string	ID of the proxy used for discovery.
status	integer	Whether the discovery rule is enabled. Possible values: 0 - *(default)* enabled; 1 - disabled.

drule.create

Description

`object drule.create(object/array discoveryRules)`

This method allows to create new discovery rules.

Parameters

`(object/array)` Discovery rules to create.

Additionally to the standard discovery rule properties, the method accepts the following parameters.

Parameter	Type	Description
dchecks (required)	array	Discovery checks to create for the discovery rule.

Return values

`(object)` Returns an object containing the IDs of the created discrovery rules under the `druleids` property. The order of the returned IDs matches the order of the passed discrovery rules.

Examples

Create a discovery rule

Create a discovery rule to find machines running the Zabbix agent in the local network. The rule must use a single Zabbix agent check on port 10050.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "drule.create",
    "params": {
        "name": "Zabbix agent discovery",
        "iprange": "192.168.1.1-255",
        "dchecks": [
            {
                "type": "9",
                "key_": "system.uname",
                "ports": "10050",
                "uniq": "0"
            }
        ]
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "druleids": [
            "6"
        ]
    },
    "id": 1
}
```

See also

- Discovery check

Source

CDRule::create() in *frontends/php/include/classes/api/services/CDRule.php*.

drule.delete

Description

`object drule.delete(array discoveryRuleIds)`

This method allows to delete discovery rules.

Parameters

`(array)` IDs of the discovery rules to delete.

Return values

`(object)` Returns an object containing the IDs of the deleted discovery rules under the `druleids` property.

Examples

Delete multiple discovery rules

Delete two discovery rules.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "drule.delete",
    "params": [
        "4",
        "6"
    ],
```

```
    "auth": "3a57200802b24cda67c4e4010b50c065",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "druleids": [
            "4",
            "6"
        ]
    },
    "id": 1
}
```

Source

CDRule::delete() in *frontends/php/include/classes/api/services/CDRule.php*.

drule.get

Description

`integer/array drule.get(object parameters)`

The method allows to retrieve discovery rules according to the given parameters.

Parameters

`(object)` Parameters defining the desired output.

The method supports the following parameters.

Parameter	Type	Description
dhostids	string/array	Return only discovery rules that created the given discovered hosts.
druleids	string/array	Return only discovery rules with the given IDs.
dserviceids	string/array	Return only discovery rules that created the given discovered services.
selectDChecks	query	Return a dchecks property with the discovery checks used by the discovery rule. Supports `count`.
selectDHosts	query	Return a dhosts property with the discovered hosts created by the discovery rule. Supports `count`.
limitSelects	integer	Limits the number of records returned by subselects. Applies to the following subselects: `selectDChecks` - results will be sorted by `dcheckid`; `selectDHosts` - results will be sorted by `dhostsid`.
sortfield	string/array	Sort the result by the given properties. Possible values are: `druleid` and `name`.
countOutput	boolean	These parameters being common for all `get` methods are described in detail in the reference commentary.
editable	boolean	
excludeSearch	boolean	
filter	object	
limit	integer	
output	query	
preservekeys	boolean	

Parameter	Type	Description
search	object	
searchByAny	boolean	
searchWildcardsEnabled	boolean	
sortorder	string/array	
startSearch	boolean	

Return values

`(integer/array)` Returns either:

- an array of objects;
- the count of retrieved objects, if the `countOutput` parameter has been used.

Examples

Retrieve all discovery rules

Retrieve all configured discovery rules and the discovery checks they use.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "drule.get",
    "params": {
        "output": "extend",
        "selectDChecks": "extend"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "druleid": "2",
            "proxy_hostid": "0",
            "name": "Local network",
            "iprange": "192.168.3.1-255",
            "delay": "5s",
            "nextcheck": "1348754327",
            "status": "0",
            "dchecks": [
                {
                    "dcheckid": "7",
                    "druleid": "2",
                    "type": "3",
                    "key_": "",
                    "snmp_community": "",
                    "ports": "21",
                    "snmpv3_securityname": "",
                    "snmpv3_securitylevel": "0",
                    "snmpv3_authpassphrase": "",
                    "snmpv3_privpassphrase": "",
                    "uniq": "0",
                    "snmpv3_authprotocol": "0",
                    "snmpv3_privprotocol": "0",
                    "host_source": "1",
                    "name_source": "0"
                },
                {
                    "dcheckid": "8",
```

```
                    "druleid": "2",
                    "type": "4",
                    "key_": "",
                    "snmp_community": "",
                    "ports": "80",
                    "snmpv3_securityname": "",
                    "snmpv3_securitylevel": "0",
                    "snmpv3_authpassphrase": "",
                    "snmpv3_privpassphrase": "",
                    "uniq": "0",
                    "snmpv3_authprotocol": "0",
                    "snmpv3_privprotocol": "0",
                    "host_source": "1",
                    "name_source": "0"
                }
            ]
        },
        {
            "druleid": "6",
            "proxy_hostid": "0",
            "name": "Zabbix agent discovery",
            "iprange": "192.168.1.1-255",
            "delay": "1h",
            "nextcheck": "0",
            "status": "0",
            "dchecks": [
                {
                    "dcheckid": "10",
                    "druleid": "6",
                    "type": "9",
                    "key_": "system.uname",
                    "snmp_community": "",
                    "ports": "10050",
                    "snmpv3_securityname": "",
                    "snmpv3_securitylevel": "0",
                    "snmpv3_authpassphrase": "",
                    "snmpv3_privpassphrase": "",
                    "uniq": "0",
                    "snmpv3_authprotocol": "0",
                    "snmpv3_privprotocol": "0",
                    "host_source": "2",
                    "name_source": "3"
                }
            ]
        }
    ],
    "id": 1
}
```


See also

- Discovered host
- Discovery check

Source

CDRule::get() in *frontends/php/include/classes/api/services/CDRule.php*.

drule.update

Description

`object drule.update(object/array discoveryRules)`

This method allows to update existing discovery rules.

Parameters

(object/array) Discovery rule properties to be updated.

The druleid property must be defined for each discovery rule, all other properties are optional. Only the passed properties will be updated, all others will remain unchanged.

Additionally to the standard discovery rule properties, the method accepts the following parameters.

Parameter	Type	Description
dchecks	array	Discovery checks to replace existing checks.

Return values

(object) Returns an object containing the IDs of the updated discovery rules under the druleids property.

Examples

Change the IP range of a discovery rule

Change the IP range of a discovery rule to "192.168.2.1-255".

Request:

```
{
    "jsonrpc": "2.0",
    "method": "drule.update",
    "params": {
        "druleid": "6",
        "iprange": "192.168.2.1-255"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "druleids": [
            "6"
        ]
    },
    "id": 1
}
```

See also

- Discovery check

Source

CDRule::update() in *frontends/php/include/classes/api/services/CDRule.php*.

Event

This class is designed to work with events.

Object references:

- Event

Available methods:

- event.get - retrieving events
- event.acknowledge - acknowledging events

> Event object

The following objects are directly related to the `event` API.

Event

> **Note:**
> Events are created by the Zabbix server and cannot be modified via the API.

The event object has the following properties.

Property	Type	Description
eventid	string	ID of the event.
source	integer	Type of the event. Possible values: 0 - event created by a trigger; 1 - event created by a discovery rule; 2 - event created by active agent auto-registration; 3 - internal event.
object	integer	Type of object that is related to the event. Possible values for trigger events: 0 - trigger. Possible values for discovery events: 1 - discovered host; 2 - discovered service. Possible values for auto-registration events: 3 - auto-registered host. Possible values for internal events: 0 - trigger; 4 - item; 5 - LLD rule.
objectid	string	ID of the related object.
acknowledged	integer	Whether the event has been acknowledged.
clock	timestamp	Time when the event was created.
ns	integer	Nanoseconds when the event was created.
name	string	Resolved event name.
value	integer	State of the related object. Possible values for trigger events: 0 - OK; 1 - problem. Possible values for discovery events: 0 - host or service up; 1 - host or service down; 2 - host or service discovered; 3 - host or service lost. Possible values for internal events: 0 - ”normal” state; 1 - ”unknown” or ”not supported” state. This parameter is not used for active agent auto-registration events.

Property	Type	Description
severity	integer	Event current severity. Possible values: 0 - not classified; 1 - information; 2 - warning; 3 - average; 4 - high; 5 - disaster.
r_eventid	string	Recovery event ID
c_eventid	string	ID of the event that was used to override (close) current event under global correlation rule. See `correlationid` to identify exact correlation rule. This parameter is only used when the event is closed by global correlation rule.
correlationid	string	ID of the correlation rule that generated closing of the problem. This parameter is only defined when the event is closed by global correlation rule.
userid	string	User ID if the event was manually closed.
suppressed	integer	Whether the event is suppressed. Possible values: 0 - event is in normal state; 1 - event is suppressed.
opdata	string	Operational data with expanded macros.
urls	array of Media type URLs	Active media types URLs.

Event tag

The event tag object has the following properties.

Property	Type	Description
tag	string	Event tag name.
value	string	Event tag value.

Media type URLs

Object with media type url have the following properties.

Property	Type	Description
name	string	Media type defined URL name.
url	string	Media type defined URL value.

Results will contain entries only for active media types with enabled event menu entry. Macro used in properties will be resolved, but if one of properties contain unresolved macro both properties will be excluded from results. Supported macros described on page.

event.acknowledge

Description

`object event.acknowledge(object/array parameters)`

This method allows to update events. Following update actions can be performed:

- Close event. If event is already resolved, this action will be skipped.
- Acknowledge event. If event is already acknowledged, this action will be skipped.
- Add message.

- Change event severity. If event already has same severity, this action will be skipped.

Attention:
Only trigger events can be updated.
Only problem events can be updated.
Read/Write rights for trigger are required to close the event or to change event's severity.
To close an event, manual close should be allowed in the trigger.

Parameters

`(object/array)` Parameters containing the IDs of the events and update operations that should be performed.

Parameter	Type	Description
eventids (required)	string/object	IDs of the events to acknowledge.
action (required)	integer	Event update action(s). This is bitmask field, any combination of values is acceptable. Possible values: 1 - close problem; 2 - acknowledge event; 4 - add message; 8 - change severity.
message	string	Text of the message. **Required**, if action contains 'add message' flag.
severity	integer	New severity for events. **Required**, if action contains 'change severity' flag. Possible values: 0 - not classified; 1 - information; 2 - warning; 3 - average; 4 - high; 5 - disaster.

Return values

`(object)` Returns an object containing the IDs of the updated events under the `eventids` property.

Examples

Acknowledging an event

Acknowledge a single event and leave a message.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "event.acknowledge",
    "params": {
        "eventids": "20427",
        "action": 6,
        "message": "Problem resolved."
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "eventids": [
```

```
            "20427"
        ]
    },
    "id": 1
}
```

Changing event's severity

Change severity for multiple events and leave a message..

Request:

```
{
    "jsonrpc": "2.0",
    "method": "event.acknowledge",
    "params": {
        "eventids": ["20427", "20428"],
        "action": 12,
        "message": "Maintenance required to fix it.",
        "severity": 4
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "eventids": [
            "20427",
            "20428"
        ]
    },
    "id": 1
}
```

Source

CEvent::acknowledge() in *frontends/php/include/classes/api/services/CEvent.php*.

event.get

Description

`integer/array event.get(object parameters)`

The method allows to retrieve events according to the given parameters.

> **Attention:**
> This method may return events of a deleted entity if these events have not been removed by the housekeeper yet.

Parameters

`(object)` Parameters defining the desired output.

The method supports the following parameters.

Parameter	Type	Description
eventids	string/array	Return only events with the given IDs.
groupids	string/array	Return only events created by objects that belong to the given host groups.
hostids	string/array	Return only events created by objects that belong to the given hosts.
objectids	string/array	Return only events created by the given objects.

Parameter	Type	Description
applicationids	string/array	Return only events created by objects that belong to the given applications. Applies only if object is trigger or item.
source	integer	Return only events with the given type. Refer to the event object page for a list of supported event types. Default: 0 - trigger events.
object	integer	Return only events created by objects of the given type. Refer to the event object page for a list of supported object types. Default: 0 - trigger.
acknowledged	boolean	If set to `true` return only acknowledged events.
suppressed	boolean	`true` - return only suppressed events; `false` - return events in the normal state.
severities	integer/array	Return only events with given event severities. Applies only if object is trigger.
evaltype	integer	Rules for tag searching. Possible values: 0 - (default) And/Or; 2 - Or.
tags	array of objects	Return only events with given tags. Exact match by tag and case-insensitive search by value and operator. Format: `[{"tag": "<tag>", "value": "<value>", "operator": "<operator>"}, ...]`. An empty array returns all events. Possible operator types: 0 - (default) Like; 1 - Equal.
eventid_from	string	Return only events with IDs greater or equal to the given ID.
eventid_till	string	Return only events with IDs less or equal to the given ID.
time_from	timestamp	Return only events that have been created after or at the given time.
time_till	timestamp	Return only events that have been created before or at the given time.
problem_time_from	timestamp	Returns only events that were in the problem state starting with `problem_time_from`. Applies only if the source is trigger event and object is trigger. Mandatory if `problem_time_till` is specified.
problem_time_till	timestamp	Returns only events that were in the problem state until `problem_time_till`. Applies only if the source is trigger event and object is trigger. Mandatory if `problem_time_from` is specified.
value	integer/array	Return only events with the given values.
selectHosts	query	Return a hosts property with hosts containing the object that created the event. Supported only for events generated by triggers, items or LLD rules.
selectRelatedObject	query	Return a `relatedObject` property with the object that created the event. The type of object returned depends on the event type.
select_alerts	query	Return an alerts property with alerts generated by the event. Alerts are sorted in reverse chronological order.

Parameter	Type	Description
select_acknowledges	query	Return an `acknowledges` property with event updates. Event updates are sorted in reverse chronological order. The event update object has the following properties: `acknowledgeid` - `(string)` acknowledgement's ID; `userid` - `(string)` ID of the user that updated the event; `eventid` - `(string)` ID of the updated event; `clock` - `(timestamp)` time when the event was updated; `message` - `(string)` text of the message; `action` - `(integer)` update action that was performed (see event.acknowledge); `old_severity` - `(integer)` event severity before this update action; `new_severity` - `(integer)` event severity after this update action; `alias` - `(string)` alias of the user that updated the event; `name` - `(string)` name of the user that updated the event; `surname` - `(string)` surname of the user that updated the event. Supports `count`.
selectTags	query	Return a tags property with event tags.
selectSuppressionData	query	Return a `suppression_data` property with the list of maintenances: `maintenanceid` - `(string)` ID of the maintenance; `suppress_until` - `(integer)` time until the event is suppressed.
sortfield	string/array	Sort the result by the given properties. Possible values are: `eventid`, `objectid` and `clock`.
countOutput	boolean	These parameters being common for all `get` methods are described in detail in the reference commentary page.
editable	boolean	
excludeSearch	boolean	
filter	object	
limit	integer	
output	query	
preservekeys	boolean	
search	object	
searchByAny	boolean	
searchWildcardsEnabled	boolean	
sortorder	string/array	
startSearch	boolean	

Return values

`(integer/array)` Returns either:

- an array of objects;
- the count of retrieved objects, if the `countOutput` parameter has been used.

Examples

Retrieving trigger events

Retrieve the latest events from trigger "13926."

Request:

```
{
    "jsonrpc": "2.0",
    "method": "event.get",
    "params": {
        "output": "extend",
        "select_acknowledges": "extend",
        "selectTags": "extend",
        "selectSuppressionData": "extend",
        "objectids": "13926",
        "sortfield": ["clock", "eventid"],
        "sortorder": "DESC"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "eventid": "9695",
            "source": "0",
            "object": "0",
            "objectid": "13926",
            "clock": "1347970410",
            "value": "1",
            "acknowledged": "1",
            "ns": "413316245",
            "name": "MySQL is down",
            "severity": "5",
            "r_eventid": "0",
            "c_eventid": "0",
            "correlationid": "0",
            "userid": "0",
            "opdata": "",
            "acknowledges": [
                {
                    "acknowledgeid": "1",
                    "userid": "1",
                    "eventid": "9695",
                    "clock": "1350640590",
                    "message": "Problem resolved.\n\r----[BULK ACKNOWLEDGE]----",
                    "action": "6",
                    "old_severity": "0",
                    "new_severity": "0",
                    "alias": "Admin",
                    "name": "Zabbix",
                    "surname": "Administrator"
                }
            ],
            "suppression_data": [
                {
                    "maintenanceid": "15",
                    "suppress_until": "1472511600"
                }
            ],
            "suppressed": "1",
            "tags": [
                {
                    "tag": "service",
                    "value": "mysqld"
```

```
                },
                {
                    "tag": "error",
                    "value": ""
                }
            ]
        },
        {
            "eventid": "9671",
            "source": "0",
            "object": "0",
            "objectid": "13926",
            "clock": "1347970347",
            "value": "0",
            "acknowledged": "0",
            "ns": "0",
            "name": "Unavailable by ICMP ping",
            "severity": "4",
            "r_eventid": "0",
            "c_eventid": "0",
            "correlationid": "0",
            "userid": "0",
            "opdata": "",
            "acknowledges": [],
            "suppression_data": [],
            "suppressed": "0",
            "tags": []
        }
    ],
    "id": 1
}
```


Retrieving events by time period

Retrieve all events that have been created between October 9 and 10, 2012, in reverse chronological order.

Request:


```
{
    "jsonrpc": "2.0",
    "method": "event.get",
    "params": {
        "output": "extend",
        "time_from": "1349797228",
        "time_till": "1350661228",
        "sortfield": ["clock", "eventid"],
        "sortorder": "desc"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```


Response:


```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "eventid": "20616",
            "source": "0",
            "object": "0",
            "objectid": "14282",
            "clock": "1350477814",
            "value": "1",
            "acknowledged": "0",
```

```
            "ns": "0",
            "name": "Less than 25% free in the history cache",
            "severity": "3",
            "r_eventid": "0",
            "c_eventid": "0",
            "correlationid": "0",
            "userid": "0",
            "opdata": "",
            "suppressed": "0"
        },
        {
            "eventid": "20617",
            "source": "0",
            "object": "0",
            "objectid": "14283",
            "clock": "1350477814",
            "value": "0",
            "acknowledged": "0",
            "ns": "0",
            "name": "Zabbix trapper processes more than 75% busy",
            "severity": "3",
            "r_eventid": "0",
            "c_eventid": "0",
            "correlationid": "0",
            "userid": "0",
            "opdata": "",
            "suppressed": "0"
        },
        {
            "eventid": "20618",
            "source": "0",
            "object": "0",
            "objectid": "14284",
            "clock": "1350477815",
            "value": "1",
            "acknowledged": "0",
            "ns": "0",
            "name": "High ICMP ping loss",
            "severity": "3",
            "r_eventid": "0",
            "c_eventid": "0",
            "correlationid": "0",
            "userid": "0",
            "opdata": "",
            "suppressed": "0"
        }
    ],
    "id": 1
}
```


See also

- Alert
- Item
- Host
- LLD rule
- Trigger

Source

CEvent::get() in *frontends/php/include/classes/api/services/CEvent.php*.

Graph

This class is designed to work with items.

Object references:

- Graph

Available methods:

- graph.create - creating new graphs
- graph.delete - deleting graphs
- graph.get - retrieving graphs
- graph.update - updating graphs

> Graph object

The following objects are directly related to the `graph` API.

Graph

The graph object has the following properties.

Property	Type	Description
graphid	string	*(readonly)* ID of the graph.
height (required)	integer	Height of the graph in pixels.
name (required)	string	Name of the graph
width (required)	integer	Width of the graph in pixels.
flags	integer	*(readonly)* Origin of the graph. Possible values are: 0 - *(default)* a plain graph; 4 - a discovered graph.
graphtype	integer	Graph's layout type. Possible values: 0 - *(default)* normal; 1 - stacked; 2 - pie; 3 - exploded.
percent_left	float	Left percentile. Default: 0.
percent_right	float	Right percentile. Default: 0.
show_3d	integer	Whether to show pie and exploded graphs in 3D. Possible values: 0 - *(default)* show in 2D; 1 - show in 3D.
show_legend	integer	Whether to show the legend on the graph. Possible values: 0 - hide; 1 - *(default)* show.
show_work_period	integer	Whether to show the working time on the graph. Possible values: 0 - hide; 1 - *(default)* show.
templateid	string	*(readonly)* ID of the parent template graph.

Property	Type	Description
yaxismax	float	The fixed maximum value for the Y axis. Default: 100.
yaxismin	float	The fixed minimum value for the Y axis. Default: 0.
ymax_itemid	string	ID of the item that is used as the maximum value for the Y axis.
ymax_type	integer	Maximum value calculation method for the Y axis. Possible values: 0 - *(default)* calculated; 1 - fixed; 2 - item.
ymin_itemid	string	ID of the item that is used as the minimum value for the Y axis.
ymin_type	integer	Minimum value calculation method for the Y axis. Possible values: 0 - *(default)* calculated; 1 - fixed; 2 - item.

graph.create

Description

`object graph.create(object/array graphs)`

This method allows to create new graphs.

Parameters

`(object/array)` Graphs to create.

Additionally to the standard graph properties, the method accepts the following parameters.

Parameter	Type	Description
gitems (required)	array	Graph items to be created for the graph.

Return values

`(object)` Returns an object containing the IDs of the created graphs under the `graphids` property. The order of the returned IDs matches the order of the passed graphs.

Examples

Creating a graph

Create a graph with two items.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "graph.create",
    "params": {
        "name": "MySQL bandwidth",
        "width": 900,
        "height": 200,
        "gitems": [
            {
                "itemid": "22828",
```

```
                "color": "00AA00"
            },
            {
                "itemid": "22829",
                "color": "3333FF"
            }
        ]
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "graphids": [
            "652"
        ]
    },
    "id": 1
}
```

See also

- Graph item

Source

CGraph::create() in *frontends/php/include/classes/api/services/CGraph.php*.

graph.delete

Description

`object graph.delete(array graphIds)`

This method allows to delete graphs.

Parameters

`(array)` IDs of the graphs to delete.

Return values

`(object)` Returns an object containing the IDs of the deleted graphs under the `graphids` property.

Examples

Deleting multiple graphs

Delete two graphs.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "graph.delete",
    "params": [
        "652",
        "653"
    ],
    "auth": "3a57200802b24cda67c4e4010b50c065",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "graphids": [
            "652",
            "653"
        ]
    },
    "id": 1
}
```

Source

CGraph::delete() in *frontends/php/include/classes/api/services/CGraph.php*.

graph.get

Description

`integer/array graph.get(object parameters)`

The method allows to retrieve graphs according to the given parameters.

Parameters

`(object)` Parameters defining the desired output.

The method supports the following parameters.

Parameter	Type	Description
graphids	string/array	Return only graphs with the given IDs.
groupids	string/array	Return only graphs that belong to hosts in the given host groups.
templateids	string/array	Return only graph that belong to the given templates.
hostids	string/array	Return only graphs that belong to the given hosts.
itemids	string/array	Return only graphs that contain the given items.
templated	boolean	If set to `true` return only graphs that belong to templates.
inherited	boolean	If set to `true` return only graphs inherited from a template.
expandName	flag	Expand macros in the graph name.
selectGroups	query	Return a groups property with the host groups that the graph belongs to.
selectTemplates	query	Return a templates property with the templates that the graph belongs to.
selectHosts	query	Return a hosts property with the hosts that the graph belongs to.
selectItems	query	Return an items property with the items used in the graph.
selectGraphDiscovery	query	Return a `graphDiscovery` property with the graph discovery object. The graph discovery objects links the graph to a graph prototype from which it was created. It has the following properties: `graphid` - `(string)` ID of the graph; `parent_graphid` - `(string)` ID of the graph prototype from which the graph has been created.
selectGraphItems	query	Return a gitems property with the items used in the graph.
selectDiscoveryRule	query	Return a discoveryRule property with the low-level discovery rule that created the graph.

Parameter	Type	Description
filter	object	Return only those results that exactly match the given filter. Accepts an array, where the keys are property names, and the values are either a single value or an array of values to match against. Supports additional filters: `host` - technical name of the host that the graph belongs to; `hostid` - ID of the host that the graph belongs to.
sortfield	string/array	Sort the result by the given properties. Possible values are: `graphid`, `name` and `graphtype`.
countOutput	boolean	These parameters being common for all `get` methods are described in detail in the reference commentary page.
editable	boolean	
excludeSearch	boolean	
limit	integer	
output	query	
preservekeys	boolean	
search	object	
searchByAny	boolean	
searchWildcardsEnabled	boolean	
sortorder	string/array	
startSearch	boolean	

Return values

`(integer/array)` Returns either:

- an array of objects;
- the count of retrieved objects, if the `countOutput` parameter has been used.

Examples

Retrieving graphs from hosts

Retrieve all graphs from host "10107" and sort them by name.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "graph.get",
    "params": {
        "output": "extend",
        "hostids": 10107,
        "sortfield": "name"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "graphid": "612",
            "name": "CPU jumps",
            "width": "900",
            "height": "200",
```

```
            "yaxismin": "0.0000",
            "yaxismax": "100.0000",
            "templateid": "439",
            "show_work_period": "1",
            "show_triggers": "1",
            "graphtype": "0",
            "show_legend": "1",
            "show_3d": "0",
            "percent_left": "0.0000",
            "percent_right": "0.0000",
            "ymin_type": "0",
            "ymax_type": "0",
            "ymin_itemid": "0",
            "ymax_itemid": "0",
            "flags": "0"
        },
        {
            "graphid": "613",
            "name": "CPU load",
            "width": "900",
            "height": "200",
            "yaxismin": "0.0000",
            "yaxismax": "100.0000",
            "templateid": "433",
            "show_work_period": "1",
            "show_triggers": "1",
            "graphtype": "0",
            "show_legend": "1",
            "show_3d": "0",
            "percent_left": "0.0000",
            "percent_right": "0.0000",
            "ymin_type": "1",
            "ymax_type": "0",
            "ymin_itemid": "0",
            "ymax_itemid": "0",
            "flags": "0"
        },
        {
            "graphid": "614",
            "name": "CPU utilization",
            "width": "900",
            "height": "200",
            "yaxismin": "0.0000",
            "yaxismax": "100.0000",
            "templateid": "387",
            "show_work_period": "1",
            "show_triggers": "0",
            "graphtype": "1",
            "show_legend": "1",
            "show_3d": "0",
            "percent_left": "0.0000",
            "percent_right": "0.0000",
            "ymin_type": "1",
            "ymax_type": "1",
            "ymin_itemid": "0",
            "ymax_itemid": "0",
            "flags": "0"
        },
        {
            "graphid": "645",
            "name": "Disk space usage /",
            "width": "600",
```

```
            "height": "340",
            "yaxismin": "0.0000",
            "yaxismax": "0.0000",
            "templateid": "0",
            "show_work_period": "0",
            "show_triggers": "0",
            "graphtype": "2",
            "show_legend": "1",
            "show_3d": "1",
            "percent_left": "0.0000",
            "percent_right": "0.0000",
            "ymin_type": "0",
            "ymax_type": "0",
            "ymin_itemid": "0",
            "ymax_itemid": "0",
            "flags": "4"
        }
    ],
    "id": 1
}
```


See also

- Discovery rule
- Graph item
- Item
- Host
- Host group
- Template

Source

CGraph::get() in *frontends/php/include/classes/api/services/CGraph.php*.

graph.update

Description

`object graph.update(object/array graphs)`

This method allows to update existing graphs.

Parameters

`(object/array)` Graph properties to be updated.

The `graphid` property must be defined for each graph, all other properties are optional. Only the passed properties will be updated, all others will remain unchanged.

Additionally to the standard graph properties the method accepts the following parameters.

Parameter	Type	Description
gitems	array	Graph items to replace existing graph items. If a graph item has the `gitemid` property defined it will be updated, otherwise a new graph item will be created.

Return values

`(object)` Returns an object containing the IDs of the updated graphs under the `graphids` property.

Examples

Setting the maximum for the Y scale

Set the the maximum of the Y scale to a fixed value of 100.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "graph.update",
    "params": {
        "graphid": "439",
        "ymax_type": 1,
        "yaxismax": 100
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "graphids": [
            "439"
        ]
    },
    "id": 1
}
```

Source

CGraph::update() in *frontends/php/include/classes/api/services/CGraph.php*.

Graph item

This class is designed to work with hosts.

Object references:

- Graph item

Available methods:

- graphitem.get - retrieving graph items

> Graph item object

The following objects are directly related to the `graphitem` API.

Graph item

Note:
Graph items can only be modified via the `graph` API.

The graph item object has the following properties.

Property	Type	Description
gitemid	string	*(readonly)* ID of the graph item.
color (required)	string	Graph item's draw color as a hexadecimal color code.
itemid (required)	string	ID of the item.

Property	Type	Description
calc_fnc	integer	Value of the item that will be displayed. Possible values: 1 - minimum value; 2 - *(default)* average value; 4 - maximum value; 7 - all values; 9 - last value, used only by pie and exploded graphs.
drawtype	integer	Draw style of the graph item. Possible values: 0 - *(default)* line; 1 - filled region; 2 - bold line; 3 - dot; 4 - dashed line; 5 - gradient line.
graphid	string	ID of the graph that the graph item belongs to.
sortorder	integer	Position of the item in the graph. Default: starts with 0 and increases by one with each entry.
type	integer	Type of graph item. Possible values: 0 - *(default)* simple; 2 - graph sum, used only by pie and exploded graphs.
yaxisside	integer	Side of the graph where the graph item's Y scale will be drawn. Possible values: 0 - *(default)* left side; 1 - right side.

graphitem.get

Description

`integer/array graphitem.get(object parameters)`

The method allows to retrieve graph items according to the given parameters.

Parameters

`(object)` Parameters defining the desired output.

The method supports the following parameters.

Parameter	Type	Description
graphids	string/array	Return only graph items that belong to the given graphs.
itemids	string/array	Return only graph items with the given item IDs.
type	integer	Return only graph items with the given type. Refer to the graph item object page for a list of supported graph item types.
selectGraphs	query	Return a graphs property with an array of graphs that the item belongs to.
sortfield	string/array	Sort the result by the given properties. Possible values are: `gitemid`.

Parameter	Type	Description
countOutput	boolean	These parameters being common for all `get` methods are described in detail in the reference commentary page.
editable	boolean	
limit	integer	
output	query	
preservekeys	boolean	
sortorder	string/array	

Return values

`(integer/array)` Returns either:

- an array of objects;
- the count of retrieved objects, if the `countOutput` parameter has been used.

Examples

Retrieving graph items from a graph

Retrieve all graph items used in a graph with additional information about the item and the host.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "graphitem.get",
    "params": {
        "output": "extend",
        "graphids": "387"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "gitemid": "1242",
            "graphid": "387",
            "itemid": "22665",
            "drawtype": "1",
            "sortorder": "1",
            "color": "FF5555",
            "yaxisside": "0",
            "calc_fnc": "2",
            "type": "0",
            "key_": "system.cpu.util[,steal]",
            "hostid": "10001",
            "flags": "0",
            "host": "Template OS Linux"
        },
        {
            "gitemid": "1243",
            "graphid": "387",
            "itemid": "22668",
            "drawtype": "1",
            "sortorder": "2",
            "color": "55FF55",
            "yaxisside": "0",
            "calc_fnc": "2",
            "type": "0",
```

```
            "key_": "system.cpu.util[,softirq]",
            "hostid": "10001",
            "flags": "0",
            "host": "Template OS Linux"
        },
        {
            "gitemid": "1244",
            "graphid": "387",
            "itemid": "22671",
            "drawtype": "1",
            "sortorder": "3",
            "color": "009999",
            "yaxisside": "0",
            "calc_fnc": "2",
            "type": "0",
            "key_": "system.cpu.util[,interrupt]",
            "hostid": "10001",
            "flags": "0",
            "host": "Template OS Linux"
        }
    ],
    "id": 1
}
```


See also

- Graph

Source

CGraphItem::get() in *frontends/php/include/classes/api/services/CGraphItem.php*.

Graph prototype

This class is designed to work with graph prototypes.

Object references:

- Graph prototype

Available methods:

- graphprototype.create - creating new graph prototypes
- graphprototype.delete - deleting graph prototypes
- graphprototype.get - retrieving graph prototypes
- graphprototype.update - updating graph prototypes

> Graph prototype object

The following objects are directly related to the `graphprototype` API.

Graph prototype

The graph prototype object has the following properties.

Property	Type	Description
graphid	string	*(readonly)* ID of the graph prototype.
height (required)	integer	Height of the graph prototype in pixels.
name (required)	string	Name of the graph prototype.
width (required)	integer	Width of the graph prototype in pixels.

Property	Type	Description
graphtype	integer	Graph prototypes's layout type. Possible values: 0 - *(default)* normal; 1 - stacked; 2 - pie; 3 - exploded.
percent_left	float	Left percentile. Default: 0.
percent_right	float	Right percentile. Default: 0.
show_3d	integer	Whether to show discovered pie and exploded graphs in 3D. Possible values: 0 - *(default)* show in 2D; 1 - show in 3D.
show_legend	integer	Whether to show the legend on the discovered graph. Possible values: 0 - hide; 1 - *(default)* show.
show_work_period	integer	Whether to show the working time on the discovered graph. Possible values: 0 - hide; 1 - *(default)* show.
templateid	string	*(readonly)* ID of the parent template graph prototype.
yaxismax	float	The fixed maximum value for the Y axis.
yaxismin	float	The fixed minimum value for the Y axis.
ymax_itemid	string	ID of the item that is used as the maximum value for the Y axis.
ymax_type	integer	Maximum value calculation method for the Y axis. Possible values: 0 - *(default)* calculated; 1 - fixed; 2 - item.
ymin_itemid	string	ID of the item that is used as the minimum value for the Y axis.
ymin_type	integer	Minimum value calculation method for the Y axis. Possible values: 0 - *(default)* calculated; 1 - fixed; 2 - item.

graphprototype.create

Description

`object graphprototype.create(object/array graphPrototypes)`

This method allows to create new graph prototypes.

Parameters

`(object/array)` Graph prototypes to create.

Additionally to the standard graph prototype properties, the method accepts the following parameters.

Parameter	Type	Description
gitems (required)	array	Graph items to be created for the graph prototypes. Graph items can reference both items and item prototypes, but at least one item prototype must be present.

Return values

`(object)` Returns an object containing the IDs of the created graph prototypes under the `graphids` property. The order of the returned IDs matches the order of the passed graph prototypes.

Examples

Creating a graph prototype

Create a graph prototype with two items.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "graphprototype.create",
    "params": {
        "name": "Disk space usage {#FSNAME}",
        "width": 900,
        "height": 200,
        "gitems": [
            {
                "itemid": "22828",
                "color": "00AA00"
            },
            {
                "itemid": "22829",
                "color": "3333FF"
            }
        ]
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "graphids": [
            "652"
        ]
    },
    "id": 1
}
```

See also

- Graph item

Source

CGraphPrototype::create() in *frontends/php/include/classes/api/services/CGraphPrototype.php*.

graphprototype.delete

Description

`object graphprototype.delete(array graphPrototypeIds)`

This method allows to delete graph prototypes.

Parameters

`(array)` IDs of the graph prototypes to delete.

Return values

`(object)` Returns an object containing the IDs of the deleted graph prototypes under the `graphids` property.

Examples

Deleting multiple graph prototypes

Delete two graph prototypes.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "graphprototype.delete",
    "params": [
        "652",
        "653"
    ],
    "auth": "3a57200802b24cda67c4e4010b50c065",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "graphids": [
            "652",
            "653"
        ]
    },
    "id": 1
}
```

Source

CGraphPrototype::delete() in *frontends/php/include/classes/api/services/CGraphPrototype.php*.

graphprototype.get

Description

`integer/array graphprototype.get(object parameters)`

The method allows to retrieve graph prototypes according to the given parameters.

Parameters

`(object)` Parameters defining the desired output.

The method supports the following parameters.

Parameter	Type	Description
discoveryids	string/array	Return only graph prototypes that belong to the given discovery rules.
graphids	string/array	Return only graph prototypes with the given IDs.
groupids	string/array	Return only graph prototypes that belong to hosts in the given host groups.
hostids	string/array	Return only graph prototypes that belong to the given hosts.
inherited	boolean	If set to `true` return only graph prototypes inherited from a template.
itemids	string/array	Return only graph prototypes that contain the given item prototypes.

Parameter	Type	Description
templated	boolean	If set to `true` return only graph prototypes that belong to templates.
templateids	string/array	Return only graph prototypes that belong to the given templates.
selectDiscoveryRule	query	Return a discoveryRule property with the LLD rule that the graph prototype belongs to.
selectGraphItems	query	Return a gitems property with the graph items used in the graph prototype.
selectGroups	query	Return a groups property with the host groups that the graph prototype belongs to.
selectHosts	query	Return a hosts property with the hosts that the graph prototype belongs to.
selectItems	query	Return an `items` property with the items and item prototypes used in the graph prototype.
selectTemplates	query	Return a templates property with the templates that the graph prototype belongs to.
filter	object	Return only those results that exactly match the given filter. Accepts an array, where the keys are property names, and the values are either a single value or an array of values to match against. Supports additional filters: `host` - technical name of the host that the graph prototype belongs to; `hostid` - ID of the host that the graph prototype belongs to.
sortfield	string/array	Sort the result by the given properties. Possible values are: `graphid`, `name` and `graphtype`.
countOutput	boolean	These parameters being common for all `get` methods are described in detail in the reference commentary.
editable	boolean	
excludeSearch	boolean	
limit	integer	
output	query	
preservekeys	boolean	
search	object	
searchByAny	boolean	
searchWildcardsEnabled	boolean	
sortorder	string/array	
startSearch	boolean	

Return values

`(integer/array)` Returns either:

- an array of objects;
- the count of retrieved objects, if the `countOutput` parameter has been used.

Examples

Retrieving graph prototypes from a LLD rule

Retrieve all graph prototypes from an LLD rule.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "graphprototype.get",
    "params": {
        "output": "extend",
```

```
        "discoveryids": "27426"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "graphid": "1017",
            "parent_itemid": "27426",
            "name": "Disk space usage {#FSNAME}",
            "width": "600",
            "height": "340",
            "yaxismin": "0.0000",
            "yaxismax": "0.0000",
            "templateid": "442",
            "show_work_period": "0",
            "show_triggers": "0",
            "graphtype": "2",
            "show_legend": "1",
            "show_3d": "1",
            "percent_left": "0.0000",
            "percent_right": "0.0000",
            "ymin_type": "0",
            "ymax_type": "0",
            "ymin_itemid": "0",
            "ymax_itemid": "0"
        }
    ],
    "id": 1
}
```

See also

- Discovery rule
- Graph item
- Item
- Host
- Host group
- Template

Source

CGraphPrototype::get() in *frontends/php/include/classes/api/services/CGraphPrototype.php*.

graphprototype.update

Description

`object graphprototype.update(object/array graphPrototypes)`

This method allows to update existing graph prototypes.

Parameters

`(object/array)` Graph prototype properties to be updated.

The `graphid` property must be defined for each graph prototype, all other properties are optional. Only the passed properties will be updated, all others will remain unchanged.

Additionally to the standard graph prototype properties, the method accepts the following parameters.

Parameter	Type	Description
gitems	array	Graph items to replace existing graph items. If a graph item has the `gitemid` property defined it will be updated, otherwise a new graph item will be created.

Return values

`(object)` Returns an object containing the IDs of the updated graph prototypes under the `graphids` property.

Examples

Changing the size of a graph prototype

Change the size of a graph prototype to 1100 to 400 pixels.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "graphprototype.update",
    "params": {
        "graphid": "439",
        "width": 1100,
        "height": 400
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "graphids": [
            "439"
        ]
    },
    "id": 1
}
```

Source

CGraphPrototype::update() in *frontends/php/include/classes/api/services/CGraphPrototype.php*.

History

This class is designed to work with history data.

Object references:

- History

Available methods:

- history.get - retrieving history data.

> History object

The following objects are directly related to the `history` API.

Note:
History objects differ depending on the item's type of information. They are created by the Zabbix server and cannot be modified via the API.

Float history

The float history object has the following properties.

Property	Type	Description
clock	timestamp	Time when that value was received.
itemid	string	ID of the related item.
ns	integer	Nanoseconds when the value was received.
value	float	Received value.

Integer history

The integer history object has the following properties.

Property	Type	Description
clock	timestamp	Time when that value was received.
itemid	string	ID of the related item.
ns	integer	Nanoseconds when the value was received.
value	integer	Received value.

String history

The string history object has the following properties.

Property	Type	Description
clock	timestamp	Time when that value was received.
itemid	string	ID of the related item.
ns	integer	Nanoseconds when the value was received.
value	string	Received value.

Text history

The text history object has the following properties.

Property	Type	Description
id	string	ID of the history entry.
clock	timestamp	Time when that value was received.
itemid	string	ID of the related item.
ns	integer	Nanoseconds when the value was received.
value	text	Received value.

Log history

The log history object has the following properties.

Property	Type	Description
id	string	ID of the history entry.
clock	timestamp	Time when that value was received.
itemid	string	ID of the related item.
logeventid	integer	Windows event log entry ID.
ns	integer	Nanoseconds when the value was received.
severity	integer	Windows event log entry level.
source	string	Windows event log entry source.
timestamp	timestamp	Windows event log entry time.
value	text	Received value.

history.get

Description

`integer/array history.get(object parameters)`

The method allows to retrieve history data according to the given parameters.

See also: known issues

Attention:
This method may return historical data of a deleted entity if this data has not been removed by the housekeeper yet.

Parameters

`(object)` Parameters defining the desired output.

The method supports the following parameters.

Parameter	Type	Description
history	integer	History object types to return. Possible values: 0 - numeric float; 1 - character; 2 - log; 3 - numeric unsigned; 4 - text. Default: 3.
hostids	string/array	Return only history from the given hosts.
itemids	string/array	Return only history from the given items.
time_from	timestamp	Return only values that have been received after or at the given time.
time_till	timestamp	Return only values that have been received before or at the given time.
sortfield	string/array	Sort the result by the given properties. Possible values are: `itemid` and `clock`.
countOutput	boolean	These parameters being common for all `get` methods are described in detail in the reference commentary page.
editable	boolean	
excludeSearch	boolean	
filter	object	
limit	integer	
output	query	
search	object	
searchByAny	boolean	
searchWildcardsEnabled	boolean	
sortorder	string/array	
startSearch	boolean	

Return values

`(integer/array)` Returns either:

- an array of objects;
- the count of retrieved objects, if the `countOutput` parameter has been used.

Examples

Retrieving item history data

Return 10 latest values received from a numeric(float) item.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "history.get",
    "params": {
        "output": "extend",
        "history": 0,
        "itemids": "23296",
        "sortfield": "clock",
        "sortorder": "DESC",
        "limit": 10
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "itemid": "23296",
            "clock": "1351090996",
            "value": "0.0850",
            "ns": "563157632"
        },
        {
            "itemid": "23296",
            "clock": "1351090936",
            "value": "0.1600",
            "ns": "549216402"
        },
        {
            "itemid": "23296",
            "clock": "1351090876",
            "value": "0.1800",
            "ns": "537418114"
        },
        {
            "itemid": "23296",
            "clock": "1351090816",
            "value": "0.2100",
            "ns": "522659528"
        },
        {
            "itemid": "23296",
            "clock": "1351090756",
            "value": "0.2150",
            "ns": "507809457"
        },
        {
            "itemid": "23296",
            "clock": "1351090696",
            "value": "0.2550",
            "ns": "495509699"
        },
        {
            "itemid": "23296",
            "clock": "1351090636",
            "value": "0.3600",
            "ns": "477708209"
        },
        {
```

```
            "itemid": "23296",
            "clock": "1351090576",
            "value": "0.3750",
            "ns": "463251343"
        },
        {
            "itemid": "23296",
            "clock": "1351090516",
            "value": "0.3150",
            "ns": "447947017"
        },
        {
            "itemid": "23296",
            "clock": "1351090456",
            "value": "0.2750",
            "ns": "435307141"
        }
    ],
    "id": 1
}
```


Source

CHistory::get() in *frontends/php/include/classes/api/services/CHistory.php*.

Host

This class is designed to work with hosts.

Object references:

- Host
- Host inventory

Available methods:

- host.create - creating new hosts
- host.delete - deleting hosts
- host.get - retrieving hosts
- host.massadd - adding related objects to hosts
- host.massremove - removing related objects from hosts
- host.massupdate - replacing or removing related objects from hosts
- host.update - updating hosts

> Host object

The following objects are directly related to the host API.

Host

The host object has the following properties.

Property	Type	Description
hostid	string	*(readonly)* ID of the host.
host (required)	string	Technical name of the host.
available	integer	*(readonly)* Availability of Zabbix agent. Possible values are: 0 - *(default)* unknown; 1 - available; 2 - unavailable.
description	text	Description of the host.

Property	Type	Description
disable_until	timestamp	*(readonly)* The next polling time of an unavailable Zabbix agent.
error	string	*(readonly)* Error text if Zabbix agent is unavailable.
errors_from	timestamp	*(readonly)* Time when Zabbix agent became unavailable.
flags	integer	*(readonly)* Origin of the host. Possible values: 0 - a plain host; 4 - a discovered host.
inventory_mode	integer	Host inventory population mode. Possible values are: -1 - *(default)* disabled; 0 - manual; 1 - automatic.
ipmi_authtype	integer	IPMI authentication algorithm. Possible values are: -1 - *(default)* default; 0 - none; 1 - MD2; 2 - MD5 4 - straight; 5 - OEM; 6 - RMCP+.
ipmi_available	integer	*(readonly)* Availability of IPMI agent. Possible values are: 0 - *(default)* unknown; 1 - available; 2 - unavailable.
ipmi_disable_until	timestamp	*(readonly)* The next polling time of an unavailable IPMI agent.
ipmi_error	string	*(readonly)* Error text if IPMI agent is unavailable.
ipmi_errors_from	timestamp	*(readonly)* Time when IPMI agent became unavailable.
ipmi_password	string	IPMI password.
ipmi_privilege	integer	IPMI privilege level. Possible values are: 1 - callback; 2 - *(default)* user; 3 - operator; 4 - admin; 5 - OEM.
ipmi_username	string	IPMI username.
jmx_available	integer	*(readonly)* Availability of JMX agent. Possible values are: 0 - *(default)* unknown; 1 - available; 2 - unavailable.
jmx_disable_until	timestamp	*(readonly)* The next polling time of an unavailable JMX agent.
jmx_error	string	*(readonly)* Error text if JMX agent is unavailable.
jmx_errors_from	timestamp	*(readonly)* Time when JMX agent became unavailable.
maintenance_from	timestamp	*(readonly)* Starting time of the effective maintenance.
maintenance_status	integer	*(readonly)* Effective maintenance status. Possible values are: 0 - *(default)* no maintenance; 1 - maintenance in effect.

Property	Type	Description
maintenance_type	integer	*(readonly)* Effective maintenance type. Possible values are: 0 - *(default)* maintenance with data collection; 1 - maintenance without data collection.
maintenanceid	string	*(readonly)* ID of the maintenance that is currently in effect on the host.
name	string	Visible name of the host. Default: `host` property value.
proxy_hostid	string	ID of the proxy that is used to monitor the host.
snmp_available	integer	*(readonly)* Availability of SNMP agent. Possible values are: 0 - *(default)* unknown; 1 - available; 2 - unavailable.
snmp_disable_until	timestamp	*(readonly)* The next polling time of an unavailable SNMP agent.
snmp_error	string	*(readonly)* Error text if SNMP agent is unavailable.
snmp_errors_from	timestamp	*(readonly)* Time when SNMP agent became unavailable.
status	integer	Status and function of the host. Possible values are: 0 - *(default)* monitored host; 1 - unmonitored host.
tls_connect	integer	Connections to host. Possible values are: 1 - *(default)* No encryption; 2 - PSK; 4 - certificate.
tls_accept	integer	Connections from host. Possible bitmap values are: 1 - *(default)* No encryption; 2 - PSK; 4 - certificate.
tls_issuer	string	Certificate issuer.
tls_subject	string	Certificate subject.
tls_psk_identity	string	PSK identity. Required if either `tls_connect` or `tls_accept` has PSK enabled. Do not put sensitive information in the PSK identity, it is transmitted unencrypted over the network to inform a receiver which PSK to use.
tls_psk	string	The preshared key, at least 32 hex digits. Required if either `tls_connect` or `tls_accept` has PSK enabled.

Host inventory

The host inventory object has the following properties.

Note:
Each property has it's own unique ID number, which is used to associate host inventory fields with items.

ID	Property	Type	Description
4	alias	string	Alias.
11	asset_tag	string	Asset tag.
28	chassis	string	Chassis.
23	contact	string	Contact person.

ID	Property	Type	Description
32	contract_number	string	Contract number.
47	date_hw_decomm	string	HW decommissioning date.
46	date_hw_expiry	string	HW maintenance expiry date.
45	date_hw_install	string	HW installation date.
44	date_hw_purchase	string	HW purchase date.
34	deployment_status	string	Deployment status.
14	hardware	string	Hardware.
15	hardware_full	string	Detailed hardware.
39	host_netmask	string	Host subnet mask.
38	host_networks	string	Host networks.
40	host_router	string	Host router.
30	hw_arch	string	HW architecture.
33	installer_name	string	Installer name.
24	location	string	Location.
25	location_lat	string	Location latitude.
26	location_lon	string	Location longitude.
12	macaddress_a	string	MAC address A.
13	macaddress_b	string	MAC address B.
29	model	string	Model.
3	name	string	Name.
27	notes	string	Notes.
41	oob_ip	string	OOB IP address.
42	oob_netmask	string	OOB host subnet mask.
43	oob_router	string	OOB router.
5	os	string	OS name.
6	os_full	string	Detailed OS name.
7	os_short	string	Short OS name.
61	poc_1_cell	string	Primary POC mobile number.
58	poc_1_email	string	Primary email.
57	poc_1_name	string	Primary POC name.
63	poc_1_notes	string	Primary POC notes.
59	poc_1_phone_a	string	Primary POC phone A.
60	poc_1_phone_b	string	Primary POC phone B.
62	poc_1_screen	string	Primary POC screen name.
68	poc_2_cell	string	Secondary POC mobile number.
65	poc_2_email	string	Secondary POC email.
64	poc_2_name	string	Secondary POC name.
70	poc_2_notes	string	Secondary POC notes.
66	poc_2_phone_a	string	Secondary POC phone A.
67	poc_2_phone_b	string	Secondary POC phone B.
69	poc_2_screen	string	Secondary POC screen name.
8	serialno_a	string	Serial number A.
9	serialno_b	string	Serial number B.
48	site_address_a	string	Site address A.
49	site_address_b	string	Site address B.
50	site_address_c	string	Site address C.
51	site_city	string	Site city.
53	site_country	string	Site country.
56	site_notes	string	Site notes.
55	site_rack	string	Site rack location.
52	site_state	string	Site state.
54	site_zip	string	Site ZIP/postal code.
16	software	string	Software.
18	software_app_a	string	Software application A.
19	software_app_b	string	Software application B.
20	software_app_c	string	Software application C.
21	software_app_d	string	Software application D.
22	software_app_e	string	Software application E.
17	software_full	string	Software details.
10	tag	string	Tag.
1	type	string	Type.

ID	Property	Type	Description
2	type_full	string	Type details.
35	url_a	string	URL A.
36	url_b	string	URL B.
37	url_c	string	URL C.
31	vendor	string	Vendor.

Host tag

The host tag object has the following properties.

Property	Type	Description
tag (required)	string	Host tag name.
value	string	Host tag value.

host.create

Description

`object host.create(object/array hosts)`

This method allows to create new hosts.

Parameters

`(object/array)` Hosts to create.

Additionally to the standard host properties, the method accepts the following parameters.

Parameter	Type	Description
groups (required)	object/array	Host groups to add the host to. The host groups must have the `groupid` property defined.
interfaces (required)	object/array	Interfaces to be created for the host.
tags	object/array	Host tags.
templates	object/array	Templates to be linked to the host. The templates must have the `templateid` property defined.
macros	object/array	User macros to be created for the host.
inventory	object	Host inventory properties.

Return values

`(object)` Returns an object containing the IDs of the created hosts under the `hostids` property. The order of the returned IDs matches the order of the passed hosts.

Examples

Creating a host

Create a host called "Linux server" with an IP interface and tags, add it to a group, link a template to it and set the MAC addresses in the host inventory.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "host.create",
    "params": {
        "host": "Linux server",
```

```
        "interfaces": [
            {
                "type": 1,
                "main": 1,
                "useip": 1,
                "ip": "192.168.3.1",
                "dns": "",
                "port": "10050"
            }
        ],
        "groups": [
            {
                "groupid": "50"
            }
        ],
        "tags": [
            {
                "tag": "Host name",
                "value": "Linux server"
            }
        ],
        "templates": [
            {
                "templateid": "20045"
            }
        ],
        "macros": [
            {
                "macro": "{$USER_ID}",
                "value": "123321"
            },
            {
                "macro": "{$USER_LOCATION}",
                "value": "0:0:0",
                "description": "latitude, longitude and altitude coordinates"
            }
        ],
        "inventory_mode": 0,
        "inventory": {
            "macaddress_a": "01234",
            "macaddress_b": "56768"
        }
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "hostids": [
            "107819"
        ]
    },
    "id": 1
}
```

See also

- Host group
- Template
- User macro

- Host interface
- Host inventory
- Host tag

Source

CHost::create() in *frontends/php/include/classes/api/services/CHost.php*.

host.delete

Description

`object host.delete(array hosts)`

This method allows to delete hosts.

Parameters

`(array)` IDs of hosts to delete.

Return values

`(object)` Returns an object containing the IDs of the deleted hosts under the `hostids` property.

Examples

Deleting multiple hosts

Delete two hosts.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "host.delete",
    "params": [
        "13",
        "32"
    ],
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "hostids": [
            "13",
            "32"
        ]
    },
    "id": 1
}
```

Source

CHost::delete() in *frontends/php/include/classes/api/services/CHost.php*.

host.get

Description

`integer/array host.get(object parameters)`

The method allows to retrieve hosts according to the given parameters.

Parameters

`(object)` Parameters defining the desired output.

The method supports the following parameters.

Parameter	Type	Description
groupids	string/array	Return only hosts that belong to the given groups.
applicationids	string/array	Return only hosts that have the given applications.
dserviceids	string/array	Return only hosts that are related to the given discovered services.
graphids	string/array	Return only hosts that have the given graphs.
hostids	string/array	Return only hosts with the given host IDs.
httptestids	string/array	Return only hosts that have the given web checks.
interfaceids	string/array	Return only hosts that use the given interfaces.
itemids	string/array	Return only hosts that have the given items.
maintenanceids	string/array	Return only hosts that are affected by the given maintenances.
monitored_hosts	flag	Return only monitored hosts.
proxy_hosts	flag	Return only proxies.
proxyids	string/array	Return only hosts that are monitored by the given proxies.
templated_hosts	flag	Return both hosts and templates.
templateids	string/array	Return only hosts that are linked to the given templates.
triggerids	string/array	Return only hosts that have the given triggers.
with_items	flag	Return only hosts that have items. Overrides the `with_monitored_items` and `with_simple_graph_items` parameters.
with_item_prototypes	flag	Return only hosts that have item prototypes. Overrides the `with_simple_graph_item_prototypes` parameter.
with_simple_graph_item_prototypes	flag	Return only hosts that have item prototypes, which are enabled for creation and have numeric type of information.
with_applications	flag	Return only hosts that have applications.
with_graphs	flag	Return only hosts that have graphs.
with_graph_prototypes	flag	Return only hosts that have graph prototypes.
with_httptests	flag	Return only hosts that have web checks. Overrides the `with_monitored_httptests` parameter.
with_monitored_httptests	flag	Return only hosts that have enabled web checks.
with_monitored_items	flag	Return only hosts that have enabled items. Overrides the `with_simple_graph_items` parameter.
with_monitored_triggers	flag	Return only hosts that have enabled triggers. All of the items used in the trigger must also be enabled.
with_simple_graph_items	flag	Return only hosts that have items with numeric type of information.
with_triggers	flag	Return only hosts that have triggers. Overrides the `with_monitored_triggers` parameter.
evaltype	integer	Rules for tag searching. Possible values: 0 - (default) And/Or; 2 - Or.

Parameter	Type	Description
tags	array/object	Return only hosts with given tags. Exact match by tag and case-sensitive or case-insensitive search by tag value depending on operator value. Format: `[{"tag": "<tag>", "value": "<value>", "operator": "<operator>"}, ...]`. An empty array returns all hosts. Possible operator values: 0 - (default) Contains; 1 - Equals.
selectApplications	query	Return an applications property with host applications. Supports `count`.
selectDiscoveries	query	Return a discoveries property with host low-level discovery rules. Supports `count`.
selectDiscoveryRule	query	Return a discoveryRule property with the low-level discovery rule that created the host (from host prototype in VMware monitoring).
selectGraphs	query	Return a graphs property with host graphs. Supports `count`.
selectGroups	query	Return a groups property with host groups data that the host belongs to.
selectHostDiscovery	query	Return a `hostDiscovery` property with host discovery object data. The host discovery object links a discovered host to a host prototype or a host prototypes to an LLD rule and has the following properties: `host` - *(string)* host of the host prototype; `hostid` - *(string)* ID of the discovered host or host prototype; `parent_hostid` - *(string)* ID of the host prototype from which the host has been created; `parent_itemid` - *(string)* ID of the LLD rule that created the discovered host; `lastcheck` - *(timestamp)* time when the host was last discovered; `ts_delete` - *(timestamp)* time when a host that is no longer discovered will be deleted.
selectHttpTests	query	Return an httpTests property with host web scenarios. Supports `count`.
selectInterfaces	query	Return an interfaces property with host interfaces. Supports `count`.
selectInventory	query	Return an inventory property with host inventory data.
selectItems	query	Return an items property with host items. Supports `count`.
selectMacros	query	Return a macros property with host macros.
selectParentTemplates	query	Return a parentTemplates property with templates that the host is linked to. Supports `count`.
selectScreens	query	Return a screens property with host screens. Supports `count`.

Parameter	Type	Description
selectTags	query	Return a tags property with host tags.
selectTriggers	query	Return a triggers property with host triggers. Supports `count`.
filter	object	Return only those results that exactly match the given filter. Accepts an array, where the keys are property names, and the values are either a single value or an array of values to match against. Allows filtering by interface properties.
limitSelects	integer	Limits the number of records returned by subselects. Applies to the following subselects: `selectParentTemplates` - results will be sorted by `host`; `selectInterfaces`; `selectItems` - sorted by `name`; `selectDiscoveries` - sorted by `name`; `selectTriggers` - sorted by `description`; `selectGraphs` - sorted by `name`; `selectApplications` - sorted by `name`; `selectScreens` - sorted by `name`.
search	object	Return results that match the given wildcard search. Accepts an array, where the keys are property names, and the values are strings to search for. If no additional options are given, this will perform a `LIKE "%...%"` search. Allows searching by interface properties. Works only with text fields.
searchInventory	object	Return only hosts that have inventory data matching the given wildcard search. This parameter is affected by the same additional parameters as `search`.
sortfield	string/array	Sort the result by the given properties. Possible values are: `hostid`, `host`, `name`, `status`.
countOutput	boolean	These parameters being common for all `get` methods are described in detail in the reference commentary.
editable	boolean	
excludeSearch	boolean	
limit	integer	
output	query	
preservekeys	boolean	
searchByAny	boolean	
searchWildcardsEnabled	boolean	
sortorder	string/array	
startSearch	boolean	

Return values

`(integer/array)` Returns either:

- an array of objects;
- the count of retrieved objects, if the `countOutput` parameter has been used.

Examples

Retrieving data by name

Retrieve all data about two hosts named ”Zabbix server” and ”Linux server”.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "host.get",
    "params": {
        "filter": {
            "host": [
                "Zabbix server",
                "Linux server"
            ]
        }
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "maintenances": [],
            "hostid": "10160",
            "proxy_hostid": "0",
            "host": "Zabbix server",
            "status": "0",
            "disable_until": "0",
            "error": "",
            "available": "0",
            "errors_from": "0",
            "lastaccess": "0",
            "ipmi_authtype": "-1",
            "ipmi_privilege": "2",
            "ipmi_username": "",
            "ipmi_password": "",
            "ipmi_disable_until": "0",
            "ipmi_available": "0",
            "snmp_disable_until": "0",
            "snmp_available": "0",
            "maintenanceid": "0",
            "maintenance_status": "0",
            "maintenance_type": "0",
            "maintenance_from": "0",
            "ipmi_errors_from": "0",
            "snmp_errors_from": "0",
            "ipmi_error": "",
            "snmp_error": "",
            "jmx_disable_until": "0",
            "jmx_available": "0",
            "jmx_errors_from": "0",
            "jmx_error": "",
            "name": "Zabbix server",
            "description": "The Zabbix monitoring server.",
            "tls_connect": "1",
            "tls_accept": "1",
            "tls_issuer": "",
            "tls_subject": "",
            "tls_psk_identity": "",
            "tls_psk": ""
        },
        {
```

```
            "maintenances": [],
            "hostid": "10167",
            "proxy_hostid": "0",
            "host": "Linux server",
            "status": "0",
            "disable_until": "0",
            "error": "",
            "available": "0",
            "errors_from": "0",
            "lastaccess": "0",
            "ipmi_authtype": "-1",
            "ipmi_privilege": "2",
            "ipmi_username": "",
            "ipmi_password": "",
            "ipmi_disable_until": "0",
            "ipmi_available": "0",
            "snmp_disable_until": "0",
            "snmp_available": "0",
            "maintenanceid": "0",
            "maintenance_status": "0",
            "maintenance_type": "0",
            "maintenance_from": "0",
            "ipmi_errors_from": "0",
            "snmp_errors_from": "0",
            "ipmi_error": "",
            "snmp_error": "",
            "jmx_disable_until": "0",
            "jmx_available": "0",
            "jmx_errors_from": "0",
            "jmx_error": "",
            "name": "Linux server",
            "description": "",
            "tls_connect": "1",
            "tls_accept": "1",
            "tls_issuer": "",
            "tls_subject": "",
            "tls_psk_identity": "",
            "tls_psk": ""
        }
    ],
    "id": 1
}
```


Retrieving host groups

Retrieve names of the groups host ”Zabbix server” is member of, but no host details themselves.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "host.get",
    "params": {
        "output": ["hostid"],
        "selectGroups": "extend",
        "filter": {
            "host": [
                "Zabbix server"
            ]
        }
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 2
}
```

Response:


```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "hostid": "10085",
            "groups": [
                {
                    "groupid": "2",
                    "name": "Linux servers",
                    "internal": "0",
                    "flags": "0"
                },
                {
                    "groupid": "4",
                    "name": "Zabbix servers",
                    "internal": "0",
                    "flags": "0"
                }
            ]
        }
    ],
    "id": 2
}
```


Retrieving linked templates

Retrieve the IDs and names of templates linked to host ”10084”.

Request:


```
{
    "jsonrpc": "2.0",
    "method": "host.get",
    "params": {
        "output": ["hostid"],
        "selectParentTemplates": [
            "templateid",
            "name"
        ],
        "hostids": "10084"
    },
    "id": 1,
    "auth": "70785d2b494a7302309b48afcdb3a401"
}
```


Response:


```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "hostid": "10084",
            "parentTemplates": [
                {
                    "name": "Template OS Linux",
                    "templateid": "10001"
                },
                {
                    "name": "Template App Zabbix Server",
                    "templateid": "10047"
                }
            ]
        }
    ],
```

```
    "id": 1
}
```

Searching by host inventory data

Retrieve hosts that contain ”Linux” in the host inventory ”OS” field.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "host.get",
    "params": {
        "output": [
            "host"
        ],
        "selectInventory": [
            "os"
        ],
        "searchInventory": {
            "os": "Linux"
        }
    },
    "id": 2,
    "auth": "7f9e00124c75e8f25facd5c093f3e9a0"
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "hostid": "10084",
            "host": "Zabbix server",
            "inventory": {
                "os": "Linux Ubuntu"
            }
        },
        {
            "hostid": "10107",
            "host": "Linux server",
            "inventory": {
                "os": "Linux Mint"
            }
        }
    ],
    "id": 1
}
```

Searching by host tags

Retrieve hosts that have tag ”Host name” equal to ”Linux server”.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "host.get",
    "params": {
        "output": ["hostid"],
        "selectTags": "extend",
        "evaltype": 0,
        "tags": [
            {
                "tag": "Host name",
                "value": "Linux server",
```

```
                "operator": 1
            }
        ]
    },
    "auth": "7f9e00124c75e8f25facd5c093f3e9a0",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "hostid": "10085",
            "tags": [
                {
                    "tag": "Host name",
                    "value": "Linux server"
                },
                {
                    "tag": "OS",
                    "value": "RHEL 7"
                }
            ]
        }
    ],
    "id": 1
}
```

See also

- Host group
- Template
- User macro
- Host interface

Source

CHost::get() in *frontends/php/include/classes/api/services/CHost.php*.

host.massadd

Description

`object host.massadd(object parameters)`

This method allows to simultaneously add multiple related objects to all the given hosts.

Parameters

`(object)` Parameters containing the IDs of the hosts to update and the objects to add to all the hosts.

The method accepts the following parameters.

Parameter	Type	Description
hosts (required)	object/array	Hosts to be updated. The hosts must have the `hostid` property defined.
groups	object/array	Host groups to add to the given hosts. The host groups must have the `groupid` property defined.
interfaces	object/array	Host interfaces to be created for the given hosts.
macros	object/array	User macros to be created for the given hosts.

Parameter	Type	Description
templates	object/array	Templates to link to the given hosts. The templates must have the `templateid` property defined.

Return values

`(object)` Returns an object containing the IDs of the updated hosts under the `hostids` property.

Examples

Adding macros

Add two new macros to two hosts.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "host.massadd",
    "params": {
        "hosts": [
            {
                "hostid": "10160"
            },
            {
                "hostid": "10167"
            }
        ],
        "macros": [
            {
                "macro": "{$TEST1}",
                "value": "MACROTEST1"
            },
            {
                "macro": "{$TEST2}",
                "value": "MACROTEST2",
                "description": "Test description"
            }
        ]
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "hostids": [
            "10160",
            "10167"
        ]
    },
    "id": 1
}
```

See also

- host.update
- Host group
- Template
- User macro
- Host interface

Source

CHost::massAdd() in *frontends/php/include/classes/api/services/CHost.php*.

host.massremove

Description

`object host.massremove(object parameters)`

This method allows to remove related objects from multiple hosts.

Parameters

`(object)` Parameters containing the IDs of the hosts to update and the objects that should be removed.

Parameter	Type	Description
hostids (required)	string/array	IDs of the hosts to be updated.
groupids	string/array	Host groups to remove the given hosts from.
interfaces	object/array	Host interfaces to remove from the given hosts. The host interface object must have the `ip`, `dns` and `port` properties defined.
macros	string/array	User macros to delete from the given hosts.
templateids	string/array	Templates to unlink from the given hosts.
templateids_clear	string/array	Templates to unlink and clear from the given hosts.

Return values

`(object)` Returns an object containing the IDs of the updated hosts under the `hostids` property.

Examples

Unlinking templates

Unlink a template from two hosts and delete all of the templated entities.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "host.massremove",
    "params": {
        "hostids": ["69665", "69666"],
        "templateids_clear": "325"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "hostids": [
            "69665",
            "69666"
        ]
    },
    "id": 1
}
```

See also

- host.update
- User macro

- Host interface

Source

CHost::massRemove() in *frontends/php/include/classes/api/services/CHost.php*.

host.massupdate

Description

`object host.massupdate(object parameters)`

This method allows to simultaneously replace or remove related objects and update properties on multiple hosts.

Parameters

`(object)` Parameters containing the IDs of the hosts to update and the properties that should be updated.

Additionally to the standard host properties, the method accepts the following parameters.

Parameter	Type	Description
hosts (required)	object/array	Hosts to be updated. The hosts must have the `hostid` property defined.
groups	object/array	Host groups to replace the current host groups the hosts belong to. The host groups must have the `groupid` property defined.
interfaces	object/array	Host interfaces to replace the current host interfaces on the given hosts.
inventory	object	Host inventory properties. Host inventory mode cannot be updated using the `inventory` parameter, use `inventory_mode` instead.
macros	object/array	User macros to replace the current user macros on the given hosts.
templates	object/array	Templates to replace the currently linked templates on the given hosts. The templates must have the `templateid` property defined.
templates_clear	object/array	Templates to unlink and clear from the given hosts. The templates must have the `templateid` property defined.

Return values

`(object)` Returns an object containing the IDs of the updated hosts under the `hostids` property.

Examples

Enabling multiple hosts

Enable monitoring of two hosts, i.e., set their status to 0.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "host.massupdate",
    "params": {
        "hosts": [
            {
                "hostid": "69665"
```

```
            },
            {
                "hostid": "69666"
            }
        ],
        "status": 0
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "hostids": [
            "69665",
            "69666"
        ]
    },
    "id": 1
}
```

See also

- host.update
- host.massadd
- host.massremove
- Host group
- Template
- User macro
- Host interface

Source

CHost::massUpdate() in *frontends/php/include/classes/api/services/CHost.php*.

host.update

Description

`object host.update(object/array hosts)`

This method allows to update existing hosts.

Parameters

`(object/array)` Host properties to be updated.

The `hostid` property must be defined for each host, all other properties are optional. Only the given properties will be updated, all others will remain unchanged.

Note, however, that updating the host technical name will also update the host's visible name (if not given or empty) by the host's technical name value.

Additionally to the standard host properties, the method accepts the following parameters.

Parameter	Type	Description
groups	object/array	Host groups to replace the current host groups the host belongs to. The host groups must have the `groupid` property defined. All host groups that are not listed in the request will be unlinked.

Parameter	Type	Description
interfaces	object/array	Host interfaces to replace the current host interfaces. All interfaces that are not listed in the request will be removed.
tags	object/array	Host tags to replace the current host tags. All tags that are not listed in the request will be removed.
inventory	object	Host inventory properties.
macros	object/array	User macros to replace the current user macros. All macros that are not listed in the request will be removed.
templates	object/array	Templates to replace the currently linked templates. All templates that are not listed in the request will be only unlinked. The templates must have the `templateid` property defined.
templates_clear	object/array	Templates to unlink and clear from the host. The templates must have the `templateid` property defined.

Note:
As opposed to the Zabbix frontend, when `name` (visible host name) is the same as `host` (technical host name), updating `host` via API will not automatically update `name`. Both properties need to be updated explicitly.

Return values

`(object)` Returns an object containing the IDs of the updated hosts under the `hostids` property.

Examples

Enabling a host

Enable host monitoring, i.e. set its status to 0.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "host.update",
    "params": {
        "hostid": "10126",
        "status": 0
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "hostids": [
            "10126"
        ]
    },
    "id": 1
}
```

Unlinking templates

Unlink and clear two templates from host.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "host.update",
    "params": {
        "hostid": "10126",
        "templates_clear": [
            {
                "templateid": "10124"
            },
            {
                "templateid": "10125"
            }
        ]
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "hostids": [
            "10126"
        ]
    },
    "id": 1
}
```

Updating host macros

Replace all host macros with two new ones.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "host.update",
    "params": {
        "hostid": "10126",
        "macros": [
            {
                "macro": "{$PASS}",
                "value": "password"
            },
            {
                "macro": "{$DISC}",
                "value": "sda",
                "description": "Updated description"
            }
        ]
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "hostids": [
```

```
            "10126"
        ]
    },
    "id": 1
}
```

Updating host inventory

Change inventory mode and add location

Request:

```
{
    "jsonrpc": "2.0",
    "method": "host.update",
    "params": {
        "hostid": "10387",
        "inventory_mode": 0,
        "inventory": {
            "location": "Latvia, Riga"
        }
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "hostids": [
            "10387"
        ]
    },
    "id": 1
}
```

Updating host tags

Replace all host tags with a new one.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "host.update",
    "params": {
        "hostid": "10387",
        "tags": {
            "tag": "OS",
            "value": "CentOS 7"
        }
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "hostids": [
            "10387"
        ]
    },
```

```
    "id": 1
}
```

See also

- host.massadd
- host.massupdate
- host.massremove
- Host group
- Template
- User macro
- Host interface
- Host inventory
- Host tag

Source

CHost::update() in *frontends/php/include/classes/api/services/CHost.php*.

Host group

This class is designed to work with host groups.

Object references:

- Host group

Available methods:

- hostgroup.create - creating new host groups
- hostgroup.delete - deleting host groups
- hostgroup.get - retrieving host groups
- hostgroup.massadd - adding related objects to host groups
- hostgroup.massremove - removing related objects from host groups
- hostgroup.massupdate - replacing or removing related objects from host groups
- hostgroup.update - updating host groups

> Host group object

The following objects are directly related to the `hostgroup` API.

Host group

The host group object has the following properties.

Property	Type	Description
groupid	string	*(readonly)* ID of the host group.
name (required)	string	Name of the host group.
flags	integer	*(readonly)* Origin of the host group. Possible values: 0 - a plain host group; 4 - a discovered host group.
internal	integer	*(readonly)* Whether the group is used internally by the system. An internal group cannot be deleted. Possible values: 0 - *(default)* not internal; 1 - internal.

hostgroup.create

Description

`object hostgroup.create(object/array hostGroups)`

This method allows to create new host groups.

Parameters

`(object/array)` Host groups to create. The method accepts host groups with the standard host group properties.

Return values

`(object)` Returns an object containing the IDs of the created host groups under the `groupids` property. The order of the returned IDs matches the order of the passed host groups.

Examples

Creating a host group

Create a host group called "Linux servers".

Request:

```
{
    "jsonrpc": "2.0",
    "method": "hostgroup.create",
    "params": {
        "name": "Linux servers"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "groupids": [
            "107819"
        ]
    },
    "id": 1
}
```

Source

CHostGroup::create() in *frontends/php/include/classes/api/services/CHostGroup.php*.

hostgroup.delete

Description

`object hostgroup.delete(array hostGroupIds)`

This method allows to delete host groups.

A host group can not be deleted if:

- it contains hosts that belong to this group only;
- it is marked as internal;
- it is used by a host prototype;
- it is used in a global script;
- it is used in a correlation condition.

Parameters

`(array)` IDs of the host groups to delete.

Return values

(object) Returns an object containing the IDs of the deleted host groups under the groupids property.

Examples

Deleting multiple host groups

Delete two host groups.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "hostgroup.delete",
    "params": [
        "107824",
        "107825"
    ],
    "auth": "3a57200802b24cda67c4e4010b50c065",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "groupids": [
            "107824",
            "107825"
        ]
    },
    "id": 1
}
```

Source

CHostGroup::delete() in *frontends/php/include/classes/api/services/CHostGroup.php*.

hostgroup.get

Description

integer/array hostgroup.get(object parameters)

The method allows to retrieve host groups according to the given parameters.

Parameters

(object) Parameters defining the desired output.

The method supports the following parameters.

Parameter	Type	Description
graphids	string/array	Return only host groups that contain hosts or templates with the given graphs.
groupids	string/array	Return only host groups with the given host group IDs.
hostids	string/array	Return only host groups that contain the given hosts.
maintenanceids	string/array	Return only host groups that are affected by the given maintenances.
monitored_hosts	flag	Return only host groups that contain monitored hosts.
real_hosts	flag	Return only host groups that contain hosts.
templated_hosts	flag	Return only host groups that contain templates.
templateids	string/array	Return only host groups that contain the given templates.
triggerids	string/array	Return only host groups that contain hosts or templates with the given triggers.
with_applications	flag	Return only host groups that contain hosts with applications.

Parameter	Type	Description
with_graphs	flag	Return only host groups that contain hosts with graphs.
with_graph_prototypes	flag	Return only host groups that contain hosts with graph prototypes.
with_hosts_and_templates	flag	Return only host groups that contain hosts *or* templates.
with_httptests	flag	Return only host groups that contain hosts with web checks. Overrides the `with_monitored_httptests` parameter.
with_items	flag	Return only host groups that contain hosts or templates with items. Overrides the `with_monitored_items` and`with_simple_graph_items` parameters.
with_item_prototypes	flag	Return only host groups that contain hosts with item prototypes. Overrides the `with_simple_graph_item_prototypes` parameter.
with_simple_graph_item_prototypes	flag	Return only host groups that contain hosts with item prototypes, which are enabled for creation and have numeric type of information.
with_monitored_httptests	flag	Return only host groups that contain hosts with enabled web checks.
with_monitored_items	flag	Return only host groups that contain hosts or templates with enabled items. Overrides the `with_simple_graph_items` parameter.
with_monitored_triggers	flag	Return only host groups that contain hosts with enabled triggers. All of the items used in the trigger must also be enabled.
with_simple_graph_items	flag	Return only host groups that contain hosts with numeric items.
with_triggers	flag	Return only host groups that contain hosts with triggers. Overrides the `with_monitored_triggers` parameter.
selectDiscoveryRule	query	Return a discoveryRule property with the LLD rule that created the host group.
selectGroupDiscovery	query	Return a `groupDiscovery` property with the host group discovery object. The host group discovery object links a discovered host group to a host group prototype and has the following properties: `groupid` - `(string)` ID of the discovered host group; `lastcheck` - `(timestamp)` time when the host group was last discovered; `name` - `(string)` name of the host goup prototype; `parent_group_prototypeid` - `(string)` ID of the host group prototype from which the host group has been created; `ts_delete` - `(timestamp)` time when a host group that is no longer discovered will be deleted.

Parameter	Type	Description
selectHosts	query	Return a hosts property with the hosts that belong to the host group. Supports `count`.
selectTemplates	query	Return a templates property with the templates that belong to the host group. Supports `count`.
limitSelects	integer	Limits the number of records returned by subselects. Applies to the following subselects: `selectHosts` - results will be sorted by `host`; `selectTemplates` - results will be sorted by `host`.
sortfield	string/array	Sort the result by the given properties. Possible values are: `groupid`, `name`.
countOutput	boolean	These parameters being common for all `get` methods are described in detail in the reference commentary page.
editable	boolean	
excludeSearch	boolean	
filter	object	
limit	integer	
output	query	
preservekeys	boolean	
search	object	
searchByAny	boolean	
searchWildcardsEnabled	boolean	
sortorder	string/array	
startSearch	boolean	

Return values

`(integer/array)` Returns either:

- an array of objects;
- the count of retrieved objects, if the `countOutput` parameter has been used.

Examples

Retrieving data by name

Retrieve all data about two host groups named ”Zabbix servers” and ”Linux servers”.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "hostgroup.get",
    "params": {
        "output": "extend",
        "filter": {
            "name": [
                "Zabbix servers",
                "Linux servers"
            ]
        }
    },
    "auth": "6f38cddc44cfbb6c1bd186f9a220b5a0",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "groupid": "2",
            "name": "Linux servers",
            "internal": "0"
        },
        {
            "groupid": "4",
            "name": "Zabbix servers",
            "internal": "0"
        }
    ],
    "id": 1
}
```


See also

- Host
- Template

Source

CHostGroup::get() in *frontends/php/include/classes/api/services/CHostGroup.php*.

hostgroup.massadd

Description

`object hostgroup.massadd(object parameters)`

This method allows to simultaneously add multiple related objects to all the given host groups.

Parameters

`(object)` Parameters containing the IDs of the host groups to update and the objects to add to all the host groups.

The method accepts the following parameters.

Parameter	Type	Description
groups (required)	object/array	Host groups to be updated. The host groups must have the `groupid` property defined.
hosts	object/array	Hosts to add to all host groups. The hosts must have the `hostid` property defined.
templates	object/array	Templates to add to all host groups. The templates must have the `templateid` property defined.

Return values

`(object)` Returns an object containing the IDs of the updated host groups under the `groupids` property.

Examples

Adding hosts to host groups

Add two hosts to host groups with IDs 5 and 6.

Request:


```
{
    "jsonrpc": "2.0",
    "method": "hostgroup.massadd",
```

```
    "params": {
        "groups": [
            {
                "groupid": "5"
            },
            {
                "groupid": "6"
            }
        ],
        "hosts": [
            {
                "hostid": "30050"
            },
            {
                "hostid": "30001"
            }
        ]
    },
    "auth": "f223adf833b2bf2ff38574a67bba6372",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "groupids": [
            "5",
            "6"
        ]
    },
    "id": 1
}
```

See also

- Host
- Template

Source

CHostGroup::massAdd() in *frontends/php/include/classes/api/services/CHostGroup.php*.

hostgroup.massremove

Description

`object hostgroup.massremove(object parameters)`

This method allows to remove related objects from multiple host groups.

Parameters

`(object)` Parameters containing the IDs of the host groups to update and the objects that should be removed.

Parameter	Type	Description
groupids (required)	string/array	IDs of the host groups to be updated.
hostids	string/array	Hosts to remove from all host groups.
templateids	string/array	Templates to remove from all host groups.

Return values

`(object)` Returns an object containing the IDs of the updated host groups under the `groupids` property.

Examples

Removing hosts from host groups

Remove two hosts from the given host groups.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "hostgroup.massremove",
    "params": {
        "groupids": [
            "5",
            "6"
        ],
        "hostids": [
            "30050",
            "30001"
        ]
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "groupids": [
            "5",
            "6"
        ]
    },
    "id": 1
}
```

Source

CHostGroup::massRemove() in *frontends/php/include/classes/api/services/CHostGroup.php*.

hostgroup.massupdate

Description

`object hostgroup.massupdate(object parameters)`

This method allows to simultaneously replace or remove related objects for multiple host groups.

Parameters

`(object)` Parameters containing the IDs of the host groups to update and the objects that should be updated.

Parameter	Type	Description
groups (required)	object/array	Host groups to be updated. The host groups must have the `groupid` property defined.
hosts	object/array	Hosts to replace the current hosts on the given host groups. The hosts must have the `hostid` property defined.

Parameter	Type	Description
templates	object/array	Templates to replace the current templates on the given host groups. The templates must have the `templateid` property defined.

Return values

`(object)` Returns an object containing the IDs of the updated host groups under the `groupids` property.

Examples

Replacing hosts in a host group

Replace all hosts in the host group with ID.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "hostgroup.massupdate",
    "params": {
        "groups": [
            {
                "groupid": "6"
            }
        ],
        "hosts": [
            {
                "hostid": "30050"
            }
        ]
    },
    "auth": "f223adf833b2bf2ff38574a67bba6372",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "groupids": [
            "6",
        ]
    },
    "id": 1
}
```

See also

- hostgroup.update
- hostgroup.massadd
- Host
- Template

Source

CHostGroup::massUpdate() in *frontends/php/include/classes/api/services/CHostGroup.php*.

hostgroup.update

Description

`object hostgroup.update(object/array hostGroups)`

This method allows to update existing hosts groups.

Parameters

(object/array) Host group properties to be updated.

The groupid property must be defined for each host group, all other properties are optional. Only the given properties will be updated, all others will remain unchanged.

Return values

(object) Returns an object containing the IDs of the updated host groups under the groupids property.

Examples

Renaming a host group

Rename a host group to "Linux hosts."

Request:

```
{
    "jsonrpc": "2.0",
    "method": "hostgroup.update",
    "params": {
        "groupid": "7",
        "name": "Linux hosts"
    },
    "auth": "700ca65537074ec963db7efabda78259",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "groupids": [
            "7"
        ]
    },
    "id": 1
}
```

Source

CHostGroup::update() in *frontends/php/include/classes/api/services/CHostGroup.php*.

Host interface

This class is designed to work with host interfaces.

Object references:

- Host interface

Available methods:

- hostinterface.create - creating new host interfaces
- hostinterface.delete - deleting host interfaces
- hostinterface.get - retrieving host interfaces
- hostinterface.massadd - adding host interfaces to hosts
- hostinterface.massremove - removing host interfaces from hosts
- hostinterface.replacehostinterfaces - replacing host interfaces on a host
- hostinterface.update - updating host interfaces

> Host interface object

The following objects are directly related to the hostinterface API.

Host interface

The host interface object has the following properties.

Attention:
Note that both IP and DNS are required. If you do not want to use DNS, set it to an empty string.

Property	Type	Description
interfaceid	string	*(readonly)* ID of the interface.
dns (required)	string	DNS name used by the interface. Can be empty if the connection is made via IP.
hostid (required)	string	ID of the host the interface belongs to.
ip (required)	string	IP address used by the interface. Can be empty if the connection is made via DNS.
main (required)	integer	Whether the interface is used as default on the host. Only one interface of some type can be set as default on a host. Possible values are: 0 - not default; 1 - default.
port (required)	string	Port number used by the interface. Can contain user macros.
type (required)	integer	Interface type. Possible values are: 1 - agent; 2 - SNMP; 3 - IPMI; 4 - JMX.
useip (required)	integer	Whether the connection should be made via IP. Possible values are: 0 - connect using host DNS name; 1 - connect using host IP address for this host interface.
bulk	integer	Whether to use bulk SNMP requests. Possible values are: 0 - don't use bulk requests; 1 - *(default)* use bulk requests.

hostinterface.create

Description

`object hostinterface.create(object/array hostInterfaces)`

This method allows to create new host interfaces.

Parameters

`(object/array)` Host interfaces to create. The method accepts host interfaces with the standard host interface properties.

Return values

`(object)` Returns an object containing the IDs of the created host interfaces under the `interfaceids` property. The order of the returned IDs matches the order of the passed host interfaces.

Examples

Create a new interface

Create a secondary IP agent interface on host ”30052.”

Request:

```
{
    "jsonrpc": "2.0",
    "method": "hostinterface.create",
    "params": {
        "hostid": "30052",
        "dns": "",
        "ip": "127.0.0.1",
        "main": 0,
        "port": "10050",
        "type": 1,
        "useip": 1
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "interfaceids": [
            "30062"
        ]
    },
    "id": 1
}
```

See also

- hostinterface.massadd
- host.massadd

Source

CHostInterface::create() in *frontends/php/include/classes/api/services/CHostInterface.php*.

hostinterface.delete

Description

`object hostinterface.delete(array hostInterfaceIds)`

This method allows to delete host interfaces.

Parameters

`(array)` IDs of the host interfaces to delete.

Return values

`(object)` Returns an object containing the IDs of the deleted host interfaces under the `interfaceids` property.

Examples

Delete a host interface

Delete the host interface with ID 30062.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "hostinterface.delete",
    "params": [
        "30062"
    ],
```

```
    "auth": "3a57200802b24cda67c4e4010b50c065",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "interfaceids": [
            "30062"
        ]
    },
    "id": 1
}
```

See also

- hostinterface.massremove
- host.massremove

Source

CHostInterface::delete() in *frontends/php/include/classes/api/services/CHostInterface.php*.

hostinterface.get

Description

`integer/array hostinterface.get(object parameters)`

The method allows to retrieve host interfaces according to the given parameters.

Parameters

`(object)` Parameters defining the desired output.

The method supports the following parameters.

Parameter	Type	Description
hostids	string/array	Return only host interfaces used by the given hosts.
interfaceids	string/array	Return only host interfaces with the given IDs.
itemids	string/array	Return only host interfaces used by the given items.
triggerids	string/array	Return only host interfaces used by items in the given triggers.
selectItems	query	Return an items property with the items that use the interface. Supports `count`.
selectHosts	query	Return a hosts property with an array of hosts that use the interface.
limitSelects	integer	Limits the number of records returned by subselects. Applies to the following subselects: `selectItems`.
sortfield	string/array	Sort the result by the given properties. Possible values are: `interfaceid`, `dns`, `ip`.
countOutput	boolean	These parameters being common for all `get` methods are described in detail in the reference commentary page.
editable	boolean	
excludeSearch	boolean	
filter	object	
limit	integer	
nodeids	string/array	
output	query	

Parameter	Type	Description
preservekeys	boolean	
search	object	
searchByAny	boolean	
searchWildcardsEnabled	boolean	
sortorder	string/array	
startSearch	boolean	

Return values

`(integer/array)` Returns either:

- an array of objects;
- the count of retrieved objects, if the `countOutput` parameter has been used.

Examples

Retrieve host interfaces

Retrieve all data about the interfaces used by host "30057."

Request:

```
{
    "jsonrpc": "2.0",
    "method": "hostinterface.get",
    "params": {
        "output": "extend",
        "hostids": "30057"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "interfaceid": "30050",
            "hostid": "30057",
            "main": "1",
            "type": "1",
            "useip": "1",
            "ip": "127.0.0.1",
            "dns": "",
            "port": "10050",
            "bulk": "1"
        },
        {
            "interfaceid": "30067",
            "hostid": "30057",
            "main": "0",
            "type": "1",
            "useip": "0",
            "ip": "",
            "dns": "localhost",
            "port": "10050",
            "bulk": "1"
        },
        {
            "interfaceid": "30068",
            "hostid": "30057",
            "main": "1",
            "type": "2",
```

```
            "useip": "1",
            "ip": "127.0.0.1",
            "dns": "",
            "port": "161",
            "bulk": "1"
        }
    ],
    "id": 1
}
```

See also

- Host
- Item

Source

CHostInterface::get() in *frontends/php/include/classes/api/services/CHostInterface.php*.

hostinterface.massadd

Description

`object hostinterface.massadd(object parameters)`

This method allows to simultaneously add host interfaces to multiple hosts.

Parameters

`(object)` Parameters containing the host interfaces to be created on the given hosts.

The method accepts the following parameters.

Parameter	Type	Description
hosts (required)	object/array	Hosts to be updated. The hosts must have the `hostid` property defined.
interfaces (required)	object/array	Host interfaces to create on the given hosts.

Return values

`(object)` Returns an object containing the IDs of the created host interfaces under the `interfaceids` property.

Examples

Creating interfaces

Create an interface on two hosts.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "hostinterface.massadd",
    "params": {
        "hosts": [
            {
                "hostid": "30050"
            },
            {
                "hostid": "30052"
            }
        ],
        "interfaces": {
            "dns": "",
            "ip": "127.0.0.1",
            "main": 0,
```

```
            "port": "10050",
            "type": 1,
            "useip": 1
        }
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "interfaceids": [
            "30069",
            "30070"
        ]
    },
    "id": 1
}
```

See also

- hostinterface.create
- host.massadd
- Host

Source

CHostInterface::massAdd() in *frontends/php/include/classes/api/services/CHostInterface.php*.

hostinterface.massremove

Description

`object hostinterface.massremove(object parameters)`

This method allows to remove host interfaces from the given hosts.

Parameters

`(object)` Parameters containing the IDs of the hosts to be updated and the interfaces to be removed.

Parameter	Type	Description
hostids (required)	string/array	IDs of the hosts to be updated.
interfaces (required)	object/array	Host interfaces to remove from the given hosts. The host interface object must have the ip, dns and port properties defined

Return values

`(object)` Returns an object containing the IDs of the deleted host interfaces under the `interfaceids` property.

Examples

Removing interfaces

Remove the ”127.0.0.1” SNMP interface from two hosts.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "hostinterface.massremove",
    "params": {
```

```
        "hostids": [
            "30050",
            "30052"
        ],
        "interfaces": {
            "dns": "",
            "ip": "127.0.0.1",
            "port": "161"
        }
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "interfaceids": [
            "30069",
            "30070"
        ]
    },
    "id": 1
}
```

See also

- hostinterface.delete
- host.massremove

Source

CHostInterface::massRemove() in *frontends/php/include/classes/api/services/CHostInterface.php*.

hostinterface.replacehostinterfaces

Description

`object hostinterface.replacehostinterfaces(object parameters)`

This method allows to replace all host interfaces on a given host.

Parameters

`(object)` Parameters containing the ID of the host to be updated and the new host interfaces.

Parameter	Type	Description
hostid (required)	string	ID of the host to be updated.
interfaces (required)	object/array	Host interfaces to replace the current host interfaces with.

Return values

`(object)` Returns an object containing the IDs of the created host interfaces under the `interfaceids` property.

Examples

Replacing host interfaces

Replace all host interfaces with a single agent interface.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "hostinterface.replacehostinterfaces",
    "params": {
        "hostid": "30052",
        "interfaces": {
            "dns": "",
            "ip": "127.0.0.1",
            "main": 1,
            "port": "10050",
            "type": 1,
            "useip": 1
        }
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "interfaceids": [
            "30081"
        ]
    },
    "id": 1
}
```

See also

- host.update
- host.massupdate

Source

CHostInterface::replaceHostInterfaces() in *frontends/php/include/classes/api/services/CHostInterface.php*.

hostinterface.update

Description

`object hostinterface.update(object/array hostInterfaces)`

This method allows to update existing host interfaces.

Parameters

`(object/array)` Host interface properties to be updated.

The `interfaceid` property must be defined for each host interface, all other properties are optional. Only the given properties will be updated, all others will remain unchanged.

Return values

`(object)` Returns an object containing the IDs of the updated host interfaces under the `interfaceids` property.

Examples

Changing a host interface port

Change the port of a host interface.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "hostinterface.update",
    "params": {
```

```
        "interfaceid": "30048",
        "port": "30050"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "interfaceids": [
            "30048"
        ]
    },
    "id": 1
}
```

Source

CHostInterface::update() in *frontends/php/include/classes/api/services/CHostInterface.php*.

Host prototype

This class is designed to work with host prototypes.

Object references:

- Host prototype
- Host prototype inventory
- Group link
- Group prototype

Available methods:

- hostprototype.create - creating new host prototypes
- hostprototype.delete - deleting host prototypes
- hostprototype.get - retrieving host prototypes
- hostprototype.update - updating host prototypes

> Host prototype object

The following objects are directly related to the `hostprototype` API.

Host prototype

The host prototype object has the following properties.

Property	Type	Description
hostid	string	*(readonly)* ID of the host prototype.
host (required)	string	Technical name of the host prototype.
name	string	Visible name of the host prototype. Default: `host` property value.
status	integer	Status of the host prototype. Possible values are: 0 - *(default)* monitored host; 1 - unmonitored host.

Property	Type	Description
inventory_mode	integer	Host inventory population mode. Possible values are: -1 - *(default)* disabled; 0 - manual; 1 - automatic.
templateid	string	*(readonly)* ID of the parent template host prototype.

Group link

The group link object links a host prototype with a host group and has the following properties.

Property	Type	Description
group_prototypeid	string	*(readonly)* ID of the group link.
groupid (required)	string	ID of the host group.
hostid	string	*(readonly)* ID of the host prototype
templateid	string	*(readonly)* ID of the parent template group link.

Group prototype

The group prototype object defines a group that will be created for a discovered host and has the following properties.

Property	Type	Description
group_prototypeid	string	*(readonly)* ID of the group prototype.
name (required)	string	Name of the group prototype.
hostid	string	*(readonly)* ID of the host prototype
templateid	string	*(readonly)* ID of the parent template group prototype.

hostprototype.create

Description

`object hostprototype.create(object/array hostPrototypes)`

This method allows to create new host prototypes.

Parameters

`(object/array)` Host prototypes to create.

Additionally to the standard host prototype properties, the method accepts the following parameters.

Parameter	Type	Description
groupLinks (required)	array	Group links to be created for the host prototype.
ruleid (required)	string	ID of the LLD rule that the host prototype belongs to.
groupPrototypes	array	Group prototypes to be created for the host prototype.
templates	object/array	Templates to be linked to the host prototype. The templates must have the `templateid` property defined.

Return values

`(object)` Returns an object containing the IDs of the created host prototypes under the `hostids` property. The order of the returned IDs matches the order of the passed host prototypes.

Examples

Creating a host prototype

Create a host prototype "{#VM.NAME}" on LLD rule "23542" with a group prototype "{#HV.NAME}". Link it to host group "2".

Request:

```
{
    "jsonrpc": "2.0",
    "method": "hostprototype.create",
    "params": {
        "host": "{#VM.NAME}",
        "ruleid": "23542",
        "groupLinks": [
            {
                "groupid": "2"
            }
        ],
        "groupPrototypes": [
            {
                "name": "{#HV.NAME}"
            }
        ]
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "hostids": [
            "10103"
        ]
    },
    "id": 1
}
```

See also

- Group link
- Group prototype

Source

CHostPrototype::create() in *frontends/php/include/classes/api/services/CHostPrototype.php*.

hostprototype.delete

Description

`object hostprototype.delete(array hostPrototypeIds)`

This method allows to delete host prototypes.

Parameters

`(array)` IDs of the host prototypes to delete.

Return values

`(object)` Returns an object containing the IDs of the deleted host prototypes under the `hostids` property.

Examples

Deleting multiple host prototypes

Delete two host prototypes.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "hostprototype.delete",
    "params": [
        "10103",
        "10105"
    ],
    "auth": "3a57200802b24cda67c4e4010b50c065",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "hostids": [
            "10103",
            "10105"
        ]
    },
    "id": 1
}
```

Source

CHostPrototype::delete() in *frontends/php/include/classes/api/services/CHostPrototype.php*.

hostprototype.get

Description

`integer/array hostprototype.get(object parameters)`

The method allows to retrieve host prototypes according to the given parameters.

Parameters

`(object)` Parameters defining the desired output.

The method supports the following parameters.

Parameter	Type	Description
hostids	string/array	Return only host prototypes with the given IDs.
discoveryids	string/array	Return only host prototype that belong to the given LLD rules.
inherited	boolean	If set to `true` return only items inherited from a template.
selectDiscoveryRule	query	Return a discoveryRule property with the LLD rule that the host prototype belongs to.
selectGroupLinks	query	Return a groupLinks property with the group links of the host prototype.
selectGroupPrototypes	query	Return a groupPrototypes property with the group prototypes of the host prototype.
selectParentHost	query	Return a parentHost property with the host that the host prototype belongs to.
selectTemplates	query	Return a templates property with the templates linked to the host prototype. Supports `count`.
sortfield	string/array	Sort the result by the given properties. Possible values are: `hostid`, `host`, `name` and `status`.

Parameter	Type	Description
countOutput	boolean	These parameters being common for all `get` methods are described in detail on the Generic Zabbix API information page.
editable	boolean	
excludeSearch	boolean	
filter	object	
limit	integer	
output	query	
preservekeys	boolean	
search	object	
searchByAny	boolean	
searchWildcardsEnabled	boolean	
sortorder	string/array	
startSearch	boolean	

Return values

`(integer/array)` Returns either:

- an array of objects;
- the count of retrieved objects, if the `countOutput` parameter has been used.

Examples

Retrieving host prototypes from an LLD rule

Retrieve all host prototypes and their group links and group prototypes from an LLD rule.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "hostprototype.get",
    "params": {
        "output": "extend",
        "selectGroupLinks": "extend",
        "selectGroupPrototypes": "extend",
        "discoveryids": "23554"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "hostid": "10092",
            "host": "{#HV.UUID}",
            "status": "0",
            "name": "{#HV.NAME}",
            "templateid": "0",
            "groupLinks": [
                {
                    "group_prototypeid": "4",
                    "hostid": "10092",
                    "groupid": "7",
                    "templateid": "0"
                }
            ],
            "groupPrototypes": [
                {
                    "group_prototypeid": "7",
```

```
                    "hostid": "10092",
                    "name": "{#CLUSTER.NAME}",
                    "templateid": "0"
                }
            ]
        }
    ],
    "id": 1
}
```


See also

- Group link
- Group prototype

Source

CHostPrototype::get() in *frontends/php/include/classes/api/services/CHostPrototype.php*.

hostprototype.update

Description

`object hostprototype.update(object/array hostPrototypes)`

This method allows to update existing host prototypes.

Parameters

`(object/array)` Host prototype properties to be updated.

The `hostid` property must be defined for each host prototype, all other properties are optional. Only the passed properties will be updated, all others will remain unchanged.

Additionally to the standard host prototype properties, the method accepts the following parameters.

Parameter	Type	Description
groupLinks	array	Group links to replace the current group links on the host prototype.
groupPrototypes	array	Group prototypes to replace the existing group prototypes on the host prototype.
templates	object/array	Templates to replace the currently linked templates. The templates must have the `templateid` property defined.

Return values

`(object)` Returns an object containing the IDs of the updated host prototypes under the `hostids` property.

Examples

Disabling a host prototype

Disable a host prototype, that is, set its status to 1.

Request:


```
{
    "jsonrpc": "2.0",
    "method": "hostprototype.update",
    "params": {
        "hostid": "10092",
        "status": 1
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "hostids": [
            "10092"
        ]
    },
    "id": 1
}
```

See also

- Group link
- Group prototype

Source

CHostPrototype::update() in *frontends/php/include/classes/api/services/CHostPrototype.php*.

Icon map

This class is designed to work with icon maps.

Object references:

- Icon map
- Icon mapping

Available methods:

- iconmap.create - create new icon maps
- iconmap.delete - delete icon maps
- iconmap.get - retrieve icon maps
- iconmap.update - update icon maps

> Icon map object

The following objects are directly related to the `iconmap` API.

Icon map

The icon map object has the following properties.

Property	Type	Description
iconmapid	string	*(readonly)* ID of the icon map.
default_iconid (reqiured)	string	ID of the default icon.
name (required)	string	Name of the icon map.

Icon mapping

The icon mapping object defines a specific icon to be used for hosts with a certain inventory field value. It has the following properties.

Property	Type	Description
iconmappingid	string	*(readonly)* ID of the icon map.
iconid (required)	string	ID of the icon used by the icon mapping.
expression (required)	string	Expression to match the inventory field against.

Property	Type	Description
inventory_link (required)	integer	ID of the host inventory field. Refer to the host inventory object for a list of supported inventory fields.
iconmapid	string	*(readonly)* ID of the icon map that the icon mapping belongs to.
sortorder	integer	*(readonly)* Position of the icon mapping in the icon map.

iconmap.create

Description

`object iconmap.create(object/array iconMaps)`

This method allows to create new icon maps.

Parameters

`(object/array)` Icon maps to create.

Additionally to the standard icon map properties, the method accepts the following parameters.

Parameter	Type	Description
mappings (required)	array	Icon mappings to be created for the icon map.

Return values

`(object)` Returns an object containing the IDs of the created icon maps under the `iconmapids` property. The order of the returned IDs matches the order of the passed icon maps.

Examples

Create an icon map

Create an icon map to display hosts of different types.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "iconmap.create",
    "params": {
        "name": "Type icons",
        "default_iconid": "2",
        "mappings": [
            {
                "inventory_link": 1,
                "expression": "server",
                "iconid": "3"
            },
            {
                "inventory_link": 1,
                "expression": "switch",
                "iconid": "4"
            }
        ]
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "iconmapids": [
            "2"
        ]
    },
    "id": 1
}
```

See also

- Icon mapping

Source

CIconMap::create() in *frontends/php/include/classes/api/services/CIconMap.php*.

iconmap.delete

Description

`object iconmap.delete(array iconMapIds)`

This method allows to delete icon maps.

Parameters

`(array)` IDs of the icon maps to delete.

Return values

`(object)` Returns an object containing the IDs of the deleted icon maps under the `iconmapids` property.

Examples

Delete multiple icon maps

Delete two icon maps.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "iconmap.delete",
    "params": [
        "2",
        "5"
    ],
    "auth": "3a57200802b24cda67c4e4010b50c065",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "iconmapids": [
            "2",
            "5"
        ]
    },
    "id": 1
}
```

Source

CIconMap::delete() in *frontends/php/include/classes/api/services/CIconMap.php*.

iconmap.get

Description

`integer/array iconmap.get(object parameters)`

The method allows to retrieve icon maps according to the given parameters.

Parameters

`(object)` Parameters defining the desired output.

The method supports the following parameters.

Parameter	Type	Description
iconmapids	string/array	Return only icon maps with the given IDs.
sysmapids	string/array	Return only icon maps that are used in the given maps.
selectMappings	query	Return a mappings property with the icon mappings used.
sortfield	string/array	Sort the result by the given properties. Possible values are: `iconmapid` and `name`.
countOutput	boolean	These parameters being common for all `get` methods are described in detail in the reference commentary.
editable	boolean	
excludeSearch	boolean	
filter	object	
limit	integer	
output	query	
preservekeys	boolean	
search	object	
searchByAny	boolean	
searchWildcardsEnabled	boolean	
sortorder	string/array	
startSearch	boolean	

Return values

`(integer/array)` Returns either:

- an array of objects;
- the count of retrieved objects, if the `countOutput` parameter has been used.

Examples

Retrieve an icon map

Retrieve all data about icon map "3".

Request:

```
{
    "jsonrpc": "2.0",
    "method": "iconmap.get",
    "params": {
        "iconmapids": "3",
        "output": "extend",
        "selectMappings": "extend"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "mappings": [
                {
                    "iconmappingid": "3",
                    "iconmapid": "3",
                    "iconid": "6",
                    "inventory_link": "1",
                    "expression": "server",
                    "sortorder": "0"
                },
                {
                    "iconmappingid": "4",
                    "iconmapid": "3",
                    "iconid": "10",
                    "inventory_link": "1",
                    "expression": "switch",
                    "sortorder": "1"
                }
            ],
            "iconmapid": "3",
            "name": "Host type icons",
            "default_iconid": "2"
        }
    ],
    "id": 1
}
```


See also

- Icon mapping

Source

CIconMap::get() in *frontends/php/include/classes/api/services/CIconMap.php*.

iconmap.update

Description

`object iconmap.update(object/array iconMaps)`

This method allows to update existing icon maps.

Parameters

`(object/array)` Icon map properties to be updated.

The `iconmapid` property must be defined for each icon map, all other properties are optional. Only the passed properties will be updated, all others will remain unchanged.

Additionally to the standard icon map properties, the method accepts the following parameters.

Parameter	Type	Description
mappings	array	Icon mappings to replace the existing icon mappings.

Return values

`(object)` Returns an object containing the IDs of the updated icon maps under the `iconmapids` property.

Examples

Rename icon map

Rename an icon map to ”OS icons”.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "iconmap.update",
    "params": {
        "iconmapid": "1",
        "name": "OS icons"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "iconmapids": [
            "1"
        ]
    },
    "id": 1
}
```

See also

- Icon mapping

Source

CIconMap::update() in *frontends/php/include/classes/api/services/CIconMap.php*.

Image

This class is designed to work with images.

Object references:

- Image

Available methods:

- image.create - create new images
- image.delete - delete images
- image.get - retrieve images
- image.update - update images

> Image object

The following objects are directly related to the `image` API.

Image

The image object has the following properties.

Property	Type	Description
imageid	string	*(readonly)* ID of the image.
name (required)	string	Name of the image.
imagetype	integer	Type of image. Possible values: 1 - *(default)* icon; 2 - background image.

image.create

Description

`object image.create(object/array images)`

This method allows to create new images.

Parameters

`(object/array)` Images to create.

Additionally to the standard image properties, the method accepts the following parameters.

Parameter	Type	Description
name (required)	string	Name of the image.
imagetype (required)	integer	Type of image. Possible values: 1 - *(default)* icon; 2 - background image.
image (required)	string	Base64 encoded image. The maximum size of the encoded image is 1 MB. Maximum size can be adjusted by changing ZBX_MAX_IMAGE_SIZE constant value. Supported image formats are: PNG, JPEG, GIF.

Return values

`(object)` Returns an object containing the IDs of the created images under the `imageids` property. The order of the returned IDs matches the order of the passed images.

Examples

Create an image

Create a cloud icon.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "image.create",
    "params": {
        "imagetype": 1,
        "name": "Cloud_(24)",
        "image": "iVBORw0KGgoAAAANSUhEUgAAABgAAAANCAYAAACzbK7QAAAABHNCSVQICAgIfAhkiAAAAAlwSFlzAAACmAAAApgB
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "imageids": [
            "188"
        ]
    },
    "id": 1
}
```

Source

CImage::create() in *frontends/php/include/classes/api/services/CImage.php*.

image.delete

Description

`object image.delete(array imageIds)`

This method allows to delete images.

Parameters

`(array)` IDs of the images to delete.

Return values

`(object)` Returns an object containing the IDs of the deleted images under the `imageids` property.

Examples

Delete multiple images

Delete two images.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "image.delete",
    "params": [
        "188",
        "192"
    ],
    "auth": "3a57200802b24cda67c4e4010b50c065",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "imageids": [
            "188",
            "192"
        ]
    },
    "id": 1
}
```

Source

CImage::delete() in *frontends/php/include/classes/api/services/CImage.php*.

image.get

Description

`integer/array image.get(object parameters)`

The method allows to retrieve images according to the given parameters.

Parameters

`(object)` Parameters defining the desired output.

The method supports the following parameters.

Parameter	Type	Description
imageids	string/array	Return only images with the given IDs.
sysmapids	string/array	Return images that are used on the given maps.
select_image	flag	Return an `image` property with the Base64 encoded image.

Parameter	Type	Description
sortfield	string/array	Sort the result by the given properties. Possible values are: `imageid` and `name`.
countOutput	boolean	These parameters being common for all `get` methods are described in detail in the reference commentary.
editable	boolean	
excludeSearch	boolean	
filter	object	
limit	integer	
output	query	
preservekeys	boolean	
search	object	
searchByAny	boolean	
searchWildcardsEnabled	boolean	
sortorder	string/array	
startSearch	boolean	

Return values

`(integer/array)` Returns either:

- an array of objects;
- the count of retrieved objects, if the `countOutput` parameter has been used.

Examples

Retrieve an image

Retrieve all data for image with ID "2".

Request:

```
{
    "jsonrpc": "2.0",
    "method": "image.get",
    "params": {
        "output": "extend",
        "select_image": true,
        "imageids": "2"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "imageid": "2",
            "imagetype": "1",
            "name": "Cloud_(24)",
            "image": "iVBORw0KGgoAAAANSUhEUgAAABgAAAANCAYAAACzbK7QAAAABHNCSVQICAgIfAhkiAAAAAlwSFlzAAACmAAA
        }
    ],
    "id": 1
}
```

Source

CImage::get() in *frontends/php/include/classes/api/services/CImage.php*.

image.update

Description

`object image.update(object/array images)`

This method allows to update existing images.

Parameters

`(object/array)` Image properties to be updated.

The `imageid` property must be defined for each image, all other properties are optional. Only the passed properties will be updated, all others will remain unchanged.

Additionally to the standard image properties, the method accepts the following parameters.

Parameter	Type	Description
image	string	Base64 encoded image. The maximum size of the encoded image is 1 MB. Maximum size can be adjusted by changing ZBX_MAX_IMAGE_SIZE constant value. Supported image formats are: PNG, JPEG, GIF.

Return values

`(object)` Returns an object containing the IDs of the updated images under the `imageids` property.

Examples

Rename image

Rename image to ”Cloud icon”.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "image.update",
    "params": {
        "imageid": "2",
        "name": "Cloud icon"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "imageids": [
            "2"
        ]
    },
    "id": 1
}
```

Source

CImage::update() in *frontends/php/include/classes/api/services/CImage.php*.

Item

This class is designed to work with items.

Object references:

- Item

Available methods:

- item.create - creating new items
- item.delete - deleting items
- item.get - retrieving items
- item.update - updating items

> Item object

The following objects are directly related to the `item` API.

Item

Note:
Web items cannot be directly created, updated or deleted via the Zabbix API.

The item object has the following properties.

Property	Type	Description
itemid	string	*(readonly)* ID of the item.
delay (required)	string	Update interval of the item. Accepts seconds or a time unit with suffix (30s,1m,2h,1d). Optionally one or more custom intervals can be specified either as flexible intervals or scheduling. Multiple intervals are separated by a semicolon. User macros may be used. A single macro has to fill the whole field. Multiple macros in a field or macros mixed with text are not supported. Flexible intervals may be written as two macros separated by a forward slash (e.g. `{$FLEX_INTERVAL}/{$FLEX_PERIOD}`). Optional for Zabbix trapper or dependent items.
hostid (required)	string	ID of the host or template that the item belongs to. For update operations this field is *readonly*.
interfaceid (required)	string	ID of the item's host interface. Used only for host items. Not required for Zabbix agent (active), Zabbix internal, Zabbix trapper, Zabbix aggregate, calculated, dependent and database monitor items.
key_ (required)	string	Item key.
name (required)	string	Name of the item.

Property	Type	Description
type (required)	integer	Type of the item. Possible values: 0 - Zabbix agent; 1 - SNMPv1 agent; 2 - Zabbix trapper; 3 - simple check; 4 - SNMPv2 agent; 5 - Zabbix internal; 6 - SNMPv3 agent; 7 - Zabbix agent (active); 8 - Zabbix aggregate; 9 - web item; 10 - external check; 11 - database monitor; 12 - IPMI agent; 13 - SSH agent; 14 - TELNET agent; 15 - calculated; 16 - JMX agent; 17 - SNMP trap; 18 - Dependent item; 19 - HTTP agent;
url (required)	string	URL string, required only for HTTP agent item type. Supports user macros, {HOST.IP}, {HOST.CONN}, {HOST.DNS}, {HOST.HOST}, {HOST.NAME}, {ITEM.ID}, {ITEM.KEY}.
value_type (required)	integer	Type of information of the item. Possible values: 0 - numeric float; 1 - character; 2 - log; 3 - numeric unsigned; 4 - text.
allow_traps	integer	HTTP agent item field. Allow to populate value as in trapper item type also. 0 - *(default)* Do not allow to accept incoming data. 1 - Allow to accept incoming data.
authtype	integer	Used only by SSH agent items or HTTP agent items. SSH agent authentication method possible values: 0 - *(default)* password; 1 - public key. HTTP agent authentication method possible values: 0 - *(default)* none 1 - basic 2 - NTLM 3 - Kerberos
description	string	Description of the item.
error	string	*(readonly)* Error text if there are problems updating the item.
flags	integer	*(readonly)* Origin of the item. Possible values: 0 - a plain item; 4 - a discovered item.

Property	Type	Description
follow_redirects	integer	HTTP agent item field. Follow respose redirects while pooling data. 0 - Do not follow redirects. 1 - *(default)* Follow redirects.
headers	object	HTTP agent item field. Object with HTTP(S) request headers, where header name is used as key and header value as value. Example: { "User-Agent": "Zabbix" }
history	string	A time unit of how long the history data should be stored. Also accepts user macro. Default: 90d.
http_proxy	string	HTTP agent item field. HTTP(S) proxy connection string.
inventory_link	integer	ID of the host inventory field that is populated by the item. Refer to the host inventory page for a list of supported host inventory fields and their IDs. Default: 0.
ipmi_sensor	string	IPMI sensor. Used only by IPMI items.
jmx_endpoint	string	JMX agent custom connection string. Default value: service:jmx:rmi:///jndi/rmi://{HOST.CONN}:{HOST.PORT}/jmxrmi
lastclock	timestamp	*(readonly)* Time when the item was last updated.
lastns	integer	This property will only return a value for the period configured in ZBX_HISTORY_PERIOD. *(readonly)* Nanoseconds when the item was last updated.
lastvalue	string	This property will only return a value for the period configured in ZBX_HISTORY_PERIOD. *(readonly)* Last value of the item.
logtimefmt	string	This property will only return a value for the period configured in ZBX_HISTORY_PERIOD. Format of the time in log entries. Used only by log items.
master_itemid	integer	Master item ID. Recursion up to 3 dependent items and maximum count of dependent items equal to 29999 are allowed. Required by dependent items.
output_format	integer	HTTP agent item field. Should response converted to JSON. 0 - *(default)* Store raw. 1 - Convert to JSON.
params	string	Additional parameters depending on the type of the item: - executed script for SSH and Telnet items; - SQL query for database monitor items; - formula for calculated items.
password	string	Password for authentication. Used by simple check, SSH, Telnet, database monitor, JMX and HTTP agent items. When used by JMX, username should also be specified together with password or both properties should be left blank.

Property	Type	Description
port	string	Port monitored by the item. Used only by SNMP items.
post_type	integer	HTTP agent item field. Type of post data body stored in posts property. 0 - *(default)* Raw data. 2 - JSON data. 3 - XML data.
posts	string	HTTP agent item field. HTTP(S) request body data. Used with post_type.
prevvalue	string	*(readonly)* Previous value of the item. This property will only return a value for the period configured in ZBX_HISTORY_PERIOD.
privatekey	string	Name of the private key file.
publickey	string	Name of the public key file.
query_fields	array	HTTP agent item field. Query parameters. Array of objects with 'key':'value' pairs, where value can be empty string.
request_method	integer	HTTP agent item field. Type of request method. 0 - *(default)* GET 1 - POST 2 - PUT 3 - HEAD
retrieve_mode	integer	HTTP agent item field. What part of response should be stored. 0 - *(default)* Body. 1 - Headers. 2 - Both body and headers will be stored. For request_method HEAD only 1 is allowed value.
snmp_community	string	SNMP community. Used only by SNMPv1 and SNMPv2 items.
snmp_oid	string	SNMP OID.
snmpv3_authpassphrase	string	SNMPv3 authentication passphrase. Used only by SNMPv3 items.
snmpv3_authprotocol	integer	SNMPv3 authentication protocol. Used only by SNMPv3 items. Possible values: 0 - *(default)* MD5; 1 - SHA.
snmpv3_contextname	string	SNMPv3 context name. Used only by SNMPv3 items.
snmpv3_privpassphrase	string	SNMPv3 privacy passphrase. Used only by SNMPv3 items.
snmpv3_privprotocol	integer	SNMPv3 privacy protocol. Used only by SNMPv3 items. Possible values: 0 - *(default)* DES; 1 - AES.
snmpv3_securitylevel	integer	SNMPv3 security level. Used only by SNMPv3 items. Possible values: 0 - noAuthNoPriv; 1 - authNoPriv; 2 - authPriv.
snmpv3_securityname	string	SNMPv3 security name. Used only by SNMPv3 items.
ssl_cert_file	string	HTTP agent item field. Public SSL Key file path.
ssl_key_file	string	HTTP agent item field. Private SSL Key file path.
ssl_key_password	string	HTTP agent item field. Password for SSL Key file.

Property	Type	Description
state	integer	*(readonly)* State of the item. Possible values: 0 - *(default)* normal; 1 - not supported.
status	integer	Status of the item. Possible values: 0 - *(default)* enabled item; 1 - disabled item.
status_codes	string	HTTP agent item field. Ranges of required HTTP status codes separated by commas. Also supports user macros as part of comma separated list. Example: 200,200-{$M},{$M},200-400
templateid	string	(readonly) ID of the parent template item. *Hint*: Use the `hostid` property to specify the template that the item belongs to.
timeout	string	HTTP agent item field. Item data polling request timeout. Support user macros. default: 3s maximum value: 60s
trapper_hosts	string	Allowed hosts. Used by trapper items or HTTP agent items.
trends	string	A time unit of how long the trends data should be stored. Also accepts user macro. Default: 365d.
units	string	Value units.
username	string	Username for authentication. Used by simple check, SSH, Telnet, database monitor, JMX and HTTP agent items. Required by SSH and Telnet items. When used by JMX, password should also be specified together with username or both properties should be left blank.
valuemapid	string	ID of the associated value map.
verify_host	integer	HTTP agent item field. Validate host name in URL is in Common Name field or a Subject Alternate Name field of host certificate. 0 - *(default)* Do not validate. 1 - Validate.
verify_peer	integer	HTTP agent item field. Validate is host certificate authentic. 0 - *(default)* Do not validate. 1 - Validate.

Item preprocessing

The item preprocessing object has the following properties.

Property	Type	Description
type (required)	integer	The preprocessing option type. Possible values: 1 - Custom multiplier; 2 - Right trim; 3 - Left trim; 4 - Trim; 5 - Regular expression matching; 6 - Boolean to decimal; 7 - Octal to decimal; 8 - Hexadecimal to decimal; 9 - Simple change; 10 - Change per second; 11 - XML XPath; 12 - JSONPath; 13 - In range; 14 - Matches regular expression; 15 - Does not match regular expression; 16 - Check for error in JSON; 17 - Check for error in XML; 18 - Check for error using regular expression; 19 - Discard unchanged; 20 - Discard unchanged with heartbeat; 21 - JavaScript; 22 - Prometheus pattern; 23 - Prometheus to JSON; 24 - CSV to JSON.
params (required)	string	Additional parameters used by preprocessing option. Multiple parameters are separated by LF (\n) character.
error_handler (required)	integer	Action type used in case of preprocessing step failure. Possible values: 0 - Error message is set by Zabbix server; 1 - Discard value; 2 - Set custom value; 3 - Set custom error message.
error_handler_params (required)	string	Error handler parameters. Used with `error_handler`. Must be empty, if `error_handler` is 0 or 1. Can be empty if, `error_handler` is 2. Cannot be empty, if `error_handler` is 3.

The following parameters and error handlers are supported for each preprocessing type.

Preprocessing type	Name	Parameter 1	Parameter 2	Parameter 3	Supported error handlers
1	Custom multiplier	number[1, 6]			0, 1, 2, 3
2	Right trim	list of characters[2]			
3	Left trim	list of characters[2]			
4	Trim	list of characters[2]			
5	Regular expression	pattern[3]	output[2]		0, 1, 2, 3

Preprocessing type	Name	Parameter 1	Parameter 2	Parameter 3	Supported error handlers
6	Boolean to decimal				0, 1, 2, 3
7	Octal to decimal				0, 1, 2, 3
8	Hexadecimal to decimal				0, 1, 2, 3
9	Simple change				0, 1, 2, 3
10	Change per second				0, 1, 2, 3
11	XML XPath	path[4]			0, 1, 2, 3
12	JSONPath	path[4]			0, 1, 2, 3
13	In range	min[1, 6]	max[1, 6]		0, 1, 2, 3
14	Matches regular expression	pattern[3]			0, 1, 2, 3
15	Does not match regular expression	pattern[3]			0, 1, 2, 3
16	Check for error in JSON	path[4]			0, 1, 2, 3
17	Check for error in XML	path[4]			0, 1, 2, 3
18	Check for error using regular expression	pattern[3]	output[2]		0, 1, 2, 3
19	Discard unchanged				

Preprocessing type	Name	Parameter 1	Parameter 2	Parameter 3	Supported error handlers
20	Discard unchanged with heartbeat	seconds[5, 6]			
21	JavaScript	script[2]			
22	Prometheus pattern	pattern[6, 7]	output[6, 8]		0, 1, 2, 3
23	Prometheus to JSON	pattern[6, 7]			0, 1, 2, 3
24	CSV to JSON	character[2]	character[2]	0,1	0, 1, 2, 3

[1] integer or floating-point number
[2] string
[3] regular expression
[4] JSONPath or XML XPath
[5] positive integer (with support of time suffixes, e.g. 30s, 1m, 2h, 1d)
[6] user macro
[7] Prometheus pattern following the syntax: `<metric name>{<label name>="<label value>", ...} == <value>`. Each Prometheus pattern component (metric, label name, label value and metric value) can be user macro.
[8] Prometheus output following the syntax: `<label name>`.

item.create

Description

`object item.create(object/array items)`

This method allows to create new items.

> **Note:**
> Web items cannot be created via the Zabbix API.

Parameters

`(object/array)` Items to create.

Additionally to the standard item properties, the method accepts the following parameters.

Parameter	Type	Description
applications	array	IDs of the applications to add the item to.
preprocessing	array	Item preprocessing options.

Return values

`(object)` Returns an object containing the IDs of the created items under the `itemids` property. The order of the returned IDs matches the order of the passed items.

Examples

Creating an item

Create a numeric Zabbix agent item to monitor free disk space on host with ID "30074" and add it to two applications.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "item.create",
    "params": {
        "name": "Free disk space on $1",
        "key_": "vfs.fs.size[/home/joe/,free]",
        "hostid": "30074",
        "type": 0,
        "value_type": 3,
        "interfaceid": "30084",
        "applications": [
            "609",
            "610"
        ],
        "delay": "30s"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "itemids": [
            "24758"
        ]
    },
    "id": 1
}
```

Creating a host inventory item

Create a Zabbix agent item to populate the host's "OS" inventory field.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "item.create",
    "params": {
        "name": "uname",
        "key_": "system.uname",
        "hostid": "30021",
        "type": 0,
        "interfaceid": "30007",
        "value_type": 1,
        "delay": "10s",
        "inventory_link": 5
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "itemids": [
            "24759"
        ]
    },
    "id": 1
}
```

Creating an item with preprocessing

Create an item using custom multiplier.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "item.create",
    "params": {
        "name": "Device uptime",
        "key_": "sysUpTime",
        "hostid": "11312",
        "type": 4,
        "snmp_community": "{$SNMP_COMMUNITY}",
        "snmp_oid": "SNMPv2-MIB::sysUpTime.0",
        "value_type": 1,
        "delay": "60s",
        "units": "uptime",
        "interfaceid": "1156",
        "preprocessing": [
            {
                "type": "1",
                "params": "0.01",
                "error_handler": "1",
                "error_handler_params": ""
            }
        ]
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "itemids": [
            "44210"
        ]
    },
    "id": 1
}
```

Creating dependent item

Create a dependent item for the master item with ID 24759. Only dependencies on the same host are allowed, therefore master and the dependent item should have the same hostid.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "item.create",
    "params": {
      "hostid": "30074",
      "name": "Dependent test item",
      "key_": "dependent.item",
      "type": "18",
      "master_itemid": "24759",
      "value_type": "2"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "itemids": [
            "44211"
        ]
    },
    "id": 1
}
```

Create HTTP agent item

Create POST request method item with JSON response preprocessing.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "item.create",
    "params": {
        "url":"http://127.0.0.1/http.php",
        "query_fields": [
            {
                "mode":"json"
            },
            {
                "min": "10"
            },
            {
                "max": "100"
            }
        ],
        "interfaceid": "1",
        "type":"19",
        "hostid":"10254",
        "delay":"5s",
        "key_":"json",
        "name":"http agent example JSON",
        "value_type":"0",
        "output_format":"1",
        "preprocessing": [
            {
                "type": "12",
                "params": "$.random"
            }
        ]
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 2
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "itemids": [
            "23865"
        ]
    },
    "id": 3
}
```

Source

CItem::create() in *frontends/php/include/classes/api/services/CItem.php*.

item.delete

Description

`object item.delete(array itemIds)`

This method allows to delete items.

> **Note:**
> Web items cannot be deleted via the Zabbix API.

Parameters

`(array)` IDs of the items to delete.

Return values

`(object)` Returns an object containing the IDs of the deleted items under the `itemids` property.

Examples

Deleting multiple items

Delete two items.
Dependent items and item prototypes are removed automatically if master item is deleted.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "item.delete",
    "params": [
        "22982",
        "22986"
    ],
    "auth": "3a57200802b24cda67c4e4010b50c065",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "itemids": [
            "22982",
            "22986"
        ]
    },
    "id": 1
}
```

Source

CItem::delete() in *frontends/php/include/classes/api/services/CItem.php*.

item.get

Description

`integer/array item.get(object parameters)`

The method allows to retrieve items according to the given parameters.

Parameters

`(object)` Parameters defining the desired output.

The method supports the following parameters.

Parameter	Type	Description
itemids	string/array	Return only items with the given IDs.
groupids	string/array	Return only items that belong to the hosts from the given groups.
templateids	string/array	Return only items that belong to the given templates.
hostids	string/array	Return only items that belong to the given hosts.
proxyids	string/array	Return only items that are monitored by the given proxies.
interfaceids	string/array	Return only items that use the given host interfaces.
graphids	string/array	Return only items that are used in the given graphs.
triggerids	string/array	Return only items that are used in the given triggers.
applicationids	string/array	Return only items that belong to the given applications.
webitems	flag	Include web items in the result.
inherited	boolean	If set to `true` return only items inherited from a template.
templated	boolean	If set to `true` return only items that belong to templates.
monitored	boolean	If set to `true` return only enabled items that belong to monitored hosts.
group	string	Return only items that belong to a group with the given name.
host	string	Return only items that belong to a host with the given name.
application	string	Return only items that belong to an application with the given name.
with_triggers	boolean	If set to `true` return only items that are used in triggers.
selectHosts	query	Return a hosts property with an array of hosts that the item belongs to.
selectInterfaces	query	Return an interfaces property with an array of host interfaces used by the item.
selectTriggers	query	Return a triggers property with the triggers that the item is used in. Supports `count`.
selectGraphs	query	Return a graphs property with the graphs that contain the item. Supports `count`.
selectApplications	query	Return an applications property with the applications that the item belongs to.
selectDiscoveryRule	query	Return a discoveryRule property with the LLD rule that created the item.
selectItemDiscovery	query	Return an `itemDiscovery` property with the item discovery object. The item discovery object links the item to an item prototype from which it was created. It has the following properties: `itemdiscoveryid` - `(string)` ID of the item discovery; `itemid` - `(string)` ID of the discovered item; `parent_itemid` - `(string)` ID of the item prototype from which the item has been created; `key_` - `(string)` key of the item prototype; `lastcheck` - `(timestamp)` time when the item was last discovered; `ts_delete` - `(timestamp)` time when an item that is no longer discovered will be deleted.

Parameter	Type	Description
selectPreprocessing	query	Return a `preprocessing` property with item preprocessing options. It has the following properties: `type` - `(string)` The preprocessing option type: 1 - Custom multiplier; 2 - Right trim; 3 - Left trim; 4 - Trim; 5 - Regular expression matching; 6 - Boolean to decimal; 7 - Octal to decimal; 8 - Hexadecimal to decimal; 9 - Simple change; 10 - Change per second; 11 - XML XPath; 12 - JSONPath; 13 - In range; 14 - Matches regular expression; 15 - Does not match regular expression; 16 - Check for error in JSON; 17 - Check for error in XML; 18 - Check for error using regular expression; 19 - Discard unchanged; 20 - Discard unchanged with heartbeat; 21 - JavaScript; 22 - Prometheus pattern; 23 - Prometheus to JSON. `params` - `(string)` Additional parameters used by preprocessing option. Multiple parameters are separated by LF (\n)character. `error_handler` - `(string)` Action type used in case of preprocessing step failure: 0 - Error message is set by Zabbix server; 1 - Discard value; 2 - Set custom value; 3 - Set custom error message. `error_handler_params` - `(string)` Error handler parameters.
filter	object	Return only those results that exactly match the given filter. Accepts an array, where the keys are property names, and the values are either a single value or an array of values to match against. Supports additional filters: `host` - technical name of the host that the item belongs to.
limitSelects	integer	Limits the number of records returned by subselects. Applies to the following subselects: `selectGraphs` - results will be sorted by `name`; `selectTriggers` - results will be sorted by `description`.
sortfield	string/array	Sort the result by the given properties. Possible values are: `itemid`, `name`, `key_`, `delay`, `history`, `trends`, `type` and `status`.

Parameter	Type	Description
countOutput	boolean	These parameters being common for all get methods are described in detail in the reference commentary page.
editable	boolean	
excludeSearch	boolean	
limit	integer	
output	query	
preservekeys	boolean	
search	object	
searchByAny	boolean	
searchWildcardsEnabled	boolean	
sortorder	string/array	
startSearch	boolean	

Return values

(integer/array) Returns either:

- an array of objects;
- the count of retrieved objects, if the countOutput parameter has been used.

Examples

Finding items by key

Retrieve all items from host with ID "10084" that have the word "system" in the key and sort them by name.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "item.get",
    "params": {
        "output": "extend",
        "hostids": "10084",
        "search": {
            "key_": "system"
        },
        "sortfield": "name"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "itemid": "23298",
            "type": "0",
            "snmp_community": "",
            "snmp_oid": "",
            "hostid": "10084",
            "name": "Context switches per second",
            "key_": "system.cpu.switches",
            "delay": "1m",
            "history": "7d",
            "trends": "365d",
            "lastvalue": "2552",
            "lastclock": "1351090998",
            "prevvalue": "2641",
            "state": "0",
            "status": "0",
```

```
        "value_type": "3",
        "trapper_hosts": "",
        "units": "sps",
        "snmpv3_securityname": "",
        "snmpv3_securitylevel": "0",
        "snmpv3_authpassphrase": "",
        "snmpv3_privpassphrase": "",
        "snmpv3_authprotocol": "0",
        "snmpv3_privprotocol": "0",
        "snmpv3_contextname": "",
        "error": "",
        "logtimefmt": "",
        "templateid": "22680",
        "valuemapid": "0",
        "params": "",
        "ipmi_sensor": "",
        "authtype": "0",
        "username": "",
        "password": "",
        "publickey": "",
        "privatekey": "",
        "lastns": "564054253",
        "flags": "0",
        "interfaceid": "1",
        "port": "",
        "description": "",
        "inventory_link": "0",
        "lifetime": "0s",
        "evaltype": "0",
        "jmx_endpoint": "",
        "master_itemid": "0",
        "timeout": "3s",
        "url": "",
        "query_fields": [],
        "posts": "",
        "status_codes": "200",
        "follow_redirects": "1",
        "post_type": "0",
        "http_proxy": "",
        "headers": [],
        "retrieve_mode": "0",
        "request_method": "0",
        "output_format": "0",
        "ssl_cert_file": "",
        "ssl_key_file": "",
        "ssl_key_password": "",
        "verify_peer": "0",
        "verify_host": "0",
        "allow_traps": "0"
    },
    {
        "itemid": "23299",
        "type": "0",
        "snmp_community": "",
        "snmp_oid": "",
        "hostid": "10084",
        "name": "CPU $2 time",
        "key_": "system.cpu.util[,idle]",
        "delay": "1m",
        "history": "7d",
        "trends": "365d",
        "lastvalue": "86.031879",
```

```
        "lastclock": "1351090999",
        "prevvalue": "85.306944",
        "state": "0",
        "status": "0",
        "value_type": "0",
        "trapper_hosts": "",
        "units": "%",
        "snmpv3_securityname": "",
        "snmpv3_securitylevel": "0",
        "snmpv3_authpassphrase": "",
        "snmpv3_privpassphrase": "",
        "snmpv3_authprotocol": "0",
        "snmpv3_privprotocol": "0",
        "snmpv3_contextname": "",
        "error": "",
        "logtimefmt": "",
        "templateid": "17354",
        "valuemapid": "0",
        "params": "",
        "ipmi_sensor": "",
        "authtype": "0",
        "username": "",
        "password": "",
        "publickey": "",
        "privatekey": "",
        "lastns": "564256864",
        "flags": "0",
        "interfaceid": "1",
        "port": "",
        "description": "The time the CPU has spent doing nothing.",
        "inventory_link": "0",
        "lifetime": "0s",
        "evaltype": "0",
        "jmx_endpoint": "",
        "master_itemid": "0",
        "timeout": "3s",
        "url": "",
        "query_fields": [],
        "posts": "",
        "status_codes": "200",
        "follow_redirects": "1",
        "post_type": "0",
        "http_proxy": "",
        "headers": [],
        "retrieve_mode": "0",
        "request_method": "0",
        "output_format": "0",
        "ssl_cert_file": "",
        "ssl_key_file": "",
        "ssl_key_password": "",
        "verify_peer": "0",
        "verify_host": "0",
        "allow_traps": "0"
    },
    {
        "itemid": "23300",
        "type": "0",
        "snmp_community": "",
        "snmp_oid": "",
        "hostid": "10084",
        "name": "CPU $2 time",
        "key_": "system.cpu.util[,interrupt]",
```

```
            "history": "7d",
            "trends": "365d",
            "lastvalue": "0.008389",
            "lastclock": "1351091000",
            "prevvalue": "0.000000",
            "state": "0",
            "status": "0",
            "value_type": "0",
            "trapper_hosts": "",
            "units": "%",
            "snmpv3_securityname": "",
            "snmpv3_securitylevel": "0",
            "snmpv3_authpassphrase": "",
            "snmpv3_privpassphrase": "",
            "snmpv3_authprotocol": "0",
            "snmpv3_privprotocol": "0",
            "snmpv3_contextname": "",
            "error": "",
            "logtimefmt": "",
            "templateid": "22671",
            "valuemapid": "0",
            "params": "",
            "ipmi_sensor": "",
            "authtype": "0",
            "username": "",
            "password": "",
            "publickey": "",
            "privatekey": "",
            "lastns": "564661387",
            "flags": "0",
            "interfaceid": "1",
            "port": "",
            "description": "The amount of time the CPU has been servicing hardware interrupts.",
            "inventory_link": "0",
            "lifetime": "0s",
            "evaltype": "0",
            "jmx_endpoint": "",
            "master_itemid": "0",
            "timeout": "3s",
            "url": "",
            "query_fields": [],
            "posts": "",
            "status_codes": "200",
            "follow_redirects": "1",
            "post_type": "0",
            "http_proxy": "",
            "headers": [],
            "retrieve_mode": "0",
            "request_method": "0",
            "output_format": "0",
            "ssl_cert_file": "",
            "ssl_key_file": "",
            "ssl_key_password": "",
            "verify_peer": "0",
            "verify_host": "0",
            "allow_traps": "0"
        }
    ],
    "id": 1
}
```


Finding dependent items by key

Retrieve all dependent items from host with ID ”10116” that have the word ”apache” in the key.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "item.get",
    "params": {
        "output": "extend",
        "hostids": "10116",
        "search": {
            "key_": "apache"
        },
        "filter": {
            "type": "18"
        }
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "itemid": "25550",
            "type": "18",
            "snmp_community": "",
            "snmp_oid": "",
            "hostid": "10116",
            "name": "Days",
            "key_": "apache.status.uptime.days",
            "delay": "",
            "history": "90d",
            "trends": "365d",
            "status": "0",
            "value_type": "3",
            "trapper_hosts": "",
            "units": "",
            "snmpv3_securityname": "",
            "snmpv3_securitylevel": "0",
            "snmpv3_authpassphrase": "",
            "snmpv3_privpassphrase": "",
            "formula": "",
            "error": "",
            "logtimefmt": "",
            "templateid": "0",
            "valuemapid": "0",
            "params": "",
            "ipmi_sensor": "",
            "authtype": "0",
            "username": "",
            "password": "",
            "publickey": "",
            "privatekey": "",
            "flags": "0",
            "interfaceid": "0",
            "port": "",
            "description": "",
            "inventory_link": "0",
            "lifetime": "30d",
            "snmpv3_authprotocol": "0",
            "snmpv3_privprotocol": "0",
```

```
            "state": "0",
            "snmpv3_contextname": "",
            "evaltype": "0",
            "master_itemid": "25545",
            "jmx_endpoint": "",
            "timeout": "3s",
            "url": "",
            "query_fields": [],
            "posts": "",
            "status_codes": "200",
            "follow_redirects": "1",
            "post_type": "0",
            "http_proxy": "",
            "headers": [],
            "retrieve_mode": "0",
            "request_method": "0",
            "output_format": "0",
            "ssl_cert_file": "",
            "ssl_key_file": "",
            "ssl_key_password": "",
            "verify_peer": "0",
            "verify_host": "0",
            "allow_traps": "0",
            "lastclock": "0",
            "lastns": "0",
            "lastvalue": "0",
            "prevvalue": "0"
        },
        {
            "itemid": "25555",
            "type": "18",
            "snmp_community": "",
            "snmp_oid": "",
            "hostid": "10116",
            "name": "Hours",
            "key_": "apache.status.uptime.hours",
            "delay": "0",
            "history": "90d",
            "trends": "365d",
            "status": "0",
            "value_type": "3",
            "trapper_hosts": "",
            "units": "",
            "snmpv3_securityname": "",
            "snmpv3_securitylevel": "0",
            "snmpv3_authpassphrase": "",
            "snmpv3_privpassphrase": "",
            "formula": "",
            "error": "",
            "logtimefmt": "",
            "templateid": "0",
            "valuemapid": "0",
            "params": "",
            "ipmi_sensor": "",
            "authtype": "0",
            "username": "",
            "password": "",
            "publickey": "",
            "privatekey": "",
            "flags": "0",
            "interfaceid": "0",
            "port": "",
```

```
            "description": "",
            "inventory_link": "0",
            "lifetime": "30d",
            "snmpv3_authprotocol": "0",
            "snmpv3_privprotocol": "0",
            "state": "0",
            "snmpv3_contextname": "",
            "evaltype": "0",
            "master_itemid": "25545",
            "jmx_endpoint": "",
            "timeout": "3s",
            "url": "",
            "query_fields": [],
            "posts": "",
            "status_codes": "200",
            "follow_redirects": "1",
            "post_type": "0",
            "http_proxy": "",
            "headers": [],
            "retrieve_mode": "0",
            "request_method": "0",
            "output_format": "0",
            "ssl_cert_file": "",
            "ssl_key_file": "",
            "ssl_key_password": "",
            "verify_peer": "0",
            "verify_host": "0",
            "allow_traps": "0",
            "lastclock": "0",
            "lastns": "0",
            "lastvalue": "0",
            "prevvalue": "0"
        }
    ],
    "id": 1
}
```


Find HTTP agent item

Find HTTP agent item with post body type XML for specific host id.

Request:


```
{
    "jsonrpc": "2.0",
    "method": "item.get",
    "params": {
        "hostids": "10255",
        "filter": {
            "type": "19",
            "post_type": "3"
        }
    },
    "id": 3,
    "auth": "d678e0b85688ce578ff061bd29a20d3b"
}
```


Response:


```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "itemid": "28252",
            "type": "19",
```

```
            "snmp_community": "",
            "snmp_oid": "",
            "hostid": "10255",
            "name": "template item",
            "key_": "ti",
            "delay": "30s",
            "history": "90d",
            "trends": "365d",
            "status": "0",
            "value_type": "3",
            "trapper_hosts": "",
            "units": "",
            "snmpv3_securityname": "",
            "snmpv3_securitylevel": "0",
            "snmpv3_authpassphrase": "",
            "snmpv3_privpassphrase": "",
            "formula": "",
            "error": "",
            "logtimefmt": "",
            "templateid": "0",
            "valuemapid": "0",
            "params": "",
            "ipmi_sensor": "",
            "authtype": "0",
            "username": "",
            "password": "",
            "publickey": "",
            "privatekey": "",
            "flags": "0",
            "interfaceid": "0",
            "port": "",
            "description": "",
            "inventory_link": "0",
            "lifetime": "30d",
            "snmpv3_authprotocol": "0",
            "snmpv3_privprotocol": "0",
            "state": "0",
            "snmpv3_contextname": "",
            "evaltype": "0",
            "jmx_endpoint": "",
            "master_itemid": "0",
            "timeout": "3s",
            "url": "localhost",
            "query_fields": [
                {
                    "mode": "xml"
                }
            ],
            "posts": "<body>\r\n<![CDATA[{$MACRO}<foo></bar>]]>\r\n</body>",
            "status_codes": "200",
            "follow_redirects": "0",
            "post_type": "3",
            "http_proxy": "",
            "headers": [],
            "retrieve_mode": "1",
            "request_method": "3",
            "output_format": "0",
            "ssl_cert_file": "",
            "ssl_key_file": "",
            "ssl_key_password": "",
            "verify_peer": "0",
            "verify_host": "0",
```

```
            "allow_traps": "0",
            "lastclock": "0",
            "lastns": "0",
            "lastvalue": "0",
            "prevvalue": "0"
        }
    ],
    "id": 3
}
```

Retrieving items with preprocessing rules

Reatrieve all items and their preprocessing rules from host with ID "10254".

Request:

```
{
    "jsonrpc": "2.0",
    "method": "item.get",
    "params": {
        "output": ["itemid", "name", "key_"],
        "selectPreprocessing": "extend",
        "hostids": "10254"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "itemid": "23865",
        "name": "http agent example JSON",
        "key_": "json",
        "preprocessing": [
            {
                "type": "12",
                "params": "$.random",
                "error_handler": "1",
                "error_handler_params": ""
            }
        ]
    },
    "id": 1
}
```

See also

- Application
- Discovery rule
- Graph
- Host
- Host interface
- Trigger

Source

CItem::get() in *frontends/php/include/classes/api/services/CItem.php*.

item.update

Description

`object item.update(object/array items)`

This method allows to update existing items.

> **Note:**
> Web items cannot be updated via the Zabbix API.

Parameters

`(object/array)` Item properties to be updated.

The `itemid` property must be defined for each item, all other properties are optional. Only the passed properties will be updated, all others will remain unchanged.

Additionally to the standard item properties, the method accepts the following parameters.

Parameter	Type	Description
applications	array	IDs of the applications to replace the current applications.
preprocessing	array	Item preprocessing options to replace the current preprocessing options.

Return values

`(object)` Returns an object containing the IDs of the updated items under the `itemids` property.

Examples

Enabling an item

Enable an item, that is, set its status to "0".

Request:

```
{
    "jsonrpc": "2.0",
    "method": "item.update",
    "params": {
        "itemid": "10092",
        "status": 0
    },
    "auth": "700ca65537074ec963db7efabda78259",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "itemids": [
            "10092"
        ]
    },
    "id": 1
}
```

Update dependent item

Update Dependent item name and Master item ID. Only dependencies on same host are allowed, therefore Master and Dependent item should have same hostid.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "item.update",
    "params": {
        "name": "Dependent item updated name",
        "master_itemid": "25562",
```

```
        "itemid": "189019"
    },
    "auth": "700ca65537074ec963db7efabda78259",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "itemids": [
            "189019"
        ]
    },
    "id": 1
}
```

Update HTTP agent item

Enable item value trapping.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "item.update",
    "params": {
        "itemid": "23856",
        "allow_traps": "1"
    },
    "auth": "700ca65537074ec963db7efabda78259",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "itemids": [
            "23856"
        ]
    },
    "id": 1
}
```

Updating an item with preprocessing

Update an item with item preprocessing rule ”In range”.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "item.update",
    "params": {
        "itemid": "23856",
        "preprocessing": [
            {
                "type": "13",
                "params": "\n100",
                "error_handler": "1",
                "error_handler_params": ""
            }
        ]
    },
    "auth": "700ca65537074ec963db7efabda78259",
```

```
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "itemids": [
            "23856"
        ]
    },
    "id": 1
}
```

Source

CItem::update() in *frontends/php/include/classes/api/services/CItem.php*.

Item prototype

This class is designed to work with item prototypes.

Object references:

- Item prototype

Available methods:

- itemprototype.create - creating new item prototypes
- itemprototype.delete - deleting item prototypes
- itemprototype.get - retrieving item prototypes
- itemprototype.update - updating item prototypes

> Item prototype object

The following objects are directly related to the `itemprototype` API.

Item prototype

The item prototype object has the following properties.

Property	Type	Description
itemid	string	*(readonly)* ID of the item prototype.
delay (required)	string	Update interval of the item prototype. Accepts seconds or a time unit with suffix (30s,1m,2h,1d). Optionally one or more custom intervals can be specified either as flexible intervals or scheduling. Multiple intervals are separated by a semicolon. User macros and LLD macros may be used. A single macro has to fill the whole field. Multiple macros in a field or macros mixed with text are not supported. Flexible intervals may be written as two macros separated by a forward slash (e.g. `{$FLEX_INTERVAL}/{$FLEX_PERIOD}`). Optional for Zabbix trapper or dependent item.
hostid (required)	string	ID of the host that the item prototype belongs to. For update operations this field is *readonly*.
ruleid (required)	string	ID of the LLD rule that the item belongs to. For update operations this field is *readonly*.

Property	Type	Description
interfaceid (required)	string	ID of the item prototype's host interface. Used only for host item prototypes. Not required for Zabbix agent (active), Zabbix internal, Zabbix trapper, Zabbix aggregate, calculated, dependent and database monitor item prototypes.
key_ (required)	string	Item prototype key.
name (required)	string	Name of the item prototype.
type (required)	integer	Type of the item prototype. Possible values: 0 - Zabbix agent; 1 - SNMPv1 agent; 2 - Zabbix trapper; 3 - simple check; 4 - SNMPv2 agent; 5 - Zabbix internal; 6 - SNMPv3 agent; 7 - Zabbix agent (active); 8 - Zabbix aggregate; 10 - external check; 11 - database monitor; 12 - IPMI agent; 13 - SSH agent; 14 - TELNET agent; 15 - calculated; 16 - JMX agent; 17 - SNMP trap; 18 - Dependent item; 19 - HTTP agent;
url (required)	string	URL string required only for HTTP agent item prototypes. Supports LLD macros, user macros, {HOST.IP}, {HOST.CONN}, {HOST.DNS}, {HOST.HOST}, {HOST.NAME}, {ITEM.ID}, {ITEM.KEY}.
value_type (required)	integer	Type of information of the item prototype. Possible values: 0 - numeric float; 1 - character; 2 - log; 3 - numeric unsigned; 4 - text.
allow_traps	integer	HTTP agent item prototype field. Allow to populate value as in trapper item type also. 0 - *(default)* Do not allow to accept incoming data. 1 - Allow to accept incoming data.
authtype	integer	Used only by SSH agent item prototypes or HTTP agent item prototypes. SSH agent authentication method possible values: 0 - *(default)* password; 1 - public key. HTTP agent authentication method possible values: 0 - *(default)* none 1 - basic 2 - NTLM 3 - Kerberos

Property	Type	Description
description	string	Description of the item prototype.
follow_redirects	integer	HTTP agent item prototype field. Follow respose redirects while pooling data. 0 - Do not follow redirects. 1 - *(default)* Follow redirects.
headers	object	HTTP agent item prototype field. Object with HTTP(S) request headers, where header name is used as key and header value as value. Example: { ”User-Agent”: ”Zabbix” }
history	string	A time unit of how long the history data should be stored. Also accepts user macro and LLD macro. Default: 90d.
http_proxy	string	HTTP agent item prototype field. HTTP(S) proxy connection string.
ipmi_sensor	string	IPMI sensor. Used only by IPMI item prototypes.
jmx_endpoint	string	JMX agent custom connection string. Default value: service:jmx:rmi:///jndi/rmi://{HOST.CONN}:{HOST.PORT}/jmxrmi
logtimefmt	string	Format of the time in log entries. Used only by log item prototypes.
master_itemid	integer	Master item ID. Recursion up to 3 dependent items and item prototypes and maximum count of dependent items and item prototypes equal to 29999 are allowed. Required by Dependent items.
output_format	integer	HTTP agent item prototype field. Should response converted to JSON. 0 - *(default)* Store raw. 1 - Convert to JSON.
params	string	Additional parameters depending on the type of the item prototype: - executed script for SSH and Telnet item prototypes; - SQL query for database monitor item prototypes; - formula for calculated item prototypes.
password	string	Password for authentication. Used by simple check, SSH, Telnet, database monitor, JMX and HTTP agent item prototypes.
port	string	Port monitored by the item prototype. Used only by SNMP items prototype.
post_type	integer	HTTP agent item prototype field. Type of post data body stored in posts property. 0 - *(default)* Raw data. 2 - JSON data. 3 - XML data.
posts	string	HTTP agent item prototype field. HTTP(S) request body data. Used with post_type.
privatekey	string	Name of the private key file.
publickey	string	Name of the public key file.
query_fields	array	HTTP agent item prototype field. Query parameters. Array of objects with ’key’:’value’ pairs, where value can be empty string.

Property	Type	Description
request_method	integer	HTTP agent item prototype field. Type of request method. 0 - *(default)* GET 1 - POST 2 - PUT 3 - HEAD
retrieve_mode	integer	HTTP agent item prototype field. What part of response should be stored. 0 - *(default)* Body. 1 - Headers. 2 - Both body and headers will be stored. For request_method HEAD only 1 is allowed value.
snmp_community	string	SNMP community. Used only by SNMPv1 and SNMPv2 item prototypes.
snmp_oid	string	SNMP OID.
snmpv3_authpassphrase	string	SNMPv3 authentication passphrase. Used only by SNMPv3 item prototypes.
snmpv3_authprotocol	integer	SNMPv3 authentication protocol. Used only by SNMPv3 items. Possible values: 0 - *(default)* MD5; 1 - SHA.
snmpv3_contextname	string	SNMPv3 context name. Used only by SNMPv3 item prototypes.
snmpv3_privpassphrase	string	SNMPv3 privacy passphrase. Used only by SNMPv3 item prototypes.
snmpv3_privprotocol	integer	SNMPv3 privacy protocol. Used only by SNMPv3 items. Possible values: 0 - *(default)* DES; 1 - AES.
snmpv3_securitylevel	integer	SNMPv3 security level. Used only by SNMPv3 item prototypes. Possible values: 0 - noAuthNoPriv; 1 - authNoPriv; 2 - authPriv.
snmpv3_securityname	string	SNMPv3 security name. Used only by SNMPv3 item prototypes.
ssl_cert_file	string	HTTP agent item prototype field. Public SSL Key file path.
ssl_key_file	string	HTTP agent item prototype field. Private SSL Key file path.
ssl_key_password	string	HTTP agent item prototype field. Password for SSL Key file.
status	integer	Status of the item prototype. Possible values: 0 - *(default)* enabled item prototype; 1 - disabled item prototype; 3 - unsupported item prototype.
status_codes	string	HTTP agent item prototype field. Ranges of required HTTP status codes separated by commas. Also supports user macros or LLD macros as part of comma separated list. Example: 200,200-{$M},{$M},200-400

Property	Type	Description
templateid	string	(readonly) ID of the parent template item prototype.
timeout	string	HTTP agent item prototype field. Item data polling request timeout. Support user macros and LLD macros. default: 3s maximum value: 60s
trapper_hosts	string	Allowed hosts. Used by trapper item prototypes or HTTP item prototypes.
trends	string	A time unit of how long the trends data should be stored. Also accepts user macro and LLD macro. Default: 365d.
units	string	Value units.
username	string	Username for authentication. Used by simple check, SSH, Telnet, database monitor, JMX and HTTP agent item prototypes. Required by SSH and Telnet item prototypes.
valuemapid	string	ID of the associated value map.
verify_host	integer	HTTP agent item prototype field. Validate host name in URL is in Common Name field or a Subject Alternate Name field of host certificate. 0 - *(default)* Do not validate. 1 - Validate.
verify_peer	integer	HTTP agent item prototype field. Validate is host certificate authentic. 0 - *(default)* Do not validate. 1 - Validate.

Item prototype preprocessing

The item prototype preprocessing object has the following properties.

Property	Type	Description
type (required)	integer	The preprocessing option type. Possible values: 1 - Custom multiplier; 2 - Right trim; 3 - Left trim; 4 - Trim; 5 - Regular expression matching; 6 - Boolean to decimal; 7 - Octal to decimal; 8 - Hexadecimal to decimal; 9 - Simple change; 10 - Change per second; 11 - XML XPath; 12 - JSONPath; 13 - In range; 14 - Matches regular expression; 15 - Does not match regular expression; 16 - Check for error in JSON; 17 - Check for error in XML; 18 - Check for error using regular expression; 19 - Discard unchanged; 20 - Discard unchanged with heartbeat; 21 - JavaScript; 22 - Prometheus pattern; 23 - Prometheus to JSON; 24 - CSV to JSON.
params (required)	string	Additional parameters used by preprocessing option. Multiple parameters are separated by LF (\n) character.
error_handler (required)	integer	Action type used in case of preprocessing step failure. Possible values: 0 - Error message is set by Zabbix server; 1 - Discard value; 2 - Set custom value; 3 - Set custom error message.
error_handler_params (required)	string	Error handler parameters. Used with `error_handler`. Must be empty, if `error_handler` is 0 or 1. Can be empty if, `error_handler` is 2. Cannot be empty, if `error_handler` is 3.

The following parameters and error handlers are supported for each preprocessing type.

Preprocessing type	Name	Parameter 1	Parameter 2	Parameter 3	Supported error handlers
1	Custom multiplier	number[1, 6]			0, 1, 2, 3
2	Right trim	list of characters[2]			
3	Left trim	list of characters[2]			
4	Trim	list of characters[2]			
5	Regular expression	pattern[3]	output[2]		0, 1, 2, 3

Preprocessing type	Name	Parameter 1	Parameter 2	Parameter 3	Supported error handlers
6	Boolean to decimal				0, 1, 2, 3
7	Octal to decimal				0, 1, 2, 3
8	Hexadecimal to decimal				0, 1, 2, 3
9	Simple change				0, 1, 2, 3
10	Change per second				0, 1, 2, 3
11	XML XPath	path[4]			0, 1, 2, 3
12	JSONPath	path[4]			0, 1, 2, 3
13	In range	min[1, 6]	max[1, 6]		0, 1, 2, 3
14	Matches regular expression	pattern[3]			0, 1, 2, 3
15	Does not match regular expression	pattern[3]			0, 1, 2, 3
16	Check for error in JSON	path[4]			0, 1, 2, 3
17	Check for error in XML	path[4]			0, 1, 2, 3
18	Check for error using regular expression	pattern[3]	output[2]		0, 1, 2, 3
19	Discard unchanged				

Preprocessing type	Name	Parameter 1	Parameter 2	Parameter 3	Supported error handlers
20	Discard unchanged with heartbeat	seconds[5, 6]			
21	JavaScript	script[2]			
22	Prometheus pattern	pattern[6, 7]	output[6, 8]		0, 1, 2, 3
23	Prometheus to JSON	pattern[6, 7]			0, 1, 2, 3
24	CSV to JSON	character[2]	character[2]	0,1	0, 1, 2, 3

[1] integer or floating-point number
[2] string
[3] regular expression
[4] JSONPath or XML XPath
[5] positive integer (with support of time suffixes, e.g. 30s, 1m, 2h, 1d)
[6] user macro, LLD macro
[7] Prometheus pattern following the syntax: `<metric name>{<label name>="<label value>", ...} == <value>`. Each Prometheus pattern component (metric, label name, label value and metric value) can be user macro or LLD macro.
[8] Prometheus output following the syntax: `<label name>`.

itemprototype.create

Description

`object itemprototype.create(object/array itemPrototypes)`

This method allows to create new item prototypes.

Parameters

`(object/array)` Item prototype to create.

Additionally to the standard item prototype properties, the method accepts the following parameters.

Parameter	Type	Description
ruleid (required)	string	ID of the LLD rule that the item belongs to.
applications	array	IDs of applications to be assigned to the discovered items.
applicationPrototypes	array	Names of application prototypes to be assigned to the item prototype.
preprocessing	array	Item prototype preprocessing options.

Return values

`(object)` Returns an object containing the IDs of the created item prototypes under the `itemids` property. The order of the returned IDs matches the order of the passed item prototypes.

Examples

Creating an item prototype

Create an item prototype to monitor free disc space on a discovered file system. Discovered items should be numeric Zabbix agent items updated every 30 seconds.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "itemprototype.create",
    "params": {
        "name": "Free disk space on $1",
        "key_": "vfs.fs.size[{#FSNAME},free]",
        "hostid": "10197",
        "ruleid": "27665",
        "type": 0,
        "value_type": 3,
        "interfaceid": "112",
        "delay": "30s"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "itemids": [
            "27666"
        ]
    },
    "id": 1
}
```

Creating an item prototype with preprocessing

Create an item using change per second and a custom multiplier as a second step.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "itemprototype.create",
    "params": {
        "name": "Incoming network traffic on $1",
        "key_": "net.if.in[{#IFNAME}]",
        "hostid": "10001",
        "ruleid": "27665",
        "type": 0,
        "value_type": 3,
        "delay": "60s",
        "units": "bps",
        "interfaceid": "1155",
        "preprocessing": [
            {
                "type": "10",
                "params": "",
                "error_handler": "0",
                "error_handler_params": ""
            },
            {
                "type": "1",
                "params": "8",
                "error_handler": "2",
                "error_handler_params": "10"
            }
        ]
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
```

```
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "itemids": [
            "44211"
        ]
    },
    "id": 1
}
```

Creating dependent item prototype

Create Dependent item prototype for Master item prototype with ID 44211. Only dependencies on same host (template/discovery rule) are allowed, therefore Master and Dependent item should have same hostid and ruleid.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "itemprototype.create",
    "params": {
      "hostid": "10001",
      "ruleid": "27665",
      "name": "Dependent test item prototype",
      "key_": "dependent.prototype",
      "type": "18",
      "master_itemid": "44211",
      "value_type": "3"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "itemids": [
            "44212"
        ]
    },
    "id": 1
}
```

Create HTTP agent item prototype

Create item prototype with URL using user macro, query fields and custom headers.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "itemprototype.create",
    "params": {
        "type": "19",
        "hostid": "10254",
        "ruleid":"28256",
        "interfaceid":"2",
        "name": "api item prototype example",
        "key_": "api_http_item",
        "value_type": "3",
        "url": "{$URL_PROTOTYPE}",
        "query_fields": [
```

```
            {
                "min": "10"
            },
            {
                "max": "100"
            }
        ],
        "headers": {
            "X-Source": "api"
        },
        "delay":"35"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "itemids": [
            "28305"
        ]
    },
    "id": 1
}
```

Source

CItemPrototype::create() in *frontends/php/include/classes/api/services/CItemPrototype.php*.

itemprototype.delete

Description

`object itemprototype.delete(array itemPrototypeIds)`

This method allows to delete item prototypes.

Parameters

`(array)` IDs of the item prototypes to delete.

Return values

`(object)` Returns an object containing the IDs of the deleted item prototypes under the `prototypeids` property.

Examples

Deleting multiple item prototypes

Delete two item prototypes.
Dependent item prototypes are removed automatically if master item or item prototype is deleted.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "itemprototype.delete",
    "params": [
        "27352",
        "27356"
    ],
    "auth": "3a57200802b24cda67c4e4010b50c065",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "prototypeids": [
            "27352",
            "27356"
        ]
    },
    "id": 1
}
```

Source

CItemPrototype::delete() in *frontends/php/include/classes/api/services/CItemPrototype.php*.

itemprototype.get

Description

`integer/array itemprototype.get(object parameters)`

The method allows to retrieve item prototypes according to the given parameters.

Parameters

`(object)` Parameters defining the desired output.

The method supports the following parameters.

Parameter	Type	Description
discoveryids	string/array	Return only item prototypes that belong to the given LLD rules.
graphids	string/array	Return only item prototypes that are used in the given graph prototypes.
hostids	string/array	Return only item prototypes that belong to the given hosts.
inherited	boolean	If set to `true` return only item prototypes inherited from a template.
itemids	string/array	Return only item prototypes with the given IDs.
monitored	boolean	If set to `true` return only enabled item prototypes that belong to monitored hosts.
templated	boolean	If set to `true` return only item prototypes that belong to templates.
templateids	string/array	Return only item prototypes that belong to the given templates.
triggerids	string/array	Return only item prototypes that are used in the given trigger prototypes.
selectApplications	query	Return an applications property with applications that the item prototype belongs to.
selectApplicationPrototypes	query	Return `applicationPrototypes` property with application prototypes linked to item prototype.
selectDiscoveryRule	query	Return a discoveryRule property with the low-level discovery rule that the graph prototype belongs to.
selectGraphs	query	Return a manual/api/reference/graphprototype/object#graph_prototype property with graph prototypes that the item prototype is used in. Supports `count`.
selectHosts	query	Return a hosts property with an array of hosts that the item prototype belongs to.
selectTriggers	query	Return a triggers property with trigger prototypes that the item prototype is used in. Supports `count`.

Parameter	Type	Description
selectPreprocessing	query	Return a `preprocessing` property with item preprocessing options. It has the following properties: `type` - `(string)` The preprocessing option type: 1 - Custom multiplier; 2 - Right trim; 3 - Left trim; 4 - Trim; 5 - Regular expression matching; 6 - Boolean to decimal; 7 - Octal to decimal; 8 - Hexadecimal to decimal; 9 - Simple change; 10 - Change per second; 11 - XML XPath; 12 - JSONPath; 13 - In range; 14 - Matches regular expression; 15 - Does not match regular expression; 16 - Check for error in JSON; 17 - Check for error in XML; 18 - Check for error using regular expression; 19 - Discard unchanged; 20 - Discard unchanged with heartbeat; 21 - JavaScript; 22 - Prometheus pattern; 23 - Prometheus to JSON. `params` - `(string)` Additional parameters used by preprocessing option. Multiple parameters are separated by LF (\n)character. `error_handler` - `(string)` Action type used in case of preprocessing step failure: 0 - Error message is set by Zabbix server; 1 - Discard value; 2 - Set custom value; 3 - Set custom error message. `error_handler_params` - `(string)` Error handler parameters.
filter	object	Return only those results that exactly match the given filter. Accepts an array, where the keys are property names, and the values are either a single value or an array of values to match against. Supports additional filters: `host` - technical name of the host that the item prototype belongs to.
limitSelects	integer	Limits the number of records returned by subselects. Applies to the following subselects: `selectGraphs` - results will be sorted by `name`; `selectTriggers` - results will be sorted by `description`.
sortfield	string/array	Sort the result by the given properties. Possible values are: `itemid`, `name`, `key_`, `delay`, `type` and `status`.

Parameter	Type	Description
countOutput	boolean	These parameters being common for all `get` methods are described in detail in the reference commentary.
editable	boolean	
excludeSearch	boolean	
limit	integer	
output	query	
preservekeys	boolean	
search	object	
searchByAny	boolean	
searchWildcardsEnabled	boolean	
sortorder	string/array	
startSearch	boolean	

Return values

`(integer/array)` Returns either:

- an array of objects;
- the count of retrieved objects, if the `countOutput` parameter has been used.

Examples

Retrieving item prototypes from an LLD rule

Retrieve all item prototypes from an LLD rule.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "itemprototype.get",
    "params": {
        "output": "extend",
        "discoveryids": "27426"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "itemid": "23077",
            "type": "0",
            "snmp_community": "",
            "snmp_oid": "",
            "hostid": "10079",
            "name": "Incoming network traffic on $1",
            "key_": "net.if.in[en0]",
            "delay": "1m",
            "history": "1w",
            "trends": "365d",
            "status": "0",
            "value_type": "3",
            "trapper_hosts": "",
            "units": "bps",
            "snmpv3_securityname": "",
            "snmpv3_securitylevel": "0",
            "snmpv3_authpassphrase": "",
            "snmpv3_privpassphrase": "",
            "formula": "",
            "error": "",
```

```
        "logtimefmt": "",
        "templateid": "0",
        "valuemapid": "0",
        "params": "",
        "ipmi_sensor": "",
        "authtype": "0",
        "username": "",
        "password": "",
        "publickey": "",
        "privatekey": "",
        "flags": "0",
        "interfaceid": "0",
        "port": "",
        "description": "",
        "inventory_link": "0",
        "lifetime": "30d",
        "snmpv3_authprotocol": "0",
        "snmpv3_privprotocol": "0",
        "state": "0",
        "snmpv3_contextname": "",
        "evaltype": "0",
        "jmx_endpoint": "",
        "master_itemid": "0",
        "timeout": "3s",
        "url": "",
        "query_fields": [],
        "posts": "",
        "status_codes": "200",
        "follow_redirects": "1",
        "post_type": "0",
        "http_proxy": "",
        "headers": [],
        "retrieve_mode": "0",
        "request_method": "0",
        "output_format": "0",
        "ssl_cert_file": "",
        "ssl_key_file": "",
        "ssl_key_password": "",
        "verify_peer": "0",
        "verify_host": "0",
        "allow_traps": "0",
        "lastclock": "0",
        "lastns": "0",
        "lastvalue": "0",
        "prevvalue": "0"
    },
    {
        "itemid": "10010",
        "type": "0",
        "snmp_community": "",
        "snmp_oid": "",
        "hostid": "10001",
        "name": "Processor load (1 min average per core)",
        "key_": "system.cpu.load[percpu,avg1]",
        "delay": "1m",
        "history": "1w",
        "trends": "365d",
        "status": "0",
        "value_type": "0",
        "trapper_hosts": "",
        "units": "",
        "snmpv3_securityname": "",
```

```
            "snmpv3_securitylevel": "0",
            "snmpv3_authpassphrase": "",
            "snmpv3_privpassphrase": "",
            "formula": "",
            "error": "",
            "logtimefmt": "",
            "templateid": "0",
            "valuemapid": "0",
            "params": "",
            "ipmi_sensor": "",
            "authtype": "0",
            "username": "",
            "password": "",
            "publickey": "",
            "privatekey": "",
            "flags": "0",
            "interfaceid": "0",
            "port": "",
            "description": "The processor load is calculated as system CPU load divided by number of CPU c
            "inventory_link": "0",
            "lifetime": "0",
            "snmpv3_authprotocol": "0",
            "snmpv3_privprotocol": "0",
            "state": "0",
            "snmpv3_contextname": "",
            "evaltype": "0",
            "jmx_endpoint": "",
            "master_itemid": "0",
            "timeout": "3s",
            "url": "",
            "query_fields": [],
            "posts": "",
            "status_codes": "200",
            "follow_redirects": "1",
            "post_type": "0",
            "http_proxy": "",
            "headers": [],
            "retrieve_mode": "0",
            "request_method": "0",
            "output_format": "0",
            "ssl_cert_file": "",
            "ssl_key_file": "",
            "ssl_key_password": "",
            "verify_peer": "0",
            "verify_host": "0",
            "allow_traps": "0",
            "lastclock": "0",
            "lastns": "0",
            "lastvalue": "0",
            "prevvalue": "0"
        }
    ],
    "id": 1
}
```


Finding dependent item

Find one Dependent item for item with ID ”25545”.

Request:


```
{
    "jsonrpc": "2.0",
    "method": "item.get",
```

```
    "params": {
        "output": "extend",
        "filter": {
            "type": "18",
            "master_itemid": "25545"
        },
        "limit": "1"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "itemid": "25547",
            "type": "18",
            "snmp_community": "",
            "snmp_oid": "",
            "hostid": "10116",
            "name": "Seconds",
            "key_": "apache.status.uptime.seconds",
            "delay": "0",
            "history": "90d",
            "trends": "365d",
            "status": "0",
            "value_type": "3",
            "trapper_hosts": "",
            "units": "",
            "snmpv3_securityname": "",
            "snmpv3_securitylevel": "0",
            "snmpv3_authpassphrase": "",
            "snmpv3_privpassphrase": "",
            "formula": "",
            "error": "",
            "logtimefmt": "",
            "templateid": "0",
            "valuemapid": "0",
            "params": "",
            "ipmi_sensor": "",
            "authtype": "0",
            "username": "",
            "password": "",
            "publickey": "",
            "privatekey": "",
            "flags": "0",
            "interfaceid": "0",
            "port": "",
            "description": "",
            "inventory_link": "0",
            "lifetime": "30d",
            "snmpv3_authprotocol": "0",
            "snmpv3_privprotocol": "0",
            "state": "0",
            "snmpv3_contextname": "",
            "evaltype": "0",
            "master_itemid": "25545",
            "jmx_endpoint": "",
            "master_itemid": "0",
            "timeout": "3s",
```

```
            "url": "",
            "query_fields": [],
            "posts": "",
            "status_codes": "200",
            "follow_redirects": "1",
            "post_type": "0",
            "http_proxy": "",
            "headers": [],
            "retrieve_mode": "0",
            "request_method": "0",
            "output_format": "0",
            "ssl_cert_file": "",
            "ssl_key_file": "",
            "ssl_key_password": "",
            "verify_peer": "0",
            "verify_host": "0",
            "allow_traps": "0",
            "lastclock": "0",
            "lastns": "0",
            "lastvalue": "0",
            "prevvalue": "0"
        }
    ],
    "id": 1
}
```


Find HTTP agent item prototype

Find HTTP agent item prototype with request method HEAD for specific host id.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "itemprototype.get",
    "params": {
        "hostids": "10254",
        "filter": {
            "type": "19",
            "request_method": "3"
        }
    },
    "id": 17,
    "auth": "d678e0b85688ce578ff061bd29a20d3b"
}
```

Response:


```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "itemid": "28257",
            "type": "19",
            "snmp_community": "",
            "snmp_oid": "",
            "hostid": "10254",
            "name": "discovered",
            "key_": "item[{#INAME}]",
            "delay": "{#IUPDATE}",
            "history": "90d",
            "trends": "30d",
            "status": "0",
            "value_type": "3",
            "trapper_hosts": "",
```

```
            "units": "",
            "snmpv3_securityname": "",
            "snmpv3_securitylevel": "0",
            "snmpv3_authpassphrase": "",
            "snmpv3_privpassphrase": "",
            "formula": "",
            "error": "",
            "logtimefmt": "",
            "templateid": "28255",
            "valuemapid": "0",
            "params": "",
            "ipmi_sensor": "",
            "authtype": "0",
            "username": "",
            "password": "",
            "publickey": "",
            "privatekey": "",
            "flags": "2",
            "interfaceid": "2",
            "port": "",
            "description": "",
            "inventory_link": "0",
            "lifetime": "30d",
            "snmpv3_authprotocol": "0",
            "snmpv3_privprotocol": "0",
            "state": "0",
            "snmpv3_contextname": "",
            "evaltype": "0",
            "jmx_endpoint": "",
            "master_itemid": "0",
            "timeout": "3s",
            "url": "{#IURL}",
            "query_fields": [],
            "posts": "",
            "status_codes": "",
            "follow_redirects": "0",
            "post_type": "0",
            "http_proxy": "",
            "headers": [],
            "retrieve_mode": "0",
            "request_method": "3",
            "output_format": "0",
            "ssl_cert_file": "",
            "ssl_key_file": "",
            "ssl_key_password": "",
            "verify_peer": "0",
            "verify_host": "0",
            "allow_traps": "0"
        }
    ],
    "id": 17
}
```


See also

- Application
- Host
- Graph prototype
- Trigger prototype

Source

CItemPrototype::get() in *frontends/php/include/classes/api/services/CItemPrototype.php*.

itemprototype.update

Description

`object itemprototype.update(object/array itemPrototypes)`

This method allows to update existing item prototypes.

Parameters

`(object/array)` Item prototype properties to be updated.

The `itemid` property must be defined for each item prototype, all other properties are optional. Only the passed properties will be updated, all others will remain unchanged.

Additionally to the standard item prototype properties, the method accepts the following parameters.

Parameter	Type	Description
applications	array	IDs of the applications to replace the current applications.
applicationPrototypes	array	Names of the application prototypes to replace the current application prototypes.
preprocessing	array	Item prototype preprocessing options to replace the current preprocessing options.

Return values

`(object)` Returns an object containing the IDs of the updated item prototypes under the `itemids` property.

Examples

Changing the interface of an item prototype

Change the host interface that will be used by discovered items.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "itemprototype.update",
    "params": {
        "itemid": "27428",
        "interfaceid": "132"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "itemids": [
            "27428"
        ]
    },
    "id": 1
}
```

Update dependent item prototype

Update Dependent item prototype with new Master item prototype ID. Only dependencies on same host (template/discovery rule) are allowed, therefore Master and Dependent item should have same hostid and ruleid.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "itemprototype.update",
```

```
    "params": {
        "master_itemid": "25570",
        "itemid": "189030"
    },
    "auth": "700ca65537074ec963db7efabda78259",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "itemids": [
            "189030"
        ]
    },
    "id": 1
}
```

Update HTTP agent item prototype

Change query fields and remove all custom headers.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "itemprototype.update",
    "params": {
        "itemid":"28305",
        "query_fields": [
            {
                "random": "qwertyuiopasdfghjklzxcvbnm"
            }
        ],
        "headers": []
    }
    "auth": "700ca65537074ec963db7efabda78259",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "itemids": [
            "28305"
        ]
    },
    "id": 1
}
```

Updating item preprocessing options

Update an item prototype with item preprocessing rule “Custom multiplier”.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "itemprototype.update",
    "params": {
        "itemid": "44211",
        "preprocessing": [
            {
                "type": "1",
```

```
                "params": "4",
                "error_handler": "2",
                "error_handler_params": "5"
            }
        ]
    },
    "auth": "700ca65537074ec963db7efabda78259",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "itemids": [
            "44211"
        ]
    },
    "id": 1
}
```

Source

CItemPrototype::update() in *frontends/php/include/classes/api/services/CItemPrototype.php*.

LLD rule

This class is designed to work with low level discovery rules.

Object references:

- LLD rule

Available methods:

- discoveryrule.copy - copying LLD rules
- discoveryrule.create - creating new LLD rules
- discoveryrule.delete - deleting LLD rules
- discoveryrule.get - retrieving LLD rules
- discoveryrule.update - updating LLD rules

> LLD rule object

The following objects are directly related to the `discoveryrule` API.

LLD rule

The low-level discovery rule object has the following properties.

Property	Type	Description
itemid	string	*(readonly)* ID of the LLD rule.
delay (required)	string	Update interval of the LLD rule. Accepts seconds or time unit with suffix and with or without one or more custom intervals that consist of either flexible intervals and scheduling intervals as serialized strings. Also accepts user macros. Flexible intervals could be written as two macros separated by a forward slash. Intervals are separated by a semicolon.
hostid (required)	string	ID of the host that the LLD rule belongs to.

Property	Type	Description
interfaceid (required)	string	ID of the LLD rule's host interface. Used only for host LLD rules. Not required for Zabbix agent (active), Zabbix internal, Zabbix trapper, dependent and database monitor LLD rules.
key_ (required)	string	LLD rule key.
name (required)	string	Name of the LLD rule.
type (required)	integer	Type of the LLD rule. Possible values: 0 - Zabbix agent; 1 - SNMPv1 agent; 2 - Zabbix trapper; 3 - simple check; 4 - SNMPv2 agent; 5 - Zabbix internal; 6 - SNMPv3 agent; 7 - Zabbix agent (active); 10 - external check; 11 - database monitor; 12 - IPMI agent; 13 - SSH agent; 14 - TELNET agent; 16 - JMX agent; 18 - Dependent item; 19 - HTTP agent;
url (required)	string	URL string, required for HTTP agent LLD rule. Supports user macros, {HOST.IP}, {HOST.CONN}, {HOST.DNS}, {HOST.HOST}, {HOST.NAME}, {ITEM.ID}, {ITEM.KEY}.
allow_traps	integer	HTTP agent LLD rule field. Allow to populate value as in trapper item type also. 0 - *(default)* Do not allow to accept incoming data. 1 - Allow to accept incoming data.
authtype	integer	Used only by SSH agent or HTTP agent LLD rules. SSH agent authentication method possible values: 0 - *(default)* password; 1 - public key. HTTP agent authentication method possible values: 0 - *(default)* none 1 - basic 2 - NTLM
description	string	Description of the LLD rule.
error	string	*(readonly)* Error text if there are problems updating the LLD rule.
follow_redirects	integer	HTTP agent LLD rule field. Follow respose redirects while pooling data. 0 - Do not follow redirects. 1 - *(default)* Follow redirects.
headers	object	HTTP agent LLD rule field. Object with HTTP(S) request headers, where header name is used as key and header value as value. Example: { "User-Agent": "Zabbix" }

Property	Type	Description
http_proxy	string	HTTP agent LLD rule field. HTTP(S) proxy connection string.
ipmi_sensor	string	IPMI sensor. Used only by IPMI LLD rules.
jmx_endpoint	string	JMX agent custom connection string. Default value: service:jmx:rmi:///jndi/rmi://{HOST.CONN}:{HOST.PORT}/jmxrmi
lifetime	string	Time period after which items that are no longer discovered will be deleted. Accepts seconds, time unit with suffix and user macro. Default: 30d.
master_itemid	integer	Master item ID. Recursion up to 3 dependent items and maximum count of dependent items equal to 999 are allowed. Discovery rule cannot be master item for another discovery rule. Required for Dependent item.
output_format	integer	HTTP agent LLD rule field. Should response converted to JSON. 0 - *(default)* Store raw. 1 - Convert to JSON.
params	string	Additional parameters depending on the type of the LLD rule: - executed script for SSH and Telnet LLD rules; - SQL query for database monitor LLD rules; - formula for calculated LLD rules.
password	string	Password for authentication. Used by simple check, SSH, Telnet, database monitor, JMX and HTTP agent LLD rules.
port	string	Port used by the LLD rule. Used only by SNMP LLD rules.
post_type	integer	HTTP agent LLD rule field. Type of post data body stored in posts property. 0 - *(default)* Raw data. 2 - JSON data. 3 - XML data.
posts	string	HTTP agent LLD rule field. HTTP(S) request body data. Used with post_type.
privatekey	string	Name of the private key file.
publickey	string	Name of the public key file.
query_fields	array	HTTP agent LLD rule field. Query parameters. Array of objects with ’key’:’value’ pairs, where value can be empty string.
request_method	integer	HTTP agent LLD rule field. Type of request method. 0 - *(default)* GET 1 - POST 2 - PUT 3 - HEAD
retrieve_mode	integer	HTTP agent LLD rule field. What part of response should be stored. 0 - *(default)* Body. 1 - Headers. 2 - Both body and headers will be stored. For request_method HEAD only 1 is allowed value.
snmp_community	string	SNMP community. Required for SNMPv1 and SNMPv2 LLD rules.

Property	Type	Description
snmp_oid	string	SNMP OID.
snmpv3_authpassphrase	string	SNMPv3 auth passphrase. Used only by SNMPv3 LLD rules.
snmpv3_authprotocol	integer	SNMPv3 authentication protocol. Used only by SNMPv3 LLD rules. Possible values: 0 - *(default)* MD5; 1 - SHA.
snmpv3_contextname	string	SNMPv3 context name. Used only by SNMPv3 checks.
snmpv3_privpassphrase	string	SNMPv3 priv passphrase. Used only by SNMPv3 LLD rules.
snmpv3_privprotocol	integer	SNMPv3 privacy protocol. Used only by SNMPv3 LLD rules. Possible values: 0 - *(default)* DES; 1 - AES.
snmpv3_securitylevel	integer	SNMPv3 security level. Used only by SNMPv3 LLD rules. Possible values: 0 - noAuthNoPriv; 1 - authNoPriv; 2 - authPriv.
snmpv3_securityname	string	SNMPv3 security name. Used only by SNMPv3 LLD rules.
ssl_cert_file	string	HTTP agent LLD rule field. Public SSL Key file path.
ssl_key_file	string	HTTP agent LLD rule field. Private SSL Key file path.
ssl_key_password	string	HTTP agent LLD rule field. Password for SSL Key file.
state	integer	*(readonly)* State of the LLD rule. Possible values: 0 - *(default)* normal; 1 - not supported.
status	integer	Status of the LLD rule. Possible values: 0 - *(default)* enabled LLD rule; 1 - disabled LLD rule.
status_codes	string	HTTP agent LLD rule field. Ranges of required HTTP status codes separated by commas. Also supports user macros as part of comma separated list. Example: 200,200-{$M},{$M},200-400
templateid	string	(readonly) ID of the parent template LLD rule.
timeout	string	HTTP agent LLD rule field. Item data polling request timeout. Support user macros. default: 3s maximum value: 60s
trapper_hosts	string	Allowed hosts. Used by trapper LLD rules or HTTP agent LLD rules.
username	string	Username for authentication. Used by simple check, SSH, Telnet, database monitor, JMX and HTTP agent LLD rules. Required by SSH and Telnet LLD rules.
verify_host	integer	HTTP agent LLD rule field. Validate host name in URL is in Common Name field or a Subject Alternate Name field of host certificate. 0 - *(default)* Do not validate. 1 - Validate.

Property	Type	Description
verify_peer	integer	HTTP agent LLD rule field. Validate is host certificate authentic. 0 - *(default)* Do not validate. 1 - Validate.

LLD rule filter

The LLD rule filter object defines a set of conditions that can be used to filter discovered objects. It has the following properties:

Property	Type	Description
conditions (required)	array	Set of filter conditions to use for filtering results.
evaltype (required)	integer	Filter condition evaluation method. Possible values: 0 - and/or; 1 - and; 2 - or; 3 - custom expression.
eval_formula	string	*(readonly)* Generated expression that will be used for evaluating filter conditions. The expression contains IDs that reference specific filter conditions by its `formulaid`. The value of `eval_formula` is equal to the value of `formula` for filters with a custom expression.
formula	string	User-defined expression to be used for evaluating conditions of filters with a custom expression. The expression must contain IDs that reference specific filter conditions by its `formulaid`. The IDs used in the expression must exactly match the ones defined in the filter conditions: no condition can remain unused or omitted. Required for custom expression filters.

LLD rule filter condition

The LLD rule filter condition object defines a separate check to perform on the value of an LLD macro. It has the following properties:

Property	Type	Description
macro (required)	string	LLD macro to perform the check on.
value (required)	string	Value to compare with.
formulaid	string	Arbitrary unique ID that is used to reference the condition from a custom expression. Can only contain capital-case letters. The ID must be defined by the user when modifying filter conditions, but will be generated anew when requesting them afterward.
operator	integer	Condition operator. Possible values: 8 - *(default)* matches regular expression; 9 - does not match regular expression.

Note:
To better understand how to use filters with various types of expressions, see examples on the discoveryrule.get and discoveryrule.create method pages.

LLD macro path

The LLD macro path has the following properties:

Property	Type	Description
lld_macro (required)	string	LLD macro.
path (required)	string	Selector for value which will be assigned to corresponding macro.

LLD rule preprocessing

The LLD rule preprocessing object has the following properties.

Property	Type	Description
type (required)	integer	The preprocessing option type. Possible values: 5 - Regular expression matching; 11 - XML XPath; 12 - JSONPath; 15 - Does not match regular expression; 16 - Check for error in JSON; 17 - Check for error in XML; 20 - Discard unchanged with heartbeat; 23 - Prometheus to JSON; 24 - CSV to JSON.
params (required)	string	Additional parameters used by preprocessing option. Multiple parameters are separated by LF (\n) character.
error_handler (required)	integer	Action type used in case of preprocessing step failure. Possible values: 0 - Error message is set by Zabbix server; 1 - Discard value; 2 - Set custom value; 3 - Set custom error message.
error_handler_params (required)	string	Error handler parameters. Used with `error_handler`. Must be empty, if `error_handler` is 0 or 1. Can be empty if, `error_handler` is 2. Cannot be empty, if `error_handler` is 3.

The following parameters and error handlers are supported for each preprocessing type.

Preprocessing type	Name	Parameter 1	Parameter 2	Parameter 3	Supported error handlers
5	Regular expression	pattern[1]	output[2]		0, 1, 2, 3
11	XML XPath	path[3]			0, 1, 2, 3
12	JSONPath	path[3]			0, 1, 2, 3
15	Does not match regular expression	pattern[1]			0, 1, 2, 3

Preprocessing type	Name	Parameter 1	Parameter 2	Parameter 3	Supported error handlers
16	Check for error in JSON	path[3]			0, 1, 2, 3
17	Check for error in XML	path[3]			0, 1, 2, 3
20	Discard unchanged with heartbeat	seconds[4, 5, 6]			
23	Prometheus to JSON	pattern[5, 7]			0, 1, 2, 3
24	CSV to JSON	character[2]	character[2]	0,1	0, 1, 2, 3

[1] regular expression
[2] string
[3] JSONPath or XML XPath
[4] positive integer (with support of time suffixes, e.g. 30s, 1m, 2h, 1d)
[5] user macro
[6] LLD macro
[7] Prometheus pattern following the syntax: `<metric name>{<label name>="<label value>", ...} == <value>`. Each Prometheus pattern component (metric, label name, label value and metric value) can be user macro.
[8] Prometheus output following the syntax: `<label name>`.

discoveryrule.copy

Description

`object discoveryrule.copy(object parameters)`

This method allows to copy LLD rules with all of the prototypes to the given hosts.

Parameters

`(object)` Parameters defining the LLD rules to copy and the target hosts.

Parameter	Type	Description
discoveryids	array	IDs of the LLD rules to be copied.
hostids	array	IDs of the hosts to copy the LLD rules to.

Return values

`(boolean)` Returns `true` if the copying was successful.

Examples

Copy an LLD rule to multiple hosts

Copy an LLD rule to two hosts.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "discoveryrule.copy",
    "params": {
        "discoveryids": [
            "27426"
        ],
        "hostids": [
            "10196",
            "10197"
        ]
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": true,
    "id": 1
}
```

Source

CDiscoveryrule::copy() in *frontends/php/include/classes/api/services/CDiscoveryRule.php*.

discoveryrule.create

Description

`object discoveryrule.create(object/array lldRules)`

This method allows to create new LLD rules.

Parameters

`(object/array)` LLD rules to create.

Additionally to the standard LLD rule properties, the method accepts the following parameters.

Parameter	Type	Description
filter	object	LLD rule filter object for the LLD rule.
preprocessing	array	LLD rule preprocessing options.
lld_macro_paths	array	LLD rule lld_macro_path options.

Return values

`(object)` Returns an object containing the IDs of the created LLD rules under the `itemids` property. The order of the returned IDs matches the order of the passed LLD rules.

Examples

Creating an LLD rule

Create a Zabbix agent LLD rule to discover mounted file systems. Discovered items will be updated every 30 seconds.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "discoveryrule.create",
    "params": {
        "name": "Mounted filesystem discovery",
        "key_": "vfs.fs.discovery",
        "hostid": "10197",
        "type": "0",
```

```
        "interfaceid": "112",
        "delay": "30s"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "itemids": [
            "27665"
        ]
    },
    "id": 1
}
```

Using a filter

Create an LLD rule with a set of conditions to filter the results by. The conditions will be grouped together using the logical "and" operator.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "discoveryrule.create",
    "params": {
        "name": "Filtered LLD rule",
        "key_": "lld",
        "hostid": "10116",
        "type": "0",
        "interfaceid": "13",
        "delay": "30s",
        "filter": {
            "evaltype": 1,
            "conditions": [
                {
                    "macro": "{#MACRO1}",
                    "value": "@regex1"
                },
                {
                    "macro": "{#MACRO2}",
                    "value": "@regex2"
                },
                {
                    "macro": "{#MACRO3}",
                    "value": "@regex3"
                }
            ]
        }
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "itemids": [
            "27665"
        ]
```

```
    },
    "id": 1
}
```

Creating a LLD rule with macro paths

Request:

```
{
    "jsonrpc": "2.0",
    "method": "discoveryrule.create",
    "params": {
        "name": "LLD rule with LLD macro paths",
        "key_": "lld",
        "hostid": "10116",
        "type": "0",
        "interfaceid": "13",
        "delay": "30s",
        "lld_macro_paths": [
            {
                "lld_macro": "{#MACRO1}",
                "path": "$.path.1"
            },
            {
                "lld_macro": "{#MACRO2}",
                "path": "$.path.2"
            }
        ]
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "itemids": [
            "27665"
        ]
    },
    "id": 1
}
```

Using a custom expression filter

Create an LLD rule with a filter that will use a custom expression to evaluate the conditions. The LLD rule must only discover objects the "{#MACRO1}" macro value of which matches both regular expression "regex1" and "regex2", and the value of "{#MACRO2}" matches either "regex3" or "regex4". The formula IDs "A", "B", "C" and "D" have been chosen arbitrarily.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "discoveryrule.create",
    "params": {
        "name": "Filtered LLD rule",
        "key_": "lld",
        "hostid": "10116",
        "type": "0",
        "interfaceid": "13",
        "delay": "30s",
        "filter": {
            "evaltype": 3,
            "formula": "(A and B) and (C or D)",
```

```
            "conditions": [
                {
                    "macro": "{#MACRO1}",
                    "value": "@regex1",
                    "formulaid": "A"
                },
                {
                    "macro": "{#MACRO1}",
                    "value": "@regex2",
                    "formulaid": "B"
                },
                {
                    "macro": "{#MACRO2}",
                    "value": "@regex3",
                    "formulaid": "C"
                },
                {
                    "macro": "{#MACRO2}",
                    "value": "@regex4",
                    "formulaid": "D"
                }
            ]
        }
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "itemids": [
            "27665"
        ]
    },
    "id": 1
}
```

Using custom query fields and headers

Create LLD rule with custom query fields and headers.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "discoveryrule.create",
    "params": {
        "hostid": "10257",
        "interfaceid": "5",
        "type": "19",
        "name": "API HTTP agent",
        "key_": "api_discovery_rule",
        "value_type": "3",
        "delay": "5s",
        "url": "http://127.0.0.1?discoverer.php",
        "query_fields": [
            {
                "mode": "json"
            },
            {
                "elements":"2"
            }
```

```
        ],
        "headers": {
            "X-Type": "api",
            "Authorization": "Bearer mF_A.B5f-2.1JcM"
        },
        "allow_traps": "1",
        "trapper_hosts": "127.0.0.1",
        "id": 35,
        "auth": "d678e0b85688ce578ff061bd29a20d3b",
    }
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "itemids": [
            "28336"
        ]
    },
    "id": 35
}
```

Creating a LLD rule with preprocessing

Request:

```
{
    "jsonrpc": "2.0",
    "method": "discoveryrule.create",
    "params": {
        "name": "Discovery rule with preprocessing",
        "key_": "lld.with.preprocessing",
        "hostid": "10001",
        "ruleid": "27665",
        "type": 0,
        "value_type": 3,
        "delay": "60s",
        "interfaceid": "1155",
        "preprocessing": [
            {
                "type": "20",
                "params": "20",
                "error_handler": "0",
                "error_handler_params": ""
            }
        ]
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "itemids": [
            "44211"
        ]
    },
    "id": 1
}
```

See also

- LLD rule filter
- LLD macro paths
- LLD rule preprocessing

Source

CDiscoveryRule::create() in *frontends/php/include/classes/api/services/CDiscoveryRule.php*.

discoveryrule.delete

Description

`object discoveryrule.delete(array lldRuleIds)`

This method allows to delete LLD rules.

Parameters

`(array)` IDs of the LLD rules to delete.

Return values

`(object)` Returns an object containing the IDs of the deleted LLD rules under the `itemids` property.

Examples

Deleting multiple LLD rules

Delete two LLD rules.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "discoveryrule.delete",
    "params": [
        "27665",
        "27668"
    ],
    "auth": "3a57200802b24cda67c4e4010b50c065",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "ruleids": [
            "27665",
            "27668"
        ]
    },
    "id": 1
}
```

Source

CDiscoveryRule::delete() in *frontends/php/include/classes/api/services/CDiscoveryRule.php*.

discoveryrule.get

Description

`integer/array discoveryrule.get(object parameters)`

The method allows to retrieve LLD rules according to the given parameters.

Parameters

`(object)` Parameters defining the desired output.

The method supports the following parameters.

Parameter	Type	Description
itemids	string/array	Return only LLD rules with the given IDs.
hostids	string/array	Return only LLD rules that belong to the given hosts.
inherited	boolean	If set to `true` return only LLD rules inherited from a template.
interfaceids	string/array	Return only LLD rules use the given host interfaces.
monitored	boolean	If set to `true` return only enabled LLD rules that belong to monitored hosts.
templated	boolean	If set to `true` return only LLD rules that belong to templates.
templateids	string/array	Return only LLD rules that belong to the given templates.
selectFilter	query	Return a filter property with data of the filter used by the LLD rule.
selectGraphs	query	Returns a graphs property with graph prototypes that belong to the LLD rule. Supports `count`.
selectHostPrototypes	query	Return a hostPrototypes property with host prototypes that belong to the LLD rule. Supports `count`.
selectHosts	query	Return a hosts property with an array of hosts that the LLD rule belongs to.
selectItems	query	Return an items property with item prototypes that belong to the LLD rule. Supports `count`.
selectTriggers	query	Return a triggers property with trigger prototypes that belong to the LLD rule. Supports `count`.
selectApplicationPrototypes	query	Return an `applicationPrototypes` property with application prototypes that belong to all item prototypes that belong to this LLD rule.
selectLLDMacroPaths	query	Return an lld_macro_paths property with a list of LLD macros and paths to values assigned to each corresponding macro.

Parameter	Type	Description
selectPreprocessing	query	Return a `preprocessing` property with LLD rule preprocessing options. It has the following properties: `type` - `(string)` The preprocessing option type: 5 - Regular expression matching; 11 - XML XPath; 12 - JSONPath; 15 - Does not match regular expression; 16 - Check for error in JSON; 17 - Check for error in XML; 20 - Discard unchanged with heartbeat; 23 - Prometheus to JSON. `params` - `(string)` Additional parameters used by preprocessing option. Multiple parameters are separated by LF (\n) character. `error_handler` - `(string)` Action type used in case of preprocessing step failure: 0 - Error message is set by Zabbix server; 1 - Discard value; 2 - Set custom value; 3 - Set custom error message. `error_handler_params` - `(string)` Error handler parameters.
filter	object	Return only those results that exactly match the given filter. Accepts an array, where the keys are property names, and the values are either a single value or an array of values to match against. Supports additional filters: `host` - technical name of the host that the LLD rule belongs to.
limitSelects	integer	Limits the number of records returned by subselects. Applies to the following subselects: `selctItems`; `selectGraphs`; `selectTriggers`.
sortfield	string/array	Sort the result by the given properties. Possible values are: `itemid`, `name`, `key_`, `delay`, `type` and `status`.
countOutput	boolean	These parameters being common for all `get` methods are described in detail in the reference commentary.
editable	boolean	
excludeSearch	boolean	
limit	integer	
output	query	
preservekeys	boolean	
search	object	
searchByAny	boolean	
searchWildcardsEnabled	boolean	
sortorder	string/array	
startSearch	boolean	

Return values

(integer/array) Returns either:

- an array of objects;
- the count of retrieved objects, if the countOutput parameter has been used.

Examples

Retrieving discovery rules from a host

Retrieve all discovery rules from host "10202".

Request:

```
{
    "jsonrpc": "2.0",
    "method": "discoveryrule.get",
    "params": {
        "output": "extend",
        "hostids": "10202"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "itemid": "27425",
            "type": "0",
            "snmp_community": "",
            "snmp_oid": "",
            "hostid": "10202",
            "name": "Network interface discovery",
            "key_": "net.if.discovery",
            "delay": "1h",
            "state": "0",
            "status": "0",
            "trapper_hosts": "",
            "snmpv3_securityname": "",
            "snmpv3_securitylevel": "0",
            "snmpv3_authpassphrase": "",
            "snmpv3_privpassphrase": "",
            "error": "",
            "templateid": "22444",
            "params": "",
            "ipmi_sensor": "",
            "authtype": "0",
            "username": "",
            "password": "",
            "publickey": "",
            "privatekey": "",
            "interfaceid": "119",
            "port": "",
            "description": "Discovery of network interfaces as defined in global regular expression \"Netw
            "lifetime": "30d",
            "snmpv3_authprotocol": "0",
            "snmpv3_privprotocol": "0",
            "snmpv3_contextname": "",
            "jmx_endpoint": "",
            "master_itemid": "0",
            "timeout": "3s",
            "url": "",
            "query_fields": [],
            "posts": "",
```

```
            "status_codes": "200",
            "follow_redirects": "1",
            "post_type": "0",
            "http_proxy": "",
            "headers": [],
            "retrieve_mode": "0",
            "request_method": "0",
            "ssl_cert_file": "",
            "ssl_key_file": "",
            "ssl_key_password": "",
            "verify_peer": "0",
            "verify_host": "0",
            "allow_traps": "0"
        },
        {
            "itemid": "27426",
            "type": "0",
            "snmp_community": "",
            "snmp_oid": "",
            "hostid": "10202",
            "name": "Mounted filesystem discovery",
            "key_": "vfs.fs.discovery",
            "delay": "1h",
            "state": "0",
            "status": "0",
            "trapper_hosts": "",
            "snmpv3_securityname": "",
            "snmpv3_securitylevel": "0",
            "snmpv3_authpassphrase": "",
            "snmpv3_privpassphrase": "",
            "error": "",
            "templateid": "22450",
            "params": "",
            "ipmi_sensor": "",
            "authtype": "0",
            "username": "",
            "password": "",
            "publickey": "",
            "privatekey": "",
            "interfaceid": "119",
            "port": "",
            "description": "Discovery of file systems of different types as defined in global regular expr
            "lifetime": "30d",
            "snmpv3_authprotocol": "0",
            "snmpv3_privprotocol": "0",
            "snmpv3_contextname": "",
            "jmx_endpoint": "",
            "master_itemid": "0",
            "timeout": "3s",
            "url": "",
            "query_fields": [],
            "posts": "",
            "status_codes": "200",
            "follow_redirects": "1",
            "post_type": "0",
            "http_proxy": "",
            "headers": [],
            "retrieve_mode": "0",
            "request_method": "0",
            "ssl_cert_file": "",
            "ssl_key_file": "",
            "ssl_key_password": "",
```

```
            "verify_peer": "0",
            "verify_host": "0",
            "allow_traps": "0"
        }
    ],
    "id": 1
}
```

Retrieving filter conditions

Retrieve the name of the LLD rule "24681" and its filter conditions. The filter uses the "and" evaluation type, so the `formula` property is empty and `eval_formula` is generated automatically.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "discoveryrule.get",
    "params": {
        "output": [
            "name"
        ],
        "selectFilter": "extend",
        "itemids": ["24681"]
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "itemid": "24681",
            "name": "Filtered LLD rule",
            "filter": {
                "evaltype": "1",
                "formula": "",
                "conditions": [
                    {
                        "macro": "{#MACRO1}",
                        "value": "@regex1",
                        "operator": "8",
                        "formulaid": "A"
                    },
                    {
                        "macro": "{#MACRO2}",
                        "value": "@regex2",
                        "operator": "8",
                        "formulaid": "B"
                    },
                    {
                        "macro": "{#MACRO3}",
                        "value": "@regex3",
                        "operator": "8",
                        "formulaid": "C"
                    }
                ],
                "eval_formula": "A and B and C"
            }
        }
    ],
    "id": 1
```

```
}
```

Retrieve LLD rule by URL

Retrieve LLD rule for host by rule URL field value. Only exact match of URL string defined for LLD rule is supported.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "discoveryrule.get",
    "params": {
        "hostids": "10257",
        "filter": {
            "type": "19",
            "url": "http://127.0.0.1/discoverer.php"
        }
    },
    "id": 39,
    "auth": "d678e0b85688ce578ff061bd29a20d3b"
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "itemid": "28336",
            "type": "19",
            "snmp_community": "",
            "snmp_oid": "",
            "hostid": "10257",
            "name": "API HTTP agent",
            "key_": "api_discovery_rule",
            "delay": "5s",
            "history": "90d",
            "trends": "0",
            "status": "0",
            "value_type": "4",
            "trapper_hosts": "",
            "units": "",
            "snmpv3_securityname": "",
            "snmpv3_securitylevel": "0",
            "snmpv3_authpassphrase": "",
            "snmpv3_privpassphrase": "",
            "error": "",
            "logtimefmt": "",
            "templateid": "0",
            "valuemapid": "0",
            "params": "",
            "ipmi_sensor": "",
            "authtype": "0",
            "username": "",
            "password": "",
            "publickey": "",
            "privatekey": "",
            "flags": "1",
            "interfaceid": "5",
            "port": "",
            "description": "",
            "inventory_link": "0",
            "lifetime": "30d",
            "snmpv3_authprotocol": "0",
            "snmpv3_privprotocol": "0",
```

```
            "state": "0",
            "snmpv3_contextname": "",
            "jmx_endpoint": "",
            "master_itemid": "0",
            "timeout": "3s",
            "url": "http://127.0.0.1/discoverer.php",
            "query_fields": [
                {
                    "mode": "json"
                },
                {
                    "elements": "2"
                }
            ],
            "posts": "",
            "status_codes": "200",
            "follow_redirects": "1",
            "post_type": "0",
            "http_proxy": "",
            "headers": {
                "X-Type": "api",
                "Authorization": "Bearer mF_A.B5f-2.1JcM"
            },
            "retrieve_mode": "0",
            "request_method": "1",
            "ssl_cert_file": "",
            "ssl_key_file": "",
            "ssl_key_password": "",
            "verify_peer": "0",
            "verify_host": "0",
            "allow_traps": "0"
        }
    ],
    "id": 39
}
```


See also

- Graph prototype
- Host
- Item prototype
- LLD rule filter
- Trigger prototype

Source

CDiscoveryRule::get() in *frontends/php/include/classes/api/services/CDiscoveryRule.php*.

discoveryrule.update

Description

`object discoveryrule.update(object/array lldRules)`

This method allows to update existing LLD rules.

Parameters

`(object/array)` LLD rule properties to be updated.

The `itemid` property must be defined for each LLD rule, all other properties are optional. Only the passed properties will be updated, all others will remain unchanged.

Additionally to the standard LLD rule properties, the method accepts the following parameters.

Parameter	Type	Description
filter	object	LLD rule filter object to replace the current filter.
preprocessing	array	LLD rule preprocessing options to replace the current preprocessing options.
lld_macro_paths	array	LLD rule lld_macro_path options.

Return values

(`object`) Returns an object containing the IDs of the updated LLD rules under the `itemids` property.

Examples

Adding a filter to an LLD rule

Add a filter so that the contents of the *{#FSTYPE}* macro would match the *@File systems for discovery* regexp.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "discoveryrule.update",
    "params": {
        "itemid": "22450",
        "filter": {
            "evaltype": 1,
            "conditions": [
                {
                    "macro": "{#FSTYPE}",
                    "value": "@File systems for discovery"
                }
            ]
        }
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "itemids": [
            "22450"
        ]
    },
    "id": 1
}
```

Adding LLD macro paths

Request:

```
{
    "jsonrpc": "2.0",
    "method": "discoveryrule.update",
    "params": {
        "itemid": "22450",
        "lld_macro_paths": [
            {
                "lld_macro": "{#MACRO1}",
                "path": "$.json.path"
            }
        ]
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
```

```
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "itemids": [
            "22450"
        ]
    },
    "id": 1
}
```

Disable trapping

Disable LLD trapping for discovery rule.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "discoveryrule.update",
    "params": {
        "itemid": "28336",
        "allow_traps": "0"
    },
    "id": 36,
    "auth": "d678e0b85688ce578ff061bd29a20d3b"
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "itemids": [
            "28336"
        ]
    },
    "id": 36
}
```

Updating LLD rule preprocessing options

Update an LLD rule with preprocessing rule “JSONPath”.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "discoveryrule.update",
    "params": {
        "itemid": "44211",
        "preprocessing": [
            {
                "type": "12",
                "params": "$.path.to.json",
                "error_handler": "2",
                "error_handler_params": "5"
            }
        ]
    },
    "auth": "700ca65537074ec963db7efabda78259",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "itemids": [
            "44211"
        ]
    },
    "id": 1
}
```

Source

CDiscoveryRule::update() in *frontends/php/include/classes/api/services/CDiscoveryRule.php*.

Maintenance

This class is designed to work with maintenances.

Object references:

- Maintenance
- Time period

Available methods:

- maintenance.create - creating new maintenances
- maintenance.delete - deleting maintenances
- maintenance.get - retrieving maintenances
- maintenance.update - updating maintenances

> Maintenance object

The following objects are directly related to the `maintenance` API.

Maintenance

The maintenance object has the following properties.

Property	Type	Description
maintenanceid	string	*(readonly)* ID of the maintenance.
name (required)	string	Name of the maintenance.
active_since (required)	timestamp	Time when the maintenance becomes active.
active_till (required)	timestamp	Time when the maintenance stops being active.
description	string	Description of the maintenance.
maintenance_type	integer	Type of maintenance. Possible values: 0 - *(default)* with data collection; 1 - without data collection.
tags_evaltype	integer	Problem tag evaluation method. Possible values: 0 - *(default)* And/Or; 2 - Or.

Time period

The time period object is used to define periods when the maintenance must come into effect. It has the following properties.

Property	Type	Description
timeperiodid	string	*(readonly)* ID of the maintenance.
day	integer	Day of the month when the maintenance must come into effect. Required only for monthly time periods.
dayofweek	integer	Days of the week when the maintenance must come into effect. Days are stored in binary form with each bit representing the corresponding day. For example, 4 equals 100 in binary and means, that maintenance will be enabled on Wednesday. Used for weekly and monthly time periods. Required only for weekly time periods.
every	integer	For daily and weekly periods `every` defines day or week intervals at which the maintenance must come into effect. For monthly periods `every` defines the week of the month when the maintenance must come into effect. Possible values: 1 - first week; 2 - second week; 3 - third week; 4 - fourth week; 5 - last week.
month	integer	Months when the maintenance must come into effect. Months are stored in binary form with each bit representing the corresponding month. For example, 5 equals 101 in binary and means, that maintenance will be enabled in January and March. Required only for monthly time periods.
period	integer	Duration of the maintenance period in seconds. Default: 3600.
start_date	timestamp	Date when the maintenance period must come into effect. Required only for one time periods. Default: current date.
start_time	integer	Time of day when the maintenance starts in seconds. Required for daily, weekly and monthly periods.
timeperiod_type	integer	Type of time period. Possible values: 0 - *(default)* one time only; 2 - daily; 3 - weekly; 4 - monthly.

Problem tag

The problem tag object is used to define which problems must be suppressed when the maintenance comes into effect. It has the following properties.

Property	Type	Description
tag (required)	string	Problem tag name.
operator	integer	Condition operator. Possible values: 0 - Equals; 2 - *(default)* Contains.
value	string	Problem tag value.

maintenance.create

Description

`object maintenance.create(object/array maintenances)`

This method allows to create new maintenances.

Parameters

`(object/array)` Maintenances to create.

Additionally to the standard maintenance properties, the method accepts the following parameters.

Parameter	Type	Description
groupids (required)	array	IDs of the host groups that will undergo maintenance.
hostids (required)	array	IDs of the hosts that will undergo maintenance.
timeperiods (required)	array	Maintenance time periods.
tags	array	Problem tags. Define what problems must be suppressed. If no tags are given, all active maintenance host problems will be suppressed.

Attention:
At least one host or host group must be defined for each maintenance.

Return values

`(object)` Returns an object containing the IDs of the created maintenances under the `maintenanceids` property. The order of the returned IDs matches the order of the passed maintenances.

Examples

Creating a maintenance

Create a maintenance with data collection for host group "2" with problem tags **service:mysqld** and **error**. It must be active from 22.01.2013 till 22.01.2014, come in effect each Sunday at 18:00 and last for one hour.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "maintenance.create",
    "params": {
        "name": "Sunday maintenance",
        "active_since": 1358844540,
        "active_till": 1390466940,
        "tags_evaltype": 0,
        "groupids": [
            "2"
```

```
        ],
        "timeperiods": [
            {
                "timeperiod_type": 3,
                "every": 1,
                "dayofweek": 64,
                "start_time": 64800,
                "period": 3600
            }
        ],
        "tags": [
            {
                "tag": "service",
                "operator": "0",
                "value": "mysqld",
            },
            {
                "tag": "error",
                "operator": "2",
                "value": ""
            }
        ]
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "maintenanceids": [
            "3"
        ]
    },
    "id": 1
}
```

See also

- Time period

Source

CMaintenance::create() in *frontends/php/include/classes/api/services/CMaintenance.php*.

maintenance.delete

Description

`object maintenance.delete(array maintenanceIds)`

This method allows to delete maintenances.

Parameters

`(array)` IDs of the maintenances to delete.

Return values

`(object)` Returns an object containing the IDs of the deleted maintenances under the `maintenanceids` property.

Examples

Deleting multiple maintenances

Delete two maintenanaces.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "maintenance.delete",
    "params": [
        "3",
        "1"
    ],
    "auth": "3a57200802b24cda67c4e4010b50c065",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "maintenanceids": [
            "3",
            "1"
        ]
    },
    "id": 1
}
```

Source

CMaintenance::delete() in *frontends/php/include/classes/api/services/CMaintenance.php*.

maintenance.get

Description

`integer/array maintenance.get(object parameters)`

The method allows to retrieve maintenances according to the given parameters.

Parameters

`(object)` Parameters defining the desired output.

The method supports the following parameters.

Parameter	Type	Description
groupids	string/array	Return only maintenances that are assigned to the given host groups.
hostids	string/array	Return only maintenances that are assigned to the given hosts.
maintenanceids	string/array	Return only maintenances with the given IDs.
selectGroups	query	Return a groups property with host groups assigned to the maintenance.
selectHosts	query	Return a hosts property with hosts assigned to the maintenance.
selectTags	query	Return a tags property with problem tags of the maintenance.
selectTimeperiods	query	Return a timeperiods property with time periods of the maintenance.
sortfield	string/array	Sort the result by the given properties. Possible values are: `maintenanceid`, `name` and `maintenance_type`.
countOutput	boolean	These parameters being common for all `get` methods are described in detail in the reference commentary.
editable	boolean	
excludeSearch	boolean	
filter	object	

Parameter	Type	Description
limit	integer	
output	query	
preservekeys	boolean	
search	object	
searchByAny	boolean	
searchWildcardsEnabled	boolean	
sortorder	string/array	
startSearch	boolean	

Return values

`(integer/array)` Returns either:

- an array of objects;
- the count of retrieved objects, if the `countOutput` parameter has been used.

Examples

Retrieving maintenances

Retrieve all configured maintenances, and the data about the assigned host groups, defined time periods and problem tags.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "maintenance.get",
    "params": {
        "output": "extend",
        "selectGroups": "extend",
        "selectTimeperiods": "extend",
        "selectTags": "extend"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "maintenanceid": "3",
            "name": "Sunday maintenance",
            "maintenance_type": "0",
            "description": "",
            "active_since": "1358844540",
            "active_till": "1390466940",
            "tags_evaltype": "0",
            "groups": [
                {
                    "groupid": "4",
                    "name": "Zabbix servers",
                    "internal": "0"
                }
            ],
            "timeperiods": [
                {
                    "timeperiodid": "4",
                    "timeperiod_type": "3",
                    "every": "1",
                    "month": "0",
                    "dayofweek": "1",
                    "day": "0",
```

```
                    "start_time": "64800",
                    "period": "3600",
                    "start_date": "2147483647"
                }
            ],
            "tags": [
                {
                    "tag": "service",
                    "operator": "0",
                    "value": "mysqld",
                },
                {
                    "tag": "error",
                    "operator": "2",
                    "value": ""
                }
            ]
        }
    ],
    "id": 1
}
```


See also

- Host
- Host group
- Time period

Source

CMaintenance::get() in *frontends/php/include/classes/api/services/CMaintenance.php*.

maintenance.update

Description

`object maintenance.update(object/array maintenances)`

This method allows to update existing maintenances.

Parameters

`(object/array)` Maintenance properties to be updated.

The `maintenanceid` property must be defined for each maintenance, all other properties are optional. Only the passed properties will be updated, all others will remain unchanged.

Additionally to the standard maintenance properties, the method accepts the following parameters.

Parameter	Type	Description
groupids	array	IDs of the host groups to replace the current groups.
hostids	array	IDs of the hosts to replace the current hosts.
timeperiods	array	Maintenance time periods to replace the current periods.
tags	array	Problem tags.

Attention:
At least one host or host group must be defined for each maintenance.

Return values

`(object)` Returns an object containing the IDs of the updated maintenances under the `maintenanceids` property.

Examples

Assigning different hosts

Replace the hosts currently assigned to maintenance "3" with two different ones.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "maintenance.update",
    "params": {
        "maintenanceid": "3",
        "hostids": [
            "10085",
            "10084"
        ]
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "maintenanceids": [
            "3"
        ]
    },
    "id": 1
}
```

See also

- Time period

Source

CMaintenance::update() in *frontends/php/include/classes/api/services/CMaintenance.php*.

Map

This class is designed to work with maps.

Object references:

- Map
- Map element
- Map link
- Map URL
- Map user
- Map user group
- Map shape
- Map line

Available methods:

- map.create - create new maps
- map.delete - delete maps
- map.get - retrieve maps
- map.update - update maps

> Map object

The following objects are directly related to the `map` API.

Map

The map object has the following properties.

Property	Type	Description
sysmapid	string	*(readonly)* ID of the map.
height (required)	integer	Height of the map in pixels.
name (required)	string	Name of the map.
width (required)	integer	Width of the map in pixels.
backgroundid	string	ID of the image used as the background for the map.
expand_macros	integer	Whether to expand macros in labels when configuring the map. Possible values: 0 - *(default)* do not expand macros; 1 - expand macros.
expandproblem	integer	Whether the the problem trigger will be displayed for elements with a single problem. Possible values: 0 - always display the number of problems; 1 - *(default)* display the problem trigger if there's only one problem.
grid_align	integer	Whether to enable grid aligning. Possible values: 0 - disable grid aligning; 1 - *(default)* enable grid aligning.
grid_show	integer	Whether to show the grid on the map. Possible values: 0 - do not show the grid; 1 - *(default)* show the grid.
grid_size	integer	Size of the map grid in pixels. Supported values: 20, 40, 50, 75 and 100. Default: 50.
highlight	integer	Whether icon highlighting is enabled. Possible values: 0 - highlighting disabled; 1 - *(default)* highlighting enabled.
iconmapid	string	ID of the icon map used on the map.
label_format	integer	Whether to enable advanced labels. Possible values: 0 - *(default)* disable advanced labels; 1 - enable advanced labels.
label_location	integer	Location of the map element label. Possible values: 0 - *(default)* bottom; 1 - left; 2 - right; 3 - top.
label_string_host	string	Custom label for host elements. Required for maps with custom host label type.
label_string_hostgroup	string	Custom label for host group elements. Required for maps with custom host group label type.

Property	Type	Description
label_string_image	string	Custom label for image elements. Required for maps with custom image label type.
label_string_map	string	Custom label for map elements. Required for maps with custom map label type.
label_string_trigger	string	Custom label for trigger elements. Required for maps with custom trigger label type.
label_type	integer	Map element label type. Possible values: 0 - label; 1 - IP address; 2 - *(default)* element name; 3 - status only; 4 - nothing.
label_type_host	integer	Label type for host elements. Possible values: 0 - label; 1 - IP address; 2 - *(default)* element name; 3 - status only; 4 - nothing; 5 - custom.
label_type_hostgroup	integer	Label type for host group elements. Possible values: 0 - label; 2 - *(default)* element name; 3 - status only; 4 - nothing; 5 - custom.
label_type_image	integer	Label type for host group elements. Possible values: 0 - label; 2 - *(default)* element name; 4 - nothing; 5 - custom.
label_type_map	integer	Label type for map elements. Possible values: 0 - label; 2 - *(default)* element name; 3 - status only; 4 - nothing; 5 - custom.
label_type_trigger	integer	Label type for trigger elements. Possible values: 0 - label; 2 - *(default)* element name; 3 - status only; 4 - nothing; 5 - custom.

Property	Type	Description
markelements	integer	Whether to highlight map elements that have recently changed their status. Possible values: 0 - *(default)* do not highlight elements; 1 - highlight elements.
severity_min	integer	Minimum severity of the triggers that will be displayed on the map. Refer to the trigger "severity" property for a list of supported trigger severities.
show_unack	integer	How problems should be displayed. Possible values: 0 - *(default)* display the count of all problems; 1 - display only the count of unacknowledged problems; 2 - display the count of acknowledged and unacknowledged problems separately.
userid	string	Map owner user ID.
private	integer	Type of map sharing. Possible values: 0 - public map; 1 - *(default)* private map.
show_suppressed	integer	Whether suppressed problems are shown. Possible values: 0 - *(default)* hide suppressed problems; 1 - show suppressed problems.

Map element

The map element object defines an object displayed on a map. It has the following properties.

Property	Type	Description
selementid	string	*(readonly)* ID of the map element.
elements (required)	array	Element data object. Required for host, host group, trigger and map type elements.
elementtype (required)	integer	Type of map element. Possible values: 0 - host; 1 - map; 2 - trigger; 3 - host group; 4 - image.
iconid_off (required)	string	ID of the image used to display the element in default state.
areatype	integer	How separate host group hosts should be displayed. Possible values: 0 - *(default)* the host group element will take up the whole map; 1 - the host group element will have a fixed size.
application	string	Name of the application to display problems from. Used only for host and host group map elements.

Property	Type	Description
elementsubtype	integer	How a host group element should be displayed on a map. Possible values: 0 - *(default)* display the host group as a single element; 1 - display each host in the group separately.
height	integer	Height of the fixed size host group element in pixels. Default: 200.
iconid_disabled	string	ID of the image used to display disabled map elements. Unused for image elements.
iconid_maintenance	string	ID of the image used to display map elements in maintenance. Unused for image elements.
iconid_on	string	ID of the image used to display map elements with problems. Unused for image elements.
label	string	Label of the element.
label_location	integer	Location of the map element label. Possible values: -1 - *(default)* default location; 0 - bottom; 1 - left; 2 - right; 3 - top.
permission	integer	Type of permission level. Possible values: -1 - none; 2 - read only; 3 - read-write.
sysmapid	string	*(readonly)* ID of the map that the element belongs to.
urls	array	Map element URLs. The map element URL object is described in detail below.
use_iconmap	integer	Whether icon mapping must be used for host elements. Possible values: 0 - do not use icon mapping; 1 - *(default)* use icon mapping.
viewtype	integer	Host group element placing algorithm. Possible values: 0 - *(default)* grid.
width	integer	Width of the fixed size host group element in pixels. Default: 200.
x	integer	X-coordinates of the element in pixels. Default: 0.
y	integer	Y-coordinates of the element in pixels. Default: 0.

Map element Host

The map element Host object defines one host element.

Property	Type	Description
hostid	string	Host ID

Map element Host group

The map element Host group object defines one host group element.

Property	Type	Description
groupid	string	Host group ID

Map element Map

The map element Map object defines one map element.

Property	Type	Description
sysmapid	string	Map ID

Map element Trigger

The map element Trigger object defines one or more trigger elements.

Property	Type	Description
triggerid	string	Trigger ID

Map element URL

The map element URL object defines a clickable link that will be available for a specific map element. It has the following properties:

Property	Type	Description
sysmapelementurlid	string	*(readonly)* ID of the map element URL.
name (required)	string	Link caption.
url (required)	string	Link URL.
selementid	string	ID of the map element that the URL belongs to.

Map link

The map link object defines a link between two map elements. It has the following properties.

Property	Type	Description
linkid	string	*(readonly)* ID of the map link.
selementid1 (required)	string	ID of the first map element linked on one end.
selementid2 (required)	string	ID of the first map element linked on the other end.
color	string	Line color as a hexadecimal color code. Default: 000000.
drawtype	integer	Link line draw style. Possible values: 0 - *(default)* line; 2 - bold line; 3 - dotted line; 4 - dashed line.
label	string	Link label.
linktriggers	array	Map link triggers to use as link status indicators. The map link trigger object is described in detail below.

Property	Type	Description
permission	integer	Type of permission level. Possible values: -1 - none; 2 - read only; 3 - read-write.
sysmapid	string	ID of the map the link belongs to.

Map link trigger

The map link trigger object defines a map link status indicator based on the state of a trigger. It has the following properties:

Property	Type	Description
linktriggerid	string	*(readonly)* ID of the map link trigger.
triggerid (reqiuired)	string	ID of the trigger used as a link indicator.
color	string	Indicator color as a hexadecimal color code. Default: DD0000.
drawtype	integer	Indicator draw style. Possible values: 0 - *(default)* line; 2 - bold line; 3 - dotted line; 4 - dashed line.
linkid	string	ID of the map link that the link trigger belongs to.

Map URL

The map URL object defines a clickable link that will be available for all elements of a specific type on the map. It has the following properties:

Property	Type	Description
sysmapurlid	string	*(readonly)* ID of the map URL.
name (required)	string	Link caption.
url (required)	string	Link URL.
elementtype	integer	Type of map element for which the URL will be available. Refer to the map element "type" property for a list of supported types. Default: 0.
sysmapid	string	ID of the map that the URL belongs to.

Map user

List of map permissions based on users. It has the following properties:

Property	Type	Description
sysmapuserid	string	*(readonly)* ID of the map user.
userid (required)	string	User ID.

Property	Type	Description
permission (required)	integer	Type of permission level. Possible values: 2 - read only; 3 - read-write;

Map user group

List of map permissions based on user groups. It has the following properties:

Property	Type	Description
sysmapusrgrpid	string	*(readonly)* ID of the map user group.
usrgrpid (required)	string	User group ID.
permission (required)	integer	Type of permission level. Possible values: 2 - read only; 3 - read-write;

Map shapes

The map shape object defines an geometric shape (with or without text) displayed on a map. It has the following properties:

Property	Type	Description
sysmap_shapeid	string	*(readonly)* ID of the map shape element.
type (required)	integer	Type of map shape element. Possible values: 0 - rectangle; 1 - ellipse. Property is required when new shapes are created.
x	integer	X-coordinates of the shape in pixels. Default: 0.
y	integer	Y-coordinates of the shape in pixels. Default: 0.
width	integer	Width of the shape in pixels. Default: 200.
height	integer	Height of the shape in pixels. Default: 200.
text	string	Text of the shape.

Property	Type	Description
font	integer	Font of the text within shape. Possible values: 0 - Georgia, serif 1 - “Palatino Linotype”, “Book Antiqua”, Palatino, serif 2 - “Times New Roman”, Times, serif 3 - Arial, Helvetica, sans-serif 4 - “Arial Black”, Gadget, sans-serif 5 - “Comic Sans MS”, cursive, sans-serif 6 - Impact, Charcoal, sans-serif 7 - “Lucida Sans Unicode”, “Lucida Grande”, sans-serif 8 - Tahoma, Geneva, sans-serif 9 - “Trebuchet MS”, Helvetica, sans-serif 10 - Verdana, Geneva, sans-serif 11 - “Courier New”, Courier, monospace 12 - “Lucida Console”, Monaco, monospace Default: 9.
font_size	integer	Font size in pixels. Default: 11.
font_color	string	Font color. Default: ’000000’.
text_halign	integer	Horizontal alignment of text. Possible values: 0 - center; 1 - left; 2 - right. Default: 0.
text_valign	integer	Vertical alignment of text. Possible values: 0 - middle; 1 - top; 2 - bottom. Default: 0.
border_type	integer	Type of the border. Possible values: 0 - none; 1 - ——————; 2 - ┅; 3 - – – –. Default: 0.
border_width	integer	Width of the border in pixels. Default: 0.
border_color	string	Border color. Default: ’000000’.
background_color	string	Background color (fill color). Default: `(empty)`.
zindex	integer	Value used to order shapes (z-index). Default: 0.

Map lines

The map line object defines an line displayed on a map. It has the following properties:

Property	Type	Description
sysmap_shapeid	string	*(readonly)* ID of the map shape element.
x1	integer	X-coordinates of the line point 1 in pixels. Default: 0.
y1	integer	Y-coordinates of the line point 1 in pixels. Default: 0.
x2	integer	X-coordinates of the line point 2 in pixels. Default: 200.
y2	integer	Y-coordinates of the line point 2 in pixels. Default: 200.
line_type	integer	Type of the border. Possible values: 0 - none; 1 - ——————; 2 - ╍╍; 3 - – – –. Default: 0.
line_width	integer	Width of the border in pixels. Default: 0.
line_color	string	Border color. Default: ’000000’.
zindex	integer	Value used to order shapes (z-index). Default: 0.

map.create

Description

`object map.create(object/array maps)`

This method allows to create new maps.

Parameters

`(object/array)` Maps to create.

Additionally to the standard map properties, the method accepts the following parameters.

Parameter	Type	Description
links	array	Map links to be created on the map.
selements	array	Map elements to be created on the map.
urls	array	Map URLs to be created on the map.
users	array	Map user shares to be created on the map.
userGroups	array	Map user group shares to be created on the map.
shapes	array	Map shapes to be created on the map.
lines	array	Map lines to be created on the map.

Note:
To create map links you'll need to set a map element `selementid` to an arbitrary value and then use this value to reference this element in the links `selementid1` or `selementid2` properties. When the element is created, this value will be replaced with the correct ID generated by Zabbix. See example.

Return values

`(object)` Returns an object containing the IDs of the created maps under the `sysmapids` property. The order of the returned IDs matches the order of the passed maps.

Examples

Create an empty map

Create a map with no elements.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "map.create",
    "params": {
        "name": "Map",
        "width": 600,
        "height": 600
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "sysmapids": [
            "8"
        ]
    },
    "id": 1
}
```

Create a host map

Create a map with two host elements and a link between them. Note the use of temporary "selementid1" and "selementid2" values in the map link object to refer to map elements.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "map.create",
    "params": {
        "name": "Host map",
        "width": 600,
        "height": 600,
        "selements": [
            {
                "selementid": "1",
                "elements": [
                    {"hostid": "1033"}
                ],
                "elementtype": 0,
                "iconid_off": "2"
            },

            {
                "selementid": "2",
```

```
                "elements": [
                    {"hostid": "1037"}
                ],
                "elementtype": 0,
                "iconid_off": "2"
            }
        ],
        "links": [
            {
                "selementid1": "1",
                "selementid2": "2"
            }
        ]
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "sysmapids": [
            "9"
        ]
    },
    "id": 1
}
```

Create a trigger map

Create a map with trigger element, which contains two triggers.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "map.create",
    "params": {
        "name": "Trigger map",
        "width": 600,
        "height": 600,
        "selements": [
            {
                "elements": [
                    {"triggerid": "12345"},
                    {"triggerid": "67890"}
                ],
                "elementtype": 2,
                "iconid_off": "2"
            }
        ]
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "sysmapids": [
            "10"
        ]
```

```
    },
    "id": 1
}
```

Map sharing

Create a map with two types of sharing (user and user group).

Request:

```
{
    "jsonrpc": "2.0",
    "method": "map.create",
    "params": {
        "name": "Map sharing",
        "width": 600,
        "height": 600,
        "users": [
            {
                "userid": "4",
                "permission": "3"
            }
        ],
        "userGroups": [
            {
                "usrgrpid": "7",
                "permission": "2"
            }
        ]
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "sysmapids": [
            "9"
        ]
    },
    "id": 1
}
```

Map shapes

Create a map with map name title.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "map.create",
    "params": {
        "name": "Host map",
        "width": 600,
        "height": 600,
        "shapes": [
            {
                "type": 0,
                "x": 0,
                "y": 0,
                "width": 600,
                "height": 11,
                "text": "{MAP.NAME}"
```

```
            }
        ]
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "sysmapids": [
            "10"
        ]
    },
    "id": 1
}
```

Map lines

Create a map line.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "map.create",
    "params": {
        "name": "Map API lines",
        "width": 500,
        "height": 500,
        "lines": [
            {
                "x1": 30,
                "y1": 10,
                "x2": 100,
                "y2": 50,
                "line_type": 1,
                "line_width": 10,
                "line_color": "009900"
            }
        ]
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "sysmapids": [
            "11"
        ]
    },
    "id": 1
}
```

See also

- Map element
- Map link
- Map URL
- Map user
- Map user group

- Map shape
- Map line

Source

CMap::create() in *frontends/php/include/classes/api/services/CMap.php*.

map.delete

Description

`object map.delete(array mapIds)`

This method allows to delete maps.

Parameters

`(array)` IDs of the maps to delete.

Return values

`(object)` Returns an object containing the IDs of the deleted maps under the `sysmapids` property.

Examples

Delete multiple maps

Delete two maps.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "map.delete",
    "params": [
        "12",
        "34"
    ],
    "auth": "3a57200802b24cda67c4e4010b50c065",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "sysmapids": [
            "12",
            "34"
        ]
    },
    "id": 1
}
```

Source

CMap::delete() in *frontends/php/include/classes/api/services/CMap.php*.

map.get

Description

`integer/array map.get(object parameters)`

The method allows to retrieve maps according to the given parameters.

Parameters

`(object)` Parameters defining the desired output.

The method supports the following parameters.

Parameter	Type	Description
sysmapids	string/array	Returns only maps with the given IDs.
userids	string/array	Returns only maps that belong to the given user IDs.
expandUrls	flag	Adds global map URLs to the corresponding map elements and expands macros in all map element URLs.
selectIconMap	query	Returns an iconmap property with the icon map used on the map.
selectLinks	query	Returns a links property with the map links between elements.
selectSelements	query	Returns a selements property with the map elements.
selectUrls	query	Returns a urls property with the map URLs.
selectUsers	query	Returns a users property with users that the map is shared with.
selectUserGroups	query	Returns a userGroups property with user groups that the map is shared with.
selectShapes	query	Returns a shapes property with the map shapes.
selectLines	query	Returns a lines property with the map lines.
sortfield	string/array	Sort the result by the given properties. Possible values are: `name`, `width` and `height`.
countOutput	boolean	These parameters being common for all `get` methods are described in detail in the reference commentary.
editable	boolean	
excludeSearch	boolean	
filter	object	
limit	integer	
output	query	
preservekeys	boolean	
search	object	
searchByAny	boolean	
searchWildcardsEnabled	boolean	
sortorder	string/array	
startSearch	boolean	

Return values

`(integer/array)` Returns either:

- an array of objects;
- the count of retrieved objects, if the `countOutput` parameter has been used.

Examples

Retrieve a map

Retrieve all data about map "3".

Request:

```
{
    "jsonrpc": "2.0",
    "method": "map.get",
    "params": {
        "output": "extend",
        "selectSelements": "extend",
        "selectLinks": "extend",
        "selectUsers": "extend",
        "selectUserGroups": "extend",
        "selectShapes": "extend",
        "selectLines": "extend",
        "sysmapids": "3"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
```

```
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "selements": [
                {
                    "selementid": "10",
                    "sysmapid": "3",
                    "elementtype": "4",
                    "iconid_off": "1",
                    "iconid_on": "0",
                    "label": "Zabbix server",
                    "label_location": "3",
                    "x": "11",
                    "y": "141",
                    "iconid_disabled": "0",
                    "iconid_maintenance": "0",
                    "elementsubtype": "0",
                    "areatype": "0",
                    "width": "200",
                    "height": "200",
                    "viewtype": "0",
                    "use_iconmap": "1",
                    "application": "",
                    "urls": [],
                    "elements": []
                },
                {
                    "selementid": "11",
                    "sysmapid": "3",
                    "elementtype": "4",
                    "iconid_off": "1",
                    "iconid_on": "0",
                    "label": "Web server",
                    "label_location": "3",
                    "x": "211",
                    "y": "191",
                    "iconid_disabled": "0",
                    "iconid_maintenance": "0",
                    "elementsubtype": "0",
                    "areatype": "0",
                    "width": "200",
                    "height": "200",
                    "viewtype": "0",
                    "use_iconmap": "1",
                    "application": "",
                    "urls": [],
                    "elements": []
                },
                {
                    "selementid": "12",
                    "sysmapid": "3",
                    "elementtype": "0",
                    "iconid_off": "185",
                    "iconid_on": "0",
                    "label": "{HOST.NAME}\r\n{HOST.CONN}",
                    "label_location": "0",
                    "x": "111",
```

```
                "y": "61",
                "iconid_disabled": "0",
                "iconid_maintenance": "0",
                "elementsubtype": "0",
                "areatype": "0",
                "width": "200",
                "height": "200",
                "viewtype": "0",
                "use_iconmap": "0",
                "application": "",
                "urls": [],
                "elements": [
                    {
                        "hostid": "10084"
                    }
                ]
            }
        ],
        "links": [
            {
                "linkid": "23",
                "sysmapid": "3",
                "selementid1": "10",
                "selementid2": "11",
                "drawtype": "0",
                "color": "00CC00",
                "label": "",
                "linktriggers": []
            }
        ],
        "users": [
            {
                "sysmapuserid": "1",
                "userid": "2",
                "permission": "2"
            }
        ],
        "userGroups": [
            {
                "sysmapusrgrpid": "1",
                "usrgrpid": "7",
                "permission": "2"
            }
        ],
        "shapes":[
            {
                "sysmap_shapeid":"1",
                "type":"0",
                "x":"0",
                "y":"0",
                "width":"680",
                "height":"15",
                "text":"{MAP.NAME}",
                "font":"9",
                "font_size":"11",
                "font_color":"000000",
                "text_halign":"0",
                "text_valign":"0",
                "border_type":"0",
                "border_width":"0",
                "border_color":"000000",
                "background_color":"",
```

```
                    "zindex":"0"
                }
            ],
            "lines":[
                {
                    "sysmap_shapeid":"2",
                    "x1": 30,
                    "y1": 10,
                    "x2": 100,
                    "y2": 50,
                    "line_type": 1,
                    "line_width": 10,
                    "line_color": "009900",
                    "zindex":"1"
                }
            ],
            "sysmapid": "3",
            "name": "Local nerwork",
            "width": "400",
            "height": "400",
            "backgroundid": "0",
            "label_type": "2",
            "label_location": "3",
            "highlight": "1",
            "expandproblem": "1",
            "markelements": "0",
            "show_unack": "0",
            "grid_size": "50",
            "grid_show": "1",
            "grid_align": "1",
            "label_format": "0",
            "label_type_host": "2",
            "label_type_hostgroup": "2",
            "label_type_trigger": "2",
            "label_type_map": "2",
            "label_type_image": "2",
            "label_string_host": "",
            "label_string_hostgroup": "",
            "label_string_trigger": "",
            "label_string_map": "",
            "label_string_image": "",
            "iconmapid": "0",
            "expand_macros": "0",
            "severity_min": "0",
            "userid": "1",
            "private": "1",
            "show_suppressed": "1"
        }
    ],
    "id": 1
}
```


See also

- Icon map
- Map element
- Map link
- Map URL
- Map user
- Map user group
- Map shapes
- Map lines

Source

CMap::get() in *frontends/php/include/classes/api/services/CMap.php*.

map.update

Description

`object map.update(object/array maps)`

This method allows to update existing maps.

Parameters

`(object/array)` Map properties to be updated.

The `mapid` property must be defined for each map, all other properties are optional. Only the passed properties will be updated, all others will remain unchanged.

Additionally to the standard map properties, the method accepts the following parameters.

Parameter	Type	Description
links	array	Map links to replace the existing links.
selements	array	Map elements to replace the existing elements.
urls	array	Map URLs to replace the existing URLs.
users	array	Map user shares to replace the existing elements.
userGroups	array	Map user group shares to replace the existing elements.
shapes	array	Map shapes to replace the existing shapes.
lines	array	Map lines to replace the existing lines.

Note:
To create map links between new map elements you'll need to set an element's `selementid` to an arbitrary value and then use this value to reference this element in the links `selementid1` or `selementid2` properties. When the element is created, this value will be replaced with the correct ID generated by Zabbix. See example for map.create.

Return values

`(object)` Returns an object containing the IDs of the updated maps under the `sysmapids` property.

Examples

Resize a map

Change the size of the map to 1200x1200 pixels.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "map.update",
    "params": {
        "sysmapid": "8",
        "width": 1200,
        "height": 1200
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "sysmapids": [
            "8"
        ]
    },
```

```
    "id": 1
}
```

Change map owner

Available only for admins and super admins.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "map.update",
    "params": {
        "sysmapid": "9",
        "userid": "1"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 2
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "sysmapids": [
            "9"
        ]
    },
    "id": 2
}
```

See also

- Map element
- Map link
- Map URL
- Map user
- Map user group
- Map shapes
- Map lines

Source

CMap::update() in *frontends/php/include/classes/api/services/CMap.php*.

Media type

This class is designed to work with media types.

Object references:

- Media type

Available methods:

- mediatype.create - creating new media types
- mediatype.delete - deleting media types
- mediatype.get - retrieving media types
- mediatype.update - updating media types

> Media type object

The following objects are directly related to the `mediatype` API.

Media type

The media type object has the following properties.

Property	Type	Description
mediatypeid	string	*(readonly)* ID of the media type.
name (required)	string	Name of the media type.
type (required)	integer	Transport used by the media type. Possible values: 0 - email; 1 - script; 2 - SMS; 4 - Webhook.
exec_path	string	For script media types `exec_path` contains the name of the executed script. Required for script media types.
gsm_modem	string	Serial device name of the GSM modem. Required for SMS media types.
passwd	string	Authentication password. Used for email media types.
smtp_email	string	Email address from which notifications will be sent. Required for email media types.
smtp_helo	string	SMTP HELO. Required for email media types.
smtp_server	string	SMTP server. Required for email media types.
smtp_port	integer	SMTP server port to connect to.
smtp_security	integer	SMTP connection security level to use. Possible values: 0 - None; 1 - STARTTLS; 2 - SSL/TLS.
smtp_verify_host	integer	SSL verify host for SMTP. Possible values: 0 - No; 1 - Yes.
smtp_verify_peer	integer	SSL verify peer for SMTP. Possible values: 0 - No; 1 - Yes.
smtp_authentication	integer	SMTP authentication method to use. Possible values: 0 - None; 1 - Normal password.
status	integer	Whether the media type is enabled. Possible values: 0 - *(default)* enabled; 1 - disabled.
username	string	User name. Used for email media types.

Property	Type	Description
exec_params	string	Script parameters. Each parameter ends with a new line feed.
maxsessions	integer	The maximum number of alerts that can be processed in parallel. Possible values for SMS: 1 - *(default)* Possible values for other media types: 0-100
maxattempts	integer	The maximum number of attempts to send an alert. Possible values: 1-10 Default value: 3
attempt_interval	string	The interval between retry attempts. Accepts seconds and time unit with suffix. Possible values: 0-60s Default value: 10s
content_type	integer	Message format. Possible values: 0 - plain text; 1 - *(default)* html.
script	string	Media type webhook script javascript body. Required for Webhook media types.
timeout	string	Media type webhook script timeout. Accepts seconds and time unit with suffix. Possible values: 1-60s Default value: 30s
process_tags	integer	Defines should the webhook script response to be interpreted as tags and these tags should be added to associated event. Possible values: 0 - *(default)* Ignore webhook script response. 1 - Process webhook script response as tags.
show_event_menu	integer	Show media type entry in `problem.get` and `event.get` property `urls`. Possible values: 0 - *(default)* Do not add `urls` entry. 1 - Add media type to `urls` property.
event_menu_url	string	Define `url` property of media type entry in `urls` property of `problem.get` and `event.get`. Used for Webhook media types.

Property	Type	Description
event_menu_name	string	Define `name` property of media type entry in `urls` property of `problem.get` and `event.get`. Used for Webhook media types.
parameters	array Webhook parameters	Array of webhook input parameters.
description	string	Media type description.

Webhook parameters

Parameters passed to webhook script when it is called, have the following properties.

Property	Type	Description
name (required)	string	Parameter name.
value	string	Parameter value, support macros. Supported macros described on page.

mediatype.create

Description

`object mediatype.create(object/array mediaTypes)`

This method allows to create new media types.

Parameters

`(object/array)` Media types to create.

Additionaly to the standard media type properties, the method accepts the following parameters.

Parameter	Type	Description
parameters	array	Webhook parameters to be created for the media type.

Return values

`(object)` Returns an object containing the IDs of the created media types under the `mediatypeids` property. The order of the returned IDs matches the order of the passed media types.

Examples

Creating an e-mail media type

Create a new e-mail media type with a custom SMTP port.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "mediatype.create",
    "params": {
        "type": "0",
        "name": "E-mail",
        "smtp_server": "mail.example.com",
        "smtp_helo": "example.com",
        "smtp_email": "zabbix@example.com",
        "smtp_port": "587",
        "content_type": "1"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "mediatypeids": [
            "7"
        ]
    },
    "id": 1
}
```

Creating a script media type

Create a new script media type with a custom value for the number of attempts and the interval between them.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "mediatype.create",
    "params": {
        "type": "1",
        "name": "Push notifications",
        "exec_path": "push-notification.sh",
        "exec_params": "{ALERT.SENDTO}\n{ALERT.SUBJECT}\n{ALERT.MESSAGE}\n",
        "maxattempts": "5",
        "attempt_interval": "11s"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "mediatypeids": [
            "8"
        ]
    },
    "id": 1
}
```

Creating a webhook media type

Create a new webhook media type.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "mediatype.create",
    "params": {
        "type": "4",
        "name": "Webhook",
        "script": "var Webhook = {\r\n    token: null,\r\n    to: null,\r\n    subject: null,\r\n    messa
        "parameters": [
            {
                "name": "Message",
                "value": "{ALERT.MESSAGE}"
            },
            {
                "name": "Subject",
                "value": "{ALERT.SUBJECT}"
            },
            {
```

```
                "name": "To",
                "value": "{ALERT.SENDTO}"
            },
            {
                "name": "Token",
                "value": "<Token>"
            }
        ]
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "mediatypeids": [
            "9"
        ]
    },
    "id": 1
}
```

Source

CMediaType::create() in *ui/include/classes/api/services/CMediaType.php*.

mediatype.delete

Description

`object mediatype.delete(array mediaTypeIds)`

This method allows to delete media types.

Parameters

`(array)` IDs of the media types to delete.

Return values

`(object)` Returns an object containing the IDs of the deleted media types under the `mediatypeids` property.

Examples

Deleting multiple media types

Delete two media types.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "mediatype.delete",
    "params": [
        "3",
        "5"
    ],
    "auth": "3a57200802b24cda67c4e4010b50c065",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "mediatypeids": [
```

```
            "3",
            "5"
        ]
    },
    "id": 1
}
```

Source

CMediaType::delete() in *frontends/php/include/classes/api/services/CMediaType.php*.

mediatype.get

Description

`integer/array mediatype.get(object parameters)`

The method allows to retrieve media types according to the given parameters.

Parameters

`(object)` Parameters defining the desired output.

The method supports the following parameters.

Parameter	Type	Description
mediatypeids	string/array	Return only media types with the given IDs.
mediaids	string/array	Return only media types used by the given media.
userids	string/array	Return only media types used by the given users.
selectUsers	query	Return a users property with the users that use the media type.
sortfield	string/array	Sort the result by the given properties. Possible values are: `mediatypeid`.
countOutput	boolean	These parameters being common for all `get` methods are described in detail in the reference commentary.
editable	boolean	
excludeSearch	boolean	
filter	object	
limit	integer	
output	query	
preservekeys	boolean	
search	object	
searchByAny	boolean	
searchWildcardsEnabled	boolean	
sortorder	string/array	
startSearch	boolean	

Return values

`(integer/array)` Returns either:

- an array of objects;
- the count of retrieved objects, if the `countOutput` parameter has been used.

Examples

Retrieving media types

Retrieve all configured media types.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "mediatype.get",
    "params": {
```

```
        "output": "extend"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "mediatypeid": "1",
            "type": "0",
            "name": "Email",
            "smtp_server": "mail.example.com",
            "smtp_helo": "example.com",
            "smtp_email": "zabbix@example.com",
            "exec_path": "",
            "gsm_modem": "",
            "username": "",
            "passwd": "",
            "status": "0",
            "smtp_port": "25",
            "smtp_security": "0",
            "smtp_verify_peer": "0",
            "smtp_verify_host": "0",
            "smtp_authentication": "0",
            "exec_params": "",
            "maxsessions": "1",
            "maxattempts": "3",
            "attempt_interval": "10s",
            "content_type": "0",
            "script": "",
            "timeout": "30s",
            "process_tags": "0",
            "show_event_menu": "1",
            "event_menu_url": "",
            "event_menu_name": "",
            "description": "",
            "parameters": []
        },
        {
            "mediatypeid": "3",
            "type": "2",
            "name": "SMS",
            "smtp_server": "",
            "smtp_helo": "",
            "smtp_email": "",
            "exec_path": "",
            "gsm_modem": "/dev/ttyS0",
            "username": "",
            "passwd": "",
            "status": "0",
            "smtp_port": "25",
            "smtp_security": "0",
            "smtp_verify_peer": "0",
            "smtp_verify_host": "0",
            "smtp_authentication": "0",
            "exec_params": "",
            "maxsessions": "1",
            "maxattempts": "3",
            "attempt_interval": "10s",
```

```
            "content_type": "1",
            "script": "",
            "timeout": "30s",
            "process_tags": "0",
            "show_event_menu": "1",
            "event_menu_url": "",
            "event_menu_name": "",
            "description": "",
            "parameters": []
        }
    ],
    "id": 1
}
```


See also

- User

Source

CMediaType::get() in *frontends/php/include/classes/api/services/CMediaType.php*.

mediatype.update

Description

`object mediatype.update(object/array mediaTypes)`

This method allows to update existing media types.

Parameters

`(object/array)` Media type properties to be updated.

The `mediatypeid` property must be defined for each media type, all other properties are optional. Only the passed properties will be updated, all others will remain unchanged.

Additionally to the standard media type properties, the method accepts the following parameters.

Parameter	Type	Description
parameters	array	Webhook parameters to replace the current webhook parameters.

Return values

`(object)` Returns an object containing the IDs of the updated media types under the `mediatypeids` property.

Examples

Enabling a media type

Enable a media type, that is, set its status to ”0”.

Request:


```
{
    "jsonrpc": "2.0",
    "method": "mediatype.update",
    "params": {
        "mediatypeid": "6",
        "status": "0"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "mediatypeids": [
            "6"
        ]
    },
    "id": 1
}
```

Source

CMediaType::update() in *ui/include/classes/api/services/CMediaType.php*.

Problem

This class is designed to work with problems.

Object references:

- Problem

Available methods:

- problem.get - retrieving problems

> Problem object

Note:
problems are created by the Zabbix server and cannot be modified via the API.

The problem object has the following properties.

Property	Type	Description
eventid	string	ID of the problem event.
source	integer	Type of the problem event. Possible values: 0 - event created by a trigger; 3 - internal event.
object	integer	Type of object that is related to the problem event. Possible values for trigger events: 0 - trigger. Possible values for internal events: 0 - trigger; 4 - item; 5 - LLD rule.
objectid	string	ID of the related object.
clock	timestamp	Time when the problem event was created.
ns	integer	Nanoseconds when the problem event was created.
r_eventid	string	Recovery event ID.
r_clock	timestamp	Time when the recovery event was created.
r_ns	integer	Nanoseconds when the recovery event was created.
correlationid	string	Correlation rule ID if this event was recovered by global correlation rule.
userid	string	User ID if the problem was manually closed.
name	string	Resolved problem name.

Property	Type	Description
acknowledged	integer	Acknowledge state for problem. Possible values: 0 - not acknowledged; 1 - acknowledged.
severity	integer	Problem current severity. Possible values: 0 - not classified; 1 - information; 2 - warning; 3 - average; 4 - high; 5 - disaster.
suppressed	integer	Whether the problem is suppressed. Possible values: 0 - problem is in normal state; 1 - problem is suppressed.
opdata	string	Operational data with expanded macros.
urls	array of Media type URLs	Active media types URLs.

Problem tag

The problem tag object has the following properties.

Property	Type	Description
tag	string	Problem tag name.
value	string	Problem tag value.

Media type URLs

Object with media type url have the following properties.

Property	Type	Description
name	string	Media type defined URL name.
url	string	Media type defined URL value.

Results will contain entries only for active media types with enabled event menu entry. Macro used in properties will be expanded, but if one of properties contain non expanded macro both properties will be excluded from results. Supported macros described on page.

problem.get

Description

`integer/array problem.get(object parameters)`

The method allows to retrieve problems according to the given parameters.

This method is for retrieving unresolved problems. It is also possible, if specified, to additionally retrieve recently resolved problems. The period that determines how old is "recently" is defined in *Administration → General*. Problems that were resolved prior to that period are not kept in the problem table. To retrieve problems that were resolved further back in the past, use the event.get method.

Attention:
This method may return problems of a deleted entity if these problems have not been removed by the housekeeper yet.

Parameters

`(object)` Parameters defining the desired output.

The method supports the following parameters.

Parameter	Type	Description
eventids	string/array	Return only problems with the given IDs.
groupids	string/array	Return only problems created by objects that belong to the given host groups.
hostids	string/array	Return only problems created by objects that belong to the given hosts.
objectids	string/array	Return only problems created by the given objects.
applicationids	string/array	Return only problems created by objects that belong to the given applications. Applies only if object is trigger or item.
source	integer	Return only problems with the given type. Refer to the problem event object page for a list of supported event types. Default: 0 - problem created by a trigger.
object	integer	Return only problems created by objects of the given type. Refer to the problem event object page for a list of supported object types. Default: 0 - trigger.
acknowledged	boolean	`true` - return acknowledged problems only; `false` - unacknowledged only.
suppressed	boolean	`true` - return only suppressed problems; `false` - return problems in the normal state.
severities	integer/array	Return only problems with given event severities. Applies only if object is trigger.
evaltype	integer	Rules for tag searching. Possible values: 0 - (default) And/Or; 2 - Or.
tags	array of objects	Return only problems with given tags. Exact match by tag and case-insensitive search by value and operator. Format: `[{"tag": "<tag>", "value": "<value>", "operator": "<operator>"}, ...]`. An empty array returns all problems. Possible operator types: 0 - (default) Like; 1 - Equal.
recent	boolean	`true` - return PROBLEM and recently RESOLVED problems (depends on Display OK triggers for N seconds) Default: `false` - UNRESOLVED problems only
eventid_from	string	Return only problems with IDs greater or equal to the given ID.
eventid_till	string	Return only problems with IDs less or equal to the given ID.
time_from	timestamp	Return only problems that have been created after or at the given time.
time_till	timestamp	Return only problems that have been created before or at the given time.

Parameter	Type	Description
selectAcknowledges	query	Return an `acknowledges` property with the problem updates. Problem updates are sorted in reverse chronological order. The problem update object has the following properties: `acknowledgeid` - `(string)` update's ID; `userid` - `(string)` ID of the user that updated the event; `eventid` - `(string)` ID of the updated event; `clock` - `(timestamp)` time when the event was updated; `message` - `(string)` text of the message; `action` - `(integer)` type of update action (see event.acknowledge); `old_severity` - `(integer)` event severity before this update action; `new_severity` - `(integer)` event severity after this update action; Supports `count`.
selectTags	query	Return a tags property with the problem tags. Output format: `[{"tag": "<tag>", "value": "<value>"}, ...]`.
selectSuppressionData	query	Return a `suppression_data` property with the list of maintenances: `maintenanceid` - `(string)` ID of the maintenance; `suppress_until` - `(integer)` time until the problem is suppressed.
sortfield	string/array	Sort the result by the given properties. Possible values are: `eventid`.
countOutput	boolean	These parameters being common for all `get` methods are described in detail in the reference commentary page.
editable	boolean	
excludeSearch	boolean	
filter	object	
limit	integer	
output	query	
preservekeys	boolean	
search	object	
searchByAny	boolean	
searchWildcardsEnabled	boolean	
sortorder	string/array	
startSearch	boolean	

Return values

`(integer/array)` Returns either:

- an array of objects;
- the count of retrieved objects, if the `countOutput` parameter has been used.

Examples

Retrieving trigger problem events

Retrieve recent events from trigger "15112."

Request:

```
{
    "jsonrpc": "2.0",
```

```
    "method": "problem.get",
    "params": {
        "output": "extend",
        "selectAcknowledges": "extend",
        "selectTags": "extend",
        "selectSuppressionData": "extend",
        "objectids": "15112",
        "recent": "true",
        "sortfield": ["eventid"],
        "sortorder": "DESC"
    },
    "auth": "67f45d3eb1173338e1b1647c4bdc1916",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "eventid": "1245463",
            "source": "0",
            "object": "0",
            "objectid": "15112",
            "clock": "1472457242",
            "ns": "209442442",
            "r_eventid": "1245468",
            "r_clock": "1472457285",
            "r_ns": "125644870",
            "correlationid": "0",
            "userid": "1",
            "name": "Zabbix agent on localhost is unreachable for 5 minutes",
            "acknowledged": "1",
            "severity": "3",
            "opdata": "",
            "acknowledges": [
                {
                    "acknowledgeid": "14443",
                    "userid": "1",
                    "eventid": "1245463",
                    "clock": "1472457281",
                    "message": "problem solved",
                    "action": "6",
                    "old_severity": "0",
                    "new_severity": "0"
                }
            ],
            "suppression_data": [
                {
                    "maintenanceid": "15",
                    "suppress_until": "1472511600"
                }
            ],
            "suppressed": "1",
            "tags": [
                {
                    "tag": "test tag",
                    "value": "test value"
                }
            ]
        }
    ],
```

```
    "id": 1
}
```

See also

- Alert
- Item
- Host
- LLD rule
- Trigger

Source

CEvent::get() in *frontends/php/include/classes/api/services/CProblem.php*.

Proxy

This class is designed to work with proxies.

Object references:

- Proxy
- Proxy interface

Available methods:

- proxy.create - create new proxies
- proxy.delete - delete proxies
- proxy.get - retrieve proxies
- proxy.update - update proxies

> Proxy object

The following objects are directly related to the `proxy` API.

Proxy

The proxy object has the following properties.

Property	Type	Description
proxyid	string	*(readonly)* ID of the proxy.
host (required)	string	Name of the proxy.
status (required)	integer	Type of proxy. Possible values: 5 - active proxy; 6 - passive proxy.
description	text	Description of the proxy.
lastaccess	timestamp	*(readonly)* Time when the proxy last connected to the server.
tls_connect	integer	Connections to host. Possible values are: 1 - *(default)* No encryption; 2 - PSK; 4 - certificate.
tls_accept	integer	Connections from host. Possible bitmap values are: 1 - *(default)* No encryption; 2 - PSK; 4 - certificate.
tls_issuer	string	Certificate issuer.

Property	Type	Description
tls_subject	string	Certificate subject.
tls_psk_identity	string	PSK identity. Required if either `tls_connect` or `tls_accept` has PSK enabled. Do not put sensitive information in the PSK identity, it is transmitted unencrypted over the network to inform a receiver which PSK to use.
tls_psk	string	The preshared key, at least 32 hex digits. Required if either `tls_connect` or `tls_accept` has PSK enabled.
proxy_address	string	Comma-delimited IP addresses or DNS names of active Zabbix proxy.
auto_compress	integer	*(readonly)* Indicates if communication between Zabbix server and proxy is compressed. Possible values are: 0 - No compression; 1 - Compression enabled;

Proxy interface

The proxy interface object defines the interface used to connect to a passive proxy. It has the following properties.

Property	Type	Description
interfaceid	string	*(readonly)* ID of the interface.
dns (required)	string	DNS name to connect to. Can be empty if connections are made via IP address.
ip (required)	string	IP address to connect to. Can be empty if connections are made via DNS names.
port (required)	string	Port number to connect to.
useip (required)	integer	Whether the connection should be made via IP address. Possible values are: 0 - connect using DNS name; 1 - connect using IP address.
hostid	string	*(readonly)* ID of the proxy the interface belongs to.

proxy.create

Description

`object proxy.create(object/array proxies)`

This method allows to create new proxies.

Parameters

`(object/array)` Proxies to create.

Additionally to the standard proxy properties, the method accepts the following parameters.

Parameter	Type	Description
hosts	array	Hosts to be monitored by the proxy. If a host is already monitored by a different proxy, it will be reassigned to the current proxy. The hosts must have the `hostid` property defined.

Parameter	Type	Description
interface	object	Host interface to be created for the passive proxy. Required for passive proxies.

Return values

(object) Returns an object containing the IDs of the created proxies under the proxyids property. The order of the returned IDs matches the order of the passed proxies.

Examples

Create an active proxy

Create an action proxy "Active proxy" and assign a host to be monitored by it.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "proxy.create",
    "params": {
        "host": "Active proxy",
        "status": "5",
        "hosts": [
            {
                "hostid": "10279"
            }
        ]
    },
    "auth": "ab9638041ec6922cb14b07982b268f47",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "proxyids": [
            "10280"
        ]
    },
    "id": 1
}
```

Create a passive proxy

Create a passive proxy "Passive proxy" and assign two hosts to be monitored by it.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "proxy.create",
    "params": {
        "host": "Passive proxy",
        "status": "6",
        "interface": {
            "ip": "127.0.0.1",
            "dns": "",
            "useip": "1",
            "port": "10051"
        },
        "hosts": [
            {
                "hostid": "10192"
```

```
            },
            {
                "hostid": "10139"
            }
        ]
    },
    "auth": "ab9638041ec6922cb14b07982b268f47",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "proxyids": [
            "10284"
        ]
    },
    "id": 1
}
```

See also

- Host
- Proxy interface

Source

CProxy::create() in *frontends/php/include/classes/api/services/CProxy.php*.

proxy.delete

Description

`object proxy.delete(array proxies)`

This method allows to delete proxies.

Parameters

`(array)` IDs of proxies to delete.

Return values

`(object)` Returns an object containing the IDs of the deleted proxies under the `proxyids` property.

Examples

Delete multiple proxies

Delete two proxies.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "proxy.delete",
    "params": [
        "10286",
        "10285"
    ],
    "auth": "3a57200802b24cda67c4e4010b50c065",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
```

```
        "proxyids": [
            "10286",
            "10285"
        ]
    },
    "id": 1
}
```

Source

CProxy::delete() in *frontends/php/include/classes/api/services/CProxy.php*.

proxy.get

Description

`integer/array proxy.get(object parameters)`

The method allows to retrieve proxies according to the given parameters.

Parameters

`(object)` Parameters defining the desired output.

The method supports the following parameters.

Parameter	Type	Description
proxyids	string/array	Return only proxies with the given IDs.
selectHosts	query	Return a hosts property with the hosts monitored by the proxy.
selectInterface	query	Return an interface property with the proxy interface used by a passive proxy.
sortfield	string/array	Sort the result by the given properties. Possible values are: `hostid`, `host` and `status`.
countOutput	boolean	These parameters being common for all `get` methods are described in detail in the reference commentary.
editable	boolean	
excludeSearch	boolean	
filter	object	
limit	integer	
output	query	
preservekeys	boolean	
search	object	
searchByAny	boolean	
searchWildcardsEnabled	boolean	
sortorder	string/array	
startSearch	boolean	

Return values

`(integer/array)` Returns either:

- an array of objects;
- the count of retrieved objects, if the `countOutput` parameter has been used.

Examples

Retrieve all proxies

Retrieve all configured proxies and their interfaces.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "proxy.get",
```

```
    "params": {
        "output": "extend",
        "selectInterface": "extend"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "host": "Active proxy",
            "status": "5",
            "lastaccess": "0",
            "description": "",
            "tls_connect": "1",
            "tls_accept": "1",
            "tls_issuer": "",
            "tls_subject": "",
            "tls_psk_identity": "",
            "tls_psk": "",
            "proxy_address": "",
            "auto_compress": "0",
            "proxyid": "30091",
            "interface": []
        },
        {
            "host": "Passive proxy",
            "status": "6",
            "lastaccess": "0",
            "description": "",
            "tls_connect": "1",
            "tls_accept": "1",
            "tls_issuer": "",
            "tls_subject": "",
            "tls_psk_identity": "",
            "tls_psk": "",
            "proxy_address": "",
            "auto_compress": "0",
            "proxyid": "30092",
            "interface": {
                "interfaceid": "30109",
                "hostid": "30092",
                "useip": "1",
                "ip": "127.0.0.1",
                "dns": "",
                "port": "10051"
            }
        }
    ],
    "id": 1
}
```

See also

- Host
- Proxy interface

Source

CProxy::get() in *frontends/php/include/classes/api/services/CProxy.php*.

proxy.update

Description

`object proxy.update(object/array proxies)`

This method allows to update existing proxies.

Parameters

`(object/array)` Proxy properties to be updated.

The `proxyid` property must be defined for each proxy, all other properties are optional. Only the passed properties will be updated, all others will remain unchanged.

Additionally to the standard proxy properties, the method accepts the following parameters.

Parameter	Type	Description
hosts	array	Hosts to be monitored by the proxy. If a host is already monitored by a different proxy, it will be reassigned to the current proxy. The hosts must have the `hostid` property defined.
interface	object	Host interface to replace the existing interface for the passive proxy.

Return values

`(object)` Returns an object containing the IDs of the updated proxies under the `proxyids` property.

Examples

Change hosts monitored by a proxy

Update the proxy to monitor the two given hosts.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "proxy.update",
    "params": {
        "proxyid": "10293",
        "hosts": [
            "10294",
            "10295"
        ]
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "proxyids": [
            "10293"
        ]
    },
    "id": 1
}
```

Change proxy status

Change the proxy to an active proxy and rename it to ”Active proxy”.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "proxy.update",
    "params": {
        "proxyid": "10293",
        "host": "Active proxy",
        "status": "5"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "proxyids": [
            "10293"
        ]
    },
    "id": 1
}
```

See also

- Host
- Proxy interface

Source

CProxy::update() in *frontends/php/include/classes/api/services/CProxy.php*.

Screen

This class is designed to work with screen.

Object references:

- Screen
- Screen user
- Screen user group

Available methods:

- screen.create - creating new screen
- screen.delete - deleting screens
- screen.get - retrieving screens
- screen.update - updating screens

> Screen object

The following objects are directly related to the `screen` API.

Screen

The screen object has the following properties.

Property	Type	Description
screenid	string	*(readonly)* ID of the screen.
name (required)	string	Name of the screen.

Property	Type	Description
hsize	integer	Width of the screen. Default: 1
vsize	integer	Height of the screen. Default: 1
userid	string	Screen owner user ID.
private	integer	Type of screen sharing. Possible values: 0 - public screen; 1 - *(default)* private screen.

Screen user

List of screen permissions based on users. It has the following properties:

Property	Type	Description
screenuserid	string	*(readonly)* ID of the screen user.
userid (required)	string	User ID.
permission (required)	integer	Type of permission level. Possible values: 2 - read only; 3 - read-write;

Screen user group

List of screen permissions based on user groups. It has the following properties:

Property	Type	Description
screenusrgrpid	string	*(readonly)* ID of the screen user group.
usrgrpid (required)	string	User group ID.
permission (required)	integer	Type of permission level. Possible values: 2 - read only; 3 - read-write;

screen.create

Description

`object screen.create(object/array screens)`

This method allows to create new screens.

Parameters

`(object/array)` Screens to create.

Additionally to the standard screen properties, the method accepts the following parameters.

Parameter	Type	Description
screenitems	array	Screen items to be created for the screen.
users	array	Screen user shares to be created on the screen.
userGroups	array	Screen user group shares to be created on the screen.

Return values

(object) Returns an object containing the IDs of the created screens under the screenids property. The order of the returned IDs matches the order of the passed screens.

Examples

Creating a screen

Create a screen named "Graphs" with 2 rows and 3 columns and add a graph to the upper-left cell.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "screen.create",
    "params": {
        "name": "Graphs",
        "hsize": 3,
        "vsize": 2,
        "screenitems": [
            {
                "resourcetype": 0,
                "resourceid": "612",
                "rowspan": 1,
                "colspan": 1,
                "x": 0,
                "y": 0
            }
        ]
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "screenids": [
            "26"
        ]
    },
    "id": 1
}
```

Screen sharing

Create a screen with two types of sharing (user and user group).

Request:

```
{
    "jsonrpc": "2.0",
    "method": "screen.create",
    "params": {
        "name": "Screen sharing",
        "hsize": 3,
        "vsize": 2,
        "users": [
            {
                "userid": "4",
                "permission": "3"
            }
        ],
        "userGroups": [
            {
                "usrgrpid": "7",
```

```
                "permission": "2"
            }
        ]
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "screenids": [
            "83"
        ]
    },
    "id": 1
}
```

See also

- Screen item
- Screen user
- Screen user group

Source

CScreen::create() in *frontends/php/include/classes/api/services/CScreen.php*.

screen.delete

Description

`object screen.delete(array screenIds)`

This method allows to delete screens.

Parameters

`(array)` IDs of the screens to delete.

Return values

`(object)` Returns an object containing the IDs of the deleted screens under the `screenids` property.

Examples

Deleting multiple screens

Delete two screens.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "screen.delete",
    "params": [
        "25",
        "26"
    ],
    "auth": "3a57200802b24cda67c4e4010b50c065",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "screenids": [
```

```
            "25",
            "26"
        ]
    },
    "id": 1
}
```

Source

CScreen::delete() in *frontends/php/include/classes/api/services/CScreen.php*.

screen.get

Description

`integer/array screen.get(object parameters)`

The method allows to retrieve screens according to the given parameters.

Parameters

`(object)` Parameters defining the desired output.

The method supports the following parameters.

Parameter	Type	Description
screenids	string/array	Return only screens with the given IDs.
userids	string/array	Return only screens that belong to the given user IDs.
screenitemids	string/array	Return only screens that contain the given screen items.
selectScreenItems	query	Return a screenitems property with the elements that are used in the screen.
selectUsers	query	Return a users property with users that the screen is shared with.
selectUserGroups	query	Return a userGroups property with user groups that the screen is shared with.
sortfield	string/array	Sort the result by the given properties. Possible values are: `screenid` and `name`.
countOutput	boolean	These parameters being common for all `get` methods are described in detail in the reference commentary page.
editable	boolean	
excludeSearch	boolean	
filter	object	
limit	integer	
output	query	
preservekeys	boolean	
search	object	
searchByAny	boolean	
searchWildcardsEnabled	boolean	
sortorder	string/array	
startSearch	boolean	

Return values

`(integer/array)` Returns either:

- an array of objects;
- the count of retrieved objects, if the `countOutput` parameter has been used.

Examples

Retrieving a screen by ID

Retrieve all data about screen ”26” and its screen items.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "screen.get",
    "params": {
        "output": "extend",
        "selectScreenItems": "extend",
        "selectUsers": "extend",
        "selectUserGroups": "extend",
        "screenids": "26"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "screenitems": [
                {
                    "screenitemid": "67",
                    "screenid": "26",
                    "resourcetype": "0",
                    "resourceid": "612",
                    "width": "320",
                    "height": "200",
                    "x": "0",
                    "y": "0",
                    "colspan": "0",
                    "rowspan": "0",
                    "elements": "25",
                    "valign": "0",
                    "halign": "0",
                    "style": "0",
                    "url": "",
                    "dynamic": "0",
                    "sort_triggers": "0"
                }
            ],
            "users": [
                {
                    "sysmapuserid": "1",
                    "userid": "2",
                    "permission": "2"
                }
            ],
            "userGroups": [
                {
                    "screenusrgrpid": "1",
                    "usrgrpid": "7",
                    "permission": "3"
                }
            ],
            "screenid": "26",
            "name": "CPU Graphs",
            "hsize": "3",
            "vsize": "2",
            "userid": "1",
            "private": "1"
        }
```

```
    ],
    "id": 1
}
```

See also

- Screen item
- Screen user
- Screen user group

Source

CScreen::get() in *frontends/php/include/classes/api/services/CScreen.php*.

screen.update

Description

`object screen.update(object/array screens)`

This method allows to update existing screens.

Parameters

`(object/array)` Screen properties to be updated.

The `screenid` property must be defined for each screen, all other properties are optional. Only the passed properties will be updated, all others will remain unchanged.

Additionally to the standard screen properties, the method accepts the following parameters.

Parameter	Type	Description
screenitems	array	Screen items to replace existing screen items. Screen items are updated by coordinates, so each screen item must have the `x` and `y` properties defined.
users	array	Screen user shares to replace the existing elements.
userGroups	array	Screen user group shares to replace the existing elements.

Return values

`(object)` Returns an object containing the IDs of the updated screens under the `screenids` property.

Examples

Renaming a screen

Rename a screen to "CPU Graphs".

Request:

```
{
    "jsonrpc": "2.0",
    "method": "screen.update",
    "params": {
        "screenid": "26",
        "name": "CPU Graphs"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "screenids": [
```

```
            "26"
        ]
    },
    "id": 1
}
```

Change screen owner

Available only for admins and super admins.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "screen.update",
    "params": {
        "screenid": "83",
        "userid": "1"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 2
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "screenids": [
            "83"
        ]
    },
    "id": 2
}
```

See also

- Screen item
- screenitem.create
- screenitem.update
- screenitem.updatebyposition
- Screen user
- Screen user group

Source

CScreen::update() in *frontends/php/include/classes/api/services/CScreen.php*.

Screen item

This class is designed to work with screen items.

Object references:

- Screen item

Available methods:

- screenitem.create - creating new screen items
- screenitem.delete - deleting screen items
- screenitem.get - retrieving screen items
- screenitem.update - updating screen items
- screenitem.updatebyposition - updating screen items in a specific screen cell

> Screen item object

The following objects are directly related to the `screenitem` API.

Screen item

The screen item object defines an element displayed on a screen. It has the following properties.

Property	Type	Description
screenitemid	string	*(readonly)* ID of the screen item.
resourcetype (required)	integer	Type of screen item. Possible values: 0 - graph; 1 - simple graph; 2 - map; 3 - plain text; 4 - hosts info; 5 - triggers info; 6 - system information; 7 - clock; 9 - triggers overview; 10 - data overview; 11 - URL; 12 - history of actions; 13 - history of events; 14 - latest host group issues; 15 - problems by severity; 16 - latest host issues; 19 - simple graph prototype; 20 - graph prototype.
screenid (required)	string	ID of the screen that the item belongs to.
application	string	Application or part of application name by which data in screen item can be filtered. Applies to resource types: ”Data overview” and ”Triggers overview”.
colspan	integer	Number of columns the screen item will span across. Default: 1.
dynamic	integer	Whether the screen item is dynamic. Possible values: 0 - *(default)* not dynamic; 1 - dynamic.
elements	integer	Number of lines to display on the screen item. Default: 25.
halign	integer	Specifies how the screen item must be aligned horizontally in the cell. Possible values: 0 - *(default)* center; 1 - left; 2 - right.
height	integer	Height of the screen item in pixels. Default: 200.
max_columns	integer	Specifies the maximum amount of columns a graph prototype or simple graph prototype screen element can have. Default: 3.

Property	Type	Description
resourceid	string	ID of the object displayed on the screen item. Depending on the type of a screen item, the `resourceid` property can reference different objects. Required for data overview, graph, map, plain text, simple graph and trigger overview screen items. Unused by local and server time clocks, history of actions, history of events, hosts info, system information, problems by severity and URL screen items.
rowspan	integer	Number or rows the screen item will span across. Default: 1.
sort_triggers	integer	Order in which actions or triggers must be sorted. Possible values for history of actions screen elements: 3 - time, ascending; 4 - time, descending; 5 - type, ascending; 6 - type, descending; 7 - status, ascending; 8 - status, descending; 9 - retries left, ascending; 10 - retries left, descending; 11 - recipient, ascending; 12 - recipient, descending. Possible values for latest host group issues and latest host issues screen items: 0 - *(default)* last change, descending; 1 - severity, descending; 2 - host, ascending.
style	integer	Screen item display option. Possible values for data overview and triggers overview screen items: 0 - *(default)* display hosts on the left side; 1 - display hosts on the top. Possible values for hosts info and triggers info screen elements: 0 - *(default)* horizontal layout; 1 - vertical layout. Possible values for clock screen items: 0 - *(default)* local time; 1 - server time; 2 - host time. Possible values for plain text screen items: 0 - *(default)* display values as plain text; 1 - display values as HTML.
url	string	URL of the webpage to be displayed in the screen item. Used by URL screen items.
valign	integer	Specifies how the screen item must be aligned vertically in the cell. Possible values: 0 - *(default)* middle; 1 - top; 2 - bottom.

Property	Type	Description
width	integer	Width of the screen item in pixels. Default: 320.
x	integer	X-coordinates of the screen item on the screen, from left to right. Default: 0.
y	integer	Y-coordinates of the screen item on the screen, from top to bottom. Default: 0.

screenitem.create

Description

`object screenitem.create(object/array screenItems)`

This method allows to create new screen items.

Parameters

`(object/array)` Screen items to create.

The method accepts screen items with the standard screen item properties.

Return values

`(object)` Returns an object containing the IDs of the created screen items under the `screenitemids` property. The order of the returned IDs matches the order of the passed screen items.

Examples

Creating a screen item

Create a screen item displaying a graph in the left-upper cell of the screen.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "screenitem.create",
    "params": {
        "screenid": 16,
        "resourcetype": 0,
        "resourceid": 612,
        "x": 0,
        "y": 0
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "screenitemids": [
            "65"
        ]
    },
    "id": 1
}
```

See also

- screen.update

Source

CScreenItem::create() in *frontends/php/include/classes/api/services/CScreenItem.php*.

screenitem.delete

Description

`object screenitem.delete(array screenItemIds)`

This method allows to delete screen items.

Parameters

`(array)` IDs of the screen items to delete.

Return values

`(object)` Returns an object containing the IDs of the deleted screen items under the `screenitemids` property.

Examples

Deleting multiple screen items

Delete two screen items.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "screenitem.delete",
    "params": [
        "65",
        "63"
    ],
    "auth": "3a57200802b24cda67c4e4010b50c065",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "screenitemids": [
            "65",
            "63"
        ]
    },
    "id": 1
}
```

See also

- screen.update

Source

CScreenItem::delete() in *frontends/php/include/classes/api/services/CScreenItem.php*.

screenitem.get

Description

`integer/array screenitem.get(object parameters)`

The method allows to retrieve screen items according to the given parameters.

Parameters

`(object)` Parameters defining the desired output.

The method supports the following parameters.

Parameter	Type	Description
screenitemids	string/array	Return only screen items with the given IDs.
screenids	string/array	Return only screen items that belong to the given screen.
sortfield	string/array	Sort the result by the given properties. Possible values are: `screenitemid` and `screenid`.
countOutput	boolean	These parameters being common for all `get` methods are described in detail in the reference commentary page page.
editable	boolean	
excludeSearch	boolean	
filter	object	
limit	integer	
output	query	
preservekeys	boolean	
search	object	
searchByAny	boolean	
searchWildcardsEnabled	boolean	
sortorder	string/array	
startSearch	boolean	

Return values

`(integer/array)` Returns either:

- an array of objects;
- the count of retrieved objects, if the `countOutput` parameter has been used.

Examples

Retrieving screen items from screen

Retrieve all screen items from the given screen.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "screenitem.get",
    "params": {
        "output": "extend",
        "screenids": "3"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "screenitemid": "20",
            "screenid": "3",
            "resourcetype": "0",
            "resourceid": "433",
            "width": "500",
            "height": "120",
            "x": "0",
            "y": "0",
            "colspan": "1",
            "rowspan": "1",
            "elements": "0",
            "valign": "1",
```

```
            "halign": "0",
            "style": "0",
            "url": "",
            "dynamic": "0",
            "sort_triggers": "0",
            "application": "",
            "max_columns": "3"
        },
        {
            "screenitemid": "21",
            "screenid": "3",
            "resourcetype": "0",
            "resourceid": "387",
            "width": "500",
            "height": "100",
            "x": "0",
            "y": "1",
            "colspan": "1",
            "rowspan": "1",
            "elements": "0",
            "valign": "1",
            "halign": "0",
            "style": "0",
            "url": "",
            "dynamic": "0",
            "sort_triggers": "0",
            "application": "",
            "max_columns": "3"
        },
        {
            "screenitemid": "22",
            "screenid": "3",
            "resourcetype": "1",
            "resourceid": "10013",
            "width": "500",
            "height": "148",
            "x": "1",
            "y": "0",
            "colspan": "1",
            "rowspan": "1",
            "elements": "0",
            "valign": "1",
            "halign": "0",
            "style": "0",
            "url": "",
            "dynamic": "0",
            "sort_triggers": "0",
            "application": "",
            "max_columns": "3"
        },
        {
            "screenitemid": "23",
            "screenid": "3",
            "resourcetype": "1",
            "resourceid": "22181",
            "width": "500",
            "height": "184",
            "x": "1",
            "y": "1",
            "colspan": "1",
            "rowspan": "1",
            "elements": "0",
```

```
            "valign": "1",
            "halign": "0",
            "style": "0",
            "url": "",
            "dynamic": "0",
            "sort_triggers": "0",
            "application": "",
            "max_columns": "3"
        }
    ],
    "id": 1
}
```

Source

CScreenItem::get() in *frontends/php/include/classes/api/services/CScreenItem.php*.

screenitem.update

Description

`object screenitem.update(object/array screenItems)`

This method allows to update existing screen items.

Parameters

`(object/array)` Screen item properties to be updated.

The `screenitemid` property must be defined for each screen item, all other properties are optional. Only the passed properties will be updated, all others will remain unchanged.

Return values

`(object)` Returns an object containing the IDs of the updated screen items under the `screenitemids` property.

Examples

Setting the size of the screen item

Set the width of the screen item to 500px and height to 300px.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "screenitem.update",
    "params": {
        "screenitemid": "20",
        "width": 500,
        "height": 300
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "screenitemids": [
            "20"
        ]
    },
    "id": 1
}
```

See also

- screenitem.updatebyposition

Source

CScreenItem::update() in *frontends/php/include/classes/api/services/CScreenItem.php*.

screenitem.updatebyposition

Description

`object screenitem.updatebyposition(array screenItems)`

This method allows to update screen items in the given screen cells. If a cell is empty, a new screen item will be created.

Parameters

`(array)` Screen item properties to be updated.

The `x`, `y` and `screenid` properties must be defined for each screen item, all other properties are optional. Only the passed properties will be updated, all others will remain unchanged.

Return values

`(object)` Returns an object containing the IDs of the updated and created screen items under the `screenitemids` property.

Examples

Changing a screen items resource ID

Change the resource ID for the screen element located in the upper-left cell of the screen.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "screenitem.updatebyposition",
    "params": [
        {
            "screenid": "16",
            "x": 0,
            "y": 0,
            "resourceid": "644"
        }
    ],
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "screenitemids": [
            "66"
        ]
    },
    "id": 1
}
```

See also

- screenitem.update

Source

CScreenItem::update() in *frontends/php/include/classes/api/services/CScreenItem.php*.

Script

This class is designed to work with scripts.

Object references:

- Script

Available methods:

- script.create - create new scripts
- script.delete - delete scripts
- script.execute - run scripts
- script.get - retrieve scripts
- script.getscriptsbyhosts - retrieve scripts for hosts
- script.update - update scripts

> Script object

The following objects are directly related to the `script` API.

Script

The script object has the following properties.

Property	Type	Description
scriptid	string	*(readonly)* ID of the script.
command (required)	string	Command to run.
name (required)	string	Name of the script.
confirmation	string	Confirmation pop up text. The pop up will appear when trying to run the script from the Zabbix frontend.
description	string	Description of the script.
execute_on	integer	Where to run the script. Possible values: 0 - run on Zabbix agent; 1 - run on Zabbix server. 2 - *(default)* run on Zabbix server (proxy).
groupid	string	ID of the host group that the script can be run on. If set to 0, the script will be available on all host groups. Default: 0.
host_access	integer	Host permissions needed to run the script. Possible values: 2 - *(default)* read; 3 - write.
type	integer	Script type. Possible values: 0 - *(default)* script; 1 - IPMI.
usrgrpid	string	ID of the user group that will be allowed to run the script. If set to 0, the script will be available for all user groups. Default: 0.

script.create

Description

`object script.create(object/array scripts)`

This method allows to create new scripts.

Parameters

(object/array) Scripts to create.

The method accepts scripts with the standard script properties.

Return values

(object) Returns an object containing the IDs of the created scripts under the scriptids property. The order of the returned IDs matches the order of the passed scripts.

Examples

Create a script

Create a script that will reboot a server. The script will require write access to the host and will display a configuration message before running in the frontend.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "script.create",
    "params": {
        "name": "Reboot server",
        "command": "reboot server 1",
        "host_access": 3,
        "confirmation": "Are you sure you would like to reboot the server?"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "scriptids": [
            "3"
        ]
    },
    "id": 1
}
```

Source

CScript::create() in *frontends/php/include/classes/api/services/CScript.php*.

script.delete

Description

`object script.delete(array scriptIds)`

This method allows to delete scripts.

Parameters

(array) IDs of the scripts to delete.

Return values

(object) Returns an object containing the IDs of the deleted scripts under the scriptids property.

Examples

Delete multiple scripts

Delete two scripts.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "script.delete",
    "params": [
        "3",
        "4"
    ],
    "auth": "3a57200802b24cda67c4e4010b50c065",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "scriptids": [
            "3",
            "4"
        ]
    },
    "id": 1
}
```

Source

CScript::delete() in *frontends/php/include/classes/api/services/CScript.php*.

script.execute

Description

`object script.execute(object parameters)`

This method allows to run a script on a host.

Parameters

`(object)` Parameters containing the ID of the script to run and the ID of the host.

Parameter	Type	Description
hostid (required)	string	ID of the host to run the script on.
scriptid (required)	string	ID of the script to run.

Return values

`(object)` Returns the result of script execution.

Property	Type	Description
response	string	Whether the script was run successfully. Possible values: `success` or `failed`.
value	string	Script output.

Examples

Run a script

Run a ”ping” script on a host.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "script.execute",
    "params": {
        "scriptid": "1",
        "hostid": "30079"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "response": "success",
        "value": "PING 127.0.0.1 (127.0.0.1) 56(84) bytes of data.\n64 bytes from 127.0.0.1: icmp_req=1 tt
    },
    "id": 1
}
```

Source

CScript::execute() in *frontends/php/include/classes/api/services/CScript.php*.

script.get

Description

`integer/array script.get(object parameters)`

The method allows to retrieve scripts according to the given parameters.

Parameters

`(object)` Parameters defining the desired output.

The method supports the following parameters.

Parameter	Type	Description
groupids	string/array	Return only scripts that can be run on the given host groups.
hostids	string/array	Return only scripts that can be run on the given hosts.
scriptids	string/array	Return only scripts with the given IDs.
usrgrpids	string/array	Return only scripts that can be run by users in the given user groups.
selectGroups	query	Return a groups property with host groups that the script can be run on.
selectHosts	query	Return a hosts property with hosts that the script can be run on.
sortfield	string/array	Sort the result by the given properties. Possible values are: `scriptid` and `name`.
countOutput	boolean	These parameters being common for all `get` methods are described in detail in the reference commentary.
editable	boolean	
excludeSearch	boolean	
filter	object	
limit	integer	
output	query	
preservekeys	boolean	
search	object	
searchByAny	boolean	
searchWildcardsEnabled	boolean	

Parameter	Type	Description
sortorder	string/array	
startSearch	boolean	

Return values

`(integer/array)` Returns either:

- an array of objects;
- the count of retrieved objects, if the `countOutput` parameter has been used.

Examples

Retrieve all scripts

Retrieve all configured scripts.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "script.get",
    "params": {
        "output": "extend"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "scriptid": "1",
            "name": "Ping",
            "command": "/bin/ping -c 3 {HOST.CONN} 2>&1",
            "host_access": "2",
            "usrgrpid": "0",
            "groupid": "0",
            "description": "",
            "confirmation": "",
            "type": "0",
            "execute_on": "1"
        },
        {
            "scriptid": "2",
            "name": "Traceroute",
            "command": "/usr/bin/traceroute {HOST.CONN} 2>&1",
            "host_access": "2",
            "usrgrpid": "0",
            "groupid": "0",
            "description": "",
            "confirmation": "",
            "type": "0",
            "execute_on": "1"
        },
        {
            "scriptid": "3",
            "name": "Detect operating system",
            "command": "sudo /usr/bin/nmap -O {HOST.CONN} 2>&1",
            "host_access": "2",
            "usrgrpid": "7",
            "groupid": "0",
            "description": "",
```

```
            "confirmation": "",
            "type": "0",
            "execute_on": "1"
        }
    ],
    "id": 1
}
```

See also

- Host
- Host group

Source

CScript::get() in *frontends/php/include/classes/api/services/CScript.php*.

script.getscriptsbyhosts

Description

`object script.getscriptsbyhosts(array hostIds)`

This method allows to retrieve scripts available on the given hosts.

Parameters

`(string/array)` IDs of hosts to return scripts for.

Return values

`(object)` Returns an object with host IDs as properties and arrays of available scripts as values.

> **Note:**
> The method will automatically expand macros in the `confirmation` text.

Examples

Retrieve scripts by host IDs

Retrieve all scripts available on hosts ”30079” and ”30073”.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "script.getscriptsbyhosts",
    "params": [
        "30079",
        "30073"
    ],
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "30079": [
            {
                "scriptid": "3",
                "name": "Detect operating system",
                "command": "sudo /usr/bin/nmap -O {HOST.CONN} 2>&1",
                "host_access": "2",
                "usrgrpid": "7",
                "groupid": "0",
                "description": "",
```

```
            "confirmation": "",
            "type": "0",
            "execute_on": "1",
            "hostid": "10001"
        },
        {
            "scriptid": "1",
            "name": "Ping",
            "command": "/bin/ping -c 3 {HOST.CONN} 2>&1",
            "host_access": "2",
            "usrgrpid": "0",
            "groupid": "0",
            "description": "",
            "confirmation": "",
            "type": "0",
            "execute_on": "1",
            "hostid": "10001"
        },
        {
            "scriptid": "2",
            "name": "Traceroute",
            "command": "/usr/bin/traceroute {HOST.CONN} 2>&1",
            "host_access": "2",
            "usrgrpid": "0",
            "groupid": "0",
            "description": "",
            "confirmation": "",
            "type": "0",
            "execute_on": "1",
            "hostid": "10001"
        }
    ],
    "30073": [
        {
            "scriptid": "3",
            "name": "Detect operating system",
            "command": "sudo /usr/bin/nmap -O {HOST.CONN} 2>&1",
            "host_access": "2",
            "usrgrpid": "7",
            "groupid": "0",
            "description": "",
            "confirmation": "",
            "type": "0",
            "execute_on": "1",
            "hostid": "10001"
        },
        {
            "scriptid": "1",
            "name": "Ping",
            "command": "/bin/ping -c 3 {HOST.CONN} 2>&1",
            "host_access": "2",
            "usrgrpid": "0",
            "groupid": "0",
            "description": "",
            "confirmation": "",
            "type": "0",
            "execute_on": "1",
            "hostid": "10001"
        },
        {
            "scriptid": "2",
            "name": "Traceroute",
```

```
                "command": "/usr/bin/traceroute {HOST.CONN} 2>&1",
                "host_access": "2",
                "usrgrpid": "0",
                "groupid": "0",
                "description": "",
                "confirmation": "",
                "type": "0",
                "execute_on": "1",
                "hostid": "10001"
            }
        ]
    },
    "id": 1
}
```


Source

CScript::getScriptsByHosts() in *frontends/php/include/classes/api/services/CScript.php*.

script.update

Description

`object script.update(object/array scripts)`

This method allows to update existing scripts.

Parameters

`(object/array)` Script properties to be updated.

The `scriptid` property must be defined for each script, all other properties are optional. Only the passed properties will be updated, all others will remain unchanged.

Return values

`(object)` Returns an object containing the IDs of the updated scripts under the `scriptids` property.

Examples

Change script command

Change the command of the script to "/bin/ping -c 10 {HOST.CONN} 2>&1".

Request:


```
{
    "jsonrpc": "2.0",
    "method": "script.update",
    "params": {
        "scriptid": "1",
        "command": "/bin/ping -c 10 {HOST.CONN} 2>&1"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```


Response:


```
{
    "jsonrpc": "2.0",
    "result": {
        "scriptids": [
            "1"
        ]
    },
    "id": 1
}
```

Source

CScript::update() in *frontends/php/include/classes/api/services/CScript.php*.

Service

This class is designed to work with services.

Object references:

- Service
- Service time
- Service dependency
- Service alarm

Available methods:

- service.adddependencies - adding dependencies between IT services
- service.addtimes - adding service times
- service.create - creating new IT services
- service.delete - deleting IT services
- service.deletedependencies - deleting dependencies between IT services
- service.deletetimes - deleting service times
- service.get - retrieving IT services
- service.getsla - retrieving availability information about IT services
- service.update - updating IT services

> Service object

The following objects are directly related to the `service` API.

Service

The service object has the following properties.

Property	Type	Description
serviceid	string	*(readonly)* ID of the service.
algorithm (required)	integer	Algorithm used to calculate the state of the service. Possible values: 0 - do not calculate; 1 - problem, if at least one child has a problem; 2 - problem, if all children have problems.
name (required)	string	Name of the service.
showsla (required)	integer	Whether SLA should be calculated. Possible values: 0 - do not calculate; 1 - calculate.
sortorder (required)	integer	Position of the service used for sorting.
goodsla	float	Minimum acceptable SLA value. If the SLA drops lower, the service is considered to be in problem state. Default: 99.9.

Property	Type	Description
status	integer	*(readonly)* Whether the service is in OK or problem state. If the service is in problem state, `status` is equal either to: - the priority of the linked trigger if it is set to 2, "Warning" or higher (priorities 0, "Not classified" and 1, "Information" are ignored); - the highest status of a child service in problem state. If the service is in OK state, `status` is equal to 0.
triggerid	string	Trigger associated with the service. Can only be set for services that don't have children. Default: 0

Service time

The service time object defines periods, when an service is scheduled to be up or down. It has the following properties.

Property	Type	Description
timeid	string	*(readonly)* ID of the service time.
serviceid (required)	string	ID of the service. Cannot be updated.
ts_from (required)	integer	Time when the service time comes into effect. For onetime downtimes `ts_from` must be set as a Unix timestamp, for other types - as a specific time in a week, in seconds, for example, 90000 for Tue, 2:00 AM.
ts_to (required)	integer	Time when the service time ends. For onetime uptimes `ts_to` must be set as a Unix timestamp, for other types - as a specific time in a week, in seconds, for example, 90000 for Tue, 2:00 AM.
type (required)	integer	Service time type. Possible values: 0 - planned uptime, repeated every week; 1 - planned downtime, repeated every week; 2 - one-time downtime.
note	string	Additional information about the service time.

Service dependency

The service dependency object represents a dependency between services. It has the following properties.

Property	Type	Description
linkid	string	*(readonly)* ID of the service dependency.
servicedownid (required)	string	ID of the service, that a service depends on, that is, the child service. An service can have multiple children.
serviceupid (required)	string	ID of the service, that is dependent on a service, that is, the parent service. An service can have multiple parents forming a directed graph.

Property	Type	Description
soft (required)	integer	Type of dependency between services. Possible values: 0 - hard dependency; 1 - soft dependency. An service can have only one hard-dependent parent. This attribute has no effect on status or SLA calculation and is only used to create a core service tree. Additional parents can be added as soft dependencies forming a graph. An service can not be deleted if it has hard-dependent children.

Service alarm

Note:
Service alarms cannot be directly created, updated or deleted via the Zabbix API.

The service alarm objects represents an service's state change. It has the following properties.

Property	Type	Description
servicealarmid	string	ID of the service alarm.
serviceid	string	ID of the service.
clock	timestamp	Time when the service state change has happened.
value	integer	Status of the service. Refer the the service status property for a list of possible values.

service.adddependencies

Description

`object service.adddependencies(object/array serviceDependencies)`

This method allows to create dependencies between services.

Parameters

`(object/array)` Service dependencies to create.

Each service dependency has the following parameters.

Parameter	Type	Description
serviceid	string	ID of the service that depends on a service, that is, the parent service.
dependsOnServiceid	string	ID of the service that a service depends on, that is, the child service.
soft	string	Type of dependency. Refer to the service dependency object page for more information on dependency types.

Return values

`(object)` Returns an object containing the IDs of the affected parent services under the `serviceids` property.

Examples

Creating a hard dependency

Make service ”2” a hard-dependent child of service ”3”.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "service.adddependencies",
    "params": {
        "serviceid": "3",
        "dependsOnServiceid": "2",
        "soft": 0
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "serviceids": [
            "3"
        ]
    },
    "id": 1
}
```

See also

- service.update

Source

CService::addDependencies() in *frontends/php/include/classes/api/services/CService.php*.

service.addtimes

Description

`object service.addtimes(object/array serviceTimes)`

This method allows to create new service times.

Parameters

`(object/array)` Service times to create.

The method accepts service times with the standard service time properties.

Return values

`(object)` Returns an object containing the IDs of the affected services under the `serviceids` property.

Examples

Adding a scheduled downtime

Add a downtime for service with ID ”4” scheduled weekly from Monday 22:00 till Tuesday 10:00.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "service.addtimes",
    "params": {
        "serviceid": "4",
        "type": 1,
        "ts_from": 165600,
        "ts_to": 201600
```

```
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "serviceids": [
            "4"
        ]
    },
    "id": 1
}
```

See also

- service.update

Source

CService::addTimes() in *frontends/php/include/classes/api/services/CService.php*.

service.create

Description

`object service.create(object/array services)`

This method allows to create new services.

Parameters

`(object/array)` services to create.

Additionally to the standard service properties, the method accepts the following parameters.

Parameter	Type	Description
dependencies	array	Service dependencies. Each service dependency has the following parameters: - `dependsOnServiceid` - *(string)* ID of an service the service depends on, that is, the child service. - `soft` - *(integer)* type of service dependency.
parentid	string	ID of a hard-linked parent service.
times	array	Service times to be created for the service.

Return values

`(object)` Returns an object containing the IDs of the created services under the `serviceids` property. The order of the returned IDs matches the order of the passed services.

Examples

Creating an service

Create an service that will be switched to problem state, if at least one child has a problem. SLA calculation will be on and the minimum acceptable SLA is 99.99%.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "service.create",
    "params": {
        "name": "Server 1",
```

```
        "algorithm": 1,
        "showsla": 1,
        "goodsla": 99.99,
        "sortorder": 1
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "serviceids": [
            "5"
        ]
    },
    "id": 1
}
```

Source

CService::create() in *frontends/php/include/classes/api/services/CService.php*.

service.delete

Description

`object service.delete(array serviceIds)`

This method allows to delete services.

Services with hard-dependent child services cannot be deleted.

Parameters

`(array)` IDs of the services to delete.

Return values

`(object)` Returns an object containing the IDs of the deleted services under the `serviceids` property.

Examples

Deleting multiple services

Delete two services.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "service.delete",
    "params": [
        "4",
        "5"
    ],
    "auth": "3a57200802b24cda67c4e4010b50c065",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "serviceids": [
            "4",
            "5"
```

```
        ]
    },
    "id": 1
}
```

Source

CService::delete() in *frontends/php/include/classes/api/services/CService.php*.

service.deletedependencies

Description

`object service.deletedependencies(string/array serviceIds)`

This method allows to delete all dependencies from services.

Parameters

`(string/array)` IDs of the services to delete all dependencies from.

Return values

`(object)` Returns an object containing the IDs of the affected services under the `serviceids` property.

Examples

Deleting dependencies from an service

Delete all dependencies from service ”2”.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "service.deletedependencies",
    "params": [
        "2"
    ],
    "auth": "3a57200802b24cda67c4e4010b50c065",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "serviceids": [
            "2"
        ]
    },
    "id": 1
}
```

See also

- service.update

Source

CService::delete() in *frontends/php/include/classes/api/services/CService.php*.

service.deletetimes

Description

`object service.deletetimes(string/array serviceIds)`

This method allows to delete all service times from services.

Parameters

(string/array) IDs of the services to delete all service times from.

Return values

(object) Returns an object containing the IDs of the affected services under the serviceids property.

Examples

Deleting service times from an service

Delete all service times from service "2".

Request:

```
{
    "jsonrpc": "2.0",
    "method": "service.deletetimes",
    "params": [
        "2"
    ],
    "auth": "3a57200802b24cda67c4e4010b50c065",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "serviceids": [
            "2"
        ]
    },
    "id": 1
}
```

See also

- service.update

Source

CService::delete() in *frontends/php/include/classes/api/services/CService.php*.

service.get

Description

integer/array service.get(object parameters)

The method allows to retrieve services according to the given parameters.

Parameters

(object) Parameters defining the desired output.

The method supports the following parameters.

Parameter	Type	Description
serviceids	string/array	Return only services with the given IDs.
parentids	string/array	Return only services with the given hard-dependent parent services.
childids	string/array	Return only services that are hard-dependent on the given child services.
selectParent	query	Return a parent property with the hard-dependent parent service.
selectDependencies	query	Return a dependencies property with child service dependencies.
selectParentDependencies	query	Return a parentDependencies property with parent service dependencies.

Parameter	Type	Description
selectTimes	query	Return a times property with service times.
selectAlarms	query	Return an alarms property with service alarms.
selectTrigger	query	Return a trigger property with the associated trigger.
sortfield	string/array	Sort the result by the given properties. Possible values are: `name` and `sortorder`.
countOutput	boolean	These parameters being common for all `get` methods are described in detail in the reference commentary.
editable	boolean	
excludeSearch	boolean	
filter	object	
limit	integer	
output	query	
preservekeys	boolean	
search	object	
searchByAny	boolean	
searchWildcardsEnabled	boolean	
sortorder	string/array	
startSearch	boolean	

Return values

`(integer/array)` Returns either:

- an array of objects;
- the count of retrieved objects, if the `countOutput` parameter has been used.

Examples

Retrieving all services

Retrieve all data about all services and their dependencies.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "service.get",
    "params": {
        "output": "extend",
        "selectDependencies": "extend"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "serviceid": "2",
            "name": "Server 1",
            "status": "0",
            "algorithm": "1",
            "triggerid": "0",
            "showsla": "1",
            "goodsla": "99.9000",
            "sortorder": "0",
            "dependencies": []
        },
        {
            "serviceid": "3",
            "name": "Data center 1",
```

```
            "status": "0",
            "algorithm": "1",
            "triggerid": "0",
            "showsla": "1",
            "goodsla": "99.9000",
            "sortorder": "0",
            "dependencies": [
                {
                    "linkid": "11",
                    "serviceupid": "3",
                    "servicedownid": "2",
                    "soft": "0",
                    "sortorder": "0",
                    "serviceid": "2"
                },
                {
                    "linkid": "10",
                    "serviceupid": "3",
                    "servicedownid": "5",
                    "soft": "0",
                    "sortorder": "1",
                    "serviceid": "5"
                }
            ]
        },
        {
            "serviceid": "5",
            "name": "Server 2",
            "status": "0",
            "algorithm": "1",
            "triggerid": "0",
            "showsla": "1",
            "goodsla": "99.9900",
            "sortorder": "1",
            "dependencies": []
        }
    ],
    "id": 1
}
```


Source

CService::get() in *frontends/php/include/classes/api/services/CService.php*.

service.getsla

Description

`object service.getsla(object parameters)`

This method allows to calculate availability information about services.

Parameters

`(object)` Parameters containing the IDs of the services and time intervals to calculate SLA.

Parameter	Type	Description
serviceids	string/array	IDs of services to return availability information for.

Parameter	Type	Description
intervals	array	Time intervals to return service layer availability information about. Each time interval must have the following parameters: - `from` - *(timestamp)* interval start time; - `to` - *(timestamp)* interval end time.

Return values

`(object)` Returns the following availability information about each service under the corresponding service ID.

Property	Type	Description
status	integer	Current status of the service. Refer to the service object page for more information on service statuses.
problems	array	Triggers that are currently in problem state and are linked either to the service or one of its descendants.
sla	array	SLA data about each time period. Each SLA object has the following properties: - `from` - *(timestamp)* interval start time; - `to` - *(timestamp)* interval end time; - `sla` - *(float)* SLA for the given time interval; - `okTime` - *(integer)* time the service was in OK state, in seconds; - `problemTime` - *(integer)* time the service was in problem state, in seconds; - `downtimeTime` - *(integer)* time the service was in scheduled downtime, in seconds.

Examples

Retrieving availability information for an service

Retrieve availability information about a service during a week.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "service.getsla",
    "params": {
        "serviceids": "2",
        "intervals": [
            {
                "from": 1352452201,
                "to": 1353057001
            }
        ]
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "2": {
```

```
            "status": "3",
            "problems": {
                "13904": {
                    "triggerid": "13904",
                    "expression": "{13359}=0",
                    "description": "Service unavailable",
                    "url": "",
                    "status": "0",
                    "value": "1",
                    "priority": "3",
                    "lastchange": "1352967420",
                    "comments": "",
                    "error": "",
                    "templateid": "0",
                    "type": "0",
                    "value_flags": "0",
                    "flags": "0"
                }
            },
            "sla": [
                {
                    "from": 1352452201,
                    "to": 1353057001,
                    "sla": 97.046296296296,
                    "okTime": 586936,
                    "problemTime": 17864,
                    "downtimeTime": 0
                }
            ]
        }
    },
    "id": 1
}
```


See also

- Trigger

Source

CService::getSla() in *frontends/php/include/classes/api/services/CService.php*.

service.update

Description

`object service.update(object/array services)`

This method allows to update existing services.

Parameters

`(object/array)` service properties to be updated.

The `serviceid` property must be defined for each service, all other properties are optional. Only the passed properties will be updated, all others will remain unchanged.

Additionally to the standard service properties, the method accepts the following parameters.

Parameter	Type	Description
dependencies	array	Service dependencies to replace the current service dependencies. Each service dependency has the following parameters: - `dependsOnServiceid` - *(string)* ID of an service the service depends on, that is, the child service. - `soft` - *(integer)* type of service dependency; refer to the service dependency object page for more information on dependency types.
parentid	string	ID of a hard-linked parent service.
times	array	Service times to replace the current service times.

Return values

`(object)` Returns an object containing the IDs of the updated services under the `serviceids` property.

Examples

Setting the parent of an service

Make service ”3” the hard-linked parent of service ”5”.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "service.update",
    "params": {
        "serviceid": "5",
        "parentid": "3"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "serviceids": [
            "5"
        ]
    },
    "id": 1
}
```

See also

- service.adddependencies
- service.addtimes
- service.deletedependencies
- service.deletetimes

Source

CService::update() in *frontends/php/include/classes/api/services/CService.php*.

Task

This class is designed to work with tasks.

Available methods:

- task.create - creating new tasks

task.create

Description

`object task.create(object task)`

This method allows to create new task.

Parameters

`(object)` A task to create.

The method accepts the following parameters.

Parameter	Type	Description
type (required)	integer	Task type. Possible values: 6 - Check now.
itemids (required)	string/array	IDs of items and low-level discovery rules.

Note that tasks can be created for the following types of items/discovery rules:

- Zabbix agent
- SNMPv1/v2/v3 agent
- Simple check
- Internal check
- Aggregate check
- External check
- Database monitor
- HTTP agent
- IPMI agent
- SSH agent
- TELNET agent
- Calculated check
- JMX agent

Return values

`(object)` Returns an object containing the IDs of the created tasks under the `taskids` property. One task is created for each item and low-level discovery rule. The order of the returned IDs matches the order of the passed `itemids`.

Examples

Creating a task

Create a task `check now` for two items. One is an item, the other is a low-level discovery rule.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "task.create",
    "params": {
        "type": "6",
        "itemids": ["10092", "10093"],
    },
    "auth": "700ca65537074ec963db7efabda78259",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "taskids": [
```

```
            "1",
            "2"
        ]
    },
    "id": 1
}
```

Source

CTask::create() in *frontends/php/include/classes/api/services/CTask.php*.

Template

This class is designed to work with templates.

Object references:

- Template

Available methods:

- template.create - creating new templates
- template.delete - deleting templates
- template.get - retrieving templates
- template.massadd - adding related objects to templates
- template.massremove - removing related objects from templates
- template.massupdate - replacing or removing related objects from templates
- template.update - updating templates

> Template object

The following objects are directly related to the `template` API.

Template

The template object has the following properties.

Property	Type	Description
templateid	string	*(readonly)* ID of the template.
host (required)	string	Technical name of the template.
description	text	Description of the template.
name	string	Visible name of the template. Default: `host` property value.

Template tag

The template tag object has the following properties.

Property	Type	Description
tag (required)	string	Template tag name.
value	string	Template tag value.

template.create

Description

`object template.create(object/array templates)`

This method allows to create new templates.

Parameters

`(object/array)` Templates to create.

Additionally to the standard template properties, the method accepts the following parameters.

Parameter	Type	Description
groups (required)	object/array	Host groups to add the template to. The host groups must have the `groupid` property defined.
tags	object/array	Template tags.
templates	object/array	Templates to be linked to the template. The templates must have the `templateid` property defined.
macros	object/array	User macros to be created for the template.
hosts	object/array	Hosts to link the template to. The hosts must have the `hostid` property defined.

Return values

`(object)` Returns an object containing the IDs of the created templates under the `templateids` property. The order of the returned IDs matches the order of the passed templates.

Examples

Creating a template

Create a template with tags and link it to two hosts.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "template.create",
    "params": {
        "host": "Linux template",
        "groups": {
            "groupid": 1
        },
        "hosts": [
            {
                "hostid": "10084"
            },
            {
                "hostid": "10090"
            }
        ],
        "tags": [
            {
                "tag": "Host name",
                "value": "{HOST.NAME}"
            }
        ]
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
```

```
    "result": {
        "templateids": [
            "10086"
        ]
    },
    "id": 1
}
```

Source

CTemplate::create() in *frontends/php/include/classes/api/services/CTemplate.php*.

template.delete

Description

`object template.delete(array templateIds)`

This method allows to delete templates.

Parameters

`(array)` IDs of the templates to delete.

Return values

`(object)` Returns an object containing the IDs of the deleted templates under the `templateids` property.

Examples

Deleting multiple templates

Delete two templates.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "template.delete",
    "params": [
        "13",
        "32"
    ],
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "templateids": [
            "13",
            "32"
        ]
    },
    "id": 1
}
```

Source

CTemplate::delete() in *frontends/php/include/classes/api/services/CTemplate.php*.

template.get

Description

`integer/array template.get(object parameters)`

The method allows to retrieve templates according to the given parameters.

Parameters

`(object)` Parameters defining the desired output.

The method supports the following parameters.

Parameter	Type	Description
templateids	string/array	Return only templates with the given template IDs.
groupids	string/array	Return only templates that belong to the given host groups.
parentTemplateids	string/array	Return only templates that are children of the given templates.
hostids	string/array	Return only templates that are linked to the given hosts/templates.
graphids	string/array	Return only templates that contain the given graphs.
itemids	string/array	Return only templates that contain the given items.
triggerids	string/array	Return only templates that contain the given triggers.
with_items	flag	Return only templates that have items.
with_triggers	flag	Return only templates that have triggers.
with_graphs	flag	Return only templates that have graphs.
with_httptests	flag	Return only templates that have web scenarios.
evaltype	integer	Rules for tag searching. Possible values: 0 - (default) And/Or; 2 - Or.
tags	array/object	Return only templates with given tags. Exact match by tag and case-sensitive or case-insensitive search by tag value depending on operator value. Format: `[{"tag": "<tag>", "value": "<value>", "operator": "<operator>"}, ...]`. An empty array returns all templates. Possible operator values: 0 - (default) Contains; 1 - Equals.
selectGroups	query	Return the host groups that the template belongs to in the groups property.
selectTags	query	Return template tags in the tags property.
selectHosts	query	Return the hosts that are linked to the template in the hosts property. Supports `count`.
selectTemplates	query	Return the child templates in the templates property. Supports `count`.
selectParentTemplates	query	Return the parent templates in the `parentTemplates` property. Supports `count`.
selectHttpTests	query	Return the web scenarios from the template in the httpTests property. Supports `count`.
selectItems	query	Return items from the template in the items property. Supports `count`.
selectDiscoveries	query	Return low-level discoveries from the template in the `discoveries` property. Supports `count`.

Parameter	Type	Description
selectTriggers	query	Return triggers from the template in the triggers property. Supports `count`.
selectGraphs	query	Return graphs from the template in the graphs property. Supports `count`.
selectApplications	query	Return applications from the template in the applications property. Supports `count`.
selectMacros	query	Return the macros from the template in the `macros` property..
selectScreens	query	Return screens from the template in the screens property. Supports `count`.
limitSelects	integer	Limits the number of records returned by subselects. Applies to the following subselects: `selectTemplates` - results will be sorted by `name`; `selectHosts` - sorted by `host`; `selectParentTemplates` - sorted by `host`; `selectItems` - sorted by `name`; `selectDiscoveries` - sorted by `name`; `selectTriggers` - sorted by `description`; `selectGraphs` - sorted by `name`; `selectApplications` - sorted by `name`; `selectScreens` - sorted by `name`.
sortfield	string/array	Sort the result by the given properties. Possible values are: `hostid`, `host`, `name`, `status`.
countOutput	boolean	These parameters being common for all `get` methods are described in detail in the reference commentary.
editable	boolean	
excludeSearch	boolean	
filter	object	
limit	integer	
output	query	
preservekeys	boolean	
search	object	
searchByAny	boolean	
searchWildcardsEnabled	boolean	
sortorder	string/array	
startSearch	boolean	

Return values

`(integer/array)` Returns either:

- an array of objects;
- the count of retrieved objects, if the `countOutput` parameter has been used.

Examples

Retrieving templates by name

Retrieve all data about two templates named ”Template OS Linux” and ”Template OS Windows”.

Request:

```
{
    "jsonrpc": "2.0",
```

```
    "method": "template.get",
    "params": {
        "output": "extend",
        "filter": {
            "host": [
                "Template OS Linux",
                "Template OS Windows"
            ]
        }
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "proxy_hostid": "0",
            "host": "Template OS Linux",
            "status": "3",
            "disable_until": "0",
            "error": "",
            "available": "0",
            "errors_from": "0",
            "lastaccess": "0",
            "ipmi_authtype": "0",
            "ipmi_privilege": "2",
            "ipmi_username": "",
            "ipmi_password": "",
            "ipmi_disable_until": "0",
            "ipmi_available": "0",
            "snmp_disable_until": "0",
            "snmp_available": "0",
            "maintenanceid": "0",
            "maintenance_status": "0",
            "maintenance_type": "0",
            "maintenance_from": "0",
            "ipmi_errors_from": "0",
            "snmp_errors_from": "0",
            "ipmi_error": "",
            "snmp_error": "",
            "jmx_disable_until": "0",
            "jmx_available": "0",
            "jmx_errors_from": "0",
            "jmx_error": "",
            "name": "Template OS Linux",
            "flags": "0",
            "templateid": "10001",
            "description": "",
            "tls_connect": "1",
            "tls_accept": "1",
            "tls_issuer": "",
            "tls_subject": "",
            "tls_psk_identity": "",
            "tls_psk": ""
        },
        {
            "proxy_hostid": "0",
            "host": "Template OS Windows",
            "status": "3",
```

```
            "disable_until": "0",
            "error": "",
            "available": "0",
            "errors_from": "0",
            "lastaccess": "0",
            "ipmi_authtype": "0",
            "ipmi_privilege": "2",
            "ipmi_username": "",
            "ipmi_password": "",
            "ipmi_disable_until": "0",
            "ipmi_available": "0",
            "snmp_disable_until": "0",
            "snmp_available": "0",
            "maintenanceid": "0",
            "maintenance_status": "0",
            "maintenance_type": "0",
            "maintenance_from": "0",
            "ipmi_errors_from": "0",
            "snmp_errors_from": "0",
            "ipmi_error": "",
            "snmp_error": "",
            "jmx_disable_until": "0",
            "jmx_available": "0",
            "jmx_errors_from": "0",
            "jmx_error": "",
            "name": "Template OS Windows",
            "flags": "0",
            "templateid": "10081",
            "description": "",
            "tls_connect": "1",
            "tls_accept": "1",
            "tls_issuer": "",
            "tls_subject": "",
            "tls_psk_identity": "",
            "tls_psk": ""
        }
    ],
    "id": 1
}
```


Searching by template tags

Retrieve templates that have tag ”Host name” equal to ”{HOST.NAME}”.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "template.get",
    "params": {
        "output": ["hostid"],
        "selectTags": "extend",
        "evaltype": 0,
        "tags": [
            {
                "tag": "Host name",
                "value": "{HOST.NAME}",
                "operator": 1
            }
        ]
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "hostid": "10402",
            "tags": [
                {
                    "tag": "Host name",
                    "value": "{HOST.NAME}"
                }
            ]
        }
    ],
    "id": 1
}
```

See also

- Host group
- Template
- User macro
- Host interface

Source

CTemplate::get() in *frontends/php/include/classes/api/services/CTemplate.php*.

template.massadd

Description

`object template.massadd(object parameters)`

This method allows to simultaneously add multiple related objects to the given templates.

Parameters

`(object)` Parameters containing the IDs of the templates to update and the objects to add to the templates.

The method accepts the following parameters.

Parameter	Type	Description
templates (required)	object/array	Templates to be updated. The templates must have the `templateid` property defined.
groups	object/array	Host groups to add the given templates to. The host groups must have the `groupid` property defined.
hosts	object/array	Hosts and templates to link the given templates to. The hosts must have the `hostid` property defined.
macros	object/array	User macros to be created for the given templates.
templates_link	object/array	Templates to link to the given templates. The templates must have the `templateid` property defined.

Return values

`(object)` Returns an object containing the IDs of the updated templates under the `templateids` property.

Examples

Adding templates to a group

Add two templates to the host group ”2”.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "template.massadd",
    "params": {
        "templates": [
            {
                "templateid": "10085"
            },
            {
                "templateid": "10086"
            }
        ],
        "groups": [
            {
                "groupid": "2"
            }
        ]
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "templateids": [
            "10085",
            "10086"
        ]
    },
    "id": 1
}
```

Linking a template to hosts

Link template ”10073” to two hosts.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "template.massadd",
    "params": {
        "templates": [
            {
                "templateid": "10073"
            }
        ],
        "hosts": [
            {
                "hostid": "10106"
            },
            {
                "hostid": "10104"
            }
        ]
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
```

```
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "templateids": [
            "10073"
        ]
    },
    "id": 1
}
```

See also

- template.update
- Host
- Host group
- User macro

Source

CTemplate::massAdd() in *frontends/php/include/classes/api/services/CTemplate.php*.

template.massremove

Description

`object template.massremove(object parameters)`

This method allows to remove related objects from multiple templates.

Parameters

`(object)` Parameters containing the IDs of the templates to update and the objects that should be removed.

Parameter	Type	Description
templateids (required)	string/array	IDs of the templates to be updated.
groupids	string/array	Host groups to remove the given templates from.
hostids	string/array	Hosts or templates to unlink the given templates from (downstream).
macros	string/array	User macros to delete from the given templates.
templateids_clear	string/array	Templates to unlink and clear from the given templates (upstream).
templateids_link	string/array	Templates to unlink from the given templates (upstream).

Return values

`(object)` Returns an object containing the IDs of the updated templates under the `templateids` property.

Examples

Removing templates from a group

Remove two templates from group ”2”.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "template.massremove",
    "params": {
        "templateids": [
            "10085",
            "10086"
```

```
        ],
        "groupids": "2"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "templateids": [
            "10085",
            "10086"
        ]
    },
    "id": 1
}
```

Unlinking templates from a host

Unlink template ”10085” from two hosts.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "template.massremove",
    "params": {
        "templateids": "10085",
        "hostids": [
            "10106",
            "10104"
        ]
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "templateids": [
            "10085"
        ]
    },
    "id": 1
}
```

See also

- template.update
- User macro

Source

CTemplate::massRemove() in *frontends/php/include/classes/api/services/CTemplate.php*.

template.massupdate

Description

`object template.massupdate(object parameters)`

This method allows to simultaneously replace or remove related objects and update properties on multiple templates.

Parameters

`(object)` Parameters containing the IDs of the templates to update and the properties that should be updated.

Additionally to the standard template properties, the method accepts the following parameters.

Parameter	Type	Description
templates (required)	object/array	Templates to be updated. The templates must have the `templateid` property defined.
groups	object/array	Host groups to replace the current host groups the templates belong to. The host groups must have the `groupid` property defined.
hosts	object/array	Hosts and templates to replace the ones the templates are currently linked to. Both hosts and templates must use the `hostid` property to pass an ID.
macros	object/array	User macros to replace the current user macros on the given templates.
templates_clear	object/array	Templates to unlink and clear from the given templates. The templates must have the `templateid` property defined.
templates_link	object/array	Templates to replace the currently linked templates. The templates must have the `templateid` property defined.

Return values

`(object)` Returns an object containing the IDs of the updated templates under the `templateids` property.

Examples

Replacing host groups

Unlink and clear template ”10091” from the given templates.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "template.massupdate",
    "params": {
        "templates": [
            {
                "templateid": "10085"
            },
            {
                "templateid": "10086"
            }
        ],
        "templates_clear": [
            {
                "templateid": "10091"
            }
        ]
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "templateids": [
            "10085",
            "10086"
        ]
    },
    "id": 1
}
```

See also

- template.update
- template.massadd
- Host group
- User macro

Source

CTemplate::massUpdate() in *frontends/php/include/classes/api/services/CTemplate.php*.

template.update

Description

`object template.update(object/array templates)`

This method allows to update existing templates.

Parameters

`(object/array)` Template properties to be updated.

The `templateid` property must be defined for each template, all other properties are optional. Only the given properties will be updated, all others will remain unchanged.

Additionally to the standard template properties, the method accepts the following parameters.

Parameter	Type	Description
groups	object/array	Host groups to replace the current host groups the templates belong to. The host groups must have the `groupid` property defined.
tags	object/array	Template tags to replace the current template tags.
hosts	object/array	Hosts and templates to replace the ones the templates are currently linked to. Both hosts and templates must use the `hostid` property to pass an ID.
macros	object/array	User macros to replace the current user macros on the given templates.
templates	object/array	Templates to replace the currently linked templates. Templates that are not passed are only unlinked. The templates must have the `templateid` property defined.
templates_clear	object/array	Templates to unlink and clear from the given templates. The templates must have the `templateid` property defined.

Return values

(object) Returns an object containing the IDs of the updated templates under the templateids property.

Examples

Renaming a template

Rename the template to "Template OS Linux".

Request:

```
{
    "jsonrpc": "2.0",
    "method": "template.update",
    "params": {
        "templateid": "10086",
        "name": "Template OS Linux"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "templateids": [
            "10086"
        ]
    },
    "id": 1
}
```

Updating template tags

Replace all template tags with a new one.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "template.update",
    "params": {
        "templateid": "10086",
        "tags": [
            {
                "tag": "Host name",
                "value": "{HOST.NAME}"
            }
        ]
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "hostids": [
            "10086"
        ]
    },
    "id": 1
}
```

Source

CTemplate::update() in *frontends/php/include/classes/api/services/CTemplate.php*.

Template screen

This class is designed to work with template screens.

Object references:

- Template screen

Available methods:

- templatescreen.copy - copy template screens
- templatescreen.create - create new template screens
- templatescreen.delete - delete template screens
- templatescreen.get - retrieve template screens
- templatescreen.update - update template screens

> Template screen object

The following objects are directly related to the `templatescreen` API.

Template screen

The template screen object has the following properties.

Property	Type	Description
screenid	string	*(readonly)* ID of the template screen.
name (required)	string	Name of the template screen.
templateid (required)	string	ID of the template that the screen belongs to.
hsize	integer	Width of the template screen. Default: 1
vsize	integer	Height of the template screen. Default: 1

templatescreen.copy

Description

`object templatescreen.copy(object parameters)`

This method allows to copy template screens to the given templates.

Parameters

`(object)` Parameters defining the template screens to copy and the target templates.

Parameter	Type	Description
screenIds (required)	string/array	IDs of template screens to copy.
templateIds (required)	string/array	IDs of templates to copy the screens to.

Return values

`(boolean)` Returns `true` if the copying was successful.

Examples

Copy a template screen

Copy template screen ”25” to template ”30085”.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "templatescreen.copy",
    "params": {
        "screenIds": "25",
        "templateIds": "30085"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": true,
    "id": 1
}
```

Source

CTemplateScreen::copy() in *frontends/php/include/classes/api/services/CTemplateScreen.php*.

templatescreen.create

Description

`object templatescreen.create(object/array templateScreens)`

This method allows to create new template screens.

Parameters

`(object/array)` Template screens to create.

Additionally to the standard template screen properties, the method accepts the following parameters.

Parameter	Type	Description
screenitems	array	Template screen items to create on the screen.

Return values

`(object)` Returns an object containing the IDs of the created template screens under the `screenids` property. The order of the returned IDs matches the order of the passed template screens.

Examples

Create a template screen

Create a template screen named “Graphs” with 2 rows and 3 columns and add a graph to the upper-left cell.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "templatescreen.create",
    "params": {
        "name": "Graphs",
        "templateid": "10047",
        "hsize": 3,
        "vsize": 2,
        "screenitems": [
            {
                "resourcetype": 0,
                "resourceid": "410",
                "x": 0,
                "y": 0
```

```
            }
        ]
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "screenids": [
            "45"
        ]
    },
    "id": 1
}
```

See also

- Template screen item

Source

CTemplateScreen::create() in *frontends/php/include/classes/api/services/CTemplateScreen.php*.

templatescreen.delete

Description

`object templatescreen.delete(array templateScreenIds)`

This method allows to delete template screens.

Parameters

`(array)` IDs of the template screens to delete.

Return values

`(object)` Returns an object containing the IDs of the deleted template screens under the `screenids` property.

Examples

Delete multiple template screens

Delete two template screens.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "templatescreen.delete",
    "params": [
        "45",
        "46"
    ],
    "auth": "3a57200802b24cda67c4e4010b50c065",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "screenids": [
            "45",
            "46"
        ]
```

```
    },
    "id": 1
}
```

Source

CTemplateScreen::delete() in *frontends/php/include/classes/api/services/CTemplateScreen.php*.

templatescreen.get

Description

`integer/array templatescreen.get(object parameters)`

The method allows to retrieve template screens according to the given parameters.

Parameters

`(object)` Parameters defining the desired output.

The method supports the following parameters.

Parameter	Type	Description
hostids	string/array	Return only template screens that belong to the given hosts.
screenids	string/array	Return only template screens with the given IDs.
screenitemids	string/array	Return only template screens that contain the given screen items.
templateids	string/arary	Return only template screens that belong to the given templates.
noInheritance	flag	Do not return inherited template screens.
selectScreenItems	query	Return the screen items that are used in the template screen in the screenitems property.
sortfield	string/array	Sort the result by the given properties. Possible values are: `screenid` and `name`.
countOutput	boolean	These parameters being common for all `get` methods are described in detail in the reference commentary.
editable	boolean	
excludeSearch	boolean	
filter	object	
limit	integer	
output	query	
preservekeys	boolean	
search	object	
searchByAny	boolean	
searchWildcardsEnabled	boolean	
sortorder	string/array	
startSearch	boolean	

Return values

`(integer/array)` Returns either:

- an array of objects;
- the count of retrieved objects, if the `countOutput` parameter has been used.

Examples

Retrieve screens from template

Retrieve all screens from template ”10001” and all of the screen items.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "templatescreen.get",
    "params":  {
        "output": "extend",
        "selectScreenItems": "extend",
        "templateids": "10001"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "screenid": "3",
            "name": "System performance",
            "hsize": "2",
            "vsize": "2",
            "templateid": "10001",
            "screenitems": [
                {
                    "screenitemid": "20",
                    "screenid": "3",
                    "resourcetype": "0",
                    "resourceid": "433",
                    "width": "500",
                    "height": "120",
                    "x": "0",
                    "y": "0",
                    "colspan": "1",
                    "rowspan": "1",
                    "elements": "0",
                    "valign": "1",
                    "halign": "0",
                    "style": "0",
                    "url": ""
                },
                {
                    "screenitemid": "21",
                    "screenid": "3",
                    "resourcetype": "0",
                    "resourceid": "387",
                    "width": "500",
                    "height": "100",
                    "x": "0",
                    "y": "1",
                    "colspan": "1",
                    "rowspan": "1",
                    "elements": "0",
                    "valign": "1",
                    "halign": "0",
                    "style": "0",
                    "url": ""
                },
                {
                    "screenitemid": "22",
                    "screenid": "3",
                    "resourcetype": "1",
                    "resourceid": "10013",
```

```
                    "width": "500",
                    "height": "148",
                    "x": "1",
                    "y": "0",
                    "colspan": "1",
                    "rowspan": "1",
                    "elements": "0",
                    "valign": "1",
                    "halign": "0",
                    "style": "0",
                    "url": ""
                },
                {
                    "screenitemid": "23",
                    "screenid": "3",
                    "resourcetype": "1",
                    "resourceid": "22181",
                    "width": "500",
                    "height": "184",
                    "x": "1",
                    "y": "1",
                    "colspan": "1",
                    "rowspan": "1",
                    "elements": "0",
                    "valign": "1",
                    "halign": "0",
                    "style": "0",
                    "url": ""
                }
            ]
        }
    ],
    "id": 1
}
```


See also

- Template screen item

Source

CTemplateScreen::get() in *frontends/php/include/classes/api/services/CTemplateScreen.php*.

templatescreen.update

Description

`object templatescreen.update(object/array templateScreens)`

This method allows to update existing template screens.

Parameters

`(object/array)` Template screen properties to be updated.

The `screenid` property must be defined for each template screen, all other properties are optional. Only the passed properties will be updated, all others will remain unchanged.

Additionally to the standard template screen properties, the method accepts the following parameters.

Parameter	Type	Description
screenitems	array	Template screen items to replace existing screen items. Screen items are updated by coordinates, so each screen item must have the `x` and `y` properties defined.

Return values

`(object)` Returns an object containing the IDs of the updated template screens under the `screenids` property.

Examples

Rename a template screen

Rename the template screen to ”Performance graphs”.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "templatescreen.update",
    "params": {
        "screenid": "3",
        "name": "Performance graphs"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "screenids": [
            "3"
        ]
    },
    "id": 1
}
```

Source

CTemplateScreen::update() in *frontends/php/include/classes/api/services/CTemplateScreen.php*.

Template screen item

This class is designed to work with template screen items.

Object references:

- Template screen item

Available methods:

- templatescreenitem.get - retrieve template screen items

> Template screen item object

The following objects are directly related to the `templatescreenitem` API.

Template screen item

The template screen item object defines an element displayed on a template screen. It has the following properties.

Property	Type	Description
screenitemid	string	*(readonly)* ID of the template screen item.
resourceid (required)	string	ID of the object from the parent template displayed on the template screen item. Depending on the type of screen item, the `resourceid` property can reference different objects. Unused by clock and URL template screen items. *Note: the `resourceid` property always references an object used in the parent template object, even if the screen item itself is inherited on a host or template.*
resourcetype (required)	integer	Type of template screen item. Possible values: 0 - graph; 1 - simple graph; 3 - plain text; 7 - clock; 11 - URL; 19 - simple graph prototype; 20 - graph prototype.
screenid (required)	string	ID of the template screen that the item belongs to.
colspan	integer	Number of columns the template screen item will span across. Default: 1.
elements	integer	Number of lines to display on the template screen item. Default: 25.
halign	integer	Specifies how the template screen item must be aligned horizontally in the cell. Possible values: 0 - *(default)* center; 1 - left; 2 - right.
height	integer	Height of the template screen item in pixels. Default: 200.
max_columns	integer	Specifies the maximum amount of columns a graph prototype or simple graph prototype screen element can have. Default: 3.
rowspan	integer	Number or rows the template screen item will span across. Default: 1.
style	integer	Template screen item display option. Possible values for clock screen items: 0 - *(default)* local time; 1 - server time; 2 - host time. Possible values for plain text screen items: 0 - *(default)* display values as plain text; 1 - display values as HTML.
url	string	URL of the webpage to be displayed in the template screen item. Used by URL template screen items.

Property	Type	Description
valign	integer	Specifies how the template screen item must be aligned vertically in the cell. Possible values: 0 - *(default)* middle; 1 - top; 2 - bottom.
width	integer	Width of the template screen item in pixels. Default: 320.
x	integer	X-coordinates of the template screen item on the screen, from left to right. Default: 0.
y	integer	Y-coordinates of the template screen item on the screen, from top to bottom. Default: 0.

templatescreenitem.get

Description

`integer/array templatescreenitem.get(object parameters)`

The method allows to retrieve template screen items according to the given parameters.

Parameters

`(object)` Parameters defining the desired output.

The method supports the following parameters.

Parameter	Type	Description
screenids	string/array	Return only template screen items that belong to the given template screens.
screenitemids	string/array	Return only template screen items with the given IDs.
hostids	string/array	Returns an additional `real_resourceid` property for each template screen item, that belongs to a screen from the given hosts or templates. The `real_resourceid` property contains the ID of object displayed on the screen.
sortfield	string/array	Sort the result by the given properties. Possible values are: `screenitemid` and `screenid`.
countOutput	boolean	These parameters being common for all `get` methods are described in detail in the reference commentary.
editable	boolean	
excludeSearch	boolean	
filter	object	
limit	integer	
output	query	
preservekeys	boolean	
search	object	
searchByAny	boolean	
searchWildcardsEnabled	boolean	
sortorder	string/array	
startSearch	boolean	

Return values

`(integer/array)` Returns either:

- an array of objects;
- the count of retrieved objects, if the `countOutput` parameter has been used.

Examples

Retrieve template screen items for screen

Return all template screen items from template screen "15".

Request:

```
{
    "jsonrpc": "2.0",
    "method": "templatescreenitem.get",
    "params": {
        "output": "extend",
        "screenids": "15"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "screenitemid": "42",
            "screenid": "15",
            "resourcetype": "0",
            "resourceid": "454",
            "width": "500",
            "height": "200",
            "x": "0",
            "y": "0",
            "colspan": "1",
            "rowspan": "1",
            "elements": "0",
            "valign": "1",
            "halign": "0",
            "style": "0",
            "url": "",
            "max_columns": "3"
        },
        {
            "screenitemid": "43",
            "screenid": "15",
            "resourcetype": "0",
            "resourceid": "455",
            "width": "500",
            "height": "270",
            "x": "1",
            "y": "0",
            "colspan": "1",
            "rowspan": "1",
            "elements": "0",
            "valign": "1",
            "halign": "0",
            "style": "0",
            "url": "",
            "max_columns": "3"
        }
    ],
    "id": 1
}
```

Source

CTemplateScreenItem::get() in *frontends/php/include/classes/api/services/CTemplateScreenItem.php*.

Trend

This class is designed to work with trend data.

Object references:

- Trend

Available methods:

- trend.get - retrieving trends

> Trend object

The following objects are directly related to the `trend` API.

Note:
Trend objects differ depending on the item's type of information. They are created by the Zabbix server and cannot be modified via the API.

Float trend

The float trend object has the following properties.

Property	Type	Description
clock	timestamp	Time when that value was received.
itemid	string	ID of the related item.
num	integer	Number of values within this hour.
value_min	float	Hourly minimum value.
value_avg	float	Hourly average value.
value_max	float	Hourly maximum value.

Integer trend

The integer trend object has the following properties.

Property	Type	Description
clock	timestamp	Time when that value was received.
itemid	string	ID of the related item.
num	integer	Number of values within this hour.
value_min	integer	Hourly minimum value.
value_avg	integer	Hourly average value.
value_max	integer	Hourly maximum value.

trend.get

Description

`integer/array trend.get(object parameters)`

The method allows to retrieve trend data according to the given parameters.

Parameters

`(object)` Parameters defining the desired output.

The method supports the following parameters.

Parameter	Type	Description
itemids	string/array	Return only trends with the given item IDs.
time_from	timestamp	Return only values that have been collected after or at the given time.
time_till	timestamp	Return only values that have been collected before or at the given time.
countOutput	boolean	Count the number of retrieved objects.
limit	integer	Limit the amount of retrieved objects.
output	query	Set fields to output.

Return values

`(integer/array)` Returns either:

- an array of objects;
- the count of retrieved objects, if the `countOutput` parameter has been used.

Examples

Retrieving item trend data

Request:

```
{
    "jsonrpc": "2.0",
    "method": "trend.get",
    "params": {
        "output": [
            "itemid",
            "clock",
            "num",
            "value_min",
            "value_avg",
            "value_max",
        ],
        "itemids": [
            "23715"
        ],
        "limit": "1"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "itemid": "23715",
            "clock": "1446199200",
            "num": "60",
            "value_min": "0.1650",
            "value_avg": "0.2168",
            "value_max": "0.3500",
        }
    ],
    "id": 1
}
```

Source

CTrend::get() in *frontends/php/include/classes/api/services/CTrend.php*.

Trigger

This class is designed to work with triggers.

Object references:

- Trigger

Available methods:

- trigger.adddependencies - adding new trigger dependencies
- trigger.create - creating new triggers
- trigger.delete - deleting triggers
- trigger.deletedependencies - deleting trigger dependencies
- trigger.get - retrieving triggers
- trigger.update - updating triggers

> Trigger object

The following objects are directly related to the `trigger` API.

Trigger

The trigger object has the following properties.

Property	Type	Description
triggerid	string	*(readonly)* ID of the trigger.
description (required)	string	Name of the trigger.
expression (required)	string	Reduced trigger expression.
opdata	string	Operational data.
comments	string	Additional description of the trigger.
error	string	*(readonly)* Error text if there have been any problems when updating the state of the trigger.
flags	integer	*(readonly)* Origin of the trigger. Possible values are: 0 - *(default)* a plain trigger; 4 - a discovered trigger.
lastchange	timestamp	*(readonly)* Time when the trigger last changed its state.
priority	integer	Severity of the trigger. Possible values are: 0 - *(default)* not classified; 1 - information; 2 - warning; 3 - average; 4 - high; 5 - disaster.
state	integer	*(readonly)* State of the trigger. Possible values: 0 - *(default)* trigger state is up to date; 1 - current trigger state is unknown.
status	integer	Whether the trigger is enabled or disabled. Possible values are: 0 - *(default)* enabled; 1 - disabled.
templateid	string	*(readonly)* ID of the parent template trigger.

Property	Type	Description
type	integer	Whether the trigger can generate multiple problem events. Possible values are: 0 - *(default)* do not generate multiple events; 1 - generate multiple events.
url	string	URL associated with the trigger.
value	integer	*(readonly)* Whether the trigger is in OK or problem state. Possible values are: 0 - *(default)* OK; 1 - problem.
recovery_mode	integer	OK event generation mode. Possible values are: 0 - *(default)* Expression; 1 - Recovery expression; 2 - None.
recovery_expression	string	Reduced trigger recovery expression.
correlation_mode	integer	OK event closes. Possible values are: 0 - *(default)* All problems; 1 - All problems if tag values match.
correlation_tag	string	Tag for matching.
manual_close	integer	Allow manual close. Possible values are: 0 - *(default)* No; 1 - Yes.

Trigger tag

The trigger tag object has the following properties.

Property	Type	Description
tag (required)	string	Trigger tag name.
value	string	Trigger tag value.

trigger.adddependencies

Description

`object trigger.adddependencies(object/array triggerDependencies)`

This method allows to create new trigger dependencies.

Parameters

`(object/array)` Trigger dependencies to create.

Each trigger dependency has the following parameters:

Parameter	Type	Description
triggerid (required)	string	ID of the dependent trigger.
dependsOnTriggerid (required)	string	ID of the trigger that the trigger depends on.

Return values

(object) Returns an object containing the IDs of the dependent triggers under the triggerids property.

Examples

Add a trigger dependency

Make trigger "14092" dependent on trigger "13565."

Request:

```
{
    "jsonrpc": "2.0",
    "method": "trigger.adddependencies",
    "params": {
        "triggerid": "14092",
        "dependsOnTriggerid": "13565"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "triggerids": [
            "14092"
        ]
    },
    "id": 1
}
```

See also

- trigger.update
- Trigger dependencies

Source

CTrigger::addDependencies() in *frontends/php/include/classes/api/services/CTrigger.php*.

trigger.create

Description

`object trigger.create(object/array triggers)`

This method allows to create new triggers.

Parameters

(object/array) Triggers to create.

Additionally to the standard trigger properties the method accepts the following parameters.

Parameter	Type	Description
dependencies	array	Triggers that the trigger is dependent on. The triggers must have the triggerid property defined.
tags	array	Trigger tags.

Attention:
The trigger expression has to be given in its expanded form.

Return values

(object) Returns an object containing the IDs of the created triggers under the `triggerids` property. The order of the returned IDs matches the order of the passed triggers.

Examples

Creating a trigger

Create a trigger with a single trigger dependency.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "trigger.create",
    "params": [
        {
            "description": "Processor load is too high on {HOST.NAME}",
            "expression": "{Linux server:system.cpu.load[percpu,avg1].last()}>5",
            "dependencies": [
                {
                    "triggerid": "17367"
                }
            ]
        },
        {
            "description": "Service status",
            "expression": "{Linux server:log[/var/log/system,Service .* has stopped].strlen()}<>0",
            "dependencies": [
                {
                    "triggerid": "17368"
                }
            ],
            "tags": [
                {
                    "tag": "service",
                    "value": "{{ITEM.VALUE}.regsub(\"Service (.*) has stopped\", \"\\1\")}"
                },
                {
                    "tag": "error",
                    "value": ""
                }
            ]
        }
    ],
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "triggerids": [
            "17369",
            "17370"
        ]
    },
    "id": 1
}
```

Source

CTrigger::create() in *frontends/php/include/classes/api/services/CTrigger.php*.

trigger.delete

Description

`object trigger.delete(array triggerIds)`

This method allows to delete triggers.

Parameters

`(array)` IDs of the triggers to delete.

Return values

`(object)` Returns an object containing the IDs of the deleted triggers under the `triggerids` property.

Examples

Delete multiple triggers

Delete two triggers.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "trigger.delete",
    "params": [
        "12002",
        "12003"
    ],
    "auth": "3a57200802b24cda67c4e4010b50c065",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "triggerids": [
            "12002",
            "12003"
        ]
    },
    "id": 1
}
```

Source

CTrigger::delete() in *frontends/php/include/classes/api/services/CTrigger.php*.

trigger.deletedependencies

Description

`object trigger.deletedependencies(string/array triggers)`

This method allows to delete all trigger dependencies from the given triggers.

Parameters

`(string/array)` Triggers to delete the trigger dependencies from.

Return values

`(object)` Returns an object containing the IDs of the affected triggers under the `triggerids` property.

Examples

Deleting dependencies from multiple triggers

Delete all dependencies from two triggers.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "trigger.deleteDependencies",
    "params": [
        {
            "triggerid": "14544"
        },
        {
            "triggerid": "14545"
        }
    ],
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "triggerids": [
            "14544",
            "14545"
        ]
    },
    "id": 1
}
```

See also

- trigger.update

Source

CTrigger::deleteDependencies() in *frontends/php/include/classes/api/services/CTrigger.php*.

trigger.get

Description

`integer/array trigger.get(object parameters)`

The method allows to retrieve triggers according to the given parameters.

Parameters

`(object)` Parameters defining the desired output.

The method supports the following parameters.

Parameter	Type	Description
triggerids	string/array	Return only triggers with the given IDs.
groupids	string/array	Return only triggers that belong to hosts from the given host groups.
templateids	string/array	Return only triggers that belong to the given templates.
hostids	string/array	Return only triggers that belong to the given hosts.
itemids	string/array	Return only triggers that contain the given items.
applicationids	string/array	Return only triggers that contain items from the given applications.
functions	string/array	Return only triggers that use the given functions. Refer to the supported trigger functions page for a list of supported functions.
group	string	Return only triggers that belong to hosts from the host group with the given name.

Parameter	Type	Description
host	string	Return only triggers that belong to host with the given name.
inherited	boolean	If set to `true` return only triggers inherited from a template.
templated	boolean	If set to `true` return only triggers that belong to templates.
dependent	boolean	If set to `true` return only triggers that have dependencies. If set to `false` return only triggers that do not have dependencies.
monitored	flag	Return only enabled triggers that belong to monitored hosts and contain only enabled items.
active	flag	Return only enabled triggers that belong to monitored hosts.
maintenance	boolean	If set to `true` return only enabled triggers that belong to hosts in maintenance.
withUnacknowledgedEvents	flag	Return only triggers that have unacknowledged events.
withAcknowledgedEvents	flag	Return only triggers with all events acknowledged.
withLastEventUnacknowledged	flag	Return only triggers with the last event unacknowledged.
skipDependent	flag	Skip triggers in a problem state that are dependent on other triggers. Note that the other triggers are ignored if disabled, have disabled items or disabled item hosts.
lastChangeSince	timestamp	Return only triggers that have changed their state after the given time.
lastChangeTill	timestamp	Return only triggers that have changed their state before the given time.
only_true	flag	Return only triggers that have recently been in a problem state.
min_severity	integer	Return only triggers with severity greater or equal than the given severity.
evaltype	integer	Rules for tag searching. Possible values: 0 - (default) And/Or; 2 - Or.
tags	array of objects	Return only triggers with given tags. Exact match by tag and case-sensitive or case-insensitive search by tag value depending on operator value. Format: `[{"tag": "<tag>", "value": "<value>", "operator": "<operator>"}, ...]`. An empty array returns all triggers. Possible operator types: 0 - (default) Like; 1 - Equal.
expandComment	flag	Expand macros in the trigger description.
expandDescription	flag	Expand macros in the name of the trigger.
expandExpression	flag	Expand functions and macros in the trigger expression.
selectGroups	query	Return the host groups that the trigger belongs to in the groups property.
selectHosts	query	Return the hosts that the trigger belongs to in the hosts property.
selectItems	query	Return items contained by the trigger in the items property.

Parameter	Type	Description
selectFunctions	query	Return functions used in the trigger in the `functions` property. The function objects represents the functions used in the trigger expression and has the following properties: `functionid` - *(string)* ID of the function; `itemid` - *(string)* ID of the item used in the function; `function` - *(string)* name of the function; `parameter` - *(string)* parameter passed to the function.
selectDependencies	query	Return triggers that the trigger depends on in the `dependencies` property.
selectDiscoveryRule	query	Return the low-level discovery rule that created the trigger.
selectLastEvent	query	Return the last significant trigger event in the lastEvent property.
selectTags	query	Return the trigger tags in tags property.
selectTriggerDiscovery	query	Return the trigger discovery object in the `triggerDiscovery` property. The trigger discovery objects links the trigger to a trigger prototype from which it was created. It has the following properties: `parent_triggerid` - `(string)` ID of the trigger prototype from which the trigger has been created.
filter	object	Return only those results that exactly match the given filter. Accepts an array, where the keys are property names, and the values are either a single value or an array of values to match against. Supports additional filters: `host` - technical name of the host that the trigger belongs to; `hostid` - ID of the host that the trigger belongs to.
limitSelects	integer	Limits the number of records returned by subselects. Applies to the following subselects: `selectHosts` - results will be sorted by `host`.
sortfield	string/array	Sort the result by the given properties. Possible values are: `triggerid`, `description`, `status`, `priority`, `lastchange` and `hostname`.
countOutput	boolean	These parameters being common for all `get` methods are described in detail in the reference commentary page.
editable	boolean	
excludeSearch	boolean	
limit	integer	
output	query	
preservekeys	boolean	
search	object	
searchByAny	boolean	
searchWildcardsEnabled	boolean	
sortorder	string/array	
startSearch	boolean	

Return values

(integer/array) Returns either:

- an array of objects;
- the count of retrieved objects, if the countOutput parameter has been used.

Examples

Retrieving data by trigger ID

Retrieve all data and the functions used in trigger "14062".

Request:

```
{
    "jsonrpc": "2.0",
    "method": "trigger.get",
    "params": {
        "triggerids": "14062",
        "output": "extend",
        "selectFunctions": "extend"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "triggerid": "14062",
            "expression": "{13513}>0",
            "description": "/etc/passwd has been changed on {HOST.NAME}",
            "url": "",
            "status": "0",
            "value": "0",
            "priority": "2",
            "lastchange": "0",
            "comments": "",
            "error": "",
            "templateid": "10016",
            "type": "0",
            "state": "0",
            "flags": "0",
            "recovery_mode": "0",
            "recovery_expression": "",
            "correlation_mode": "0",
            "correlation_tag": "",
            "manual_close": "0",
            "opdata": "",
            "functions": [
                {
                    "functionid": "13513",
                    "itemid": "24350",
                    "triggerid": "14062",
                    "parameter": "0",
                    "function": "diff"
                }
            ]
        }
    ],
    "id": 1
}
```

Retrieving triggers in problem state

Retrieve the ID, name and severity of all triggers in problem state and sort them by severity in descending order.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "trigger.get",
    "params": {
        "output": [
            "triggerid",
            "description",
            "priority"
        ],
        "filter": {
            "value": 1
        },
        "sortfield": "priority",
        "sortorder": "DESC"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "triggerid": "13907",
            "description": "Zabbix self-monitoring processes < 100% busy",
            "priority": "4"
        },
        {
            "triggerid": "13824",
            "description": "Zabbix discoverer processes more than 75% busy",
            "priority": "3"
        }
    ],
    "id": 1
}
```

Retrieving a specific trigger with tags

Retrieve a specific trigger with tags.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "trigger.get",
    "params": {
        "output": [
            "triggerid",
            "description"
        ],
        "selectTags": "extend",
        "triggerids": [
            "17578"
        ]
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
```

```
    "result": [
        {
            "triggerid": "17370",
            "description": "Service status",
            "tags": [
                {
                    "tag": "service",
                    "value": "{{ITEM.VALUE}.regsub(\"Service (.*) has stopped\", \"\\1\")}"
                },
                {
                    "tag": "error",
                    "value": ""
                }
            ]
        }
    ],
    "id": 1
}
```


See also

- Discovery rule
- Item
- Host
- Host group

Source

CTrigger::get() in *frontends/php/include/classes/api/services/CTrigger.php*.

trigger.update

Description

`object trigger.update(object/array triggers)`

This method allows to update existing triggers.

Parameters

`(object/array)` Trigger properties to be updated.

The `triggerid` property must be defined for each trigger, all other properties are optional. Only the passed properties will be updated, all others will remain unchanged.

Additionally to the standard trigger properties the method accepts the following parameters.

Parameter	Type	Description
dependencies	array	Triggers that the trigger is dependent on. The triggers must have the `triggerid` property defined.
tags	array	Trigger tags.

Attention:
The trigger expression has to be given in its expanded form.

Return values

`(object)` Returns an object containing the IDs of the updated triggers under the `triggerids` property.

Examples

Enabling a trigger

Enable a trigger, that is, set its status to 0.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "trigger.update",
    "params": {
        "triggerid": "13938",
        "status": 0
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "triggerids": [
            "13938"
        ]
    },
    "id": 1
}
```

Replacing triggers tags

Replace tags for trigger.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "trigger.update",
    "params": {
        "triggerid": "13938",
        "tags": [
            {
                "tag": "service",
                "value": "{{ITEM.VALUE}.regsub(\"Service (.*) has stopped\", \"\\1\")}"
            },
            {
                "tag": "error",
                "value": ""
            }
        ]
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "triggerids": [
            "13938"
        ]
    },
    "id": 1
}
```

See also

- trigger.adddependencies
- trigger.deletedependencies

Source

CTrigger::update() in *frontends/php/include/classes/api/services/CTrigger.php*.

Trigger prototype

This class is designed to work with trigger prototypes.

Object references:

- Trigger prototype

Available methods:

- triggerprototype.create - creating new trigger prototypes
- triggerprototype.delete - deleting trigger prototypes
- triggerprototype.get - retrieving trigger prototypes
- triggerprototype.update - updating trigger prototypes

> Trigger prototype object

The following objects are directly related to the `triggerprototype` API.

Trigger prototype

The trigger prototype object has the following properties.

Property	Type	Description
triggerid	string	*(readonly)* ID of the trigger prototype.
description (required)	string	Name of the trigger prototype.
expression (required)	string	Reduced trigger expression.
opdata	string	Operational data.
comments	string	Additional comments to the trigger prototype.
priority	integer	Severity of the trigger prototype. Possible values: 0 - *(default)* not classified; 1 - information; 2 - warning; 3 - average; 4 - high; 5 - disaster.
status	integer	Whether the trigger prototype is enabled or disabled. Possible values: 0 - *(default)* enabled; 1 - disabled.
templateid	string	*(readonly)* ID of the parent template trigger prototype.
type	integer	Whether the trigger prototype can generate multiple problem events. Possible values: 0 - *(default)* do not generate multiple events; 1 - generate multiple events.
url	string	URL associated with the trigger prototype.
recovery_mode	integer	OK event generation mode. Possible values are: 0 - *(default)* Expression; 1 - Recovery expression; 2 - None.

Property	Type	Description
recovery_expression	string	Reduced trigger recovery expression.
correlation_mode	integer	OK event closes. Possible values are: 0 - *(default)* All problems; 1 - All problems if tag values match.
correlation_tag	string	Tag for matching.
manual_close	integer	Allow manual close. Possible values are: 0 - *(default)* No; 1 - Yes.

Trigger prototype tag

The trigger prototype tag object has the following properties.

Property	Type	Description
tag (required)	string	Trigger prototype tag name.
value	string	Trigger prototype tag value.

triggerprototype.create

Description

`object triggerprototype.create(object/array triggerPrototypes)`

This method allows to create new trigger prototypes.

Parameters

`(object/array)` Trigger prototypes to create.

Additionally to the standard trigger prototype properties the method accepts the following parameters.

Parameter	Type	Description
dependencies	array	Triggers and trigger prototypes that the trigger prototype is dependent on. The triggers must have the `triggerid` property defined.
tags	array	Trigger prototype tags.

Attention:
The trigger expression has to be given in its expanded form and must contain at least one item prototype.

Return values

`(object)` Returns an object containing the IDs of the created trigger prototypes under the `triggerids` property. The order of the returned IDs matches the order of the passed trigger prototypes.

Examples

Creating a trigger prototype

Create a trigger prototype to detect when a file system has less than 20% free disk space.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "triggerprototype.create",
    "params": {
        "description": "Free disk space is less than 20% on volume {#FSNAME}",
        "expression": "{Zabbix server:vfs.fs.size[{#FSNAME},pfree].last()}<20",
        "tags": [
            {
                "tag": "volume",
                "value": "{#FSNAME}"
            },
            {
                "tag": "type",
                "value": "{#FSTYPE}"
            }
        ]
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "triggerids": [
            "17372"
        ]
    },
    "id": 1
}
```

Source

CTriggerPrototype::create() in *frontends/php/include/classes/api/services/CTriggerPrototype.php*.

triggerprototype.delete

Description

`object triggerprototype.delete(array triggerPrototypeIds)`

This method allows to delete trigger prototypes.

Parameters

`(array)` IDs of the trigger prototypes to delete.

Return values

`(object)` Returns an object containing the IDs of the deleted trigger prototypes under the `triggerids` property.

Examples

Deleting multiple trigger prototypes

Delete two trigger prototypes.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "triggerprototype.delete",
    "params": [
        "12002",
        "12003"
    ],
    "auth": "3a57200802b24cda67c4e4010b50c065",
```

```
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "triggerids": [
            "12002",
            "12003"
        ]
    },
    "id": 1
}
```

Source

CTriggerPrototype::delete() in *frontends/php/include/classes/api/services/CTriggerPrototype.php*.

triggerprototype.get

Description

`integer/array triggerprototype.get(object parameters)`

The method allows to retrieve trigger prototypes according to the given parameters.

Parameters

`(object)` Parameters defining the desired output.

The method supports the following parameters.

Parameter	Type	Description
active	flag	Return only enabled trigger prototypes that belong to monitored hosts.
applicationids	string/array	Return only trigger prototypes that contain items from the given applications.
discoveryids	string/array	Return only trigger prototypes that belong to the given LLD rules.
functions	string/array	Return only triggers that use the given functions. Refer to the supported trigger functions page for a list of supported functions.
group	string	Return only trigger prototypes that belong to hosts from the host groups with the given name.
groupids	string/array	Return only trigger prototypes that belong to hosts from the given host groups.
host	string	Return only trigger prototypes that belong to hosts with the given name.
hostids	string/array	Return only trigger prototypes that belong to the given hosts.
inherited	boolean	If set to `true` return only trigger prototypes inherited from a template.
maintenance	boolean	If set to `true` return only enabled trigger prototypes that belong to hosts in maintenance.
min_severity	integer	Return only trigger prototypes with severity greater or equal than the given severity.
monitored	flag	Return only enabled trigger prototypes that belong to monitored hosts and contain only enabled items.
templated	boolean	If set to `true` return only trigger prototypes that belong to templates.
templateids	string/array	Return only trigger prototypes that belong to the given templates.
triggerids	string/array	Return only trigger prototypes with the given IDs.

Parameter	Type	Description
expandExpression	flag	Expand functions and macros in the trigger expression.
selectDiscoveryRule	query	Return the LLD rule that the trigger prototype belongs to.
selectFunctions	query	Return functions used in the trigger prototype in the `functions` property. The function objects represents the functions used in the trigger expression and has the following properties: `functionid` - *(string)* ID of the function; `itemid` - *(string)* ID of the item used in the function; `function` - *(string)* name of the function; `parameter` - *(string)* parameter passed to the function.
selectGroups	query	Return the host groups that the trigger prototype belongs to in the groups property.
selectHosts	query	Return the hosts that the trigger prototype belongs to in the hosts property.
selectItems	query	Return items and item prototypes used the trigger prototype in the items property.
selectDependencies	query	Return trigger prototypes and triggers that the trigger prototype depends on in the `dependencies` property.
selectTags	query	Return the trigger prototype tags in tags property.
filter	object	Return only those results that exactly match the given filter. Accepts an array, where the keys are property names, and the values are either a single value or an array of values to match against. Supports additional filters: `host` - technical name of the host that the trigger prototype belongs to; `hostid` - ID of the host that the trigger prototype belongs to.
limitSelects	integer	Limits the number of records returned by subselects. Applies to the following subselects: `selectHosts` - results will be sorted by `host`.
sortfield	string/array	Sort the result by the given properties. Possible values are: `triggerid`, `description`, `status` and `priority`.
countOutput	boolean	These parameters being common for all `get` methods are described in detail in the reference commentary.
editable	boolean	
excludeSearch	boolean	
limit	integer	
output	query	
preservekeys	boolean	
search	object	
searchByAny	boolean	
searchWildcardsEnabled	boolean	
sortorder	string/array	
startSearch	boolean	

Return values

`(integer/array)` Returns either:

- an array of objects;

- the count of retrieved objects, if the `countOutput` parameter has been used.

Examples

Retrieve trigger prototypes from an LLD rule

Retrieve all trigger prototypes and their functions from an LLD rule.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "triggerprototype.get",
    "params": {
        "output": "extend",
        "selectFunctions": "extend",
        "discoveryids": "22450"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "triggerid": "13272",
            "expression": "{12598}<20",
            "description": "Free inodes is less than 20% on volume {#FSNAME}",
            "url": "",
            "status": "0",
            "priority": "2",
            "comments": "",
            "templateid": "0",
            "type": "0",
            "flags": "2",
            "recovery_mode": "0",
            "recovery_expression": "",
            "correlation_mode": "0",
            "correlation_tag": "",
            "manual_close": "0",
            "opdata": "",
            "functions": [
                {
                    "functionid": "12598",
                    "itemid": "22454",
                    "triggerid": "13272",
                    "parameter": "0",
                    "function": "last"
                }
            ]
        },
        {
            "triggerid": "13266",
            "expression": "{13500}<201",
            "description": "Free disk space is less than 20% on volume {#FSNAME}",
            "url": "",
            "status": "0",
            "priority": "2",
            "comments": "",
            "templateid": "0",
            "type": "0",
            "flags": "2",
            "recovery_mode": "0",
```

```
            "recovery_expression": "",
            "correlation_mode": "0",
            "correlation_tag": "",
            "manual_close": "0",
            "opdata": "",
            "functions": [
                {
                    "functionid": "13500",
                    "itemid": "22686",
                    "triggerid": "13266",
                    "parameter": "0",
                    "function": "last"
                }
            ]
        }
    ],
    "id": 1
}
```

Retrieving a specific trigger prototype with tags

Request:

```
{
    "jsonrpc": "2.0",
    "method": "triggerprototype.get",
    "params": {
        "output": [
            "triggerid",
            "description"
        ]
        "selectTags": "extend",
        "triggerids": [
            "17373"
        ]
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "triggerid": "17373",
            "description": "Free disk space is less than 20% on volume {#FSNAME}",
            "tags": [
                {
                    "tag": "volume",
                    "value": "{#FSNAME}"
                },
                {
                    "tag": "type",
                    "value": "{#FSTYPE}"
                }
            ]
        }
    ],
    "id": 1
}
```

See also

- Discovery rule

- Item
- Host
- Host group

Source

CTriggerPrototype::get() in *frontends/php/include/classes/api/services/CTriggerPrototype.php*.

triggerprototype.update

Description

`object triggerprototype.update(object/array triggerPrototypes)`

This method allows to update existing trigger prototypes.

Parameters

`(object/array)` Trigger prototype properties to be updated.

The `triggerid` property must be defined for each trigger prototype, all other properties are optional. Only the passed properties will be updated, all others will remain unchanged.

Additionally to the standard trigger prototype properties the method accepts the following parameters.

Parameter	Type	Description
dependencies	array	Triggers and trigger prototypes that the trigger prototype is dependent on. The triggers must have the `triggerid` property defined.
tags	array	Trigger prototype tags.

Attention:
The trigger expression has to be given in its expanded form and must contain at least one item prototype.

Return values

`(object)` Returns an object containing the IDs of the updated trigger prototypes under the `triggerids` property.

Examples

Enabling a trigger prototype

Enable a trigger prototype, that is, set its status to 0.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "triggerprototype.update",
    "params": {
        "triggerid": "13938",
        "status": 0
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "triggerids": [
            "13938"
        ]
    },
```

```
    "id": 1
}
```

Replacing trigger prototype tags

Replace tags for one trigger prototype.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "triggerprototype.update",
    "params": {
        "triggerid": "17373",
        "tags": [
            {
                "tag": "volume",
                "value": "{#FSNAME}"
            },
            {
                "tag": "type",
                "value": "{#FSTYPE}"
            }
        ]
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "triggerids": [
            "17373"
        ]
    },
    "id": 1
}
```

Source

CTriggerPrototype::update() in *frontends/php/include/classes/api/services/CTriggerPrototype.php*.

User

This class is designed to work with users.

Object references:

- User

Available methods:

- user.create - creating new users
- user.delete - deleting users
- user.get - retrieving users
- user.login - logging in to the API
- user.logout - logging out of the API
- user.update - updating users

> User object

The following objects are directly related to the `user` API.

User

The user object has the following properties.

Property	Type	Description
userid	string	*(readonly)* ID of the user.
alias *(required)*	string	User alias.
attempt_clock	timestamp	*(readonly)* Time of the last unsuccessful login attempt.
attempt_failed	integer	*(readonly)* Recent failed login attempt count.
attempt_ip	string	*(readonly)* IP address from where the last unsuccessful login attempt came from.
autologin	integer	Whether to enable auto-login. Possible values: 0 - *(default)* auto-login disabled; 1 - auto-login enabled.
autologout	string	User session life time. Accepts seconds and time unit with suffix. If set to 0s, the session will never expire. Default: 15m.
lang	string	Language code of the user's language. Default: `en_GB`.
name	string	Name of the user.
refresh	string	Automatic refresh period. Accepts seconds and time unit with suffix. Default: 30s.
rows_per_page	integer	Amount of object rows to show per page. Default: 50.
surname	string	Surname of the user.
theme	string	User's theme. Possible values: `default` - *(default)* system default; `blue-theme` - Blue; `dark-theme` - Dark.
type	integer	Type of the user. Possible values: 1 - *(default)* Zabbix user; 2 - Zabbix admin; 3 - Zabbix super admin.
url	string	URL of the page to redirect the user to after logging in.

Media

The media object has the following properties.

Property	Type	Description
mediatypeid (required)	string	ID of the media type used by the media.
sendto (required)	string/array	Address, user name or other identifier of the recipient. If type of Media type is e-mail, values are represented as array. For other types of Media types, value is represented as a string.

Property	Type	Description
active	integer	Whether the media is enabled. Possible values: 0 - *(default)* enabled; 1 - disabled.
severity	integer	Trigger severities to send notifications about. Severities are stored in binary form with each bit representing the corresponding severity. For example, 12 equals 1100 in binary and means, that notifications will be sent from triggers with severities warning and average. Refer to the trigger object page for a list of supported trigger severities. Default: 63
period	string	Time when the notifications can be sent as a time period or user macros separated by a semicolon. Default: 1-7,00:00-24:00

user.checkAuthentication

Description

`object user.checkAuthentication`

This method checks and prolongs user session.

Parameters

The method accepts the following parameters.

Parameter	Type	Description
extend	boolean	Default value: "true". Setting it's value to "false" allows to check session without extending it's lifetime. Supported since Zabbix 4.0.
sessionid	string	User session id.

Attention:
Calling **user.checkAuthentication** method prolongs user session by default.

Return values

`(object)` Returns an object containing information about user.

Examples

Request:

```
{
    "jsonrpc": "2.0",
    "method": "user.checkAuthentication",
    "params": {
        "sessionid": "8C8447FF6F61D134CEAC740CCA1BC90D"
    },
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "userid": "1",
        "alias": "Admin",
        "name": "Zabbix",
        "surname": "Administrator",
        "url": "",
        "autologin": "1",
        "autologout": "0",
        "lang": "ru_RU",
        "refresh": "0",
        "type": "3",
        "theme": "default",
        "attempt_failed": "0",
        "attempt_ip": "127.0.0.1",
        "attempt_clock": "1355919038",
        "rows_per_page": "50",
        "debug_mode": true,
        "userip": "127.0.0.1",
        "sessionid": "8C8447FF6F61D134CEAC740CCA1BC90D",
        "gui_access": "0"
    },
    "id": 1
}
```


Note:
Response is similar to User.login call response with "userData" parameter set to true (the difference is that user data is retrieved by session id and not by username / password).

Source

CUser::checkAuthentication() in *frontends/php/include/classes/api/services/CUser.php*.

user.create

Description

`object user.create(object/array users)`

This method allows to create new users.

Parameters

`(object/array)` Users to create.

Additionally to the standard user properties, the method accepts the following parameters.

Parameter	Type	Description
passwd *(required)*	string	User's password. Can be omitted if user is added only to groups that have LDAP access.
usrgrps (required)	array	User groups to add the user to. The user groups must have the `usrgrpid` property defined.
user_medias	array	User media to be created.

Return values

`(object)` Returns an object containing the IDs of the created users under the `userids` property. The order of the returned IDs matches the order of the passed users.

Examples

Creating a user

Create a new user, add him to a user group and create a new media for him.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "user.create",
    "params": {
        "alias": "John",
        "passwd": "Doe123",
        "usrgrps": [
            {
                "usrgrpid": "7"
            }
        ],
        "user_medias": [
            {
                "mediatypeid": "1",
                "sendto": [
                    "support@company.com"
                ],
                "active": 0,
                "severity": 63,
                "period": "1-7,00:00-24:00"
            }
        ]
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "userids": [
            "12"
        ]
    },
    "id": 1
}
```

See also

- Media
- User group

Source

CUser::create() in *frontends/php/include/classes/api/services/CUser.php*.

user.delete

Description

`object user.delete(array users)`

This method allows to delete users.

Parameters

`(array)` IDs of users to delete.

Return values

(object) Returns an object containing the IDs of the deleted users under the userids property.

Examples

Deleting multiple users

Delete two users.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "user.delete",
    "params": [
        "1",
        "5"
    ],
    "auth": "3a57200802b24cda67c4e4010b50c065",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "userids": [
            "1",
            "5"
        ]
    },
    "id": 1
}
```

Source

CUser::delete() in *frontends/php/include/classes/api/services/CUser.php*.

user.get

Description

integer/array user.get(object parameters)

The method allows to retrieve users according to the given parameters.

Parameters

(object) Parameters defining the desired output.

The method supports the following parameters.

Parameter	Type	Description
mediaids	string/array	Return only users that use the given media.
mediatypeids	string/array	Return only users that use the given media types.
userids	string/array	Return only users with the given IDs.
usrgrpids	string/array	Return only users that belong to the given user groups.

Parameter	Type	Description
getAccess	flag	Adds additional information about user permissions. Adds the following properties for each user: `gui_access` - *(integer)* user's frontend authentication method. Refer to the `gui_access` property of the user group object for a list of possible values. `debug_mode` - *(integer)* indicates whether debug is enabled for the user. Possible values: 0 - debug disabled, 1 - debug enabled. `users_status` - *(integer)* indicates whether the user is disabled. Possible values: 0 - user enabled, 1 - user disabled.
selectMedias	query	Return media used by the user in the medias property.
selectMediatypes	query	Return media types used by the user in the mediatypes property.
selectUsrgrps	query	Return user groups that the user belongs to in the usrgrps property.
sortfield	string/array	Sort the result by the given properties. Possible values are: `userid` and `alias`.
countOutput	boolean	These parameters being common for all `get` methods are described in detail in the reference commentary.
editable	boolean	
excludeSearch	boolean	
filter	object	
limit	integer	
output	query	
preservekeys	boolean	
search	object	
searchByAny	boolean	
searchWildcardsEnabled	boolean	
sortorder	string/array	
startSearch	boolean	

Return values

`(integer/array)` Returns either:

- an array of objects;
- the count of retrieved objects, if the `countOutput` parameter has been used.

Examples

Retrieving users

Retrieve all of the configured users.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "user.get",
    "params": {
        "output": "extend"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
```

```
        {
            "userid": "1",
            "alias": "Admin",
            "name": "Zabbix",
            "surname": "Administrator",
            "url": "",
            "autologin": "1",
            "autologout": "0s",
            "lang": "ru_RU",
            "refresh": "0s",
            "type": "3",
            "theme": "default",
            "attempt_failed": "0",
            "attempt_ip": "",
            "attempt_clock": "0",
            "rows_per_page": "50"
        },
        {
            "userid": "2",
            "alias": "guest",
            "name": "Default2",
            "surname": "User",
            "url": "",
            "autologin": "0",
            "autologout": "15m",
            "lang": "en_GB",
            "refresh": "30s",
            "type": "1",
            "theme": "default",
            "attempt_failed": "0",
            "attempt_ip": "",
            "attempt_clock": "0",
            "rows_per_page": "50"
        }
    ],
    "id": 1
}
```


See also

- Media
- Media type
- User group

Source

CUser::get() in *frontends/php/include/classes/api/services/CUser.php*.

user.login

Description

`string/object user.login(object parameters)`

This method allows to log in to the API and generate an authentication token.

Warning:
When using this method, you also need to do user.logout to prevent the generation of a large number of open session records.

Parameters

Attention:
This method is available to unauthenticated users and must be called without the `auth` parameter in the JSON-RPC request.

(object) Parameters containing the user name and password.

The method accepts the following parameters.

Parameter	Type	Description
password (required)	string	User password.
user (required)	string	User name.
userData	flag	Return information about the authenticated user.

Return values

(string/object) If the userData parameter is used, returns an object containing information about the authenticated user.

Additionally to the standard user properties, the following information is returned:

Property	Type	Description
debug_mode	boolean	Whether debug mode is enabled for the user.
gui_access	integer	User's authentication method to the frontend. Refer to the gui_access property of the user group object for a list of possible values.
sessionid	string	Authentication token, which must be used in the following API requests.
userip	string	IP address of the user.

Note:
If a user has been successfully authenticated after one or more failed attempts, the method will return the current values for the attempt_clock, attempt_failed and attempt_ip properties and then reset them.

If the userData parameter is not used, the method returns an authentication token.

Note:
The generated authentication token should be remembered and used in the auth parameter of the following JSON-RPC requests. It is also required when using HTTP authentication.

Examples

Authenticating a user

Authenticate a user.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "user.login",
    "params": {
        "user": "Admin",
        "password": "zabbix"
    },
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": "0424bd59b807674191e7d77572075f33",
    "id": 1
}
```

Requesting authenticated user's information

Authenticate and return additional information about the user.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "user.login",
    "params": {
        "user": "Admin",
        "password": "zabbix",
        "userData": true
    },
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "userid": "1",
        "alias": "Admin",
        "name": "Zabbix",
        "surname": "Administrator",
        "url": "",
        "autologin": "1",
        "autologout": "0",
        "lang": "ru_RU",
        "refresh": "0",
        "type": "3",
        "theme": "default",
        "attempt_failed": "0",
        "attempt_ip": "127.0.0.1",
        "attempt_clock": "1355919038",
        "rows_per_page": "50",
        "debug_mode": true,
        "userip": "127.0.0.1",
        "sessionid": "5b56eee8be445e98f0bd42b435736e42",
        "gui_access": "0"
    },
    "id": 1
}
```

See also

- user.logout

Source

CUser::login() in *frontends/php/include/classes/api/services/CUser.php*.

user.logout

Description

`string/object user.logout(array)`

This method allows to log out of the API and invalidates the current authentication token.

Parameters

`(array)` The method accepts an empty array.

Return values

`(boolean)` Returns `true` if the user has been logged out successfully.

Examples

Logging out

Log out from the API.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "user.logout",
    "params": [],
    "id": 1,
    "auth": "16a46baf181ef9602e1687f3110abf8a"
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": true,
    "id": 1
}
```

See also

- user.login

Source

CUser::login() in *frontends/php/include/classes/api/services/CUser.php*.

user.update

Description

`object user.update(object/array users)`

This method allows to update existing users.

Parameters

`(object/array)` User properties to be updated.

The `userid` property must be defined for each user, all other properties are optional. Only the passed properties will be updated, all others will remain unchanged.

Additionally to the standard user properties, the method accepts the following parameters.

Parameter	Type	Description
passwd	string	User's password. Can be empty string if user belongs to or is moved only to groups that have LDAP access.
usrgrps	array	User groups to replace existing user groups. The user groups must have the `usrgrpid` property defined.
user_medias	array	User media to replace existing media.

Return values

`(object)` Returns an object containing the IDs of the updated users under the `userids` property.

Examples

Renaming a user

Rename a user to John Doe.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "user.update",
    "params": {
        "userid": "1",
        "name": "John",
        "surname": "Doe"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "userids": [
            "1"
        ]
    },
    "id": 1
}
```

Source

CUser::update() in *frontends/php/include/classes/api/services/CUser.php*.

User group

This class is designed to work with user groups.

Object references:

- User group

Available methods:

- usergroup.create - creating new user groups
- usergroup.delete - deleting user groups
- usergroup.get - retrieving user groups
- usergroup.update - updating user groups

> User group object

The following objects are directly related to the `usergroup` API.

User group

The user group object has the following properties.

Property	Type	Description
usrgrpid	string	*(readonly)* ID of the user group.
name (required)	string	Name of the user group.
debug_mode	integer	Whether debug mode is enabled or disabled. Possible values are: 0 - *(default)* disabled; 1 - enabled.

Property	Type	Description
gui_access	integer	Frontend authentication method of the users in the group. Possible values: 0 - *(default)* use the system default authentication method; 1 - use internal authentication; 2 - use LDAP authentication; 3 - disable access to the frontend.
users_status	integer	Whether the user group is enabled or disabled. Possible values are: 0 - *(default)* enabled; 1 - disabled.

Permission

The permission object has the following properties.

Property	Type	Description
id (required)	string	ID of the host group to add permission to.
permission (required)	integer	Access level to the host group. Possible values: 0 - access denied; 2 - read-only access; 3 - read-write access.

Tag based permission

The tag based permission object has the following properties.

Property	Type	Description
groupid (required)	string	ID of the host group to add permission to.
tag	string	Tag name.
value	string	Tag value.

usergroup.create

Description

`object usergroup.create(object/array userGroups)`

This method allows to create new user groups.

Parameters

`(object/array)` User groups to create.

Additionally to the standard user group properties, the method accepts the following parameters.

Parameter	Type	Description
rights	object/array	Permissions to assign to the group
tag_filters	array	Tag based permissions to assign to the group
userids	string/array	IDs of users to add to the user group.

Return values

(object) Returns an object containing the IDs of the created user groups under the usrgrpids property. The order of the returned IDs matches the order of the passed user groups.

Examples

Creating a user group

Create a user group, which denies access to host group "2", and add a user to it.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "usergroup.create",
    "params": {
        "name": "Operation managers",
        "rights": {
            "permission": 0,
            "id": "2"
        },
        "userids": "12"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "usrgrpids": [
            "20"
        ]
    },
    "id": 1
}
```

See also

- Permission

Source

CUserGroup::create() in *frontends/php/include/classes/api/services/CUserGroup.php*.

usergroup.delete

Description

`object usergroup.delete(array userGroupIds)`

This method allows to delete user groups.

Parameters

(array) IDs of the user groups to delete.

Return values

(object) Returns an object containing the IDs of the deleted user groups under the usrgrpids property.

Examples

Deleting multiple user groups

Delete two user groups.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "usergroup.delete",
```

```
    "params": [
        "20",
        "21"
    ],
    "auth": "3a57200802b24cda67c4e4010b50c065",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "usrgrpids": [
            "20",
            "21"
        ]
    },
    "id": 1
}
```

Source

CUserGroup::delete() in *frontends/php/include/classes/api/services/CUserGroup.php*.

usergroup.get

Description

`integer/array usergroup.get(object parameters)`

The method allows to retrieve user groups according to the given parameters.

Parameters

`(object)` Parameters defining the desired output.

The method supports the following parameters.

Parameter	Type	Description
status	integer	Return only user groups with the given status. Refer to the user group page for a list of supported statuses.
userids	string/array	Return only user groups that contain the given users.
usrgrpids	string/array	Return only user groups with the given IDs.
with_gui_access	integer	Return only user groups with the given frontend authentication method. Refer to the user group page for a list of supported methods.
selectTagFilters	query	Return user group tag based permissions in the tag_filters property. It has the following properties: `groupid` - (string) ID of the host group; `tag` - (string) tag name; `value` - (string) tag value.
selectUsers	query	Return the users from the user group in the users property.

Parameter	Type	Description
selectRights	query	Return user group rights in the rights property. It has the following properties: `permission` - (integer) access level to the host group; `id` - (string) ID of the host group. Refer to the user group page for a list of access levels to host groups.
limitSelects	integer	Limits the number of records returned by subselects.
sortfield	string/array	Sort the result by the given properties. Possible values are: `usrgrpid`, `name`.
countOutput	boolean	These parameters being common for all `get` methods are described in detail in the reference commentary.
editable	boolean	
excludeSearch	boolean	
filter	object	
limit	integer	
output	query	
preservekeys	boolean	
search	object	
searchByAny	boolean	
searchWildcardsEnabled	boolean	
sortorder	string/array	
startSearch	boolean	

Return values

`(integer/array)` Returns either:

- an array of objects;
- the count of retrieved objects, if the `countOutput` parameter has been used.

Examples

Retrieving enabled user groups

Retrieve all enabled user groups.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "usergroup.get",
    "params": {
        "output": "extend",
        "status": 0
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "usrgrpid": "7",
            "name": "Zabbix administrators",
            "gui_access": "0",
            "users_status": "0",
            "debug_mode": "1"
        },
```

```
        {
            "usrgrpid": "8",
            "name": "Guests",
            "gui_access": "0",
            "users_status": "0",
            "debug_mode": "0"
        },
        {
            "usrgrpid": "11",
            "name": "Enabled debug mode",
            "gui_access": "0",
            "users_status": "0",
            "debug_mode": "1"
        },
        {
            "usrgrpid": "12",
            "name": "No access to the frontend",
            "gui_access": "2",
            "users_status": "0",
            "debug_mode": "0"
        },
        {
            "usrgrpid": "14",
            "name": "Read only",
            "gui_access": "0",
            "users_status": "0",
            "debug_mode": "0"
        },
        {
            "usrgrpid": "18",
            "name": "Deny",
            "gui_access": "0",
            "users_status": "0",
            "debug_mode": "0"
        }
    ],
    "id": 1
}
```


See also

- User

Source

CUserGroup::get() in *frontends/php/include/classes/api/services/CUserGroup.php*.

usergroup.update

Description

`object usergroup.update(object/array userGroups)`

This method allows to update existing user groups.

Parameters

`(object/array)` User group properties to be updated.

The `usrgrpid` property must be defined for each user group, all other properties are optional. Only the passed properties will be updated, all others will remain unchanged.

Additionally to the standard user group properties, the method accepts the following parameters.

Parameter	Type	Description
rights	object/array	Permissions to replace the current permissions assigned to the user group.
tag_filters	array	Tag based permissions to assign to the group.
userids	string/array	IDs of the users to replace the users in the group.

Return values

`(object)` Returns an object containing the IDs of the updated user groups under the `usrgrpids` property.

Examples

Disabling a user group

Disable a user group.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "usergroup.update",
    "params": {
        "usrgrpid": "17",
        "users_status": "1"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "usrgrpids": [
            "17"
        ]
    },
    "id": 1
}
```

See also

- Permission

Source

CUserGroup::update() in *frontends/php/include/classes/api/services/CUserGroup.php*.

User macro

This class is designed to work with host and global macros.

Object references:

- Global macro
- Host macro

Available methods:

- usermacro.create - creating new host macros
- usermacro.createglobal - creating new global macros
- usermacro.delete - deleting host macros
- usermacro.deleteglobal - deleting global macros
- usermacro.get - retrieving host and global macros
- usermacro.update - updating host macros
- usermacro.updateglobal - updating global macros

> User macro object

The following objects are directly related to the `usermacro` API.

Global macro

The global macro object has the following properties.

Property	Type	Description
globalmacroid	string	*(readonly)* ID of the global macro.
macro (required)	string	Macro string.
value (required)	string	Value of the macro.
description	string	Description of the macro.

Host macro

The host macro object defines a macro available on a host or template. It has the following properties.

Property	Type	Description
hostmacroid	string	*(readonly)* ID of the host macro.
hostid (required)	string	ID of the host that the macro belongs to.
macro (required)	string	Macro string.
value (required)	string	Value of the macro.
description	string	Description of the macro.

usermacro.create

Description

`object usermacro.create(object/array hostMacros)`

This method allows to create new host macros.

Parameters

`(object/array)` Host macros to create.

The method accepts host macros with the standard host macro properties.

Return values

`(object)` Returns an object containing the IDs of the created host macros under the `hostmacroids` property. The order of the returned IDs matches the order of the passed host macros.

Examples

Creating a host macro

Creat a host macro "{$SNMP_COMMUNITY}" with the value "public" on host "10198".

Request:

```
{
    "jsonrpc": "2.0",
    "method": "usermacro.create",
    "params": {
        "hostid": "10198",
        "macro": "{$SNMP_COMMUNITY}",
        "value": "public"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
```

```
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "hostmacroids": [
            "11"
        ]
    },
    "id": 1
}
```

Source

CUserMacro::create() in *frontends/php/include/classes/api/services/CUserMacro.php*.

usermacro.createglobal

Description

`object usermacro.createglobal(object/array globalMacros)`

This method allows to create new global macros.

Parameters

`(object/array)` Global macros to create.

The method accepts global macros with the standard global macro properties.

Return values

`(object)` Returns an object containing the IDs of the created global macros under the `globalmacroids` property. The order of the returned IDs matches the order of the passed global macros.

Examples

Creating a global macro

Create a global macro "{$SNMP_COMMUNITY}" with value "public".

Request:

```
{
    "jsonrpc": "2.0",
    "method": "usermacro.createglobal",
    "params":  {
        "macro": "{$SNMP_COMMUNITY}",
        "value": "public"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "globalmacroids": [
            "6"
        ]
    },
    "id": 1
}
```

Source

CUserMacro::createGlobal() in *frontends/php/include/classes/api/services/CUserMacro.php*.

usermacro.delete

Description

`object usermacro.delete(array hostMacroIds)`

This method allows to delete host macros.

Parameters

`(array)` IDs of the host macros to delete.

Return values

`(object)` Returns an object containing the IDs of the deleted host macros under the `hostmacroids` property.

Examples

Deleting multiple host macros

Delete two host macros.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "usermacro.delete",
    "params": [
        "32",
        "11"
    ],
    "auth": "3a57200802b24cda67c4e4010b50c065",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "hostmacroids": [
            "32",
            "11"
        ]
    },
    "id": 1
}
```

Source

CUserMacro::delete() in *frontends/php/include/classes/api/services/CUserMacro.php*.

usermacro.deleteglobal

Description

`object usermacro.deleteglobal(array globalMacroIds)`

This method allows to delete global macros.

Parameters

`(array)` IDs of the global macros to delete.

Return values

`(object)` Returns an object containing the IDs of the deleted global macros under the `globalmacroids` property.

Examples

Deleting multiple global macros

Delete two global macros.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "usermacro.deleteglobal",
    "params": [
        "32",
        "11"
    ],
    "auth": "3a57200802b24cda67c4e4010b50c065",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "globalmacroids": [
            "32",
            "11"
        ]
    },
    "id": 1
}
```

Source

CUserMacro::deleteGlobal() in *frontends/php/include/classes/api/services/CUserMacro.php*.

usermacro.get

Description

`integer/array usermacro.get(object parameters)`

The method allows to retrieve host and global macros according to the given parameters.

Parameters

`(object)` Parameters defining the desired output.

The method supports the following parameters.

Parameter	Type	Description
globalmacro	flag	Return global macros instead of host macros.
globalmacroids	string/array	Return only global macros with the given IDs.
groupids	string/array	Return only host macros that belong to hosts or templates from the given host groups.
hostids	string/array	Return only macros that belong to the given hosts or templates.
hostmacroids	string/array	Return only host macros with the given IDs.
selectGroups	query	Return host groups that the host macro belongs to in the groups property. Used only when retrieving host macros.
selectHosts	query	Return hosts that the host macro belongs to in the hosts property. Used only when retrieving host macros.
selectTemplates	query	Return templates that the host macro belongs to in the templates property. Used only when retrieving host macros.

Parameter	Type	Description
sortfield	string/array	Sort the result by the given properties. Possible value: `macro`.
countOutput	boolean	These parameters being common for all `get` methods are described in detail in the reference commentary page.
editable	boolean	
excludeSearch	boolean	
filter	object	
limit	integer	
output	query	
preservekeys	boolean	
search	object	
searchByAny	boolean	
searchWildcardsEnabled	boolean	
sortorder	string/array	
startSearch	boolean	

Return values

`(integer/array)` Returns either:

- an array of objects;
- the count of retrieved objects, if the `countOutput` parameter has been used.

Examples

Retrieving host macros for a host

Retrieve all host macros defined for host "10198".

Request:

```
{
    "jsonrpc": "2.0",
    "method": "usermacro.get",
    "params": {
        "output": "extend",
        "hostids": "10198"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "hostmacroid": "9",
            "hostid": "10198",
            "macro": "{$INTERFACE}",
            "value": "eth0",
            "description": ""
        },
        {
            "hostmacroid": "11",
            "hostid": "10198",
            "macro": "{$SNMP_COMMUNITY}",
            "value": "public",
            "description": ""
        }
    ],
```

```
    "id": 1
}
```

Retrieving global macros

Retrieve all global macros.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "usermacro.get",
    "params": {
        "output": "extend",
        "globalmacro": true
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "globalmacroid": "6",
            "macro": "{$SNMP_COMMUNITY}",
            "value": "public",
            "description": ""
        }
    ],
    "id": 1
}
```

Source

CUserMacro::get() in *frontends/php/include/classes/api/services/CUserMacro.php*.

usermacro.update

Description

`object usermacro.update(object/array hostMacros)`

This method allows to update existing host macros.

Parameters

`(object/array)` Host macro properties to be updated.

The `hostmacroid` property must be defined for each host macro, all other properties are optional. Only the passed properties will be updated, all others will remain unchanged.

Return values

`(object)` Returns an object containing the IDs of the updated host macros under the `hostmacroids` property.

Examples

Changing the value of a host macro

Change the value of a host macro to ”public”.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "usermacro.update",
    "params": {
        "hostmacroid": "1",
```

```
        "value": "public"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "hostmacroids": [
            "1"
        ]
    },
    "id": 1
}
```

Source

CUserMacro::update() in *frontends/php/include/classes/api/services/CUserMacro.php*.

usermacro.updateglobal

Description

`object usermacro.updateglobal(object/array globalMacros)`

This method allows to update existing global macros.

Parameters

`(object/array)` Global macro properties to be updated.

The `globalmacroid` property must be defined for each global macro, all other properties are optional. Only the passed properties will be updated, all others will remain unchanged.

Return values

`(object)` Returns an object containing the IDs of the updated global macros under the `globalmacroids` property.

Examples

Changing the value of a global macro

Change the value of a global macro to ”public”.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "usermacro.updateglobal",
    "params": {
        "globalmacroid": "1",
        "value": "public"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "globalmacroids": [
            "1"
        ]
    },
```

```
    "id": 1
}
```

Source

CUserMacro::updateGlobal() in *frontends/php/include/classes/api/services/CUserMacro.php*.

Value map

This class is designed to work with value maps.

Object references:

- Value map

Available methods:

- valuemap.create - creating new value maps
- valuemap.delete - deleting value maps
- valuemap.get - retrieving value maps
- valuemap.update - updating value maps

> Value map object

The following objects are directly related to the `valuemap` API.

Value map

The value map object has the following properties.

Property	Type	Description
valuemapid	string	*(readonly)* ID of the value map.
name (required)	string	Name of the value map.
mappings (required)	array	Value mappings for current value map. The mapping object is described in detail below.

Value mappings

The value mappings object defines value mappings of the value map. It has the following properties.

Property	Type	Description
value (required)	string	Original value.
newvalue (required)	string	Value to which the original value is mapped to.

valuemap.create

Description

`object valuemap.create(object/array valuemaps)`

This method allows to create new value maps.

Parameters

`(object/array)` Value maps to create.

The method accepts value maps with the standard value map properties.

Return values

(object) Returns an object containing the IDs of the created value maps the valuemapids property. The order of the returned IDs matches the order of the passed value maps.

Examples

Creating a value map

Create one value map with two mappings.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "valuemap.create",
    "params": {
        "name": "Service state",
        "mappings": [
            {
                "value": "0",
                "newvalue": "Down"
            },
            {
                "value": "1",
                "newvalue": "Up"
            }
        ]
    },
    "auth": "57562fd409b3b3b9a4d916d45207bbcb",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "valuemapids": [
            "1"
        ]
    },
    "id": 1
}
```

Source

CValueMap::create() in *frontends/php/include/classes/api/services/CValueMap.php*.

valuemap.delete

Description

`object valuemap.delete(array valuemapids)`

This method allows to delete value maps.

Parameters

(array) IDs of the value maps to delete.

Return values

(object) Returns an object containing the IDs of the deleted value maps under the valuemapids property.

Examples

Deleting multiple value maps

Delete two value maps.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "valuemap.delete",
    "params": [
        "1",
        "2"
    ],
    "auth": "57562fd409b3b3b9a4d916d45207bbcb",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "valuemapids": [
            "1",
            "2"
        ]
    },
    "id": 1
}
```

Source

CValueMap::delete() in *frontends/php/include/classes/api/services/CValueMap.php*.

valuemap.get

Description

`integer/array valuemap.get(object parameters)`

The method allows to retrieve value maps according to the given parameters.

Parameters

`(object)` Parameters defining the desired output.

The method supports the following parameters.

Parameter	Type	Description
valuemapids	string/array	Return only value maps with the given IDs.
selectMappings	query	Return the value mappings for current value map in the mappings property. Supports `count`.
sortfield	string/array	Sort the result by the given properties. Possible values are: `valuemapid`, `name`.
countOutput	boolean	These parameters being common for all `get` methods are described in detail in the reference commentary.
editable	boolean	
excludeSearch	boolean	
filter	object	
limit	integer	
output	query	
preservekeys	boolean	
search	object	
searchByAny	boolean	
searchWildcardsEnabled	boolean	
sortorder	string/array	
startSearch	boolean	

Return values

(integer/array) Returns either:

- an array of objects;
- the count of retrieved objects, if the countOutput parameter has been used.

Examples

Retrieving value maps

Retrieve all configured value maps.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "valuemap.get",
    "params": {
        "output": "extend"
    },
    "auth": "57562fd409b3b3b9a4d916d45207bbcb",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "valuemapid": "4",
            "name": "APC Battery Replacement Status"
        },
        {
            "valuemapid": "5",
            "name": "APC Battery Status"
        },
        {
            "valuemapid": "7",
            "name": "Dell Open Manage System Status"
        }
    ],
    "id": 1
}
```

Retrieve one value map with its mappings.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "valuemap.get",
    "params": {
        "output": "extend",
        "selectMappings": "extend",
        "valuemapids": ["4"]
    },
    "auth": "57562fd409b3b3b9a4d916d45207bbcb",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "valuemapid": "4",
```

```
            "name": "APC Battery Replacement Status",
            "mappings": [
                {
                    "value": "1",
                    "newvalue": "unknown"
                },
                {
                    "value": "2",
                    "newvalue": "notInstalled"
                },
                {
                    "value": "3",
                    "newvalue": "ok"
                },
                {
                    "value": "4",
                    "newvalue": "failed"
                },
                {
                    "value": "5",
                    "newvalue": "highTemperature"
                },
                {
                    "value": "6",
                    "newvalue": "replaceImmediately"
                },
                {
                    "value": "7",
                    "newvalue": "lowCapacity"
                }
            ]
        }
    ],
    "id": 1
}
```


Source

CValueMap::get() in *frontends/php/include/classes/api/services/CValueMap.php*.

valuemap.update

Description

`object valuemap.update(object/array valuemaps)`

This method allows to update existing value maps.

Parameters

`(object/array)` Value map properties to be updated.

The `valuemapid` property must be defined for each value map, all other properties are optional. Only the passed properties will be updated, all others will remain unchanged.

Return values

`(object)` Returns an object containing the IDs of the updated value maps under the `valuemapids` property.

Examples

Changing value map name

Change value map name to ”Device status”.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "valuemap.update",
    "params": {
        "valuemapid": "2",
        "name": "Device status"
    },
    "auth": "57562fd409b3b3b9a4d916d45207bbcb",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "valuemapids": [
            "2"
        ]
    },
    "id": 1
}
```

Changing mappings for one value map.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "valuemap.update",
    "params": {
        "valuemapid": "2",
        "mappings": [
            {
                "value": "0",
                "newvalue": "Online"
            },
            {
                "value": "1",
                "newvalue": "Offline"
            }
        ]
    },
    "auth": "57562fd409b3b3b9a4d916d45207bbcb",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "valuemapids": [
            "2"
        ]
    },
    "id": 1
}
```

Source

CValueMap::update() in *frontends/php/include/classes/api/services/CValueMap.php*.

Web scenario

This class is designed to work with web scenarios.

Object references:

- Web scenario
- Scenario step

Available methods:

- httptest.create - creating new web scenarios
- httptest.delete - deleting web scenarios
- httptest.get - retrieving web scenarios
- httptest.update - updating web scenarios

> Web scenario object

The following objects are directly related to the `webcheck` API.

Web scenario

The web scenario object has the following properties.

Property	Type	Description
httptestid	string	*(readonly)* ID of the web scenario.
hostid (required)	string	ID of the host that the web scenario belongs to.
name (required)	string	Name of the web scenario.
agent	string	User agent string that will be used by the web scenario. Default: Zabbix
applicationid	string	ID of the application that the web scenario belongs to.
authentication	integer	Authentication method that will be used by the web scenario. Possible values: 0 - *(default)* none; 1 - basic HTTP authentication; 2 - NTLM authentication.
delay	string	Execution interval of the web scenario. Accepts seconds, time unit with suffix and user macro. Default: 1m.
headers	array of HTTP fields	HTTP headers that will be sent when performing a request.
http_password	string	Password used for basic HTTP or NTLM authentication.
http_proxy	string	Proxy that will be used by the web scenario given as *http://[username[:password]@]proxy.example.com[:port]*.
http_user	string	User name used for basic HTTP or NTLM authentication.
nextcheck	timestamp	*(readonly)* Time of the next web scenario execution.
retries	integer	Number of times a web scenario will try to execute each step before failing. Default: 1.
ssl_cert_file	string	Name of the SSL certificate file used for client authentication (must be in PEM format).
ssl_key_file	string	Name of the SSL private key file used for client authentication (must be in PEM format).
ssl_key_password	string	SSL private key password.
status	integer	Whether the web scenario is enabled. Possible values are: 0 - *(default)* enabled; 1 - disabled.

Property	Type	Description
templateid	string	*(readonly)* ID of the parent template web scenario.
variables	array of HTTP fields	Web scenario variables.
verify_host	integer	Whether to verify that the host name specified in the SSL certificate matches the one used in the scenario. Possible values are: 0 - *(default)* skip host verification; 1 - verify host.
verify_peer	integer	Whether to verify the SSL certificate of the web server. Possible values are: 0 - *(default)* skip peer verification; 1 - verify peer.

Scenario step

The scenario step object defines a specific web scenario check. It has the following properties.

Property	Type	Description
httpstepid	string	*(readonly)* ID of the scenario step.
name (required)	string	Name of the scenario step.
no (required)	integer	Sequence number of the step in a web scenario.
url (required)	string	URL to be checked.
follow_redirects	integer	Whether to follow HTTP redirects. Possible values are: 0 - don't follow redirects; 1 - *(default)* follow redirects.
headers	array of HTTP fields	HTTP headers that will be sent when performing a request. Scenario step headers will overwrite headers specified for the web scenario.
httptestid	string	*(readonly)* ID of the web scenario that the step belongs to.
posts	string array of HTTP fields	HTTP POST variables as a string (raw post data) or as an array of HTTP fields (form field data).
required	string	Text that must be present in the response.
retrieve_mode	integer	Part of the HTTP response that the scenario step must retrieve. Possible values are: 0 - *(default)* only body; 1 - only headers; 2 - headers and body.
status_codes	string	Ranges of required HTTP status codes separated by commas.
timeout	string	Request timeout in seconds. Accepts seconds, time unit with suffix and user macro. Default: 15s. Maximum: 1h. Minimum: 1s.
variables	array of HTTP fields	Scenario step variables.
query_fields	array of HTTP fields	Query fields - array of HTTP fields that will be added to URL when performing a request

HTTP field

The HTTP field object defines a name and value that is used to specify variable, HTTP header, POST form field data of query field data. It has the following properties.

Property	Type	Description
name (required)	string	Name of header / variable / POST or GET field.
value (required)	string	Value of header / variable / POST or GET field.

httptest.create

Description

`object httptest.create(object/array webScenarios)`

This method allows to create new web scenarios.

> **Note:**
> Creating a web scenario will automatically create a set of web monitoring items.

Parameters

`(object/array)` Web scenarios to create.

Additionally to the standard web scenario properties, the method accepts the following parameters.

Parameter	Type	Description
steps (required)	array	Web scenario steps.

Return values

`(object)` Returns an object containing the IDs of the created web scenarios under the `httptestids` property. The order of the returned IDs matches the order of the passed web scenarios.

Examples

Creating a web scenario

Create a web scenario to monitor the company home page. The scenario will have two steps, to check the home page and the "About" page and make sure they return the HTTP status code 200.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "httptest.create",
    "params": {
        "name": "Homepage check",
        "hostid": "10085",
        "steps": [
            {
                "name": "Homepage",
                "url": "http://mycompany.com",
                "status_codes": "200",
                "no": 1
            },
            {
                "name": "Homepage / About",
                "url": "http://mycompany.com/about",
                "status_codes": "200",
                "no": 2
            }
        ]
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "httptestids": [
            "5"
        ]
    },
    "id": 1
}
```

See also

- Scenario step

Source

CHttpTest::create() in *frontends/php/include/classes/api/services/CHttpTest.php*.

httptest.delete

Description

`object httptest.delete(array webScenarioIds)`

This method allows to delete web scenarios.

Parameters

`(array)` IDs of the web scenarios to delete.

Return values

`(object)` Returns an object containing the IDs of the deleted web scenarios under the `httptestids` property.

Examples

Deleting multiple web scenarios

Delete two web scenarios.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "httptest.delete",
    "params": [
        "2",
        "3"
    ],
    "auth": "3a57200802b24cda67c4e4010b50c065",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "httptestids": [
            "2",
            "3"
        ]
    },
    "id": 1
}
```

Source

CHttpTest::delete() in *frontends/php/include/classes/api/services/CHttpTest.php*.

httptest.get

Description

`integer/array httptest.get(object parameters)`

The method allows to retrieve web scenarios according to the given parameters.

Parameters

`(object)` Parameters defining the desired output.

The method supports the following parameters.

Parameter	Type	Description
applicationids	string/array	Return only web scenarios that belong to the given applications.
groupids	string/array	Return only web scenarios that belong to the given host groups.
hostids	string/array	Return only web scenarios that belong to the given hosts.
httptestids	string/array	Return only web scenarios with the given IDs.
inherited	boolean	If set to `true` return only web scenarios inherited from a template.
monitored	boolean	If set to `true` return only enabled web scenarios that belong to monitored hosts.
templated	boolean	If set to `true` return only web scenarios that belong to templates.
templateids	string/array	Return only web scenarios that belong to the given templates.
expandName	flag	Expand macros in the name of the web scenario.
expandStepName	flag	Expand macros in the names of scenario steps.
selectHosts	query	Return the hosts that the web scenario belongs to as an array in the hosts property.
selectSteps	query	Return web scenario steps in the steps property. Supports `count`.
sortfield	string/array	Sort the result by the given properties. Possible values are: `httptestid` and `name`.
countOutput	boolean	These parameters being common for all `get` methods are described in detail in the reference commentary.
editable	boolean	
excludeSearch	boolean	
filter	object	
limit	integer	
output	query	
preservekeys	boolean	
search	object	
searchByAny	boolean	
searchWildcardsEnabled	boolean	
sortorder	string/array	
startSearch	boolean	

Return values

`(integer/array)` Returns either:

- an array of objects;
- the count of retrieved objects, if the `countOutput` parameter has been used.

Examples

Retrieving a web scenario

Retrieve all data about web scenario "4".

Request:

```
{
    "jsonrpc": "2.0",
    "method": "httptest.get",
    "params": {
        "output": "extend",
        "selectSteps": "extend",
        "httptestids": "9"
    },
    "auth": "038e1d7b1735c6a5436ee9eae095879e",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "httptestid": "9",
            "name": "Homepage check",
            "applicationid": "0",
            "nextcheck": "0",
            "delay": "1m",
            "status": "0",
            "variables": [],
            "agent": "Zabbix",
            "authentication": "0",
            "http_user": "",
            "http_password": "",
            "hostid": "10084",
            "templateid": "0",
            "http_proxy": "",
            "retries": "1",
            "ssl_cert_file": "",
            "ssl_key_file": "",
            "ssl_key_password": "",
            "verify_peer": "0",
            "verify_host": "0",
            "headers": [],
            "steps": [
                {
                    "httpstepid": "36",
                    "httptestid": "9",
                    "name": "Homepage",
                    "no": "1",
                    "url": "http://mycompany.com",
                    "timeout": "15s",
                    "posts": "",
                    "required": "",
                    "status_codes": "200",
                    "variables": [
                        {
                            "name":"{var}",
                            "value":"12"
                        }
                    ],
                    "follow_redirects": "1",
                    "retrieve_mode": "0",
                    "headers": [],
                    "query_fields": []
                },
                {
```

```
                    "httpstepid": "37",
                    "httptestid": "9",
                    "name": "Homepage / About",
                    "no": "2",
                    "url": "http://mycompany.com/about",
                    "timeout": "15s",
                    "posts": "",
                    "required": "",
                    "status_codes": "200",
                    "variables": [],
                    "follow_redirects": "1",
                    "retrieve_mode": "0",
                    "headers": [],
                    "query_fields": []
                }
            ]
        }
    ],
    "id": 1
}
```


See also

- Host
- Scenario step

Source

CHttpTest::get() in *frontends/php/include/classes/api/services/CHttpTest.php*.

httptest.update

Description

`object httptest.update(object/array webScenarios)`

This method allows to update existing web scenarios.

Parameters

`(object/array)` Web scenario properties to be updated.

The `httptestid` property must be defined for each web scenario, all other properties are optional. Only the passed properties will be updated, all others will remain unchanged.

Additionally to the standard web scenario properties, the method accepts the following parameters.

Parameter	Type	Description
steps	array	Scenario steps to replace existing steps.

Return values

`(object)` Returns an object containing the IDs of the updated web scenarios under the `httptestid` property.

Examples

Enabling a web scenario

Enable a web scenario, that is, set its status to "0".

Request:


```
{
    "jsonrpc": "2.0",
    "method": "httptest.update",
    "params": {
        "httptestid": "5",
        "status": 0
```

```
    },
    "auth": "700ca65537074ec963db7efabda78259",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "httptestids": [
            "5"
        ]
    },
    "id": 1
}
```

See also

- Scenario step

Source

CHttpTest::update() in *frontends/php/include/classes/api/services/CHttpTest.php*.

Appendix 1. Reference commentary

Notation Data types

The Zabbix API supports the following data types:

Type	Description
boolean	A boolean value, accepts either `true` or `false`.
flag	The value is considered to be `true` if it is passed and not equal to `null` and `false` otherwise.
integer	A whole number.
float	A floating point number.
string	A text string.
text	A longer text string.
timestamp	A Unix timestamp.
array	An ordered sequence of values, that is, a plain array.
object	An associative array.
query	A value which defines, what data should be returned. Can be defined as an array of property names to return only specific properties, or as one of the predefined values: `extend` - returns all object properties; `count` - returns the number of retrieved records, supported only by certain subselects.

Property labels

Some of the objects properties are marked with short labels to describe their behavior. The following labels are used:

- *readonly* - the value of the property is set automatically and cannot be defined or changed by the client;
- *constant* - the value of the property can be set when creating an object, but cannot be changed after.

Reserved ID value "0" Reserved ID value "0" can be used to filter elements and to remove referenced objects. For example, to remove a referenced proxy from a host, proxy_hostid should be set to 0 ("proxy_hostid": "0") or to filter hosts monitored by server option proxyids should be set to 0 ("proxyids": "0").

Common "get" method parameters The following parameters are supported by all `get` methods:

Parameter	Type	Description
countOutput	boolean	Return the number of records in the result instead of the actual data.
editable	boolean	If set to `true` return only objects that the user has write permissions to. Default: `false`.
excludeSearch	boolean	Return results that do not match the criteria given in the `search` parameter.
filter	object	Return only those results that exactly match the given filter. Accepts an array, where the keys are property names, and the values are either a single value or an array of values to match against. Doesn't work for `text` fields.
limit	integer	Limit the number of records returned.
output	query	Object properties to be returned. Default: `extend`.
preservekeys	boolean	Use IDs as keys in the resulting array.
search	object	Return results that match the given wildcard search (case-insensitive). Accepts an array, where the keys are property names, and the values are strings to search for. If no additional options are given, this will perform a `LIKE "%…%"` search. Works only for `string` and `text` fields.
searchByAny	boolean	If set to `true` return results that match any of the criteria given in the `filter` or `search` parameter instead of all of them. Default: `false`.
searchWildcardsEnabled	boolean	If set to `true` enables the use of "*" as a wildcard character in the `search` parameter. Default: `false`.
sortfield	string/array	Sort the result by the given properties. Refer to a specific API get method description for a list of properties that can be used for sorting. Macros are not expanded before sorting. If no value is specified, data will be returned unsorted.
sortorder	string/array	Order of sorting. If an array is passed, each value will be matched to the corresponding property given in the `sortfield` parameter. Possible values are: `ASC` - *(default)* ascending; `DESC` - descending.
startSearch	boolean	The `search` parameter will compare the beginning of fields, that is, perform a `LIKE "…%"` search instead. Ignored if `searchWildcardsEnabled` is set to `true`.

Examples User permission check

Does the user have permission to write to hosts whose names begin with "MySQL" or "Linux" ?

Request:

```
{
    "jsonrpc": "2.0",
    "method": "host.get",
    "params": {
        "countOutput": true,
        "search": {
            "host": ["MySQL", "Linux"]
        },
        "editable": true,
        "startSearch": true,
        "searchByAny": true
    },
    "auth": "766b71ee543230a1182ca5c44d353e36",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": "0",
    "id": 1
}
```

Note:
Zero result means no hosts with read/write permissions.

Mismatch counting

Count the number of hosts whose names do not contain the substring ”ubuntu”

Request:

```
{
    "jsonrpc": "2.0",
    "method": "host.get",
    "params": {
        "countOutput": true,
        "search": {
            "host": "ubuntu"
        },
        "excludeSearch": true
    },
    "auth": "766b71ee543230a1182ca5c44d353e36",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": "44",
    "id": 1
}
```

Searching for hosts using wildcards

Find hosts whose name contains word ”server” and have interface ports ”10050” or ”10071”. Sort the result by host name in descending order and limit it to 5 hosts.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "host.get",
    "params": {
        "output": ["hostid", "host"],
```

```
        "selectInterfaces": ["port"],
        "filter": {
            "port": ["10050", "10071"]
        },
        "search": {
            "host": "*server*"
        },
        "searchWildcardsEnabled": true,
        "searchByAny": true,
        "sortfield": "host",
        "sortorder": "DESC",
        "limit": 5
    },
    "auth": "766b71ee543230a1182ca5c44d353e36",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": [
        {
            "hostid": "50003",
            "host": "WebServer-Tomcat02",
            "interfaces": [
                {
                    "port": "10071"
                }
            ]
        },
        {
            "hostid": "50005",
            "host": "WebServer-Tomcat01",
            "interfaces": [
                {
                    "port": "10071"
                }
            ]
        },
        {
            "hostid": "50004",
            "host": "WebServer-Nginx",
            "interfaces": [
                {
                    "port": "10071"
                }
            ]
        },
        {
            "hostid": "99032",
            "host": "MySQL server 01",
            "interfaces": [
                {
                    "port": "10050"
                }
            ]
        },
        {
            "hostid": "99061",
            "host": "Linux server 01",
            "interfaces": [
                {
```

```
                    "port": "10050"
                }
            ]
        }
    ],
    "id": 1
}
```

Searching for hosts using wildcards with ”preservekeys”

If you add the parameter ”preservekeys” to the previous request, the result is returned as an associative array, where the keys are the id of the objects.

Request:

```
{
    "jsonrpc": "2.0",
    "method": "host.get",
    "params": {
        "output": ["hostid", "host"],
        "selectInterfaces": ["port"],
        "filter": {
            "port": ["10050", "10071"]
        },
        "search": {
            "host": "*server*"
        },
        "searchWildcardsEnabled": true,
        "searchByAny": true,
        "sortfield": "host",
        "sortorder": "DESC",
        "limit": 5,
        "preservekeys": true
    },
    "auth": "766b71ee543230a1182ca5c44d353e36",
    "id": 1
}
```

Response:

```
{
    "jsonrpc": "2.0",
    "result": {
        "50003": {
            "hostid": "50003",
            "host": "WebServer-Tomcat02",
            "interfaces": [
                {
                    "port": "10071"
                }
            ]
        },
        "50005": {
            "hostid": "50005",
            "host": "WebServer-Tomcat01",
            "interfaces": [
                {
                    "port": "10071"
                }
            ]
        },
        "50004": {
            "hostid": "50004",
            "host": "WebServer-Nginx",
            "interfaces": [
```

```
                {
                    "port": "10071"
                }
            ]
        },
        "99032": {
            "hostid": "99032",
            "host": "MySQL server 01",
            "interfaces": [
                {
                    "port": "10050"
                }
            ]
        },
        "99061": {
            "hostid": "99061",
            "host": "Linux server 01",
            "interfaces": [
                {
                    "port": "10050"
                }
            ]
        }
    },
    "id": 1
}
```


Appendix 2. Changes from 4.2 to 4.4

Backward incompatible changes General

mediatype

Changes:
ZBXNEXT-5426 renamed ”description” property to ”name”
ZBXNEXT-5416 dropped support of ”Jabber” and ”Ez Texting” media types
ZBXNEXT-5386 added ”webhook” media type

screen

Changes:
ZBXNEXT-5250 dropped support of `resourcetype` value ”8” in `screenitems` property

screenitem

Changes:
ZBXNEXT-5250 dropped support of `resourcetype` value ”8”

Other changes and bug fixes General

Changes:
ZBXNEXT-5291 added a new autoregistration API introducing new methods `autoregistration.get` and `autoregistration.update`

configuration

Changes:
ZBXNEXT-5372 added support of media type import and export

dashboard

Changes:
ZBXNEXT-5252 added new widget type `graphprototype` and widget fields *(5 - Item prototype, 7 - Graph prototype)*
ZBXNEXT-5281 added optional `view_mode` property
ZBXNEXT-5249 added new widget type `hostavail`

event

Changes:
ZBXNEXT-4942 `even.get`: added new property `opdata`
ZBXNEXT-5386 `even.get`: added new property `urls`

host

Changes:
ZBXNEXT-4166 added optional `description` property in `macros` object
ZBXNEXT-5252 `host.get`: added new flags: `with_item_prototypes`, `with_item_prototypes`, `with_simple_graph_item_prototyp`
and `with_graph_prototypes`

hostgroup

Changes:
ZBXNEXT-5252 `hostgroup.get`: added new flags: `with_item_prototypes`, `with_item_prototypes`, `with_simple_graph_item_pro`
and `with_graph_prototypes`

discoveryrule

Changes:
ZBXNEXT-3970 added support of preprocessing `type` value "24"
ZBXNEXT-5343 added support of customizable `error_handler` for preprocessing steps of `type` "16" and "17"
ZBXNEXT-5344 added support of preprocessing `type` values "11" and "17"
ZBXNEXT-5040 `discoveryrule.get`: removed `lastlogsize`, `mtime` from API response

item

Changes:
ZBXNEXT-3970 added support of preprocessing `type` value "24"
ZBXNEXT-5343 added support of customizable `error_handler` for preprocessing steps of `type` "16", "17" and "18"
ZBXNEXT-5040 `item.get`: removed `lastlogsize`, `mtime` from API response

itemprototype

Changes:
ZBXNEXT-3970 added support of preprocessing `type` value "24"
ZBXNEXT-5343 added support of customizable `error_handler` for preprocessing steps of `type` "16", "17" and "18"
ZBXNEXT-5040 `itemprototype.get`: removed `lastlogsize`, `mtime` from API response

problem

Changes:
ZBXNEXT-4942 `problem.get`: added new property `opdata`
ZBXNEXT-5386 `problem.get`: added new property `urls`

template

Changes:
ZBXNEXT-4166 added optional `description` property in `macros` object

trigger

Changes:
ZBXNEXT-4942 `trigger.get`, `trigger.create`, `trigger.update`: added new property `opdata`

triggerprototype

Changes:
ZBXNEXT-4942 `triggerprototype.get`, `triggerprototype.create`, `triggerprototype.update`: added new property `opdata`

usermacro

Changes:
ZBXNEXT-4166 added optional `description` property

Zabbix API changes in 4.4

4.4.5 script

Changes:
ZBX-3783 `script.get`: added strict validation of input parameters

4.4.4 configuration

Changes:
ZBXNEXT-5271 `configuration.import`: implemented `deleteMissing` option for `templateLinkage`

4.4.1 Breaking changes:

host.get

ZBX-12943 removed `withInventory` flag because the host's object field `inventory_mode` is no longer *(writeonly)*. Now, instead of using `withInventory` flag, you can filter hosts by `inventory_mode` to achieve the same effect.

Backward compatible changes:

host

Changes:
ZBX-12943 changed `inventory_mode` object to be a part of `host` object

hostprototype

Changes:
ZBX-12943 changed `inventory_mode` object to be a part of `hostprototype` object

20. Appendixes

Please use the sidebar to access content in the Appendixes section.

1 Frequently asked questions / Troubleshooting

Frequently asked questions or FAQ.

1. Q: Can I flush/clear the queue (as depicted in *Administration* → *Queue*)?
   A: No.
2. Q: How do I migrate from one database to another?
   A: Dump data only (for MySQL, use flag -t or --no-create-info), create the new database using schema files from Zabbix and import the data.

3. Q: I would like to replace all spaces with underscores in my item keys because they worked in older versions but space is not a valid symbol for an item key in 3.0 (or any other reason to mass-modify item keys). How should I do it and what should i beware of?
   A: You may use a database query to replace all occurrences of spaces in item keys with underscores:
   update items set key_=replace(key_,' ','_');
   Triggers will be able to use these items without any additional modifications, but you might have to change any item references in these locations:
   * Notifications (actions)
   * Map element and link labels
   * Calculated item formulas
4. Q: My graphs have dots instead of lines or empty areas. Why so?
   A: Data is missing. This can happen for a variety of reasons - performance problems on Zabbix database, Zabbix server, network, monitored devices...
5. Q: Zabbix daemons fail to start up with a message *Listener failed with error: socket() for [[-]:10050] failed with error 22: Invalid argument.*
   A: This error arises at attempt to run Zabbix agent compiled on version 2.6.27 or above on a platform with a kernel 2.6.26 and lower. Note that static linking will not help in this case because it is the socket() system call that does not support SOCK_CLOEXEC flag on earlier kernels. ZBX-3395
6. Q: I try to set up a flexible user parameter (one that accepts parameters) with a command that uses a positional parameter like $1, but it doesn't work (uses item parameter instead). How to solve this?
   A: Use a double dollar sign like **$$1**
7. Q: All dropdowns have a scrollbar and look ugly in Opera 11. Why so?
   A: It's a known bug in Opera 11.00 and 11.01; see Zabbix issue tracker for more information.
8. Q: How can I change graph background colour in a custom theme?
   A: See graph_theme table in the database and theming guide.
9. Q: With DebugLevel 4 I'm seeing messages "Trapper got [] len 0" in server/proxy log - what's that?
   A: Most likely that is frontend, connecting and checking whether server is still running.
10. Q: My system had the time set in the future and now no data is coming in. How could this be solved?
    A: Clear values of database fields hosts.disable_until*, drules.nextcheck, httptest.nextcheck and restart the server/proxy.
11. Q: Text item values in frontend (when using *{ITEM.VALUE}* macro and in other cases) are cut/trimmed to 20 symbols. Is that normal?
    A: Yes, there is a hardcoded limit in include/items.inc.php currently.

See also

* Troubleshooting page on zabbix.org

2 Installation

1 Database creation

Overview

A Zabbix database must be created during the installation of Zabbix server or proxy.

This section provides instructions for creating a Zabbix database. A separate set of instructions is available for each supported database.

Note:
`schema.sql`, `images.sql` and `data.sql` files are located in the *database* subdirectory of Zabbix sources. If Zabbix was installed from distribution packages, refer to the distribution documentation.

Attention:
For a Zabbix proxy database, **only** `schema.sql` should be imported (no images.sql nor data.sql)

UTF-8 is the only encoding supported by Zabbix. It is known to work without any security flaws. Users should be aware that there are known security issues if using some of the other encodings.

MySQL

Character set utf8 and utf8_bin collation is required for Zabbix server to work properly with MySQL database.

```
shell> mysql -uroot -p<password>
mysql> create database zabbix character set utf8 collate utf8_bin;
mysql> create user 'zabbix'@'localhost' identified by '<password>';
mysql> grant all privileges on zabbix.* to 'zabbix'@'localhost';
mysql> quit;
```

Warning:
If you are installing from Zabbix packages, stop here and continue with instructions for Debian/Ubuntu or RHEL/CentOS to import the data into the database.

If you are installing Zabbix from sources, proceed to import the data into the database:

```
shell> cd database/mysql
shell> mysql -uzabbix -p<password> zabbix < schema.sql
# stop here if you are creating database for Zabbix proxy
shell> mysql -uzabbix -p<password> zabbix < images.sql
shell> mysql -uzabbix -p<password> zabbix < data.sql
```

PostgreSQL

You need to have database user with permissions to create database objects. The following shell command will create user `zabbix`. Specify password when prompted and repeat password (note, you may first be asked for `sudo` password):

```
shell> sudo -u postgres createuser --pwprompt zabbix
```

Now we will set up the database `zabbix` (last parameter) with the previously created user as the owner (`-O zabbix`).

```
shell> sudo -u postgres createdb -O zabbix -E Unicode -T template0 zabbix
```

Warning:
If you are installing from Zabbix packages, stop here and continue with instructions for Debian/Ubuntu or RHEL/CentOS to import the initial schema and data into the database.

If you are installing Zabbix from sources, proceed to import the initial schema and data (assuming you are in the root directory of Zabbix sources):

```
shell> cd database/postgresql
shell> cat schema.sql | sudo -u zabbix psql zabbix
# stop here if you are creating database for Zabbix proxy
shell> cat images.sql | sudo -u zabbix psql zabbix
shell> cat data.sql | sudo -u zabbix psql zabbix
```

Attention:
The above commands are provided as an example that will work in most of GNU/Linux installations. You can use different commands, e. g. "psql -U <username>" depending on how your system/database are configured. If you have troubles setting up the database please consult your Database administrator.

TimescaleDB

Warning:
Currently TimescaleDB is not supported by Zabbix proxy.

We assume that TimescaleDB extension has been already installed on the database server (see installation instructions).

TimescaleDB extension must also be enabled for the specific DB by executing:

```
echo "CREATE EXTENSION IF NOT EXISTS timescaledb CASCADE;" | sudo -u postgres psql zabbix
```

Running this command requires database administrator privileges.

Note:
If you use a database schema other than 'public' you need to add a SCHEMA clause to the command above. E.g.:
`echo "CREATE EXTENSION IF NOT EXISTS timescaledb SCHEMA yourschema CASCADE;" | sudo -u postgres psql zabbix`

The `timescaledb.sql` script is located in database/postgresql. The script must be run after the regular PostgreSQL database has been created with initial schema/data (see section above):

```
cat timescaledb.sql | sudo -u zabbix psql zabbix
```

Note that the `timescaledb.sql` script sets the following housekeeping parameters (from *Administration → General → Housekeeping*):

- Override item history period
- Override item trend period

In order to use partitioned housekeeping for history and trends both these options must be enabled. It's possible to use TimescaleDB partitioning only for trends (by setting *Override item trend period*) or only for history (*Override item history period*).

Note:
You may want to run the timescaledb-tune tool provided by TimescaleDB to optimize PostgreSQL configuration parameters in your `postgresql.conf`.

Oracle

We assume that a *zabbix* database user with *password* password exists and has permissions to create database objects in ORCL service located on the *host* Oracle database server with a *user* shell user having write access to /tmp directory. Zabbix requires a Unicode database character set and a UTF8 national character set. Check current settings:

```
sqlplus> select parameter,value from v$nls_parameters where parameter='NLS_CHARACTERSET' or parameter='NLS
```

If you are creating a database for Zabbix server you need to have images from Zabbix sources on the host where Oracle is running. Copy them to a directory */tmp/zabbix_images* on the Oracle host:

```
shell> cd /path/to/zabbix-sources
shell> ssh user@oracle_host "mkdir /tmp/zabbix_images"
shell> scp -r misc/images/png_modern user@oracle_host:/tmp/zabbix_images/
```

Now prepare the database:

```
shell> cd /path/to/zabbix-sources/database/oracle
shell> sqlplus zabbix/password@oracle_host/ORCL
sqlplus> @schema.sql
# stop here if you are creating database for Zabbix proxy
sqlplus> @images.sql
sqlplus> @data.sql
```

Note:
Please set the initialization parameter CURSOR_SHARING=FORCE for best performance.

Now the temporary directory can be removed:

```
shell> ssh user@oracle_host "rm -rf /tmp/zabbix_images"
```

IBM DB2

```
shell> db2 "create database zabbix using codeset utf-8 territory us pagesize 32768"
shell> cd database/ibm_db2
shell> db2batch -d zabbix -f schema.sql
# stop here if you are creating database for Zabbix proxy
shell> db2batch -d zabbix -f images.sql
shell> db2batch -d zabbix -f data.sql -l ';;'
```

Note:
It is important to set UTF-8 locale for Zabbix server, Zabbix proxy and the web server running Zabbix frontend. Otherwise text information from Zabbix will be interpreted by IBM DB2 server as non-UTF-8 and will be additionally converted on the way from Zabbix to the database and back. The database will store corrupted non-ASCII characters.

Zabbix frontend uses `OFFSET` and `LIMIT` clauses in SQL queries. For this to work, IBM DB2 server must have DB2_COMPATIBILITY_VECTOR variable be set to 3. Run the following command before starting the database server:

```
shell> db2set DB2_COMPATIBILITY_VECTOR=3
```

SQLite

Using SQLite is supported for **Zabbix proxy** only!

> **Note:**
> If using SQLite with Zabbix proxy, database will be automatically created if it does not exist.

```
shell> cd database/sqlite3
shell> sqlite3 /var/lib/sqlite/zabbix.db < schema.sql
```

Return to the installation section.

2 Repairing Zabbix database character set and collation

MySQL/MariaDB

1. Check the database character set and collation.

For example:

```
mysql> SELECT @@character_set_database, @@collation_database;
+--------------------------+----------------------+
| @@character_set_database | @@collation_database |
+--------------------------+----------------------+
| utf8mb4                  | utf8mb4_general_ci   |
+--------------------------+----------------------+
```

As we see, the character set here is not 'utf8' and collation is not 'utf8_bin', so we need to fix them.

2. Stop Zabbix.

3. Create a backup copy of the database!

4. Fix the character set and collation on database level:

```
alter database <your DB name> character set utf8 collate utf8_bin;
```

Fixed values:

```
mysql> SELECT @@character_set_database, @@collation_database;
+--------------------------+----------------------+
| @@character_set_database | @@collation_database |
+--------------------------+----------------------+
| utf8                     | utf8_bin             |
+--------------------------+----------------------+
```

5. Load the script to fix character set and collation on table and column level:

```
mysql <your DB name> < utf8_convert.sql
```

6. Execute the script:

```
                SET @ZABBIX_DATABASE = '<your DB name>';
If MariaDB →    set innodb_strict_mode = OFF;
                CALL zbx_convert_utf8();
If MariaDB →    set innodb_strict_mode = ON;
                drop procedure zbx_convert_utf8;
```

Note that data encoding will be changed on disk. For example, when converting characters like Æ, Ñ, Ö from 'latin1' to 'utf8' they will go from 1 byte to 2 bytes. Thus the repaired database may require more space than before.

7. If no errors - you may want to create a database backup copy with the fixed database.

8. Start Zabbix.

3 Migration to TimescaleDB

Overview

Zabbix supports TimescaleDB, a PostgreSQL-based database solution of automatically partitioning data into time-based chunks to support faster performance at scale.

Warning:
Currently TimescaleDB is not supported by Zabbix proxy.

This section provides the steps necessary for migrating from existing PostgreSQL tables to TimescaleDB.

Configuration

We assume that TimescaleDB extension has been already installed on the database server (see installation instructions).

TimescaleDB extension must also be enabled for the specific DB by executing:

```
echo "CREATE EXTENSION IF NOT EXISTS timescaledb CASCADE;" | sudo -u postgres psql zabbix
```

Running this command requires database administrator privileges.

Note:
If you use a database schema other than 'public' you need to add a SCHEMA clause to the command above. E.g.:
`echo "CREATE EXTENSION IF NOT EXISTS timescaledb SCHEMA yourschema CASCADE;" | sudo -u postgres psql zabbix`

Then run the `timescaledb.sql` script located in database/postgresql:

```
cat timescaledb.sql | sudo -u zabbix psql zabbix
```

Migration of existing history and trend data may take a lot of time. Zabbix server and frontend must be down for the period of migration.

The `timescaledb.sql` script sets the following housekeeping parameters (from *Administration → General → Housekeeping*):

- Override item history period
- Override item trend period

In order to use partitioned housekeeping for history and trends both these options must be on. It's possible to use TimescaleDB partitioning only for trends (by setting *Override item trend period*) or only for history (*Override item history period*).

4 Elasticsearch setup

Attention:
Elasticsearch support is experimental!
Setup procedure considered in this section is applicable to the following Elasticsearch versions: **5.0.x -→ 6.1.x**. In case an earlier or later version of Elasticsearch is used, some functionality may not work as intended.

Zabbix has recently started to support storage of historical data by means of Elasticsearch instead of a database. Users are now given the possibility to choose the storage place for historical data between a compatible database and Elasticsearch.

Warning:
If all history data is stored in Elasticsearch, trends are **not** calculated nor stored in the database. With no trends calculated and stored, the history storage period may need to be extended.

Configuration

To ensure proper communication between all elements involved make sure server configuration file and frontend configuration file parameters are properly configured.

Zabbix server and frontend

Zabbix server configuration file draft with parameters to be updated:

```
### Option: HistoryStorageURL
# History storage HTTP[S] URL.
#
# Mandatory: no
# Default:
# HistoryStorageURL=
### Option: HistoryStorageTypes
# Comma separated list of value types to be sent to the history storage.
#
```

```
# Mandatory: no
# Default:
# HistoryStorageTypes=uint,dbl,str,log,text
```

Example parameter values to fill the Zabbix server configuration file with:

```
HistoryStorageURL=http://test.elasticsearch.lan:9200
HistoryStorageTypes=str,log,text
```

This configuration forces Zabbix Server to store history values of numeric types in the corresponding database and textual history data in Elasticsearch.

Elasticsearch supports the following item types:

`uint,dbl,str,log,text`

Supported item type explanation:

Item value type	Database table	Elasticsearch type
Numeric (unsigned)	history_uint	uint
Numeric (float)	history	dbl
Character	history_str	str
Log	history_log	log
Text	history_text	text

Zabbix frontend configuration file (`conf/zabbix.conf.php`) draft with parameters to be updated:

```
// Elasticsearch url (can be string if same url is used for all types).
$HISTORY['url']   = [
      'uint' => 'http://localhost:9200',
      'text' => 'http://localhost:9200'
];
// Value types stored in Elasticsearch.
$HISTORY['types'] = ['uint', 'text'];
```

Example parameter values to fill the Zabbix frontend configuration file with:

```
$HISTORY['url']   = 'http://test.elasticsearch.lan:9200';
$HISTORY['types'] = ['str', 'text', 'log'];
```

This configuration forces to store `Text`, `Character` and `Log` history values in Elasticsearch.

It is also required to make `$HISTORY` global in `conf/zabbix.conf.php` to ensure everything is working properly (see `conf/zabbix.conf.php.example` for how to do it):

```
// Zabbix GUI configuration file.
global $DB, $HISTORY;
```

Installing Elasticsearch and creating mapping

Final two steps of making things work are installing Elasticsearch itself and creating mapping process.

To install Elasticsearch please refer to Elasticsearch installation guide.

Note:
Mapping is a data structure in Elasticsearch (similar to a table in a database). Mapping for all history data types is available here: `database/elasticsearch/elasticsearch.map`.

Warning:
Creating mapping is mandatory. Some functionality will be broken if mapping is not created according to the instruction.

To create mapping for `text` type send the following request to Elasticsearch:

```
curl -X PUT \
 http://your-elasticsearch.here:9200/text \
 -H 'content-type:application/json' \
 -d '{
   "settings" : {
      "index" : {
```

```
         "number_of_replicas" : 1,
         "number_of_shards" : 5
      }
   },
   "mappings" : {
      "values" : {
         "properties" : {
            "itemid" : {
               "type" : "long"
            },
            "clock" : {
               "format" : "epoch_second",
               "type" : "date"
            },
            "value" : {
               "fields" : {
                  "analyzed" : {
                     "index" : true,
                     "type" : "text",
                     "analyzer" : "standard"
                  }
               },
               "index" : false,
               "type" : "text"
            }
         }
      }
   }
}'
```

Similar request is required to be executed for `Character` and `Log` history values mapping creation with corresponding type correction.

Note:
To work with Elasticsearch please refer to Requirement page for additional information.

Note:
Housekeeper is not deleting any data from Elasticsearch.

Storing history data in multiple date-based indices

This section describes additional steps required to work with pipelines and ingest nodes.

To begin with, you must create templates for indices.

Warning:
Starting from **Elasticsearch version 5.6** the field `"template"` is no longer supported.

The example below shows a request for creating uint template (for ES 5.6 or newer delete `"template": "uint*",` from the script):

```
curl -X PUT \
 http://your-elasticsearch.here:9200/_template/uint_template \
 -H 'content-type:application/json' \
 -d '{
   "template": "uint*",
   "index_patterns": ["uint*"],
   "settings" : {
      "index" : {
         "number_of_replicas" : 1,
         "number_of_shards" : 5
      }
   },
```

```
   "mappings" : {
      "values" : {
         "properties" : {
            "itemid" : {
               "type" : "long"
            },
            "clock" : {
               "format" : "epoch_second",
               "type" : "date"
            },
            "value" : {
               "type" : "long"
            }
         }
      }
   }
}'
```

To create other templates, user should:

- **For ES versions below 5.6**: change the URL (last part is the name of template), change `"template"` and `"index_patterns"` fields to match index name and to set valid mapping, which can be taken from `database/elasticsearch/elas`
- **For ES 5.6 and newer**: change the URL (last part is the name of template), change `"index_patterns"` field to match index name and to set valid mapping, which can be taken from `database/elasticsearch/elasticsearch.map`.

For example, the following command can be used to create a template for text index (for ES 5.6 or newer delete `"template": "text*"`, from the script):

```
curl -X PUT \
 http://your-elasticsearch.here:9200/_template/text_template \
 -H 'content-type:application/json' \
 -d '{
   "template": "text*",
   "index_patterns": ["text*"],
   "settings" : {
      "index" : {
         "number_of_replicas" : 1,
         "number_of_shards" : 5
      }
   },
   "mappings" : {
      "values" : {
         "properties" : {
            "itemid" : {
               "type" : "long"
            },
            "clock" : {
               "format" : "epoch_second",
               "type" : "date"
            },
            "value" : {
               "fields" : {
                  "analyzed" : {
                     "index" : true,
                     "type" : "text",
                     "analyzer" : "standard"
                  }
               },
               "index" : false,
               "type" : "text"
            }
         }
      }
   }
```

```
}'
```

This is required to allow Elasticsearch to set valid mapping for indices created automatically. Then it is required to create the pipeline definition. Pipeline is some sort of preprocessing of data before putting data in indices. The following command can be used to create pipeline for uint index:

```
curl -X PUT \
 http://your-elasticsearch.here:9200/_ingest/pipeline/uint-pipeline \
 -H 'content-type:application/json' \
 -d '{
  "description": "daily uint index naming",
  "processors": [
    {
      "date_index_name": {
        "field": "clock",
        "date_formats": ["UNIX"],
        "index_name_prefix": "uint-",
        "date_rounding": "d"
      }
    }
  ]
}'
```

User can change the rounding parameter (”date_rounding”) to set a specific index rotation period. To create other pipelines, user should change the URL (last part is the name of pipeline) and change ”index_name_prefix” field to match index name.

See also Elasticsearch documentation.

Additionally, storing history data in multiple date-based indices should also be enabled in the new parameter in Zabbix server configuration:

```
### Option: HistoryStorageDateIndex
# Enable preprocessing of history values in history storage to store values in different indices based on
# 0 - disable
# 1 - enable
#
# Mandatory: no
# Default:
# HistoryStorageDateIndex=0
```

Troubleshooting

The following steps may help you troubleshoot problems with Elasticsearch setup:

1. Check if the mapping is correct (GET request to required index URL like `http://localhost:9200/uint`).
2. Check if shards are not in failed state (restart of Elasticsearch should help).
3. Check the configuration of Elasticsearch. Configuration should allow access from the Zabbix frontend host and the Zabbix server host.
4. Check Elasticsearch logs.

If you are still experiencing problems with your installation then please create a bug report with all the information from this list (mapping, error logs, configuration, version, etc.)

5 Real-time export of events, item values, trends

Overview

It is possible to configure real-time exporting of trigger events, item values and trends in a newline-delimited JSON format.

Exporting is done into files, where each line of the export file is a JSON object. Value mappings are not applied.

In case of a write error (data cannot be written to the export file or the export file cannot be renamed or a new one cannot be created after renaming it), the data item is dropped and never written to the export file. It is written only in the Zabbix database. Writing data to the export file is resumed when the writing problem is resolved.

Note that ***before Zabbix 4.4.4***, in case of a write error, Zabbix would retry with a 10 second interval until success. This behaviour, while ensuring history data equivalence between database and export files resulted in actually stopping monitoring until the problem with the export file was fixed. Since 4.4.4 the priority is given to continued monitoring rather than keeping the export file in sync with database at all cost.

For precise details on what information is exported, see the export protocol page.

Note that host/item can have no metadata (host groups, host name, item name) if the host/item was removed after the data was received, but before server exported data.

Configuration

Real-time export of trigger events, item values and trends is configured by specifying a directory for the export files - see the `ExportDir` parameter in server configuration.

Another parameter - `ExportFileSize` may be used to set the maximum allowed size of an individual export file. When a process needs to write to a file it checks the size of the file first. If it exceeds the configured size limit, the file is renamed by appending .old to its name and a new file with the original name is created.

> **Attention:**
> A file will be created per each process that will write data (i.e. approximately 4-30 files). As the default size per export file is 1G, keeping large export files may drain the disk space fast.

6 Distribution-specific notes on setting up Nginx for Zabbix

RHEL

Nginx is available only in EPEL:

```
# yum -y install epel-release
```

SLES 12

In SUSE Linux Enterprise Server 12 you need to add the Nginx repository, before installing Nginx:

```
zypper addrepo -G -t yum -c 'http://nginx.org/packages/sles/12' nginx
```

You also need to configure `php-fpm`:

```
cp /etc/php5/fpm/php-fpm.conf{.default,}
sed -i 's/user = nobody/user = wwwrun/; s/group = nobody/group = www/' /etc/php5/fpm/php-fpm.conf
```

SLES 15

In SUSE Linux Enterprise Server 15 you need to configure `php-fpm`:

```
cp /etc/php7/fpm/php-fpm.conf{.default,}
cp /etc/php7/fpm/php-fpm.d/www.conf{.default,}
sed -i 's/user = nobody/user = wwwrun/; s/group = nobody/group = www/' /etc/php7/fpm/php-fpm.d/www.conf
```

7 Running agent as root

Starting with version **4.4.2** systemd service file for Zabbix agent in official packages (https://www.zabbix.com/download) was updated to explicitly include directives for `User` and `Group`. Both are set to `zabbix`.

This means that old functionality of configuring which user Zabbix agent runs as via `zabbix_agentd.conf` file is bypassed and agent will always run as the user specified in the systemd service file.

To override this new behavior create file `/etc/systemd/system/zabbix-agent.service.d/override.conf` with the following content.

```
[Service]
User=root
Group=root
```

Reload daemons and restart zabbix-agent service.

```
systemctl daemon-reload
systemctl restart zabbix-agent
```

For **agent2** this completely determines the user that it runs as.

For old **agent** this only re-enables the functionality of configuring user in `zabbix_agentd.conf` file. Therefore in order to run zabbix agent as root you still have to edit `zabbix_agentd.conf` and specify `User=root` as well as `AllowRoot=1` options. More on this here: https://www.zabbix.com/documentation/4.0/manual/appendix/config/zabbix_agentd.

Configuring agent

Zabbix agent runs as a Windows service.

You can run a single instance of Zabbix agent or multiple instances of the agent on a Microsoft Windows host. A single instance can use the default configuration file `C:\zabbix_agentd.conf` or a configuration file specified in the command line. In case of multiple instances each agent instance must have its own configuration file (one of the instances can use the default configuration file).

An example configuration file is available in Zabbix source archive as `conf/zabbix_agentd.win.conf`.

See the configuration file options for details on configuring Zabbix Windows agent.

Warning:
Zabbix agent for Windows does not support non-standard Windows configurations where CPUs are distributed non-uniformly across NUMA nodes. If logical CPUs are distributed non-uniformly, then CPU performance metrics may not be available for some CPUs. For example, if there are 72 logical CPUs with 2 NUMA nodes, both nodes must have 36 CPUs each.

Hostname parameter

To perform active checks on a host Zabbix agent needs to have the hostname defined. Moreover, the hostname value set on the agent side should exactly match the "Host name" configured for the host in the frontend.

The hostname value on the agent side can be defined by either the **Hostname** or **HostnameItem** parameter in the agent configuration file - or the default values are used if any of these parameters are not specified.

The default value for **HostnameItem** parameter is the value returned by the "system.hostname" agent key and for Windows platform it returns the NetBIOS host name.

The default value for **Hostname** is the value returned by the **HostnameItem** parameter. So, in effect, if both these parameters are unspecified the actual hostname will be the host NetBIOS name; Zabbix agent will use NetBIOS host name to retrieve the list of active checks from Zabbix server and send results to it.

Attention:
The **system.hostname** key always returns the NetBIOS host name which is limited to 15 symbols and in UPPERCASE only - regardless of the length and lowercase/uppercase characters in the real host name.

Starting from Zabbix agent 1.8.6 version for Windows the "system.hostname" key supports an optional parameter - *type* of the name. The default value of this parameter is "netbios" (for backward compatibility) and the other possible value is "host".

Attention:
The **system.hostname[host]** key always returns the full, real (case sensitive) Windows host name.

So, to simplify the configuration of zabbix_agentd.conf file and make it unified, two different approaches could be used.

1. leave **Hostname** or **HostnameItem** parameters undefined and Zabbix agent will use NetBIOS host name as the hostname;
2. leave **Hostname** parameter undefined and define **HostnameItem** like this:
   HostnameItem=system.hostname[host]
   and Zabbix agent will use the full, real (case sensitive) Windows host name as the hostname.

Host name is also used as part of Windows service name which is used for installing, starting, stopping and uninstalling the Windows service. For example, if Zabbix agent configuration file specifies `Hostname=Windows_db_server`, then the agent will be installed as a Windows service "`Zabbix Agent [Windows_db_server]`". Therefore, to have a different Windows service name for each Zabbix agent instance, each instance must use a different host name.

Installing agent as Windows service

To install a single instance of Zabbix agent with the default configuration file `c:\zabbix_agentd.conf`:

```
zabbix_agentd.exe --install
```

Attention:
On a 64-bit system, a 64-bit Zabbix agent version is required for all checks related to running 64-bit processes to work correctly.

If you wish to use a configuration file other than `c:\zabbix_agentd.conf`, you should use the following command for service installation:

```
zabbix_agentd.exe --config <your_configuration_file> --install
```

A full path to the configuration file should be specified.

Multiple instances of Zabbix agent can be installed as services like this:

```
zabbix_agentd.exe --config <configuration_file_for_instance_1> --install --multiple-agents
zabbix_agentd.exe --config <configuration_file_for_instance_2> --install --multiple-agents
...
zabbix_agentd.exe --config <configuration_file_for_instance_N> --install --multiple-agents
```

The installed service should now be visible in Control Panel.

Starting agent

To start the agent service, you can use Control Panel or do it from command line.

To start a single instance of Zabbix agent with the default configuration file:

```
zabbix_agentd.exe --start
```

To start a single instance of Zabbix agent with another configuration file:

```
zabbix_agentd.exe --config <your_configuration_file> --start
```

To start one of multiple instances of Zabbix agent:

```
zabbix_agentd.exe --config <configuration_file_for_this_instance> --start --multiple-agents
```

Stopping agent

To stop the agent service, you can use Control Panel or do it from command line.

To stop a single instance of Zabbix agent started with the default configuration file:

```
zabbix_agentd.exe --stop
```

To stop a single instance of Zabbix agent started with another configuration file:

```
zabbix_agentd.exe --config <your_configuration_file> --stop
```

To stop one of multiple instances of Zabbix agent:

```
zabbix_agentd.exe --config <configuration_file_for_this_instance> --stop --multiple-agents
```

Uninstalling agent Windows service

To uninstall a single instance of Zabbix agent using the default configuration file:

```
zabbix_agentd.exe --uninstall
```

To uninstall a single instance of Zabbix agent using a non-default configuration file:

```
zabbix_agentd.exe --config <your_configuration_file> --uninstall
```

To uninstall multiple instances of Zabbix agent from Windows services:

```
zabbix_agentd.exe --config <configuration_file_for_instance_1> --uninstall --multiple-agents
zabbix_agentd.exe --config <configuration_file_for_instance_2> --uninstall --multiple-agents
...
zabbix_agentd.exe --config <configuration_file_for_instance_N> --uninstall --multiple-agents
```

3 Daemon configuration

1 Zabbix server

Overview

This section lists parameters supported in a Zabbix server configuration file (zabbix_server.conf). Note that:

- The default values reflect daemon defaults, not the values in the shipped configuration files;
- Zabbix supports configuration files only in UTF-8 encoding without BOM;

- Comments starting with "#" are only supported in the beginning of the line.

Parameters

Parameter	Mandatory	Range	Default	Description
AlertScriptsPath	no		/usr/local/share/zabbix/alertscripts	Location of custom alert scripts (depends on compile-time installation variable *datadir*).
AllowRoot	no		0	Allow the server to run as 'root'. If disabled and the server is started by 'root', the server will try to switch to the 'zabbix' user instead. Has no effect if started under a regular user. 0 - do not allow 1 - allow This parameter is supported since Zabbix 2.2.0.
CacheSize	no	128K-64G	8M	Size of configuration cache, in bytes. Shared memory size for storing host, item and trigger data. The maximum value of this parameter was increased from 8GB to 64GB in Zabbix 4.4.9.
CacheUpdateFrequency	no	1-3600	60	How often Zabbix will perform update of configuration cache, in seconds. See also runtime control options.
DBHost	no		localhost	Database host name. In case of MySQL localhost or empty string results in using a socket. In case of PostgreSQL only empty string results in attempt to use socket.
DBName	yes			Database name.
DBPassword	no			Database password. Comment this line if no password is used.
DBPort	no	1024-65535		Database port when not using local socket.
DBSchema	no			Schema name. Used for IBM DB2 and PostgreSQL.
DBSocket	no			Path to MySQL socket file.
DBUser	no			Database user.

Parameter	Mandatory	Range	Default	Description
DebugLevel	no	0-5	3	Specifies debug level: 0 - basic information about starting and stopping of Zabbix processes 1 - critical information 2 - error information 3 - warnings 4 - for debugging (produces lots of information) 5 - extended debugging (produces even more information) See also runtime control options.
ExportDir	no			Directory for real-time export of events, history and trends in newline-delimited JSON format. If set, enables real-time export. This parameter is supported since Zabbix 4.0.0.
ExportFileSize	no	1M-1G	1G	Maximum size per export file in bytes. Only used for rotation if ExportDir is set. This parameter is supported since Zabbix 4.0.0.
ExternalScripts	no		/usr/local/share/zabbix/externalscripts	Location of external scripts (depends on compile-time installation variable *datadir*).
Fping6Location	no		/usr/sbin/fping6	Location of fping6. Make sure that fping6 binary has root ownership and SUID flag set. Make empty (”Fping6Location=”) if your fping utility is capable to process IPv6 addresses.
FpingLocation	no		/usr/sbin/fping	Location of fping. Make sure that fping binary has root ownership and SUID flag set!
HistoryCacheSize	no	128K-2G	16M	Size of history cache, in bytes. Shared memory size for storing history data.
HistoryIndexCacheSize	no	128K-2G	4M	Size of history index cache, in bytes. Shared memory size for indexing history data stored in history cache. The index cache size needs roughly 100 bytes to cache one item. This parameter is supported since Zabbix 3.0.0.
HistoryStorageDateIndex	no		0	Enable preprocessing of history values in history storage to store values in different indices based on date: 0 - disable 1 - enable

Parameter	Mandatory	Range	Default	Description
HistoryStorageURL	no			History storage HTTP[S] URL. This parameter is used for Elasticsearch setup.
HistoryStorageTypes	no		uint,dbl,str,log,text	Comma separated list of value types to be sent to the history storage. This parameter is used for Elasticsearch setup.
HousekeepingFrequency	no	0-24	1	How often Zabbix will perform housekeeping procedure (in hours). Housekeeping is removing outdated information from the database. *Note*: To prevent housekeeper from being overloaded (for example, when history and trend periods are greatly reduced), no more than 4 times HousekeepingFrequency hours of outdated information are deleted in one housekeeping cycle, for each item. Thus, if HousekeepingFrequency is 1, no more than 4 hours of outdated information (starting from the oldest entry) will be deleted per cycle. *Note*: To lower load on server startup housekeeping is postponed for 30 minutes after server start. Thus, if HousekeepingFrequency is 1, the very first housekeeping procedure after server start will run after 30 minutes, and will repeat with one hour delay thereafter. This postponing behavior is in place since Zabbix 2.4.0. Since Zabbix 3.0.0 it is possible to disable automatic housekeeping by setting HousekeepingFrequency to 0. In this case the housekeeping procedure can only be started by *housekeeper_execute* runtime control option and the period of outdated information deleted in one housekeeping cycle is 4 times the period since the last housekeeping cycle, but not less than 4 hours and not greater than 4 days. See also runtime control options.

Parameter	Mandatory	Range	Default	Description
Include	no			You may include individual files or all files in a directory in the configuration file. To only include relevant files in the specified directory, the asterisk wildcard character is supported for pattern matching. For example: `/absolute/path/to/config/files/*.` Pattern matching is supported since Zabbix 2.4.0. See special notes about limitations.
JavaGateway	no			IP address (or hostname) of Zabbix Java gateway. Only required if Java pollers are started. This parameter is supported since Zabbix 2.0.0.
JavaGatewayPort	no	1024-32767	10052	Port that Zabbix Java gateway listens on. This parameter is supported since Zabbix 2.0.0.
ListenIP	no		0.0.0.0	List of comma delimited IP addresses that the trapper should listen on. Trapper will listen on all network interfaces if this parameter is missing. Multiple IP addresses are supported since Zabbix 1.8.3.
ListenPort	no	1024-32767	10051	Listen port for trapper.
LoadModule	no			Module to load at server startup. Modules are used to extend functionality of the server. Formats: LoadModule=<module.so> LoadModule=<path/module.so> LoadModule=</abs_path/module.so> Either the module must be located in directory specified by LoadModulePath or the path must precede the module name. If the preceding path is absolute (starts with '/') then LoadModulePath is ignored. It is allowed to include multiple LoadModule parameters.
LoadModulePath	no			Full path to location of server modules. Default depends on compilation options.
LogFile	yes, if LogType is set to *file*, otherwise no			Name of log file.

Parameter	Mandatory	Range	Default	Description
LogFileSize	no	0-1024	1	Maximum size of log file in MB. 0 - disable automatic log rotation. *Note*: If the log file size limit is reached and file rotation fails, for whatever reason, the existing log file is truncated and started anew.
LogType	no		file	Log output type: *file* - write log to file specified by LogFile parameter, *system* - write log to syslog, *console* - write log to standard output. This parameter is supported since Zabbix 3.0.0.
LogSlowQueries	no	0-3600000	0	How long a database query may take before being logged (in milliseconds). 0 - don't log slow queries. This option becomes enabled starting with DebugLevel=3. This parameter is supported since Zabbix 1.8.2.
MaxHousekeeperDelete	no	0-1000000	5000	No more than 'MaxHousekeeperDelete' rows (corresponding to [tablename], [field], [value]) will be deleted per one task in one housekeeping cycle. If set to 0 then no limit is used at all. In this case you must know what you are doing, so as not to overload the database! [2] This parameter is supported since Zabbix 1.8.2 and applies only to deleting history and trends of already deleted items.
PidFile	no		/tmp/zabbix_server.pid	Name of PID file.
ProxyConfigFrequency	no	1-604800	3600	How often Zabbix server sends configuration data to a Zabbix proxy in seconds. Used only for proxies in a passive mode. This parameter is supported since Zabbix 1.8.3.
ProxyDataFrequency	no	1-3600	1	How often Zabbix server requests history data from a Zabbix proxy in seconds. Used only for proxies in a passive mode. This parameter is supported since Zabbix 1.8.3.

Parameter	Mandatory	Range	Default	Description
SNMPTrapperFile	no		/tmp/zabbix_traps.tmp	Temporary file used for passing data from SNMP trap daemon to the server. Must be the same as in zabbix_trap_receiver.pl or SNMPTT configuration file. This parameter is supported since Zabbix 2.0.0.
SocketDir	no		/tmp	Directory to store IPC sockets used by internal Zabbix services. This parameter is supported since Zabbix 3.4.0.
SourceIP	no			Source IP address for outgoing connections.
SSHKeyLocation	no			Location of public and private keys for SSH checks and actions
SSLCertLocation	no			Location of SSL client certificate files for client authentication. This parameter is used in web monitoring only and is supported since Zabbix 2.4.
SSLKeyLocation	no			Location of SSL private key files for client authentication. This parameter is used in web monitoring only and is supported since Zabbix 2.4.
SSLCALocation	no			Override the location of certificate authority (CA) files for SSL server certificate verification. If not set, system-wide directory will be used. Note that the value of this parameter will be set as libcurl option CURLOPT_CAPATH. For libcurl versions before 7.42.0, this only has effect if libcurl was compiled to use OpenSSL. For more information see cURL web page. This parameter is used in web monitoring since Zabbix 2.4.0 and in SMTP authentication since Zabbix 3.0.0.
StartDBSyncers	no	1-100	4	Number of pre-forked instances of DB Syncers. The upper limit used to be 64 before version 1.8.5. This parameter is supported since Zabbix 1.8.3.
StartAlerters	no	1-100	3	Number of pre-forked instances of alerters. This parameter is supported since Zabbix 3.4.0.
StartDiscoverers	no	0-250	1	Number of pre-forked instances of discoverers. The upper limit used to be 255 before version 1.8.5.

Parameter	Mandatory	Range	Default	Description
StartEscalators	no	1-100	1	Number of pre-forked instances of escalators. This parameter is supported since Zabbix 3.0.0.
StartHTTPPollers	no	0-1000	1	Number of pre-forked instances of HTTP pollers[1]. The upper limit used to be 255 before version 1.8.5.
StartIPMIPollers	no	0-1000	0	Number of pre-forked instances of IPMI pollers. The upper limit used to be 255 before version 1.8.5.
StartJavaPollers	no	0-1000	0	Number of pre-forked instances of Java pollers[1]. This parameter is supported since Zabbix 2.0.0.
StartLLDProcessors	no	1-100	2	Number of pre-forked instances of low-level discovery (LLD) workers[1]. The LLD manager process is automatically started when an LLD worker is started. This parameter is supported since Zabbix 4.2.0.
StartPingers	no	0-1000	1	Number of pre-forked instances of ICMP pingers[1]. The upper limit used to be 255 before version 1.8.5.
StartPollersUnreachable	no	0-1000	1	Number of pre-forked instances of pollers for unreachable hosts (including IPMI and Java)[1]. Since Zabbix 2.4.0, at least one poller for unreachable hosts must be running if regular, IPMI or Java pollers are started. The upper limit used to be 255 before version 1.8.5. This option is missing in version 1.8.3.
StartPollers	no	0-1000	5	Number of pre-forked instances of pollers[1]. *Note* that a non-zero value is required for internal, aggregated and calculated items to work.
StartPreprocessors	no	1-1000	3	Number of pre-forked instances of preprocessing workers[1]. The preprocessing manager process is automatically started when a preprocessor worker is started. This parameter is supported since Zabbix 3.4.0.

Parameter	Mandatory	Range	Default	Description
StartProxyPollers	no	0-250	1	Number of pre-forked instances of pollers for passive proxies[1]. The upper limit used to be 255 before version 1.8.5. This parameter is supported since Zabbix 1.8.3.
StartSNMPTrapper	no	0-1	0	If set to 1, SNMP trapper process will be started. This parameter is supported since Zabbix 2.0.0.
StartTimers	no	1-1000	1	Number of pre-forked instances of timers. Timers process maintenance periods. This parameter is supported since Zabbix 2.2.0.
StartTrappers	no	0-1000	5	Number of pre-forked instances of trappers[1]. Trappers accept incoming connections from Zabbix sender, active agents and active proxies. At least one trapper process must be running to display server availability and view queue in the frontend. The upper limit used to be 255 before version 1.8.5.
StartVMwareCollectors	no	0-250	0	Number of pre-forked vmware collector instances. This parameter is supported since Zabbix 2.2.0.
StatsAllowedIP	no			List of comma delimited IP addresses, optionally in CIDR notation, or DNS names of external Zabbix instances. Stats request will be accepted only from the addresses listed here. If this parameter is not set no stats requests will be accepted. If IPv6 support is enabled then '127.0.0.1', '::127.0.0.1', '::ffff:127.0.0.1' are treated equally and '::/0' will allow any IPv4 or IPv6 address. '0.0.0.0/0' can be used to allow any IPv4 address. Example: StatsAllowedIP=127.0.0.1,192.168.1.0/24,::1,2001 This parameter is supported since Zabbix 4.2.0.
Timeout	no	1-30	3	Specifies how long we wait for agent, SNMP device or external check (in seconds).

Parameter	Mandatory	Range	Default	Description
TLSCAFile	no			Full pathname of a file containing the top-level CA(s) certificates for peer certificate verification, used for encrypted communications between Zabbix components. This parameter is supported since Zabbix 3.0.0.
TLSCertFile	no			Full pathname of a file containing the server certificate or certificate chain, used for encrypted communications between Zabbix components. This parameter is supported since Zabbix 3.0.0.
TLSCipherAll	no			GnuTLS priority string or OpenSSL (TLS 1.2) cipher string. Override the default ciphersuite selection criteria for certificate- and PSK-based encryption. Example: TLS_AES_256_GCM_SHA384:TLS_CHACHA20 This parameter is supported since Zabbix 4.4.7.
TLSCipherAll13	no			Cipher string for OpenSSL 1.1.1 or newer in TLS 1.3. Override the default ciphersuite selection criteria for certificate- and PSK-based encryption. Example for GnuTLS: NONE:+VERS-TLS1.2:+ECDHE-RSA:+RSA:+ECDHE-PSK:+PSK:+AES-128-GCM:+AES-128-CBC:+AEAD:+SHA256:+SHA1:+CURVE-ALL:+COMP-NULL::+SIGN-ALL:+CTYPE-X.509 Example for OpenSSL: EECDH+aRSA+AES128:RSA+aRSA+AES128 This parameter is supported since Zabbix 4.4.7.

Parameter	Mandatory	Range	Default	Description
TLSCipherCert	no			GnuTLS priority string or OpenSSL (TLS 1.2) cipher string. Override the default ciphersuite selection criteria for certificate-based encryption. Example for GnuTLS: NONE:+VERS-TLS1.2:+ECDHE-RSA:+RSA:+AES-128-GCM:+AES-128-CBC:+AEAD:+SHA256:+SHA1:+CURVE-ALL:+COMP-NULL:+SIGN-ALL:+CTYPE-X.509 Example for OpenSSL: EECDH+aRSA+AES128:RSA+aRSA+AES128 This parameter is supported since Zabbix 4.4.7.
TLSCipherCert13	no			Cipher string for OpenSSL 1.1.1 or newer in TLS 1.3. Override the default ciphersuite selection criteria for certificate-based encryption. This parameter is supported since Zabbix 4.4.7.
TLSCipherPSK	no			GnuTLS priority string or OpenSSL (TLS 1.2) cipher string. Override the default ciphersuite selection criteria for PSK-based encryption. Example for GnuTLS: NONE:+VERS-TLS1.2:+ECDHE-PSK:+PSK:+AES-128-GCM:+AES-128-CBC:+AEAD:+SHA256:+SHA1:+CURVE-ALL:+COMP-NULL:+SIGN-ALL Example for OpenSSL: kECDHEPSK+AES128:kPSK+AES128 This parameter is supported since Zabbix 4.4.7.
TLSCipherPSK13	no			Cipher string for OpenSSL 1.1.1 or newer in TLS 1.3. Override the default ciphersuite selection criteria for PSK-based encryption. Example: TLS_CHACHA20_POLY1305_SHA256:TLS_AES This parameter is supported since Zabbix 4.4.7.
TLSCRLFile	no			Full pathname of a file containing revoked certificates. This parameter is used for encrypted communications between Zabbix components. This parameter is supported since Zabbix 3.0.0.

Parameter	Mandatory	Range	Default	Description
TLSKeyFile	no			Full pathname of a file containing the server private key, used for encrypted communications between Zabbix components. This parameter is supported since Zabbix 3.0.0.
TmpDir	no		/tmp	Temporary directory.
TrapperTimeout	no	1-300	300	Specifies how many seconds trapper may spend processing new data.
TrendCacheSize	no	128K-2G	4M	Size of trend cache, in bytes. Shared memory size for storing trends data.
UnavailableDelay	no	1-3600	60	How often host is checked for availability during the unavailability period, in seconds.
UnreachableDelay	no	1-3600	15	How often host is checked for availability during the unreachability period, in seconds.
UnreachablePeriod	no	1-3600	45	After how many seconds of unreachability treat a host as unavailable.
User	no		zabbix	Drop privileges to a specific, existing user on the system. Only has effect if run as 'root' and AllowRoot is disabled. This parameter is supported since Zabbix 2.4.0.
ValueCacheSize	no	0,128K-64G	8M	Size of history value cache, in bytes. Shared memory size for caching item history data requests. Setting to 0 disables value cache (not recommended). When value cache runs out of the shared memory a warning message is written to the server log every 5 minutes. This parameter is supported since Zabbix 2.2.0.
VMwareCacheSize	no	256K-2G	8M	Shared memory size for storing VMware data. A VMware internal check zabbix[vmware,buffer,...] can be used to monitor the VMware cache usage (see Internal checks). Note that shared memory is not allocated if there are no vmware collector instances configured to start. This parameter is supported since Zabbix 2.2.0.

Parameter	Mandatory	Range	Default	Description
VMwareFrequency	no	10-86400	60	Delay in seconds between data gathering from a single VMware service. This delay should be set to the least update interval of any VMware monitoring item. This parameter is supported since Zabbix 2.2.0.
VMwarePerfFrequency	no	10-86400	60	Delay in seconds between performance counter statistics retrieval from a single VMware service. This delay should be set to the least update interval of any VMware monitoring item that uses VMware performance counters. This parameter is supported since Zabbix 2.2.9, 2.4.4
VMwareTimeout	no	1-300	10	The maximum number of seconds vmware collector will wait for a response from VMware service (vCenter or ESX hypervisor). This parameter is supported since Zabbix 2.2.9, 2.4.4

Footnotes

[1] Note that too many data gathering processes (pollers, unreachable pollers, HTTP pollers, Java pollers, pingers, trappers, proxy-pollers) together with IPMI manager, SNMP trapper and preprocessing workers can **exhaust** the per-process file descriptor limit for the preprocessing manager.

Warning:
This will cause Zabbix server to stop (usually shortly after the start, but sometimes it can take more time). The configuration file should be revised or the limit should be raised to avoid this situation.

[2] When a lot of items are deleted it increases the load to the database, because the housekeeper will need to remove all the history data that these items had. For example, if we only have to remove 1 item prototype, but this prototype is linked to 50 hosts and for every host the prototype is expanded to 100 real items, 5000 items in total have to be removed (1*50*100). If 500 is set for MaxHousekeeperDelete (MaxHousekeeperDelete=500), the housekeeper process will have to remove up to 2500000 values (5000*500) for the deleted items from history and trends tables in one cycle.

2 Zabbix proxy

Overview

This section lists parameters supported in a Zabbix proxy configuration file (zabbix_proxy.conf). Note that:

- The default values reflect daemon defaults, not the values in the shipped configuration files;
- Zabbix supports configuration files only in UTF-8 encoding without BOM;
- Comments starting with "#" are only supported in the beginning of the line.

Parameters

Parameter	Mandatory	Range	Default	Description
AllowRoot	no		0	Allow the proxy to run as 'root'. If disabled and the proxy is started by 'root', the proxy will try to switch to the 'zabbix' user instead. Has no effect if started under a regular user. 0 - do not allow 1 - allow This parameter is supported since Zabbix 2.2.0.
CacheSize	no	128K-64G	8M	Size of configuration cache, in bytes. Shared memory size, for storing host and item data. The maximum value of this parameter was increased from 8GB to 64GB in Zabbix 4.4.9.
ConfigFrequency	no	1-604800	3600	How often proxy retrieves configuration data from Zabbix server in seconds. Active proxy parameter. Ignored for passive proxies (see ProxyMode parameter).
DBHost	no		localhost	Database host name. In case of MySQL localhost or empty string results in using a socket. In case of PostgreSQL only empty string results in attempt to use socket.
DBName	yes			Database name or path to database file for SQLite3 (multi-process architecture of Zabbix does not allow to use in-memory database, e.g. `:memory:`, `file::memory:?cache=shared` or `file:memdb1?mode=memory&cache=sha` Warning: Do not attempt to use the same database Zabbix server is using.
DBPassword	no			Database password. Ignored for SQLite. Comment this line if no password is used.
DBSchema	no			Schema name. Used for IBM DB2 and PostgreSQL.
DBSocket	no		3306	Path to MySQL socket. Database port when not using local socket. Ignored for SQLite.
DBUser				Database user. Ignored for SQLite.

Parameter	Mandatory	Range	Default	Description
DataSenderFrequency	no	1-3600	1	Proxy will send collected data to the server every N seconds. Note that active proxy will still poll Zabbix server every second for remote command tasks. Active proxy parameter. Ignored for passive proxies (see ProxyMode parameter).
DebugLevel	no	0-5	3	Specifies debug level: 0 - basic information about starting and stopping of Zabbix processes 1 - critical information 2 - error information 3 - warnings 4 - for debugging (produces lots of information) 5 - extended debugging (produces even more information)
EnableRemoteCommands	no		0	Whether remote commands from Zabbix server are allowed. 0 - not allowed 1 - allowed This parameter is supported since Zabbix 3.4.0.
ExternalScripts	no		/usr/local/share/zabbix/externalscripts	Location of external scripts (depends on compile-time installation variable *datadir*).
Fping6Location	no		/usr/sbin/fping6	Location of fping6. Make sure that fping6 binary has root ownership and SUID flag set. Make empty (”Fping6Location=”) if your fping utility is capable to process IPv6 addresses.
FpingLocation	no		/usr/sbin/fping	Location of fping. Make sure that fping binary has root ownership and SUID flag set!
HeartbeatFrequency	no	0-3600	60	Frequency of heartbeat messages in seconds. Used for monitoring availability of proxy on server side. 0 - heartbeat messages disabled. Active proxy parameter. Ignored for passive proxies (see ProxyMode parameter).
HistoryCacheSize	no	128K-2G	16M	Size of history cache, in bytes. Shared memory size for storing history data.

Parameter	Mandatory	Range	Default	Description
HistoryIndexCacheSize	no	128K-2G	4M	Size of history index cache, in bytes. Shared memory size for indexing history data stored in history cache. The index cache size needs roughly 100 bytes to cache one item. This parameter is supported since Zabbix 3.0.0.
Hostname	no		Set by HostnameItem	Unique, case sensitive Proxy name. Make sure the proxy name is known to the server! Allowed characters: alphanumeric, '.', ' ', '_' and '-'. Maximum length: 128
HostnameItem	no		system.hostname	Item used for setting Hostname if it is undefined (this will be run on the proxy similarly as on an agent). Does not support UserParameters, performance counters or aliases, but does support system.run[]. Ignored if Hostname is set. This parameter is supported since Zabbix 1.8.6.

Parameter	Mandatory	Range	Default	Description
HousekeepingFrequency	no	0-24	1	How often Zabbix will perform housekeeping procedure (in hours). Housekeeping is removing outdated information from the database. *Note*: To prevent housekeeper from being overloaded (for example, when configuration parameters ProxyLocalBuffer or ProxyOfflineBuffer are greatly reduced), no more than 4 times HousekeepingFrequency hours of outdated information are deleted in one housekeeping cycle. Thus, if HousekeepingFrequency is 1, no more than 4 hours of outdated information (starting from the oldest entry) will be deleted per cycle. *Note*: To lower load on proxy startup housekeeping is postponed for 30 minutes after proxy start. Thus, if HousekeepingFrequency is 1, the very first housekeeping procedure after proxy start will run after 30 minutes, and will repeat every hour thereafter. This postponing behavior is in place since Zabbix 2.4.0. Since Zabbix 3.0.0 it is possible to disable automatic housekeeping by setting HousekeepingFrequency to 0. In this case the housekeeping procedure can only be started by *housekeeper_execute* runtime control option and the period of outdated information deleted in one housekeeping cycle is 4 times the period since the last housekeeping cycle, but not less than 4 hours and not greater than 4 days.

Parameter	Mandatory	Range	Default	Description
Include	no			You may include individual files or all files in a directory in the configuration file. To only include relevant files in the specified directory, the asterisk wildcard character is supported for pattern matching. For example: `/absolute/path/to/config/files/*.` Pattern matching is supported since Zabbix 2.4.0. See special notes about limitations.
JavaGateway	no			IP address (or hostname) of Zabbix Java gateway. Only required if Java pollers are started. This parameter is supported since Zabbix 2.0.0.
JavaGatewayPort	no	1024-32767	10052	Port that Zabbix Java gateway listens on. This parameter is supported since Zabbix 2.0.0.
ListenIP	no		0.0.0.0	List of comma delimited IP addresses that the trapper should listen on. Trapper will listen on all network interfaces if this parameter is missing. Multiple IP addresses are supported since Zabbix 1.8.3.
ListenPort	no	1024-32767	10051	Listen port for trapper.
LoadModule	no			Module to load at proxy startup. Modules are used to extend functionality of the proxy. Formats: LoadModule=<module.so> LoadModule=<path/module.so> LoadModule=</abs_path/module.so> Either the module must be located in directory specified by LoadModulePath or the path must precede the module name. If the preceding path is absolute (starts with '/') then LoadModulePath is ignored. It is allowed to include multiple LoadModule parameters.
LoadModulePath	no			Full path to location of proxy modules. Default depends on compilation options.
LogFile	yes, if LogType is set to *file*, otherwise no			Name of log file.

Parameter	Mandatory	Range	Default	Description
LogFileSize	no	0-1024	1	Maximum size of log file in MB. 0 - disable automatic log rotation. *Note*: If the log file size limit is reached and file rotation fails, for whatever reason, the existing log file is truncated and started anew.
LogRemoteCommands	no		0	Enable logging of executed shell commands as warnings. 0 - disabled 1 - enabled This parameter is supported since Zabbix 3.4.0.
LogType	no		file	Log output type: *file* - write log to file specified by LogFile parameter, *system* - write log to syslog, *console* - write log to standard output. This parameter is supported since Zabbix 3.0.0.
LogSlowQueries	no	0-3600000	0	How long a database query may take before being logged (in milliseconds). 0 - don't log slow queries. This option becomes enabled starting with DebugLevel=3. This parameter is supported since Zabbix 1.8.2.
PidFile	no		/tmp/zabbix_proxy.pid	Name of PID file.
ProxyLocalBuffer	no	0-720	0	Proxy will keep data locally for N hours, even if the data have already been synced with the server. This parameter may be used if local data will be used by third party applications.
ProxyMode	no	0-1	0	Proxy operating mode. 0 - proxy in the active mode 1 - proxy in the passive mode This parameter is supported since Zabbix 1.8.3. *Note* that (sensitive) proxy configuration data may become available to parties having access to the Zabbix server trapper port when using an active proxy. This is possible because anyone may pretend to be an active proxy and request configuration data; authentication does not take place.
ProxyOfflineBuffer	no	1-720	1	Proxy will keep data for N hours in case of no connectivity with Zabbix server. Older data will be lost.

Parameter	Mandatory	Range	Default	Description
ServerPort	no	1024-32767	10051	Port of Zabbix trapper on Zabbix server. Active proxy parameter. Ignored for passive proxies (see ProxyMode parameter).
Server	yes			If ProxyMode is set to *active mode*: IP address or DNS name of Zabbix server to get configuration data from and send data to. If ProxyMode is set to *passive mode*: List of comma delimited IP addresses, optionally in CIDR notation, or DNS names of Zabbix server. Incoming connections will be accepted only from the addresses listed here. If IPv6 support is enabled then '127.0.0.1', '::127.0.0.1', '::ffff:127.0.0.1' are treated equally and '::/0' will allow any IPv4 or IPv6 address. '0.0.0.0/0' can be used to allow any IPv4 address. *Example*: Server=127.0.0.1,192.168.1.0/24,::1,2001:d
SNMPTrapperFile	no		/tmp/zabbix_traps.tmp	Temporary file used for passing data from SNMP trap daemon to the proxy. Must be the same as in zabbix_trap_receiver.pl or SNMPTT configuration file. This parameter is supported since Zabbix 2.0.0.
SocketDir	no		/tmp	Directory to store IPC sockets used by internal Zabbix services. This parameter is supported since Zabbix 3.4.0.
SourceIP	no			Source IP address for outgoing connections.
SSHKeyLocation	no			Location of public and private keys for SSH checks and actions
SSLCertLocation	no			Location of SSL client certificate files for client authentication. This parameter is used in web monitoring only and is supported since Zabbix 2.4.0.
SSLKeyLocation	no			Location of SSL private key files for client authentication. This parameter is used in web monitoring only and is supported since Zabbix 2.4.0.

Parameter	Mandatory	Range	Default	Description
SSLCALocation	no			Location of certificate authority (CA) files for SSL server certificate verification. Note that the value of this parameter will be set as libcurl option CURLOPT_CAPATH. For libcurl versions before 7.42.0, this only has effect if libcurl was compiled to use OpenSSL. For more information see cURL web page. This parameter is used in web monitoring since Zabbix 2.4.0 and in SMTP authentication since Zabbix 3.0.0.
StartDBSyncers	no	1-100	4	Number of pre-forked instances of DB Syncers. The upper limit used to be 64 before version 1.8.5. This parameter is supported since Zabbix 1.8.3.
StartDiscoverers	no	0-250	1	Number of pre-forked instances of discoverers. The upper limit used to be 255 before version 1.8.5.
StartHTTPPollers	no	0-1000	1	Number of pre-forked instances of HTTP pollers.
StartIPMIPollers	no	0-1000	0	Number of pre-forked instances of IPMI pollers. The upper limit used to be 255 before version 1.8.5.
StartJavaPollers	no	0-1000	0	Number of pre-forked instances of Java pollers. This parameter is supported since Zabbix 2.0.0.
StartPingers	no	0-1000	1	Number of pre-forked instances of ICMP pingers. The upper limit used to be 255 before version 1.8.5.
StartPollersUnreachable	no	0-1000	1	Number of pre-forked instances of pollers for unreachable hosts (including IPMI and Java). Since Zabbix 2.4.0, at least one poller for unreachable hosts must be running if regular, IPMI or Java pollers are started. The upper limit used to be 255 before version 1.8.5. This option is missing in version 1.8.3.
StartPollers	no	0-1000	5	Number of pre-forked instances of pollers. The upper limit used to be 255 before version 1.8.5.

Parameter	Mandatory	Range	Default	Description
StartPreprocessors	no	1-1000	3	Number of pre-forked instances of preprocessing workers[1]. The preprocessing manager process is automatically started when a preprocessor worker is started. This parameter is supported since Zabbix 4.2.0.
StartSNMPTrapper	no	0-1	0	If set to 1, SNMP trapper process will be started. This parameter is supported since Zabbix 2.0.0.
StartTrappers	no	0-1000	5	Number of pre-forked instances of trappers. Trappers accept incoming connections from Zabbix sender and active agents. The upper limit used to be 255 before version 1.8.5.
StartVMwareCollectors	no	0-250	0	Number of pre-forked vmware collector instances. This parameter is supported since Zabbix 2.2.0.
StatsAllowedIP	no			List of comma delimited IP addresses, optionally in CIDR notation, or DNS names of external Zabbix instances. Stats request will be accepted only from the addresses listed here. If this parameter is not set no stats requests will be accepted. If IPv6 support is enabled then '127.0.0.1', '::127.0.0.1', '::ffff:127.0.0.1' are treated equally and '::/0' will allow any IPv4 or IPv6 address. '0.0.0.0/0' can be used to allow any IPv4 address. Example: StatsAllowedIP=127.0.0.1,192.168.1.0/24,::1,2001 This parameter is supported since Zabbix 4.2.0.
Timeout	no	1-30	3	Specifies how long we wait for agent, SNMP device or external check (in seconds).

Parameter	Mandatory	Range	Default	Description
TLSAccept	yes for passive proxy, if TLS certificate or PSK parameters are defined (even for *unencrypted* connection), otherwise no			What incoming connections to accept from Zabbix server. Used for a passive proxy, ignored on an active proxy. Multiple values can be specified, separated by comma: *unencrypted* - accept connections without encryption (default) *psk* - accept connections with TLS and a pre-shared key (PSK) *cert* - accept connections with TLS and a certificate This parameter is supported since Zabbix 3.0.0.
TLSCAFile	no			Full pathname of a file containing the top-level CA(s) certificates for peer certificate verification, used for encrypted communications between Zabbix components. This parameter is supported since Zabbix 3.0.0.
TLSCertFile	no			Full pathname of a file containing the proxy certificate or certificate chain, used for encrypted communications between Zabbix components. This parameter is supported since Zabbix 3.0.0.
TLSCipherAll	no			GnuTLS priority string or OpenSSL (TLS 1.2) cipher string. Override the default ciphersuite selection criteria for certificate- and PSK-based encryption. Example: TLS_AES_256_GCM_SHA384:TLS_CHACHA20 This parameter is supported since Zabbix 4.4.7.

Parameter	Mandatory	Range	Default	Description
TLSCipherAll13	no			Cipher string for OpenSSL 1.1.1 or newer in TLS 1.3. Override the default ciphersuite selection criteria for certificate- and PSK-based encryption. Example for GnuTLS: NONE:+VERS-TLS1.2:+ECDHE-RSA:+RSA:+ECDHE-PSK:+PSK:+AES-128-GCM:+AES-128-CBC:+AEAD:+SHA256:+SHA1:+CURVE-ALL:+COMP-NULL::+SIGN-ALL:+CTYPE-X.509 Example for OpenSSL: EECDH+aRSA+AES128:RSA+aRSA+AES128 This parameter is supported since Zabbix 4.4.7.
TLSCipherCert	no			GnuTLS priority string or OpenSSL (TLS 1.2) cipher string. Override the default ciphersuite selection criteria for certificate-based encryption. Example for GnuTLS: NONE:+VERS-TLS1.2:+ECDHE-RSA:+RSA:+AES-128-GCM:+AES-128-CBC:+AEAD:+SHA256:+SHA1:+CURVE-ALL:+COMP-NULL:+SIGN-ALL:+CTYPE-X.509 Example for OpenSSL: EECDH+aRSA+AES128:RSA+aRSA+AES128 This parameter is supported since Zabbix 4.4.7.
TLSCipherCert13	no			Cipher string for OpenSSL 1.1.1 or newer in TLS 1.3. Override the default ciphersuite selection criteria for certificate-based encryption. This parameter is supported since Zabbix 4.4.7.
TLSCipherPSK	no			GnuTLS priority string or OpenSSL (TLS 1.2) cipher string. Override the default ciphersuite selection criteria for PSK-based encryption. Example for GnuTLS: NONE:+VERS-TLS1.2:+ECDHE-PSK:+PSK:+AES-128-GCM:+AES-128-CBC:+AEAD:+SHA256:+SHA1:+CURVE-ALL:+COMP-NULL:+SIGN-ALL Example for OpenSSL: kECDHEPSK+AES128:kPSK+AES128 This parameter is supported since Zabbix 4.4.7.

Parameter	Mandatory	Range	Default	Description
TLSCipherPSK13	no			Cipher string for OpenSSL 1.1.1 or newer in TLS 1.3. Override the default ciphersuite selection criteria for PSK-based encryption. Example: TLS_CHACHA20_POLY1305_SHA256:TLS_AES This parameter is supported since Zabbix 4.4.7.
TLSConnect	yes for active proxy, if TLS certificate or PSK parameters are defined (even for *unencrypted* connection), otherwise no			How the proxy should connect to Zabbix server. Used for an active proxy, ignored on a passive proxy. Only one value can be specified: *unencrypted* - connect without encryption (default) *psk* - connect using TLS and a pre-shared key (PSK) *cert* - connect using TLS and a certificate This parameter is supported since Zabbix 3.0.0.
TLSCRLFile	no			Full pathname of a file containing revoked certificates.This parameter is used for encrypted communications between Zabbix components. This parameter is supported since Zabbix 3.0.0.
TLSKeyFile	no			Full pathname of a file containing the proxy private key, used for encrypted communications between Zabbix components. This parameter is supported since Zabbix 3.0.0.
TLSPSKFile	no			Full pathname of a file containing the proxy pre-shared key. used for encrypted communications with Zabbix server. This parameter is supported since Zabbix 3.0.0.
TLSPSKIdentity	no			Pre-shared key identity string, used for encrypted communications with Zabbix server. This parameter is supported since Zabbix 3.0.0.
TLSServerCertIssuer	no			Allowed server certificate issuer. This parameter is supported since Zabbix 3.0.0.
TLSServerCertSubject	no			Allowed server certificate subject. This parameter is supported since Zabbix 3.0.0.
TmpDir	no		/tmp	Temporary directory.

Parameter	Mandatory	Range	Default	Description
TrapperTimeout	no	1-300	300	Specifies how many seconds trapper may spend processing new data.
User	no		zabbix	Drop privileges to a specific, existing user on the system. Only has effect if run as 'root' and AllowRoot is disabled. This parameter is supported since Zabbix 2.4.0.
UnavailableDelay	no	1-3600	60	How often host is checked for availability during the unavailability period, in seconds.
UnreachableDelay	no	1-3600	15	How often host is checked for availability during the unreachability period, in seconds.
UnreachablePeriod	no	1-3600	45	After how many seconds of unreachability treat a host as unavailable.
VMwareCacheSize	no	256K-2G	8M	Shared memory size for storing VMware data. A VMware internal check zabbix[vmware,buffer,...] can be used to monitor the VMware cache usage (see Internal checks). Note that shared memory is not allocated if there are no vmware collector instances configured to start. This parameter is supported since Zabbix 2.2.0.
VMwareFrequency	no	10-86400	60	Delay in seconds between data gathering from a single VMware service. This delay should be set to the least update interval of any VMware monitoring item. This parameter is supported since Zabbix 2.2.0.
VMwarePerfFrequency	no	10-86400	60	Delay in seconds between performance counter statistics retrieval from a single VMware service. This delay should be set to the least update interval of any VMware monitoring item that uses VMware performance counters. This parameter is supported since Zabbix 2.2.9, 2.4.4
VMwareTimeout	no	1-300	10	The maximum number of seconds vmware collector will wait for a response from VMware service (vCenter or ESX hypervisor). This parameter is supported since Zabbix 2.2.9, 2.4.4

3 Zabbix agent (UNIX)

Overview

This section lists parameters supported in a Zabbix agent configuration file (zabbix_agentd.conf). Note that:

- The default values reflect daemon defaults, not the values in the shipped configuration files;
- Zabbix supports configuration files only in UTF-8 encoding without BOM;
- Comments starting with ”#” are only supported in the beginning of the line.

Parameters

Parameter	Mandatory	Range	Default	Description
Alias	no			Sets an alias for an item key. It can be used to substitute long and complex item key with a smaller and simpler one. Multiple *Alias* parameters may be present. Multiple parameters with the same *Alias* key are allowed. Different *Alias* keys may reference the same item key. Aliases can be used in *HostMetadataItem* but not in *HostnameItem* parameters. Examples: 1. Retrieving the ID of user ’zabbix’. Alias=zabbix.userid:vfs.file.regexp[/etc/pass 9]+)”„„\1] Now shorthand key **zabbix.userid** may be used to retrieve data. 2. Getting CPU utilization with default and custom parameters. Alias=cpu.util:system.cpu.util Alias=cpu.util[*]:system.cpu.util[*] This allows use **cpu.util** key to get CPU utilisation percentage with default parameters as well as use **cpu.util[all, idle, avg15]** to get specific data about CPU utilisation. 3. Running multiple low-level discovery rules processing the same discovery items. Alias=vfs.fs.discovery[*]:vfs.fs.discovery Now it is possible to set up several discovery rules using **vfs.fs.discovery** with different parameters for each rule, e.g., **vfs.fs.discovery[foo]**, **vfs.fs.discovery[bar]**, etc.

Parameter	Mandatory	Range	Default	Description
AllowRoot	no		0	Allow the agent to run as 'root'. If disabled and the agent is started by 'root', the agent will try to switch to user 'zabbix' instead. Has no effect if started under a regular user. 0 - do not allow 1 - allow
BufferSend	no	1-3600	5	Do not keep data longer than N seconds in buffer.
BufferSize	no	2-65535	100	Maximum number of values in a memory buffer. The agent will send all collected data to Zabbix server or proxy if the buffer is full.
DebugLevel	no	0-5	3	Specifies debug level: 0 - basic information about starting and stopping of Zabbix processes 1 - critical information 2 - error information 3 - warnings 4 - for debugging (produces lots of information) 5 - extended debugging (produces even more information)
EnableRemoteCommands	no		0	Whether remote commands from Zabbix server are allowed. 0 - not allowed 1 - allowed
HostInterface	no	0-255 characters		Optional parameter that defines host interface. Host interface is used at host auto-registration process. An agent will issue an error and not start if the value is over the limit of 255 characters. If not defined, value will be acquired from HostInterfaceItem. Supported since Zabbix 4.4.0.
HostInterfaceItem	no			Optional parameter that defines an item used for getting host interface. Host interface is used at host auto-registration process. During an auto-registration request an agent will log a warning message if the value returned by specified item is over limit of 255 characters. This option is only used when HostInterface is not defined. Supported since Zabbix 4.4.0.

Parameter	Mandatory	Range	Default	Description
HostMetadata	no	0-255 characters		Optional parameter that defines host metadata. Host metadata is used only at host auto-registration process (active agent). If not defined, the value will be acquired from HostMetadataItem. An agent will issue an error and not start if the specified value is over the limit or a non-UTF-8 string. This option is supported in version 2.2.0 and higher.
HostMetadataItem	no			Optional parameter that defines a *Zabbix agent* item used for getting host metadata. This option is only used when HostMetadata is not defined. Supports UserParameters and aliases. Supports *system.run[]* regardless of *EnableRemoteCommands* value. HostMetadataItem value is retrieved on each auto-registration attempt and is used only at host auto-registration process (active agent). During an auto-registration request an agent will log a warning message if the value returned by the specified item is over the limit of 255 characters. The value returned by the item must be a UTF-8 string otherwise it will be ignored. This option is supported in version 2.2.0 and higher.
Hostname	no		Set by HostnameItem	Unique, case sensitive hostname. Required for active checks and must match hostname as configured on the server. Allowed characters: alphanumeric, '.', ' ', '_' and '-'. Maximum length: 128

Parameter	Mandatory	Range	Default	Description
HostnameItem	no		system.hostname	Optional parameter that defines a *Zabbix agent* item used for getting host name. This option is only used when Hostname is not defined. Does not support UserParameters or aliases, but does support *system.run[]* regardless of *EnableRemoteCommands* value. This option is supported in version 1.8.6 and higher.
Include	no			You may include individual files or all files in a directory in the configuration file. To only include relevant files in the specified directory, the asterisk wildcard character is supported for pattern matching. For example: `/absolute/path/to/config/files/*.` Pattern matching is supported since Zabbix 2.4.0. See special notes about limitations.
ListenIP	no		0.0.0.0	List of comma delimited IP addresses that the agent should listen on. Multiple IP addresses are supported in version 1.8.3 and higher.
ListenPort	no	1024-32767	10050	Agent will listen on this port for connections from the server.
LoadModule	no			Module to load at agent startup. Modules are used to extend functionality of the agent. Formats: LoadModule=<module.so> LoadModule=<path/module.so> LoadModule=</abs_path/module.so> Either the module must be located in directory specified by LoadModulePath or the path must precede the module name. If the preceding path is absolute (starts with '/') then LoadModulePath is ignored. It is allowed to include multiple LoadModule parameters.
LoadModulePath	no			Full path to location of agent modules. Default depends on compilation options.
LogFile	yes, if LogType is set to *file*, otherwise no			Name of log file.

Parameter	Mandatory	Range	Default	Description
LogFileSize	no	0-1024	1	Maximum size of log file in MB. 0 - disable automatic log rotation. *Note*: If the log file size limit is reached and file rotation fails, for whatever reason, the existing log file is truncated and started anew.
LogType	no		file	Log output type: *file* - write log to file specified by LogFile parameter, *system* - write log to syslog, *console* - write log to standard output. This parameter is supported since Zabbix 3.0.0.
LogRemoteCommands	no		0	Enable logging of executed shell commands as warnings. 0 - disabled 1 - enabled
MaxLinesPerSecond	no	1-1000	20	Maximum number of new lines the agent will send per second to Zabbix server or proxy when processing 'log' and 'eventlog' active checks. The provided value will be overridden by the parameter 'maxlines', provided in 'log' or 'eventlog' item key. *Note*: Zabbix will process 10 times more new lines than set in *MaxLinesPerSecond* to seek the required string in log items.
PidFile	no		/tmp/zabbix_agentd.pid	Name of PID file.
RefreshActiveChecks	no	60-3600	120	How often list of active checks is refreshed, in seconds. Note that after failing to refresh active checks the next refresh will be attempted after 60 seconds.

Parameter	Mandatory	Range	Default	Description
Server	yes, if StartAgents is not explicitly set to 0			List of comma delimited IP addresses, optionally in CIDR notation, or hostnames of Zabbix servers and Zabbix proxies. Incoming connections will be accepted only from the hosts listed here. If IPv6 support is enabled then '127.0.0.1', '::127.0.0.1', '::ffff:127.0.0.1' are treated equally and '::/0' will allow any IPv4 or IPv6 address. '0.0.0.0/0' can be used to allow any IPv4 address. Note, that "IPv4-compatible IPv6 addresses" (0000::/96 prefix) are supported but deprecated by RFC4291. Example: Server=127.0.0.1,192.168.1.0/24,::1,2001:d Spaces are allowed.
ServerActive	no			IP:port (or hostname:port) of Zabbix server or Zabbix proxy for active checks. Multiple comma-delimited addresses can be provided to use several independent Zabbix servers in parallel. Spaces are allowed. If port is not specified, default port is used. IPv6 addresses must be enclosed in square brackets if port for that host is specified. If port is not specified, square brackets for IPv6 addresses are optional. If this parameter is not specified, active checks are disabled.
SourceIP	no			Source IP address for outgoing connections.
StartAgents	no	0-100	3	Number of pre-forked instances of zabbix_agentd that process passive checks. If set to 0, disables passive checks and the agent will not listen on any TCP port. The upper limit used to be 16 before version 1.8.5.
Timeout	no	1-30	3	Spend no more than Timeout seconds on processing.

Parameter	Mandatory	Range	Default	Description
TLSAccept	yes, if TLS certificate or PSK parameters are defined (even for *unencrypted* connection), otherwise no			What incoming connections to accept. Used for a passive checks. Multiple values can be specified, separated by comma: *unencrypted* - accept connections without encryption (default) *psk* - accept connections with TLS and a pre-shared key (PSK) *cert* - accept connections with TLS and a certificate This parameter is supported since Zabbix 3.0.0.
TLSCAFile	no			Full pathname of a file containing the top-level CA(s) certificates for peer certificate verification, used for encrypted communications between Zabbix components. This parameter is supported since Zabbix 3.0.0.
TLSCertFile	no			Full pathname of a file containing the agent certificate or certificate chain, used for encrypted communications with Zabbix components. This parameter is supported since Zabbix 3.0.0.
TLSCipherAll	no			GnuTLS priority string or OpenSSL (TLS 1.2) cipher string. Override the default ciphersuite selection criteria for certificate- and PSK-based encryption. Example: TLS_AES_256_GCM_SHA384:TLS_CHACHA20 This parameter is supported since Zabbix 4.4.7.
TLSCipherAll13	no			Cipher string for OpenSSL 1.1.1 or newer in TLS 1.3. Override the default ciphersuite selection criteria for certificate- and PSK-based encryption. Example for GnuTLS: NONE:+VERS-TLS1.2:+ECDHE-RSA:+RSA:+ECDHE-PSK:+PSK:+AES-128-GCM:+AES-128-CBC:+AEAD:+SHA256:+SHA1:+CURVE-ALL:+COMP-NULL::+SIGN-ALL:+CTYPE-X.509 Example for OpenSSL: EECDH+aRSA+AES128:RSA+aRSA+AES128 This parameter is supported since Zabbix 4.4.7.

Parameter	Mandatory	Range	Default	Description
TLSCipherCert	no			GnuTLS priority string or OpenSSL (TLS 1.2) cipher string. Override the default ciphersuite selection criteria for certificate-based encryption. Example for GnuTLS: NONE:+VERS-TLS1.2:+ECDHE-RSA:+RSA:+AES-128-GCM:+AES-128-CBC:+AEAD:+SHA256:+SHA1:+CURVE-ALL:+COMP-NULL:+SIGN-ALL:+CTYPE-X.509 Example for OpenSSL: EECDH+aRSA+AES128:RSA+aRSA+AES128 This parameter is supported since Zabbix 4.4.7.
TLSCipherCert13	no			Cipher string for OpenSSL 1.1.1 or newer in TLS 1.3. Override the default ciphersuite selection criteria for certificate-based encryption. This parameter is supported since Zabbix 4.4.7.
TLSCipherPSK	no			GnuTLS priority string or OpenSSL (TLS 1.2) cipher string. Override the default ciphersuite selection criteria for PSK-based encryption. Example for GnuTLS: NONE:+VERS-TLS1.2:+ECDHE-PSK:+PSK:+AES-128-GCM:+AES-128-CBC:+AEAD:+SHA256:+SHA1:+CURVE-ALL:+COMP-NULL:+SIGN-ALL Example for OpenSSL: kECDHEPSK+AES128:kPSK+AES128 This parameter is supported since Zabbix 4.4.7.
TLSCipherPSK13	no			Cipher string for OpenSSL 1.1.1 or newer in TLS 1.3. Override the default ciphersuite selection criteria for PSK-based encryption. Example: TLS_CHACHA20_POLY1305_SHA256:TLS_AE This parameter is supported since Zabbix 4.4.7.

Parameter	Mandatory	Range	Default	Description
TLSConnect	yes, if TLS certificate or PSK parameters are defined (even for *unencrypted* connection), otherwise no			How the agent should connect to Zabbix server or proxy. Used for active checks. Only one value can be specified: *unencrypted* - connect without encryption (default) *psk* - connect using TLS and a pre-shared key (PSK) *cert* - connect using TLS and a certificate This parameter is supported since Zabbix 3.0.0.
TLSCRLFile	no			Full pathname of a file containing revoked certificates. This parameter is used for encrypted communications with Zabbix components. This parameter is supported since Zabbix 3.0.0.
TLSKeyFile	no			Full pathname of a file containing the agent private key used for encrypted communications with Zabbix components. This parameter is supported since Zabbix 3.0.0.
TLSPSKFile	no			Full pathname of a file containing the agent pre-shared key used for encrypted communications with Zabbix components. This parameter is supported since Zabbix 3.0.0.
TLSPSKIdentity	no			Pre-shared key identity string, used for encrypted communications with Zabbix server. This parameter is supported since Zabbix 3.0.0.
TLSServerCertIssuer	no			Allowed server (proxy) certificate issuer. This parameter is supported since Zabbix 3.0.0.
TLSServerCertSubject	no			Allowed server (proxy) certificate subject. This parameter is supported since Zabbix 3.0.0.
UnsafeUserParameters	no	0,1	0	Allow all characters to be passed in arguments to user-defined parameters. Supported since Zabbix 1.8.2. The following characters are not allowed: \ ' " ` * ? [ ] { } ~ $! & ; ( ) < > | # @ Additionally, newline characters are not allowed.

Parameter	Mandatory	Range	Default	Description
User	no		zabbix	Drop privileges to a specific, existing user on the system. Only has effect if run as 'root' and AllowRoot is disabled. This parameter is supported since Zabbix 2.4.0.
UserParameter	no			User-defined parameter to monitor. There can be several user-defined parameters. Format: UserParameter=<key>,<shell command> Note that shell command must not return empty string or EOL only. Example: UserParameter=system.test,who|wc -l

See also

1. Differences in the Zabbix agent configuration for active and passive checks starting from version 2.0.0

4 Zabbix agent 2 (UNIX)

Overview

Zabbix agent 2 is a new generation of Zabbix agent and may be used in place of Zabbix agent.

This section lists parameters supported in a Zabbix agent 2 configuration file (zabbix_agent2.conf). Note that:

- The default values reflect process defaults, not the values in the shipped configuration files;
- Zabbix supports configuration files only in UTF-8 encoding without BOM;
- Comments starting with "#" are only supported in the beginning of the line.

Parameters

Parameter	Mandatory	Range	Default	Description
Alias	no			Sets an alias for an item key. It can be used to substitute long and complex item key with a smaller and simpler one. Multiple *Alias* parameters may be present. Multiple parameters with the same *Alias* key are allowed. Different *Alias* keys may reference the same item key. Aliases can be used in *HostMetadataItem* but not in *HostnameItem* parameters. Examples: 1. Retrieving the ID of user 'zabbix'. Alias=zabbix.userid:vfs.file.regexp[/etc/pa 9]+)"„„\1] Now shorthand key **zabbix.userid** may be used to retrieve data. 2. Getting CPU utilization with default and custom parameters. Alias=cpu.util:system.cpu.util Alias=cpu.util[*]:system.cpu.util[*] This allows use **cpu.util** key to get CPU utilisation percentage with default parameters as well as use **cpu.util[all, idle, avg15]** to get specific data about CPU utilisation. 3. Running multiple low-level discovery rules processing the same discovery items. Alias=vfs.fs.discovery[*]:vfs.fs.discovery Now it is possible to set up several discovery rules using **vfs.fs.discovery** with different parameters for each rule, e.g., **vfs.fs.discovery[foo]**, **vfs.fs.discovery[bar]**, etc.
BufferSend	no	1-3600	5	Do not keep data longer than N seconds in buffer.
BufferSize	no	2-65535	100	Maximum number of values in a memory buffer. The agent will send all collected data to Zabbix server or proxy if the buffer is full.

Parameter	Mandatory	Range	Default	Description
ControlSocket	no		/tmp/agent.sock	The control socket, used to send runtime commands with '-R' option.
DebugLevel	no	0-5	3	Specifies debug level: 0 - basic information about starting and stopping of Zabbix processes 1 - critical information 2 - error information 3 - warnings 4 - for debugging (produces lots of information) 5 - extended debugging (produces even more information)
EnableRemoteCommands	no		0	Whether remote commands from Zabbix server are allowed. 0 - not allowed 1 - allowed Note that this parameter has been replaced by the `Plugins.SystemRun.EnableRemoteCo` parameter in 4.4.2.
HostMetadata	no	0-255 characters		Optional parameter that defines host metadata. Host metadata is used at host auto-registration process. An agent will issue an error and not start if the specified value is over the limit or a non-UTF-8 string. If not defined, the value will be acquired from HostMetadataItem.
HostMetadataItem	no			Optional parameter that defines an item used for getting host metadata. Host metadata item value is retrieved on each auto-registration attempt for host auto-registration process. During an auto-registration request an agent will log a warning message if the value returned by the specified item is over the limit of 255 characters. This option is only used when HostMetadata is not defined. Supports UserParameters and aliases. Supports *system.run[]* regardless of *EnableRemoteCommands* value. The value returned by the item must be a UTF-8 string otherwise it will be ignored.

Parameter	Mandatory	Range	Default	Description
Hostname	no		Set by HostnameItem	Unique, case sensitive hostname. Required for active checks and must match hostname as configured on the server. Allowed characters: alphanumeric, '.', ' ', '_' and '-'. Maximum length: 128
HostnameItem	no		system.hostname	Item used for generating Hostname if it is not defined. Ignored if Hostname is defined. Does not support UserParameters or aliases, but does support *system.run[]* regardless of *EnableRemoteCommands* value.
Include	no			You may include individual files or all files in a directory in the configuration file. During installation Zabbix will create the include directory in /usr/local/etc, unless modified during the compile time. To only include relevant files in the specified directory, the asterisk wildcard character is supported for pattern matching. For example: `/absolute/path/to/config/files/*` See special notes about limitations.
ListenIP	no		0.0.0.0	List of comma-delimited IP addresses that the agent should listen on. The first IP address is sent to Zabbix server, if connecting to it, to retrieve the list of active checks.
ListenPort	no	1024-32767	10050	Agent will listen on this port for connections from the server.
LogFile	yes, if LogType is set to *file*, otherwise no		/tmp/zabbix_agentd.log	Log file name if LogType is 'file'.
LogFileSize	no	0-1024	1	Maximum size of log file in MB. 0 - disable automatic log rotation. *Note*: If the log file size limit is reached and file rotation fails, for whatever reason, the existing log file is truncated and started anew.

Parameter	Mandatory	Range	Default	Description
LogRemoteCommands	no		0	Enable logging of executed shell commands as warnings. 0 - disabled 1 - enabled Note that this parameter has been replaced by the `Plugins.SystemRun.LogRemoteComma` parameter in 4.4.2.
LogType	no		file	Specifies where log messages are written to: *system* - syslog, *file* - file specified by LogFile parameter, *console* - standard output.
MaxLinesPerSecond	no	1-1000	20	Maximum number of new lines the agent will send per second to Zabbix server or proxy when processing 'log' and 'eventlog' active checks. The provided value will be overridden by the parameter 'maxlines', provided in 'log' or 'eventlog' item key. *Note*: Zabbix will process 10 times more new lines than set in *MaxLinesPerSecond* to seek the required string in log items. Note that this parameter has been replaced by the `Plugins.Log.MaxLinesPerSecond parameter` in 4.4.2.
PidFile	no		/tmp/zabbix_agent2.pid	Name of PID file.
Plugins	no			A plugin can have one or more plugin-specific configuration parameters in format: Plugins.<PluginName>.<Parameter1>=< Plugins.<PluginName>.<Parameter2>=<
Plugins.Redis.KeepAlive	no	60-900	300	The maximum time of waiting (in seconds) before unused Redis connections are closed. This parameter is supported since 4.4.5 and is used by the Redis plugin.
Plugins.Redis.Sessions.<sessionName>.<sessionParameter>	no			Named Redis session parameters. E.g. `Plugins.Redis.Sessions.<sessionN` `Plugins.Redis.Sessions.<sessionN` where <sessionName> is the name of the session. This parameter is supported since 4.4.5 and is used by the Redis plugin.

Parameter	Mandatory	Range	Default	Description
	Plugins.Redis.Timeout	1-30	Global timeout	The maximum time of waiting (in seconds) for a Redis request to complete. This parameter is supported since 4.4.5 and is used by the Redis plugin.
	Plugins.Redis.Uri		tcp://localhost:6379	Redis connection string. Port can be omitted (default=6379). It ignores embedded credentials. Must match the URI format. Must contain a scheme (the only supported schemas: ”tcp” and ”unix”). For example: `tcp://localhost:6379`, `tcp://localhost`, `unix:/var/run/redis.sock` This parameter is supported since 4.4.5 and is used by the Redis plugin.
	Plugins.SystemRun.EnableRemoteCommands		0	Whether remote commands from Zabbix server are allowed. 0 - not allowed 1 - allowed This parameter is supported since 4.4.2 and replaces EnableRemoteCommands.
	Plugins.SystemRun.LogRemoteCommands		0	Enable logging of executed shell commands as warnings. 0 - disabled 1 - enabled This parameter is supported since 4.4.2 and replaces LogRemoteCommands.
	Plugins.Log.MaxLinesPerSecond	1-1000	20	Maximum number of new lines the agent will send per second to Zabbix server or proxy when processing ’log’ and ’eventlog’ active checks. The provided value will be overridden by the parameter ’maxlines’, provided in ’log’ or ’eventlog’ item key. *Note*: Zabbix will process 10 times more new lines than set in *MaxLinesPerSecond* to seek the required string in log items. This parameter is supported since 4.4.2 and replaces MaxLinesPerSecond.

Parameter	Mandatory	Range	Default	Description
RefreshActiveChecks	no	60-3600	120	How often the list of active checks is refreshed, in seconds. Note that after failing to refresh active checks the next refresh will be attempted after 60 seconds.
Server	yes			List of comma-delimited IP addresses, optionally in CIDR notation, or DNS names of Zabbix servers and Zabbix proxies. Incoming connections will be accepted only from the hosts listed here. If IPv6 support is enabled then '127.0.0.1', '::ffff:127.0.0.1' are treated equally and '::/0' will allow any IPv4 or IPv6 address. '0.0.0.0/0' can be used to allow any IPv4 address. Example: Server=127.0.0.1,192.168.1.0/24,::1,2001 Spaces are allowed.
ServerActive	no			List of comma-delimited IP:port (or DNS name:port) pairs of Zabbix servers and Zabbix proxies for active checks. Multiple addresses can be provided to use several independent Zabbix servers in parallel. Spaces are allowed. If port is not specified, default port is used. IPv6 addresses must be enclosed in square brackets if port for that host is specified. If port is not specified, square brackets for IPv6 addresses are optional. If this parameter is not specified, active checks are disabled. Example: ServerAc-tive=127.0.0.1:20051,zabbix.example.com
SourceIP	no			Source IP address for: - outgoing connections to Zabbix server or Zabbix proxy; - making connections while executing some items (web.page.get, net.tcp.port, etc.)
StatusPort	no	1024-32767		If set, agent will listen on this port for HTTP status requests (http://localhost:<port>/status).

Parameter	Mandatory	Range	Default	Description
Timeout	no	1-30	3	Spend no more than Timeout seconds on processing.
TLSAccept	yes, if TLS certificate or PSK parameters are defined (even for *unencrypted* connection), otherwise no			What incoming connections to accept. Used for a passive checks. Multiple values can be specified, separated by comma: *unencrypted* - accept connections without encryption (default) *psk* - accept connections with TLS and a pre-shared key (PSK) *cert* - accept connections with TLS and a certificate
TLSCAFile	no			Full pathname of a file containing the top-level CA(s) certificates for peer certificate verification, used for encrypted communications between Zabbix components.
TLSCertFile	no			Full pathname of a file containing the agent certificate or certificate chain, used for encrypted communications with Zabbix components.
TLSConnect	yes, if TLS certificate or PSK parameters are defined (even for *unencrypted* connection), otherwise no			How the agent should connect to Zabbix server or proxy. Used for active checks. Only one value can be specified: *unencrypted* - connect without encryption (default) *psk* - connect using TLS and a pre-shared key (PSK) *cert* - connect using TLS and a certificate
TLSCRLFile	no			Full pathname of a file containing revoked certificates. This parameter is used for encrypted communications with Zabbix components.
TLSKeyFile	no			Full pathname of a file containing the agent private key used for encrypted communications with Zabbix components.
TLSPSKFile	no			Full pathname of a file containing the agent pre-shared key used for encrypted communications with Zabbix components.
TLSPSKIdentity	no			Pre-shared key identity string, used for encrypted communications with Zabbix server.
TLSServerCertIssuer	no			Allowed server (proxy) certificate issuer.

Parameter	Mandatory	Range	Default	Description
TLSServerCertSubject	no			Allowed server (proxy) certificate subject.
UnsafeUserParameters	no	0,1	0	Allow all characters to be passed in arguments to user-defined parameters. The following characters are not allowed: \ ' " ` * ? [ ] { } ~ $! & ; ( ) > | # @ Additionally, newline characters are not allowed.
UserParameter	no			User-defined parameter to monitor. There can be several user-defined parameters. Format: UserParameter=<key>,<shell command> Note that the shell command must not return empty string or EOL only. Example: UserParameter=system.test,who|wc -l

5 Zabbix agent (Windows)

Overview

This section lists parameters supported in a Zabbix agent (Windows) configuration file (zabbix_agent.conf). Note that:

- The default values reflect daemon defaults, not the values in the shipped configuration files;
- Zabbix supports configuration files only in UTF-8 encoding without BOM;
- Comments starting with "#" are only supported in the beginning of the line.

Parameters

Parameter	Mandatory	Range	Default	Description
Alias	no			Sets an alias for an item key. It can be used to substitute long and complex item key with a smaller and simpler one. Multiple *Alias* parameters may be present. Multiple parameters with the same *Alias* key are allowed. Different *Alias* keys may reference the same item key. Aliases can be used in *HostMetadataItem* but not in *HostnameItem* or *PerfCounter* parameters. Examples: 1. Retrieving paging file usage in percents from the server. Alias=pg_usage:perf_counter[\Paging File(_Total)\% Usage] Now shorthand key **pg_usage** may be used to retrieve data. 2. Getting CPU load with default and custom parameters. Alias=cpu.load:system.cpu.load Alias=cpu.load[*]:system.cpu.load[*] This allows use **cpu.load** key to get CPU utilisation percentage with default parameters as well as use **cpu.load[percpu,avg15]** to get specific data about CPU load. 3. Running multiple low-level discovery rules processing the same discovery items. Alias=vfs.fs.discovery[*]:vfs.fs.discovery Now it is possible to set up several discovery rules using **vfs.fs.discovery** with different parameters for each rule, e.g., **vfs.fs.discovery[foo]**, **vfs.fs.discovery[bar]**, etc.
BufferSend	no	1-3600	5	Do not keep data longer than N seconds in buffer.
BufferSize	no	2-65535	100	Maximum number of values in a memory buffer. The agent will send all collected data to Zabbix server or proxy if the buffer is full.

Parameter	Mandatory	Range	Default	Description
DebugLevel	no	0-5	3	Specifies debug level: 0 - basic information about starting and stopping of Zabbix processes 1 - critical information 2 - error information 3 - warnings 4 - for debugging (produces lots of information) 5 - extended debugging (produces even more information)
EnableRemoteCommands	no		0	Whether remote commands from Zabbix server are allowed. 0 - not allowed 1 - allowed
HostInterface	no	0-255 characters		Optional parameter that defines host interface. Host interface is used at host auto-registration process. An agent will issue an error and not start if the value is over the limit of 255 characters. If not defined, value will be acquired from HostInterfaceItem. Supported since Zabbix 4.4.0.
HostInterfaceItem	no			Optional parameter that defines an item used for getting host interface. Host interface is used at host auto-registration process. During an auto-registration request an agent will log a warning message if the value returned by specified item is over limit of 255 characters. This option is only used when HostInterface is not defined. Supported since Zabbix 4.4.0.
HostMetadata	no	0-255 characters		Optional parameter that defines host metadata. Host metadata is used only at host auto-registration process (active agent). If not defined, the value will be acquired from HostMetadataItem. An agent will issue an error and not start if the specified value is over the limit or a non-UTF-8 string. This option is supported in version 2.2.0 and higher.

Parameter	Mandatory	Range	Default	Description
HostMetadataItem	no			Optional parameter that defines a *Zabbix agent* item used for getting host metadata. This option is only used when HostMetadata is not defined. Supports UserParameters, performance counters and aliases. Supports *system.run[]* regardless of *EnableRemoteCommands* value. HostMetadataItem value is retrieved on each auto-registration attempt and is used only at host auto-registration process (active agent). During an auto-registration request an agent will log a warning message if the value returned by the specified item is over the limit of 255 characters. The value returned by the item must be a UTF-8 string otherwise it will be ignored. This option is supported in version 2.2.0 and higher.
Hostname	no		Set by HostnameItem	Unique, case sensitive hostname. Required for active checks and must match hostname as configured on the server. Allowed characters: alphanumeric, '.', ' ', '_' and '-'. Maximum length: 128
HostnameItem	no		system.hostname	Optional parameter that defines a *Zabbix agent* item used for getting host name. This option is only used when Hostname is not defined. Does not support UserParameters, performance counters or aliases, but does support *system.run[]* regardless of *EnableRemoteCommands* value. This option is supported in version 1.8.6 and higher. See also a more detailed description.

Parameter	Mandatory	Range	Default	Description
Include	no			You may include individual files or all files in a directory in the configuration file. To only include relevant files in the specified directory, the asterisk wildcard character is supported for pattern matching. For example: `/absolute/path/to/config/files/*.` Pattern matching is supported since Zabbix 2.4.0. See special notes about limitations.
ListenIP	no		0.0.0.0	List of comma-delimited IP addresses that the agent should listen on. Multiple IP addresses are supported since Zabbix 1.8.3.
ListenPort	no	1024-32767	10050	Agent will listen on this port for connections from the server.
LogFile	yes, if LogType is set to *file*, otherwise no		C:\zabbix_agentd.log	Name of the agent log file.
LogFileSize	no	0-1024	1	Maximum size of log file in MB. 0 - disable automatic log rotation. *Note*: If the log file size limit is reached and file rotation fails, for whatever reason, the existing log file is truncated and started anew.
LogType	no		file	Log output type: *file* - write log to file specified by LogFile parameter, *system* - write log Windows Event Log, *console* - write log to standard output. This parameter is supported since Zabbix 3.0.0.
LogRemoteCommands	no		0	Enable logging of executed shell commands as warnings. 0 - disabled 1 - enabled
MaxLinesPerSecond	no	1-1000	20	Maximum number of new lines the agent will send per second to Zabbix server or proxy processing 'log', 'logrt' and 'eventlog' active checks. The provided value will be overridden by the parameter 'maxlines', provided in 'log', 'logrt' or 'eventlog' item keys. *Note*: Zabbix will process 10 times more new lines than set in *MaxLinesPerSecond* to seek the required string in log items.

Parameter	Mandatory	Range	Default	Description
PerfCounter	no			Defines a new parameter <parameter_name> which is an average value for system performance counter <perf_counter_path> for the specified time period <period> (in seconds). Syntax: <parameter_name>,”<perf_counter_path>”,<period> For example, if you wish to receive average number of processor interrupts per second for last minute, you can define a new parameter ”interrupts” as the following: PerfCounter = interrupts,”\Processor(0)\Interrupts/sec”,60 Please note double quotes around performance counter path. The parameter name (interrupts) is to be used as the item key when creating an item. Samples for calculating average value will be taken every second. You may run ”typeperf -qx” to get list of all performance counters available in Windows.

Parameter	Mandatory	Range	Default	Description
PerfCounterEn	no			Defines a new parameter <parameter_name> which is an average value for system performance counter <perf_counter_path> for the specified time period <period> (in seconds). Syntax: <parameter_name>,”<perf_counter_path>”,<period> Compared to PerfCounter, perfcounter paths must be in English. Supported only on **Windows Server 2008/Vista** and above. For example, if you wish to receive average number of processor interrupts per second for last minute, you can define a new parameter ”interrupts” as the following: PerfCounterEn = interrupts,”\Processor(0)\Interrupts/sec”,60 Please note double quotes around performance counter path. The parameter name (interrupts) is to be used as the item key when creating an item. Samples for calculating average value will be taken every second. You can find the list of English strings by viewing the following registry key: `HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows NT\CurrentVersion\Perflib\009`. This parameter is supported since Zabbix 4.0.13 and 4.2.7.
RefreshActiveChecks	no	60-3600	120	How often list of active checks is refreshed, in seconds. Note that after failing to refresh active checks the next refresh will be attempted after 60 seconds.

Parameter	Mandatory	Range	Default	Description
Server	yes, if StartAgents is not explicitly set to 0			List of comma delimited IP addresses, optionally in CIDR notation, or hostnames of Zabbix servers. Incoming connections will be accepted only from the hosts listed here. If IPv6 support is enabled then '127.0.0.1', '::127.0.0.1', '::ffff:127.0.0.1' are treated equally and '::/0' will allow any IPv4 or IPv6 address. '0.0.0.0/0' can be used to allow any IPv4 address. Note, that "IPv4-compatible IPv6 addresses" (0000::/96 prefix) are supported but deprecated by RFC4291. Example: Server=127.0.0.1,192.168.1.0/24,::1,2001:d Spaces are allowed.
ServerActive	no	(*)		IP:port (or hostname:port) of Zabbix server or Zabbix proxy for active checks. Multiple comma-delimited addresses can be provided to use several independent Zabbix servers in parallel. Spaces are allowed. If port is not specified, default port is used. IPv6 addresses must be enclosed in square brackets if port for that host is specified. If port is not specified, square brackets for IPv6 addresses are optional. If this parameter is not specified, active checks are disabled.
SourceIP	no			Source IP address for outgoing connections.
StartAgents	no	0-63 (*)	3	Number of pre-forked instances of zabbix_agentd that process passive checks. If set to 0, disables passive checks and the agent will not listen on any TCP port. The upper limit used to be 16 before version 1.8.5.
Timeout	no	1-30	3	Spend no more than Timeout seconds on processing

Parameter	Mandatory	Range	Default	Description
TLSAccept	yes, if TLS certificate or PSK parameters are defined (even for *unencrypted* connection), otherwise no			What incoming connections to accept. Used for a passive checks. Multiple values can be specified, separated by comma: *unencrypted* - accept connections without encryption (default) *psk* - accept connections with TLS and a pre-shared key (PSK) *cert* - accept connections with TLS and a certificate This parameter is supported since Zabbix 3.0.0.
TLSCAFile	no			Full pathname of a file containing the top-level CA(s) certificates for peer certificate verification, used for encrypted communications between Zabbix components. This parameter is supported since Zabbix 3.0.0.
TLSCertFile	no			Full pathname of a file containing the agent certificate or certificate chain, used for encrypted communications with Zabbix components. This parameter is supported since Zabbix 3.0.0.
TLSConnect	yes, if TLS certificate or PSK parameters are defined (even for *unencrypted* connection), otherwise no			How the agent should connect to Zabbix server or proxy. Used for active checks. Only one value can be specified: *unencrypted* - connect without encryption (default) *psk* - connect using TLS and a pre-shared key (PSK) *cert* - connect using TLS and a certificate This parameter is supported since Zabbix 3.0.0.
TLSCRLFile	no			Full pathname of a file containing revoked certificates. This parameter is used for encrypted communications with Zabbix components. This parameter is supported since Zabbix 3.0.0.
TLSKeyFile	no			Full pathname of a file containing the agent private key used for encrypted communications with Zabbix components. This parameter is supported since Zabbix 3.0.0.

Parameter	Mandatory	Range	Default	Description
TLSPSKFile	no			Full pathname of a file containing the agent pre-shared key used for encrypted communications with Zabbix components. This parameter is supported since Zabbix 3.0.0.
TLSPSKIdentity	no			Pre-shared key identity string, used for encrypted communications with Zabbix server. This parameter is supported since Zabbix 3.0.0.
TLSServerCertIssuer	no			Allowed server (proxy) certificate issuer. This parameter is supported since Zabbix 3.0.0.
TLSServerCertSubject	no			Allowed server (proxy) certificate subject. This parameter is supported since Zabbix 3.0.0.
UnsafeUserParameters	no	0-1	0	Allow all characters to be passed in arguments to user-defined parameters. 0 - do not allow 1 - allow The following characters are not allowed: \ ' " ` * ? [ ] { } ~ $! & ; ( ) < > | # @ Additionally, newline characters are not allowed.
UserParameter				User-defined parameter to monitor. There can be several user-defined parameters. Format: UserParameter=<key>,<shell command> Note that shell command must not return empty string or EOL only. Example: UserParameter=system.test,echo 1

Note:
(*) The number of active servers listed in ServerActive plus the number of pre-forked instances for passive checks specified in StartAgents must be less than 64.

See also

1. Differences in the Zabbix agent configuration for active and passive checks starting from version 2.0.0.

6 Zabbix agent 2 (Windows)

Overview

Zabbix agent 2 is a new generation of Zabbix agent and may be used in place of Zabbix agent.

Attention:
Agent 2 is supported on Windows since Zabbix version 4.4.4.

This section lists parameters supported in a Zabbix agent 2 configuration file (zabbix_agent2.win.conf). Note that:

- The default values reflect process defaults, not the values in the shipped configuration files;
- Zabbix supports configuration files only in UTF-8 encoding without BOM;
- Comments starting with ”#” are only supported in the beginning of the line.

Parameters

Parameter	Mandatory	Range	Default	Description
Alias	no			Sets an alias for an item key. It can be used to substitute long and complex item key with a smaller and simpler one. Multiple *Alias* parameters may be present. Multiple parameters with the same *Alias* key are allowed. Different *Alias* keys may reference the same item key. Aliases can be used in *HostMetadataItem* but not in *HostnameItem* parameters. Examples: 1. Retrieving the ID of user ’zabbix’. Alias=zabbix.userid:vfs.file.regexp[/etc/pa 9]+)”„„\1] Now shorthand key **zabbix.userid** may be used to retrieve data. 2. Getting CPU utilization with default and custom parameters. Alias=cpu.util:system.cpu.util Alias=cpu.util[*]:system.cpu.util[*] This allows use **cpu.util** key to get CPU utilisation percentage with default parameters as well as use **cpu.util[all, idle, avg15]** to get specific data about CPU utilisation. 3. Running multiple low-level discovery rules processing the same discovery items. Alias=vfs.fs.discovery[*]:vfs.fs.discovery Now it is possible to set up several discovery rules using **vfs.fs.discovery** with different parameters for each rule, e.g., **vfs.fs.discovery[foo]**, **vfs.fs.discovery[bar]**, etc.

Parameter	Mandatory	Range	Default	Description
BufferSend	no	1-3600	5	The time interval in seconds which determines how often values are sent from the buffer to Zabbix server. Note, that if the buffer is full, the data will be sent sooner.
BufferSize	no	2-65535	100	Maximum number of values in a memory buffer. The agent will send all collected data to Zabbix server or proxy if the buffer is full. This parameter should only be used if persistent buffer is disabled (*EnablePersistentBuffer=0*).
ControlSocket	no		\\.\pipe\agent.sock	The control socket, used to send runtime commands with '-R' option.
DebugLevel	no	0-5	3	Specifies debug level: 0 - basic information about starting and stopping of Zabbix processes 1 - critical information 2 - error information 3 - warnings 4 - for debugging (produces lots of information) 5 - extended debugging (produces even more information)
EnablePersistentBuffer	no	0-1	0	Enable usage of local persistent storage. 0 - disabled 1 - enabled If persistent storage is disabled, the memory buffer will be used.
HostInterface	no	0-255 characters		Optional parameter that defines host interface. Host interface is used at host autoregistration process. An agent will issue an error and not start if the value is over the limit of 255 characters. If not defined, value will be acquired from HostInterfaceItem. Supported since Zabbix 4.4.0.

Parameter	Mandatory	Range	Default	Description
HostInterfaceItem	no			Optional parameter that defines an item used for getting host interface. Host interface is used at host autoregistration process. During an autoregistration request an agent will log a warning message if the value returned by specified item is over limit of 255 characters. This option is only used when HostInterface is not defined. Supported since Zabbix 4.4.0.
HostMetadata	no	0-255 characters		Optional parameter that defines host metadata. Host metadata is used at host autoregistration process. An agent will issue an error and not start if the specified value is over the limit or a non-UTF-8 string. If not defined, the value will be acquired from HostMetadataItem.
HostMetadataItem	no			Optional parameter that defines an item used for getting host metadata. Host metadata item value is retrieved on each autoregistration attempt for host autoregistration process. During an autoregistration request an agent will log a warning message if the value returned by the specified item is over the limit of 255 characters. This option is only used when HostMetadata is not defined. Supports UserParameters and aliases. Supports *system.run[]* regardless of *EnableRemoteCommands* value. The value returned by the item must be a UTF-8 string otherwise it will be ignored.
Hostname	no		set by HostnameItem	Unique, case sensitive hostname. Required for active checks and must match hostname as configured on the server. Allowed characters: alphanumeric, '.', ' ', '_' and '-'. Maximum length: 128

Parameter	Mandatory	Range	Default	Description
HostnameItem	no		system.hostname	Item used for generating Hostname if it is not defined. Ignored if Hostname is defined. Does not support UserParameters or aliases, but does support *system.run[]* regardless of *EnableRemoteCommands* value.
Include	no			You may include individual files or all files in a directory in the configuration file. During installation Zabbix will create the include directory in /usr/local/etc, unless modified during the compile time. To only include relevant files in the specified directory, the asterisk wildcard character is supported for pattern matching. For example: `/absolute/path/to/config/files/*` See special notes about limitations.
ListenIP	no		0.0.0.0	List of comma-delimited IP addresses that the agent should listen on. The first IP address is sent to Zabbix server, if connecting to it, to retrieve the list of active checks.
ListenPort	no	1024-32767	10050	Agent will listen on this port for connections from the server.
LogFile	yes, if LogType is set to *file*, otherwise no		c:\zabbix_agentd.log	Log file name if LogType is 'file'.
LogFileSize	no	0-1024	1	Maximum size of log file in MB. 0 - disable automatic log rotation. *Note*: If the log file size limit is reached and file rotation fails, for whatever reason, the existing log file is truncated and started anew.
LogType	no		file	Specifies where log messages are written to: *system* - syslog, *file* - file specified by LogFile parameter, *console* - standard output.

Parameter	Mandatory	Range	Default	Description
PersistentBufferFile	no			The file, where Zabbix Agent2 should keep SQLite database. Must be a full filename. This parameter is only used if persistent buffer is enabled (*EnablePersistentBuffer=1*).
PersistentBufferPeriod	no	1m-365d	1h	The time period for which data should be stored, when there is no connection to the server or proxy. Older data will be lost. Log data will be preserved. This parameter is only used if persistent buffer is enabled (*EnablePersistentBuffer=1*).
Plugins	no			A plugin can have one or more plugin-specific configuration parameters in format: Plugins.<PluginName>.<Parameter1>=< Plugins.<PluginName>.<Parameter2>=<
Plugins.<PluginName>.KeepAlive	no	60-900	300	The maximum time of waiting (in seconds) before unused plugin connections are closed. Example: `Plugins.Memcached.KeepAlive=200` Supported for the following plugins: // MySQL, Redis, PostgreSQL//.
Plugins.<PluginName>.Sessions.<sessionName>.<sessionParameter>	no			Named session parameters. **<sessionName>** - name of the instance to be monitored. **<sessionParameter>** - parameter name (supported names: *Uri*, *Username*, *Password*). Example: `Plugins.Postgres.Sessions.Postgr` `Plugins.Postgres.Sessions.Postgr` `Plugins.Postgres.Sessions.Postgr` `Plugins.Postgres.Sessions.Postgr` Supported for the following plugins: *MySQL, Redis, PostgreSQL*.

Parameter	Mandatory	Range	Default	Description
	Plugins.so.<PluginName>.Timeout	1-30	Global timeout	The maximum time of waiting (in seconds) for a plugin request to complete. Supported for the following plugins: // MySQL, Redis, PostgreSQL. | ^ |*Plugins.Log.MaxLinesPerSecond* | *no* | *1-1000* |*20* |*Maximum number of new lines the agent will send per second to Zabbix server or proxy when processing 'log' and 'logrt' checks. The provided value will be overridden by the parameter 'maxlines', provided in 'log' or 'logrt' item key. *Note//: Zabbix will process 10 times more new lines than set in *MaxLinesPerSecond* to seek the required string in log items. This parameter is supported since 4.4.2 and replaces MaxLinesPerSecond.
	Plugins.so.Mysql.Password			A password to send to a protected MySQL server.

	Plugins.so.Mysql.Uri		tcp://localhost:3306	MySQL connection string.
				Should not include embedded credentials (they will be ignored).
				Must match the URI format.
				Must contain a scheme (supported: `tcp`, `unix`).
				A port can be omitted (default=3306).
				Examples:
				`tcp://localhost:3306`
				`tcp://localhost`
				`unix:/var/run/mysql.sock`

	Plugins.so.Mysql.User		root	A username to send to a protected MySQL server.
	Plugins.so.Postgres.Database		postgres	A database name to be used for PostgreSQL.
	Plugins.so.Postgres.Host		localhost	IP address or DNS name of the host used for PostgreSQL. Examples: `localhost`, `192.168.1.1`
	Plugins.so.Postgres.Password		postgres	A password to send to a protected PostgreSQL server.
	Plugins.so.Postgres.Port		5432	A port to be used for PostgreSQL.
	Plugins.so.Postgres.User		postgres	A username to send to a protected PostgreSQL server.

Parameter	Mandatory	Range	Default	Description

	Plugins.Redis.Uri		tcp://localhost:6379	Redis connection string.
				A port can be omitted (default=6379).
				Should not include embedded credentials (they will be ignored).
				Must match the URI format.
				Must contain a scheme (supported: `tcp`, `unix`).
				Examples:
				`tcp://localhost:6379`
				`tcp://localhost`
				`unix:/var/run/redis.sock`

	Plugins.SystemRun.EnableRemoteCommands		0	Whether remote commands from Zabbix server are allowed. 0 - not allowed 1 - allowed This parameter is supported since 4.4.2 and replaces EnableRemoteCommands.
	Plugins.SystemRun.LogRemoteCommands		0	Enable logging of executed shell commands as warnings. 0 - disabled 1 - enabled Commands will be logged only if executed remotely. Log entries will not be created if system.run[] is launched locally by HostMetadataItem, HostInterfaceItem or HostnameItem parameters. This parameter is supported since 4.4.2 and replaces LogRemoteCommands.
	Plugins.WindowsEventlog.MaxLinesPerSecond	1-1000	20	Maximum number of new lines the agent will send per second to Zabbix Server or Proxy processing ’eventlog’ checks. The provided value will be overridden by the parameter ’maxlines’, provided in ’eventlog’ item keys.
RefreshActiveChecks	no	60-3600	120	How often the list of active checks is refreshed, in seconds. Note that after failing to refresh active checks the next refresh will be attempted after 60 seconds.

Parameter	Mandatory	Range	Default	Description
Server	yes			List of comma-delimited IP addresses, optionally in CIDR notation, or DNS names of Zabbix servers and Zabbix proxies. Incoming connections will be accepted only from the hosts listed here. If IPv6 support is enabled then '127.0.0.1', '::ffff:127.0.0.1' are treated equally and '::/0' will allow any IPv4 or IPv6 address. '0.0.0.0/0' can be used to allow any IPv4 address. Example: Server=127.0.0.1,192.168.1.0/24,::1,2001 Spaces are allowed.
ServerActive	no			List of comma-delimited IP:port (or DNS name:port) pairs of Zabbix servers and Zabbix proxies for active checks. Multiple addresses can be provided to use several independent Zabbix servers in parallel. Spaces are allowed. If port is not specified, default port is used. IPv6 addresses must be enclosed in square brackets if port for that host is specified. If port is not specified, square brackets for IPv6 addresses are optional. If this parameter is not specified, active checks are disabled. Example: ServerActive=127.0.0.1:20051,zabbix.example.com
SourceIP	no			Source IP address for: - outgoing connections to Zabbix server or Zabbix proxy; - making connections while executing some items (web.page.get, net.tcp.port, etc.)
StatusPort	no	1024-32767		If set, agent will listen on this port for HTTP status requests (http://localhost:<port>/status).
Timeout	no	1-30	3	Spend no more than Timeout seconds on processing.

Parameter	Mandatory	Range	Default	Description
TLSAccept	yes, if TLS certificate or PSK parameters are defined (even for *unencrypted* connection), otherwise no			What incoming connections to accept. Used for a passive checks. Multiple values can be specified, separated by comma: *unencrypted* - accept connections without encryption (default) *psk* - accept connections with TLS and a pre-shared key (PSK) *cert* - accept connections with TLS and a certificate
TLSCAFile	no			Full pathname of a file containing the top-level CA(s) certificates for peer certificate verification, used for encrypted communications between Zabbix components.
TLSCertFile	no			Full pathname of a file containing the agent certificate or certificate chain, used for encrypted communications with Zabbix components.
TLSConnect	yes, if TLS certificate or PSK parameters are defined (even for *unencrypted* connection), otherwise no			How the agent should connect to Zabbix server or proxy. Used for active checks. Only one value can be specified: *unencrypted* - connect without encryption (default) *psk* - connect using TLS and a pre-shared key (PSK) *cert* - connect using TLS and a certificate
TLSCRLFile	no			Full pathname of a file containing revoked certificates. This parameter is used for encrypted communications with Zabbix components.
TLSKeyFile	no			Full pathname of a file containing the agent private key used for encrypted communications with Zabbix components.
TLSPSKFile	no			Full pathname of a file containing the agent pre-shared key used for encrypted communications with Zabbix components.
TLSPSKIdentity	no			Pre-shared key identity string, used for encrypted communications with Zabbix server.
TLSServerCertIssuer	no			Allowed server (proxy) certificate issuer.
TLSServerCertSubject	no			Allowed server (proxy) certificate subject.

Parameter	Mandatory	Range	Default	Description
UnsafeUserParameters	no	0,1	0	Allow all characters to be passed in arguments to user-defined parameters. The following characters are not allowed: \ ' " ` * ? [ ] { } ~ $! & ; ( ) > | # @ Additionally, newline characters are not allowed.
UserParameter	no			User-defined parameter to monitor. There can be several user-defined parameters. Format: UserParameter=<key>,<shell command> Note that the shell command must not return empty string or EOL only. Example: UserParameter=system.test,who|wc -l

6 Zabbix Java gateway

If you use `startup.sh` and `shutdown.sh` scripts for starting Zabbix Java gateway, then you can specify the necessary configuration parameters in the `settings.sh` file. The startup and shutdown scripts source the settings file and take care of converting shell variables (listed in the first column) to Java properties (listed in the second column).

If you start Zabbix Java gateway manually by running `java` directly, then you specify the corresponding Java properties on the command line.

Variable	Property	Mandatory	Range	Default	Description
LISTEN_IP	zabbix.listenIP	no		0.0.0.0	IP address to listen on.
LISTEN_PORT	zabbix.listenPort	no	1024-32767	10052	Port to listen on.
PID_FILE	zabbix.pidFile	no		/tmp/zabbix_java.pid	Name of PID file. If omitted, Zabbix Java Gateway is started as a console application.
START_POLLERS	zabbix.startPollers	no	1-1000	5	Number of worker threads to start.
TIMEOUT	zabbix.timeout	no	1-30	3	How long to wait for network operations. This parameter is supported since Zabbix 2.0.15, 2.2.10 and 2.4.5.

Warning:
Port 10052 is not IANA registered.

7 Special notes on "Include" parameter

If an `Include` parameter is used for including a file, the file must be readable.

If an `Include` parameter is used for including a directory:

- All files in the directory must be readable.
- No particular order of inclusion should be assumed (e.g. files are not included in alphabetical order)

- All files in the directory are included into configuration.
- Beware of file backup copies automatically created by some text editors. For example, if editing the '

If an Include parameter is used for including files using a pattern:

- All files matching the pattern must be readable.
- No particular order of inclusion should be assumed (e.g. files are not included in alphabetical order)

4 Protocols

1 Server-proxy data exchange protocol

Overview

Server - proxy data exchange is based on JSON format.

Request and response messages must begin with header and data length.

Passive proxy

Proxy config request

The proxy config request is sent by server to provide proxy configuration data. This request is sent every ProxyConfigFrequency (server configuration parameter) seconds.

name	value type	description
server→proxy:		
request	*string*	'proxy config'
<table>	*object*	one or more objects with <table> data
fields	*array*	array of field names
-	*string*	field name
data	*array*	array of rows
-	*array*	array of columns
-	*string,number*	column value with type depending on column type in database schema
proxy→server:		
response	*string*	the request success information ('success' or 'failed')
version	*string*	the proxy version (<major>.<minor>.<build>)

Example:

server→proxy:

```
{
    "request": "proxy config",
    "globalmacro":{
        "fields":[
            "globalmacroid",
            "macro",
            "value"
        ],
        "data":[
            [
                2,
                "{$SNMP_COMMUNITY}",
                "public"
            ]
        ]
    },
    "hosts":{
        "fields":[
```

```
            "hostid",
            "host",
            "status",
            "ipmi_authtype",
            "ipmi_privilege",
            "ipmi_username",
            "ipmi_password",
            "name",
            "tls_connect",
            "tls_accept",
            "tls_issuer",
            "tls_subject",
            "tls_psk_identity",
            "tls_psk"
        ],
        "data":[
            [
                10001,
                "Template OS Linux",
                3,
                -1,
                2,
                "",
                "",
                "Template OS Linux",
                1,
                1,
                "",
                "",
                "",
                "",
                ""
            ],
            [
                10050,
                "Template App Zabbix Agent",
                3,
                -1,
                2,
                "",
                "",
                "Template App Zabbix Agent",
                1,
                1,
                "",
                "",
                "",
                "",
                ""
            ],
            [
                10105,
                "Logger",
                0,
                -1,
                2,
                "",
                "",
                "Logger",
                1,
                1,
                "",
                "",
                "",
```

```
                ""
            ]
        ]
    },
    "interface":{
        "fields":[
            "interfaceid",
            "hostid",
            "main",
            "type",
            "useip",
            "ip",
            "dns",
            "port",
            "bulk"
        ],
        "data":[
            [
                2,
                10105,
                1,
                1,
                1,
                "127.0.0.1",
                "",
                "10050",
                1
            ]
        ]
    },
    ...
}
```

proxy→server:

```
{
  "response": "success",
  "version": "3.4.0"
}
```

Proxy request

The `proxy data` request is used to obtain host availability, historical, discovery and autoregistration data from proxy. This request is sent every `ProxyDataFrequency` (server configuration parameter) seconds.

name	value type	description
server→proxy:		
request	*string*	'proxy data'
proxy→server:		
session	*string*	data session token
host availability	*array*	*(optional)* array of host availability data objects
hostid	*number*	host identifier
available	*number*	Zabbix agent availability **0**, *HOST_AVAILABLE_UNKNOWN* - unknown **1**, *HOST_AVAILABLE_TRUE* - available **2**, *HOST_AVAILABLE_FALSE* - unavailable
error	*string*	Zabbix agent error message or empty string
snmp_available	*number*	SNMP agent availability **0**, *HOST_AVAILABLE_UNKNOWN* - unknown **1**, *HOST_AVAILABLE_TRUE* - available **2**, *HOST_AVAILABLE_FALSE* - unavailable
snmp_error	*string*	SNMP agent error message or empty string

name	value type	description
	ipmi_available *number*	IPMI agent availability **0**, *HOST_AVAILABLE_UNKNOWN* - unknown **1**, *HOST_AVAILABLE_TRUE* - available **2**, *HOST_AVAILABLE_FALSE* - unavailable
	ipmi_error *string*	IPMI agent error message or empty string
	jmx_available *number*	JMX agent availability **0**, *HOST_AVAILABLE_UNKNOWN* - unknown **1**, *HOST_AVAILABLE_TRUE* - available **2**, *HOST_AVAILABLE_FALSE* - unavailable
	jmx_error *string*	JMX agent error message or empty string
history data	*array*	*(optional)* array of history data objects
	itemid *number*	item identifier
	clock *number*	item value timestamp (seconds)
	ns *number*	item value timestamp (nanoseconds)
	value *string*	*(optional)* item value
	id *number*	value identifier (ascending counter, unique within one data session)
	timestamp *number*	*(optional)* timestamp of log type items
	source *string*	*(optional)* eventlog item source value
	severity *number*	*(optional)* eventlog item severity value
	eventid *number*	*(optional)* eventlog item eventid value
	state *string*	*(optional)* item state **0**, *ITEM_STATE_NORMAL* **1**, *ITEM_STATE_NOTSUPPORTED*
	lastlogsize *number*	*(optional)* last log size of log type items
	mtime *number*	*(optional)* modify time of log type items
discovery data	*array*	*(optional)* array of discovery data objects
	clock *number*	the discovery data timestamp
	druleid *number*	the discovery rule identifier
	dcheckid *number*	the discovery check indentifier or null for discovery rule data
	type *number*	the discovery check type: **-1** discovery rule data **0**, *SVC_SSH* - SSH service check **1**, *SVC_LDAP* - LDAP service check **2**, *SVC_SMTP* - SMTP service check **3**, *SVC_FTP* - FTP service check **4**, *SVC_HTTP* - HTTP service check **5**, *SVC_POP* - POP service check **6**, *SVC_NNTP* - NNTP service check **7**, *SVC_IMAP* - IMAP service check **8**, *SVC_TCP* - TCP port availability check **9**, *SVC_AGENT* - Zabbix agent **10**, *SVC_SNMPv1* - SNMPv1 agent **11**, *SVC_SNMPv2* - SNMPv2 agent **12**, *SVC_ICMPPING* - ICMP ping **13**, *SVC_SNMPv3* - SNMPv3 agent **14**, *SVC_HTTPS* - HTTPS service check **15**, *SVC_TELNET* - Telnet availability check
	ip *string*	the host IP address
	dns *string*	the host DNS name
	port *number*	*(optional)* service port number
	key_ *string*	*(optional)* the item key for discovery check of type **9** *SVC_AGENT*
	value *string*	*(optional)* value received from the service, can be empty for most of services

name		value type	description
	status	*number*	*(optional)* service status: **0**, *DOBJECT_STATUS_UP* - Service UP **1**, *DOBJECT_STATUS_DOWN* - Service DOWN
auto registration		*array*	*(optional)* array of auto registration data objects
	clock	*number*	the auto registration data timestamp
	host	*string*	the host name
	ip	*string*	*(optional)* the host IP address
	dns	*string*	*(optional)* the resolved DNS name from IP address
	port	*string*	*(optional)* the host port
	host_metadata	*string*	*(optional)* the host metadata sent by agent (based on HostMetadata or HostMetadataItem agent configuration parameter)
tasks		*array*	*(optional)* array of tasks
	type	*number*	the task type: **0**, *ZBX_TM_TASK_PROCESS_REMOTE_COMMAND_RESULT* - remote command result
	status	*number*	the remote command execution status: **0**, *ZBX_TM_REMOTE_COMMAND_COMPLETED* - the remote command completed successfully **1**, *ZBX_TM_REMOTE_COMMAND_FAILED* - the remote command failed
	error	*string*	*(optional)* the error message
	parent_taskid	*string*	the parent task id
more		*number*	*(optional)* 1 - there are more history data to send
clock		*number*	*(optional)* data transfer timestamp (seconds)
ns		*number*	*(optional)* data transfer timestamp (nanoseconds)
version		*string*	the proxy version (<major>.<minor>.<build>)
server→proxy:			
response		*string*	the request success information (’success’ or ’failed’)
tasks		*array*	*(optional)* array of tasks
	type	*number*	the task type: **1**, *ZBX_TM_TASK_PROCESS_REMOTE_COMMAND* - remote command
	clock	*number*	the task creation time
	ttl	*number*	the time in seconds after which task expires
	command_type	*number*	the remote command type: **0**, *ZBX_SCRIPT_TYPE_CUSTOM_SCRIPT* - use custom script **1**, *ZBX_SCRIPT_TYPE_IPMI* - use IPMI **2**, *ZBX_SCRIPT_TYPE_SSH* - use SSH **3**, *ZBX_SCRIPT_TYPE_TELNET* - use Telnet **4**, *ZBX_SCRIPT_TYPE_GLOBAL_SCRIPT* - use global script (currently functionally equivalent to custom script)
	command	*string*	the remote command to execute

name	value type	description
execute_on	*number*	the execution target for custom scripts: **0**, *ZBX_SCRIPT_EXECUTE_ON_AGENT* - execute script on agent **1**, *ZBX_SCRIPT_EXECUTE_ON_SERVER* - execute script on server **2**, *ZBX_SCRIPT_EXECUTE_ON_PROXY* - execute script on proxy
port	*number*	*(optional)* the port for telnet and ssh commands
authtype	*number*	*(optional)* the authentication type for ssh commands
username	*string*	*(optional)* the user name for telnet and ssh commands
password	*string*	*(optional)* the password for telnet and ssh commands
publickey	*string*	*(optional)* the public key for ssh commands
privatekey	*string*	*(optional)* the private key for ssh commands
parent_taskid	*number*	the parent task id
hostid	*number*	target hostid

Example:

server→proxy:

```
{
  "request": "proxy data"
}
```

proxy→server:

```
{
    "session": "12345678901234567890123456789012"
    "host availability":[
        {
            "hostid":10106,
            "available":1,
            "error":"",
            "snmp_available":0,
            "snmp_error":"",
            "ipmi_available":0,
            "ipmi_error":"",
            "jmx_available":0,
            "jmx_error":""
        },
        {
            "hostid":10107,
            "available":1,
            "error":"",
            "snmp_available":0,
            "snmp_error":"",
            "ipmi_available":0,
            "ipmi_error":"",
            "jmx_available":0,
            "jmx_error":""
        }
    ],
    "history data":[
        {
            "itemid":"12345",
            "clock":1478609647,
            "ns":332510044,
            "value":"52956612",
```

```
            "id": 1
        },
        {
            "itemid":"12346",
            "clock":1478609647,
            "ns":330690279,
            "state":1,
            "value":"Cannot find information for this network interface in /proc/net/dev.",
            "id": 2
        }
    ],
    "discovery data":[
        {
            "clock":1478608764,
            "drule":2,
            "dcheck":3,
            "type":12,
            "ip":"10.3.0.10",
            "dns":"vdebian",
            "status":1
        },
        {
            "clock":1478608764,
            "drule":2,
            "dcheck":null,
            "type":-1,
            "ip":"10.3.0.10",
            "dns":"vdebian",
            "status":1
        }
    ],
    "auto registration":[
        {
            "clock":1478608371,
            "host":"Logger1",
            "ip":"10.3.0.1",
            "dns":"localhost",
            "port":"10050"
        },
        {
            "clock":1478608381,
            "host":"Logger2",
            "ip":"10.3.0.2",
            "dns":"localhost",
            "port":"10050"
        }
    ],
    "tasks":[
        {
            "type": 0,
            "status": 0,
            "parent_taskid": 10
        },
        {
            "type": 0,
            "status": 1,
            "error": "No permissions to execute task.",
            "parent_taskid": 20
        }
    ],
    "version":"3.4.0"
}
```

server→proxy:


```
{
  "response": "success",
  "tasks":[
      {
         "type": 1,
         "clock": 1478608371,
         "ttl": 600,
         "commandtype": 2,
         "command": "restart_service1.sh",
         "execute_on": 2,
         "port": 80,
         "authtype": 0,
         "username": "userA",
         "password": "password1",
         "publickey": "MIGfMA0GCSqGSIb3DQEBAQUAA4GNADCBiQKBgQCqGKukO1De7zhZj6+H0qtjTkVxwTCpvKe",
         "privatekey": "lsuusFncCzWBQ7RKNUSesmQRMSGkVb1/3j+skZ6UtW+5u09lHNsj6tQ5QCqGKukO1De7zhd",
         "parent_taskid": 10,
         "hostid": 10070
      },
      {
         "type": 1,
         "clock": 1478608381,
         "ttl": 600,
         "commandtype": 1,
         "command": "restart_service2.sh",
         "execute_on": 0,
         "authtype": 0,
         "username": "",
         "password": "",
         "publickey": "",
         "privatekey": "",
         "parent_taskid": 20,
         "hostid": 10084
      }
  ]
}
```


Active proxy

Proxy heartbeat request

The `proxy heartbeat` request is sent by proxy to report that proxy is running. This request is sent every `HeartbeatFrequency` (proxy configuration parameter) seconds.

name	value type	description
proxy→server:		
request	*string*	'proxy heartbeat'
host	*string*	the proxy name
version	*string*	the proxy version (<major>.<minor>.<build>)
server→proxy:		
response	*string*	the request success information ('success' or 'failed')

proxy→server:


```
{
   "request": "proxy heartbeat",
   "host": "Proxy #12",
   "version": "3.4.0"
}
```


server→proxy:

```
{
  "response": "success"
}
```

Proxy config request

The `proxy config` request is sent by proxy to obtain proxy configuration data. This request is sent every `ConfigFrequency` (proxy configuration parameter) seconds.

name			value type	description
proxy→server:				
request			*string*	'proxy config'
host			*string*	proxy name
version			*string*	the proxy version (<major>.<minor>.<build>)
server→proxy:				
request			*string*	'proxy config'
<table>			*object*	one or more objects with <table> data
	fields		*array*	array of field names
		-	*string*	field name
	data		*array*	array of rows
		-	*array*	array of columns
			- *string,number*	column value with type depending on column type in database schema
proxy→server:				
response			*string*	the request success information ('success' or 'failed')

Example:

proxy→server:

```
{
  "request": "proxy config",
  "host": "Proxy #12",
  "version":"3.4.0"
}
```

server→proxy:

```
{
    "globalmacro":{
        "fields":[
            "globalmacroid",
            "macro",
            "value"
        ],
        "data":[
            [
                2,
                "{$SNMP_COMMUNITY}",
                "public"
            ]
        ]
    },
    "hosts":{
        "fields":[
            "hostid",
            "host",
            "status",
            "ipmi_authtype",
            "ipmi_privilege",
            "ipmi_username",
            "ipmi_password",
```

```
            "name",
            "tls_connect",
            "tls_accept",
            "tls_issuer",
            "tls_subject",
            "tls_psk_identity",
            "tls_psk"
        ],
        "data":[
            [
                10001,
                "Template OS Linux",
                3,
                -1,
                2,
                "",
                "",
                "Template OS Linux",
                1,
                1,
                "",
                "",
                "",
                ""
            ],
            [
                10050,
                "Template App Zabbix Agent",
                3,
                -1,
                2,
                "",
                "",
                "Template App Zabbix Agent",
                1,
                1,
                "",
                "",
                "",
                ""
            ],
            [
                10105,
                "Logger",
                0,
                -1,
                2,
                "",
                "",
                "Logger",
                1,
                1,
                "",
                "",
                "",
                ""
            ]
        ]
    },
    "interface":{
        "fields":[
            "interfaceid",
```

```
            "hostid",
            "main",
            "type",
            "useip",
            "ip",
            "dns",
            "port",
            "bulk"
        ],
        "data":[
            [
                2,
                10105,
                1,
                1,
                1,
                "127.0.0.1",
                "",
                "10050",
                1
            ]
        ]
    },
    ...
}
```

proxy→server:

```
{
  "response": "success"
}
```

Proxy data request

The `proxy data` request is sent by proxy to provide host availability, history, discovery and auto registation data. This request is sent every `DataSenderFrequency` (proxy configuration parameter) seconds.

name	value type	description
proxy→server:		
request	*string*	'proxy data'
host	*string*	the proxy name
session	*string*	data session token
host availability	*array*	*(optional)* array of host availability data objects
hostid	*number*	host identifier
available	*number*	Zabbix agent availability
		0, *HOST_AVAILABLE_UNKNOWN* - unknown **1**, *HOST_AVAILABLE_TRUE* - available **2**, *HOST_AVAILABLE_FALSE* - unavailable
error	*string*	Zabbix agent error message or empty string
snmp_available	*number*	SNMP agent availability
		0, *HOST_AVAILABLE_UNKNOWN* - unknown **1**, *HOST_AVAILABLE_TRUE* - available **2**, *HOST_AVAILABLE_FALSE* - unavailable
snmp_error	*string*	SNMP agent error message or empty string
ipmi_available	*number*	IPMI agent availability
		0, *HOST_AVAILABLE_UNKNOWN* - unknown **1**, *HOST_AVAILABLE_TRUE* - available **2**, *HOST_AVAILABLE_FALSE* - unavailable
ipmi_error	*string*	IPMI agent error message or empty string

name	value type	description
	jmx_available *number*	JMX agent availability **0**, *HOST_AVAILABLE_UNKNOWN* - unknown **1**, *HOST_AVAILABLE_TRUE* - available **2**, *HOST_AVAILABLE_FALSE* - unavailable
	jmx_error *string*	JMX agent error message or empty string
history data	*array*	*(optional)* array of history data objects
	itemid *number*	item identifier
	clock *number*	item value timestamp (seconds)
	ns *number*	item value timestamp (nanoseconds)
	value *string*	*(optional)* item value
	id *number*	value identifier (ascending counter, unique within one data session)
	timestamp *number*	*(optional)* timestamp of log type items
	source *string*	*(optional)* eventlog item source value
	severity *number*	*(optional)* eventlog item severity value
	eventid *number*	*(optional)* eventlog item eventid value
	state *string*	*(optional)* item state **0**, *ITEM_STATE_NORMAL* **1**, *ITEM_STATE_NOTSUPPORTED*
	lastlogsize *number*	*(optional)* last log size of log type items
	mtime *number*	*(optional)* modify time of log type items
discovery data	*array*	*(optional)* array of discovery data objects
	clock *number*	the discovery data timestamp
	druleid *number*	the discovery rule identifier
	dcheckid *number*	the discovery check indentifier or null for discovery rule data
	type *number*	the discovery check type: **-1** discovery rule data **0**, *SVC_SSH* - SSH service check **1**, *SVC_LDAP* - LDAP service check **2**, *SVC_SMTP* - SMTP service check **3**, *SVC_FTP* - FTP service check **4**, *SVC_HTTP* - HTTP service check **5**, *SVC_POP* - POP service check **6**, *SVC_NNTP* - NNTP service check **7**, *SVC_IMAP* - IMAP service check **8**, *SVC_TCP* - TCP port availability check **9**, *SVC_AGENT* - Zabbix agent **10**, *SVC_SNMPv1* - SNMPv1 agent **11**, *SVC_SNMPv2* - SNMPv2 agent **12**, *SVC_ICMPPING* - ICMP ping **13**, *SVC_SNMPv3* - SNMPv3 agent **14**, *SVC_HTTPS* - HTTPS service check **15**, *SVC_TELNET* - Telnet availability check
	ip *string*	the host IP address
	dns *string*	the host DNS name
	port *number*	*(optional)* service port number
	key_ *string*	*(optional)* the item key for discovery check of type **9** *SVC_AGENT*
	value *string*	*(optional)* value received from the service, can be empty for most of services
	status *number*	*(optional)* service status: **0**, *DOBJECT_STATUS_UP* - Service UP **1**, *DOBJECT_STATUS_DOWN* - Service DOWN
auto registration	*array*	*(optional)* array of auto registration data objects
	clock *number*	the auto registration data timestamp
	host *string*	the host name

name		value type	description
	ip	*string*	*(optional)* the host IP address
	dns	*string*	*(optional)* the resolved DNS name from IP address
	port	*string*	*(optional)* the host port
	host_metadata	*string*	*(optional)* the host metadata sent by agent (based on HostMetadata or HostMetadataItem agent configuration parameter)
tasks		*array*	*(optional)* array of tasks
	type	*number*	the task type: **0**, *ZBX_TM_TASK_PROCESS_REMOTE_COMMAND_RESULT* - remote command result
	status	*number*	the remote command execution status: **0**, *ZBX_TM_REMOTE_COMMAND_COMPLETED* - the remote command completed successfully **1**, *ZBX_TM_REMOTE_COMMAND_FAILED* - the remote command failed
	error	*string*	*(optional)* the error message
	parent_taskid	*string*	the parent task id
more		*number*	*(optional)* 1 - there are more history data to send
clock		*number*	*(optional)* data transfer timestamp (seconds)
ns		*number*	*(optional)* data transfer timestamp (nanoseconds)
version		*string*	the proxy version (<major>.<minor>.<build>)
server→proxy:			
response		*string*	the request success information (’success’ or ’failed’)
tasks		*array*	*(optional)* array of tasks
	type	*number*	the task type: **1**, *ZBX_TM_TASK_PROCESS_REMOTE_COMMAND* - remote command
	clock	*number*	the task creation time
	ttl	*number*	the time in seconds after which task expires
	command_type	*number*	the remote command type: **0**, *ZBX_SCRIPT_TYPE_CUSTOM_SCRIPT* - use custom script **1**, *ZBX_SCRIPT_TYPE_IPMI* - use IPMI **2**, *ZBX_SCRIPT_TYPE_SSH* - use SSH **3**, *ZBX_SCRIPT_TYPE_TELNET* - use Telnet **4**, *ZBX_SCRIPT_TYPE_GLOBAL_SCRIPT* - use global script (currently functionally equivalent to custom script)
	command	*string*	the remote command to execute
	execute_on	*number*	the execution target for custom scripts: **0**, *ZBX_SCRIPT_EXECUTE_ON_AGENT* - execute script on agent **1**, *ZBX_SCRIPT_EXECUTE_ON_SERVER* - execute script on server **2**, *ZBX_SCRIPT_EXECUTE_ON_PROXY* - execute script on proxy
	port	*number*	*(optional)* the port for telnet and ssh commands
	authtype	*number*	*(optional)* the authentication type for ssh commands
	username	*string*	*(optional)* the user name for telnet and ssh commands

name	value type	description
	password *string*	*(optional)* the password for telnet and ssh commands
	publickey *string*	*(optional)* the public key for ssh commands
	privatekey *string*	*(optional)* the private key for ssh commands
	parent_taskid *number*	the parent task id
	hostid *number*	target hostid

Example:

proxy→server:

```
{
    "request": "proxy data",
    "host": "Proxy #12",
    "session": "12345678901234567890123456789012",
    "host availability":[
        {
            "hostid":10106,
            "available":1,
            "error":"",
            "snmp_available":0,
            "snmp_error":"",
            "ipmi_available":0,
            "ipmi_error":"",
            "jmx_available":0,
            "jmx_error":""
        },
        {
            "hostid":10107,
            "available":1,
            "error":"",
            "snmp_available":0,
            "snmp_error":"",
            "ipmi_available":0,
            "ipmi_error":"",
            "jmx_available":0,
            "jmx_error":""
        }
    ],
    "history data":[
        {
            "itemid":"12345",
            "clock":1478609647,
            "ns":332510044,
            "value":"52956612",
            "id": 1
        },
        {
            "itemid":"12346",
            "clock":1478609647,
            "ns":330690279,
            "state":1,
            "value":"Cannot find information for this network interface in /proc/net/dev.",
            "id": 2
        }
    ],
    "discovery data":[
        {
            "clock":1478608764,
            "drule":2,
            "dcheck":3,
            "type":12,
```

```
            "ip":"10.3.0.10",
            "dns":"vdebian",
            "status":1
        },
        {
            "clock":1478608764,
            "drule":2,
            "dcheck":null,
            "type":-1,
            "ip":"10.3.0.10",
            "dns":"vdebian",
            "status":1
        }
    ],
    "auto registration":[
        {
            "clock":1478608371,
            "host":"Logger1",
            "ip":"10.3.0.1",
            "dns":"localhost",
            "port":"10050"
        },
        {
            "clock":1478608381,
            "host":"Logger2",
            "ip":"10.3.0.2",
            "dns":"localhost",
            "port":"10050"
        }
    ],
    "tasks":[
        {
            "type": 2,
            "clock":1478608371,
            "ttl": 600,
            "commandtype": 2,
            "command": "restart_service1.sh",
            "execute_on": 2,
            "port": 80,
            "authtype": 0,
            "username": "userA",
            "password": "password1",
            "publickey": "MIGfMA0GCSqGSIb3DQEBAQUAA4GNADCBiQKBgQCqGKukO1De7zhZj6+H0qtjTkVxwTCpvKe",
            "privatekey": "lsuusFncCzWBQ7RKNUSesmQRMSGkVb1/3j+skZ6UtW+5u09lHNsj6tQ5QCqGKukO1De7zhd",
            "parent_taskid": 10,
            "hostid": 10070
        },
        {
            "type": 2,
            "clock":1478608381,
            "ttl": 600,
            "commandtype": 1,
            "command": "restart_service2.sh",
            "execute_on": 0,
            "authtype": 0,
            "username": "",
            "password": "",
            "publickey": "",
            "privatekey": "",
            "parent_taskid": 20,
            "hostid": 10084
        }
```

```
    ],
    "tasks":[
        {
            "type": 0,
            "status": 0,
            "parent_taskid": 10
        },
        {
            "type": 0,
            "status": 1,
            "error": "No permissions to execute task.",
            "parent_taskid": 20
        }
    ],
    "version":"3.4.0"
}
```

server→proxy:

```
{
  "response": "success",
  "tasks":[
      {
         "type": 1,
         "clock": 1478608371,
         "ttl": 600,
         "commandtype": 2,
         "command": "restart_service1.sh",
         "execute_on": 2,
         "port": 80,
         "authtype": 0,
         "username": "userA",
         "password": "password1",
         "publickey": "MIGfMA0GCSqGSIb3DQEBAQUAA4GNADCBiQKBgQCqGKukO1De7zhZj6+H0qtjTkVxwTCpvKe",
         "privatekey": "lsuusFncCzWBQ7RKNUSesmQRMSGkVb1/3j+skZ6UtW+5u09lHNsj6tQ5QCqGKukO1De7zhd",
         "parent_taskid": 10,
         "hostid": 10070
      },
      {
         "type": 1,
         "clock": 1478608381,
         "ttl": 600,
         "commandtype": 1,
         "command": "restart_service2.sh",
         "execute_on": 0,
         "authtype": 0,
         "username": "",
         "password": "",
         "publickey": "",
         "privatekey": "",
         "parent_taskid": 20,
         "hostid": 10084
      }
  ]
}
```

2 Zabbix agent protocol

Please refer to Passive and active agent checks page for more information.

3 Zabbix sender protocol

Please refer to Trapper items page for more information.

4 Header

Overview

Header is present in response and request messages between Zabbix components. It is required to determine the length of message. The header consists of:

```
<PROTOCOL> - "ZBXD" (4 bytes).
<FLAGS> -the protocol flags, (1 byte). 0x01 - Zabbix communications protocol, 0x02 - compression).
<DATALEN> - data length (4 bytes). 1 will be formatted as 01/00/00/00 (four bytes, 32 bit number in little
<RESERVED> - reserved for protocol extensions (4 bytes).
```

When compression is enabled (0x02 flag) the <RESERVED> bytes contains uncompressed data size, 32 bit number in little-endian format.

To not exhaust memory (potentially) Zabbix protocol is limited to accept only 128MB in one connection.

Implementation

Here are code snippets showing how to add Zabbix protocol header to the `data` you *want* to send in order to obtain `packet` you *should* send to Zabbix so it is interpreted correctly.

Language	Code
bash	`printf -v LENGTH '%016x' "${#DATA}"PACK=`
Java	`byte[] header = new byte[] {'Z', 'B', 'X`
PHP	`$packet = "ZBXD\1" . pack('P', strlen($d`
Perl	`my $packet = "ZBXD\1" . pack('<Q', length`
Python	`packet = "ZBXD\1" + struct.pack('<Q', le`

5 Real-time export protocol

This section presents details of the real-time export protocol in a newline-delimited JSON format for:

- trigger events
- item values
- trends

All files have a .ndjson extension. Each line of the export file is a JSON object.

Trigger events

The following information is exported for a problem event:

Field			Type	Description
hosts			array	List of hosts involved in the trigger expression; there should be at least one element in array.
	-		object	
		host	string	Host name.
		name	string	Visible host name.
groups			array	list of host groups of all hosts involved in the trigger expression; there should be at least one element in array.
	-		string	Host group name.
tags			array	List of problem tags (can be empty).
	-		object	
		tag	string	Tag name.
		value	string	Tag value (can be empty).
name			string	Problem event name.
clock			number	Number of seconds since Epoch to the moment when problem was detected (integer part).
ns			number	Number of nanoseconds to be added to `clock` to get a precise problem detection time.
eventid			number	Problem event ID.

Field	Type	Description
value	number	1 (always).

The following information is exported for a recovery event:

Field	Type	Description
clock	number	Number of seconds since Epoch to the moment when problem was resolved (integer part).
ns	number	Number of nanoseconds to be added to `clock` to get a precise problem resolution time.
eventid	number	Recovery event ID.
p_eventid	number	Problem event ID.
value	number	0 (always).

Examples

Problem:

```
{"hosts":[{"host":"Host B", "name":"Host B visible"},{"host":"Zabbix Server","name":"Zabbix Server visible
```

Recovery:

```
{"clock":1519304345,"ns":987654321,"eventid":43,"p_eventid":42,"value":0}
```

Problem (multiple problem event generation):

```
{"hosts":[{"host":"Host B", "name":"Host B visible"},{"host":"Zabbix Server","name":"Zabbix Server visible
```

```
{"hosts":[{"host":"Host B", "name":"Host B visible"},{"host":"Zabbix Server","name":"Zabbix Server visible
```

Recovery:

```
{"clock":1519304346,"ns":987654321,"eventid":44,"p_eventid":43,"value":0}
```

```
{"clock":1519304346,"ns":987654321,"eventid":44,"p_eventid":42,"value":0}
```

Item values

The following information is exported for a collected item value:

Field		Type	Description
host		object	Host name of the item host.
	host	string	Host name.
	name	string	Visible host name.
groups		array	List of host groups of the item host; there should be at least one element in array.
	-	string	Host group name.
applications		array	List of the item applications; empty if there are none.
	-	string	Application name.
itemid		number	Item ID.
name		string	Visible item name.
clock		number	Number of seconds since Epoch to the moment when value was collected (integer part).
ns		number	Number of nanoseconds to be added to `clock` to get a precise value collection time.
timestamp (*Log* only)		number	0 if not available.
source (*Log* only)		string	Empty string if not available.
severity (*Log* only)		number	0 if not available.
eventid (*Log* only)		number	0 if not available.

Field	Type	Description
value	number (for numeric items) or string (for text items)	Collected item value.
type	number	Collected value type: 0 - numeric float, 1 - character, 2 - log, 3 - numeric unsigned, 4 -text

Examples

Numeric (unsigned) value:

```
{"host":{"host":"Host B","name":"Host B visible"},"groups":["Group X","Group Y","Group Z"],"applications":
```

Numeric (float) value:

```
{"host":{"host":"Host B","name":"Host B visible"},"groups":["Group X","Group Y","Group Z"],"applications":
```

Character, text value:

```
{"host":{"host":"Host B","name":"Host B visible"},"groups":["Group X","Group Y","Group Z"],"applications":
```

Log value:

```
{"host":{"host":"Host A","name":"Host A visible"},"groups":["Group X","Group Y","Group Z"],"applications":
```

Trends

The following information is exported for a calculated trend value:

Field		Type	Description
host		object	Host name of the item host.
	host	string	Host name.
	name	string	Visible host name.
groups		array	List of host groups of the item host; there should be at least one element in array.
	-	string	Host group name.
applications		array	List of the item applications; empty if there are none.
	-	string	Application name.
itemid		number	Item ID.
name		string	Visible item name.
clock		number	Number of seconds since Epoch to the moment when value was collected (integer part).
count		number	Number of values collected for a given hour.
min		number	Minimum item value for a given hour.
avg		number	Average item value for a given hour.
max		number	Maximum item value for a given hour.
type		number	Value type: 0 - numeric float, 3 - numeric unsigned

Examples

Numeric (unsigned) value:

```
{"host":{"host":"Host B","name":"Host B visible"},"groups":["Group X","Group Y","Group Z"],"applications":
```

Numeric (float) value:

```
{"host":{"host":"Host B","name":"Host B visible"},"groups":["Group X","Group Y","Group Z"],"applications":
```

5 Items

1 Items supported by platform

The table displays support for Zabbix agent items on various platforms:

- Items marked with "**X**" are supported, the ones marked with "**-**" are not supported.
- If an item is marked with "**?**", it is not known whether it is supported or not.
- If an item is marked with "**r**", it means that it requires root privileges.
- Parameters that are included in angle brackets **<**like_this**>** are optional.

Note:
Windows-only Zabbix agent items are not included in this table.

NetBSD OpenBSD Mac OS X Tru64 AIX HP-UX Solaris FreeBSD Linux 2.6 (and later) Linux 2.4 Windows Parameter / sys- tem											▼▼
▼▼	1	2	3	4	5	6	7	8	9	10	11
agent.hostname	X	X	X	X	X	X	X	X	X	X	X
agent.ping	X	X	X	X	X	X	X	X	X	X	X
agent.version	X	X	X	X	X	X	X	X	X	X	X
kernel.maxfiles	-	X	X	X	-	-	-	?	X	X	X
kernel.maxproc	-	-	X	X	X	-	-	?	X	X	X
log[file,<regexp>,<encoding>,<maxlines>,<mode>,<output>,<maxdelay>]	X[4]	X	X	X	X	X	X	X	X	X	X
log.count[file,<regexp>,<encoding>,<maxproclines>,<mode>,<maxdelay>]	X[4]	X	X	X	X	X	X	X	X	X	X
logrt[file_regexp,<regexp>,<encoding>,<maxlines>,<mode>,<output>,<maxdelay>,<options>]	X[4]	X	X	X	X	X	X	X	X	X	X
logrt.count[file_regexp,<regexp>,<encoding>,<maxproclines>,<mode>,<maxdelay>,<options>]	X[4]	X	X	X	X	X	X	X	X	X	X
net.dns[<ip>,zone,<type>,<timeout>,<count>]	X	X	X	X	X	X	X	X	X	X	X
net.dns.record[<ip>,zone,<type>,<timeout>,<count>]	X	X	X	X	X	X	X	X	X	X	X
net.if.collisions[if]		X	X	X	X	-	X	-	X	X	r
net.if.discovery	X	X	X	X	X	X	X	-	-	X	X
net.if.in[if,<mode>]	X	X	X	X	X	X[1]	X	-	X	X	r
mode ▲	bytes *(default)*	X	X	X	X	X[2]	X	X	-	X	X	r
	packets	X	X	X	X	X	X	X	-	X	X	r
	errors	X	X	X	X	X[2]	X	X	-	X	X	r
	dropped	X	X	X	X	-	X	-	-	X	X	r
net.if.out[if,<mode>]		X	X	X	X	X[1]	X	-	X	X	r
mode ▲	bytes *(default)*	X	X	X	X	X[2]	X	X	-	X	X	r
	packets	X	X	X	X	X	X	X	-	X	X	r
	errors	X	X	X	X	X[2]	X	X	-	X	X	r
	dropped	X	X	X	-	-	X	-	-	-	-	-
net.if.total[if,<mode>]		X	X	X	X	X[1]	X	-	X	X	r

mode ▲	bytes *(default)*	X	X	X	X	X [2]	X	X	-	X	X	r
	packets	X	X	X	X	X	X	X	-	X	X	r
	errors	X	X	X	X	X [2]	X	X	-	X	X	r
	dropped	X	X	X	-	-	X	-	-	-	-	-
net.tcp.listen[port]		X	X	X	X	X	-	-	-	X	-	-
net.tcp.port[<ip>,port]		X	X	X	X	X	X	X	X	X	X	X
net.tcp.service[service,<ip>,<port>]		X	X	X	X	X	X	X	X	X	X	X
net.tcp.service.perf[service,<ip>,<port>]		X	X	X	X	X	X	X	X	X	X	X
net.udp.listen[port]		X	X	X	X	X	-	-	-	X	-	-
net.udp.service[service,<ip>,<port>]		X	X	X	X	X	X	X	X	X	X	X
net.udp.service.perf[service,<ip>,<port>]		X	X	X	X	X	X	X	X	X	X	X
		1	2	3	4	5	6	7	8	9	10	11
proc.cpu.util[<name>,<user>,<type>,<cmdline>,<mode>,<zone>]		X	X	X	X	X [3]	X	X	-	-	-	-
type ▲	total *(default)*	-	X	X	-	X	-	-	-	-	-	-
	user	-	X	X	-	X	-	-	-	-	-	-
	system	-	X	X	-	X	-	-	-	-	-	-
mode ▲	avg1 *(default)*	-	X	X	-	X	-	-	-	-	-	-
	avg5	-	X	X	-	X	-	-	-	-	-	-
	avg15	-	X	X	-	X	-	-	-	-	-	-
zone ▲	current *(default)*	-	-	-	-	X	-	-	-	-	-	-
	all	-	-	-	-	X	-	-	-	-	-	-
proc.mem[<name>,<user>,<mode>,<cmdline><memtype>]		X	X	X	X	X [3]	X	X	-	X	X	
mode ▲	sum *(default)*	-	X	X	X	X	-	X	X	-	X	X
	avg	-	X	X	X	X	-	X	X	-	X	X
	max	-	X	X	X	X	-	X	X	-	X	X
	min	-	X	X	X	X	-	X	X	-	X	X
memtype ▲		-	X	X	X	X	-	X	-	-	-	-
proc.num[<name>,<user>,<state>,<cmdline>,<zone>]		X	X	X	X	X [3]	X	X	X	-	X	X
state ▲	all *(default)*	-	X	X	X	X	X	X	X	-	X	X
	disk	-	X	X	X	-	-	-	-	-	X	X
	sleep	-	X	X	X	X	X	X	X	-	X	X
	zomb	-	X	X	X	X	X	X	X	-	X	X
	run	-	X	X	X	X	X	X	X	-	X	X
	trace	-	X	X	X	-	-	-	-	-	X	X
cmdline ▲		-	X	X	X	X	X	X	X	-	X	X
zone ▲	current *(default)*	-	-	-	-	X	-	-	-	-	-	-
	all	-	-	-	-	X	-	-	-	-	-	-
sensor[device,sensor,<mode>]		X	X	X	-	-	-	-	-	-	X	-
system.boottime		-	X	X	X	X	-	-	-	X	X	X
system.cpu.discovery		X	X	X	X	X	X	X	X	X	X	X
system.cpu.intr		-	X	X	X	X	-	X	-	-	X	X
system.cpu.load[<cpu>,<mode>]		X	X	X	X	X	X	X	X	X	X	X
cpu ▲	all *(default)*	X	X	X	X	X	X	X	X	X	X	X
	percpu	X	X	X	X	X	X	X	-	X	X	X

mode ▲	avg1 *(default)*	X	X	X	X	X	X	X	X	X	X	X
	avg5	X	X	X	X	X	X	X	X	X	X	X
	avg15	X	X	X	X	X	X	X	X	X	X	X
system.cpu.num[<type>]		X	X	X	X	X	X	X	-	X	X	X
type ▲	online *(default)*	X	X	X	X	X	X	X	-	X	X	X
	max	-	X	X	X	X	-	-	-	X	-	-
system.cpu.switches		-	X	X	X	X	-	X	-	-	X	X
system.cpu.util[<cpu>,<type>,<mode>]		X	X	X	X	X	X	X	X	-	X	X
type ▲	user *(default)*	-	X	X	X	X	X	X	X	-	X	X
	nice	-	X	X	X	-	X	-	X	-	X	X
	idle	-	X	X	X	X	X	X	X	-	X	X
	system *(default for Windows)*	X	X	X	X	X	X	X	X	-	X	X
	iowait	-	-	X	-	X	-	X	-	-	-	-
	interrupt	-	-	X	X	-	-	-	-	-	X	-
	softirq	-	-	X	-	-	-	-	-	-	-	-
	steal	-	-	X	-	-	-	-	-	-	-	-
	guest	-	-	X	-	-	-	-	-	-	-	-
	guest_nice	-	-	X	-	-	-	-	-	-	-	-
mode ▲	avg1 *(default)*	X	X	X	X	X	X	X	X	-	X	X
	avg5	X	X	X	X	X	X	X	-	-	X	X
	avg15	X	X	X	X	X	X	X	-	-	X	X
		1	2	3	4	5	6	7	8	9	10	11
system.hostname[<type>]		X	X	X	X	X	X	X	X	X	X	X
system.hw.chassis[<info>]		-	X	-	-	-	-	-	-	-	-	-
system.hw.cpu[<cpu>,<info>]		X	X	-	-	-	-	-	-	-	-	-
system.hw.devices[<type>]		-	X	-	-	-	-	-	-	-	-	-
system.hw.macaddr[<interface>,<format>]		-	X	-	-	-	-	-	-	-	-	-
system.localtime[<type>]		X	X	X	X	X	X	X	X	X	X	X
type ▲	utc *(default)*	X	X	X	X	X	X	X	X	X	X	X
	local	X	X	X	X	X	X	X	X	X	X	X
system.run[command,<mode>]		X	X	X	X	X	X	X	X	X	X	X
mode ▲	wait *(default)*	X	X	X	X	X	X	X	X	X	X	X
	nowait	X	X	X	X	X	X	X	X	X	X	X
system.stat[resource,<type>]		-	-	-	-	X	-	-	-	-	-	-
system.sw.arch		X	X	X	X	X	X	X	X	X	X	X
system.sw.os[<info>]		X	X	-	-	-	-	-	-	-	-	-
system.sw.packages[<package>,<manager>,<format>]		-	X	-	-	-	-	-	-	-	-	-

system.swap.in[<device>,<type>] *(specifying a device is only supported under Linux)*		X	-	X	-	-	-	-	X	-		
type ▲ *(pages will only work if device was not specified)*	count *(default under Linux)*	-	X	X	-	X	-	-	-	-	X	-
	sectors	-	X	X	-	-	-	-	-	-	-	-
	pages *(default under Linux)*	-	X	X	-	X	-	-	-	-	X	-
system.swap.out[<device>,<type>] *(specifying a device is only supported under Linux)*		X	-	X	-	-	-	-	X	-		
type ▲ *(pages will only work if device was not specified)*	count *(default under Linux)*	-	X	X	-	X	-	-	-	-	X	-
	sectors	-	X	X	-	-	-	-	-	-	-	-
	pages *(default under Linux)*	-	X	X	-	X	-	-	-	-	X	-

system.swap.size[<device>,<type>] *(specifying a device is only supported under FreeBSD, for other platforms must be empty or "all")*		X	X	X	X	X	-	X	X	-	X	-
type ▲	free *(default)*	X	X	X	X	X	-	X	X	-	X	-
	total	X	X	X	X	X	-	X	X	-	X	-
	used	X	X	X	X	X	-	X	X	-	X	-
	pfree	X	X	X	X	X	-	X	X	-	X	-
	pused	-	X	X	X	X	-	X	X	-	X	-
system.uname		X	X	X	X	X	X	X	X	X	X	X
system.uptime		X	X	X	X	X	-	X	?	X	X	X
system.users.num		-	X	X	X	X	X	X	X	X	X	X
systemd.unit.discovery		X	X	-	-	-	-	-	-	-	-	-
systemd.unit.info		-	X	X	-	-	-	-	-	-	-	-
		1	2	3	4	5	6	7	8	9	10	11
vfs.dev.discovery		-	X	X	-	-	-	-	-	-	-	-
vfs.dev.read[<device>,<type>,<mode>]		X	X	X	X	X	-	X	-	-	X	-
type ▲	sectors	-	X	X	-	-	-	-	-	-	-	-
	operations *(default for OpenBSD, AIX)*	-	X	X	X	X	-	X	-	-	X	-
	bytes *(default for Solaris)*	-	-	-	X	X	-	X	-	-	X	-
	sps *(default for Linux)*	-	X	X	-	-	-	-	-	-	-	-
	ops	-	X	X	X	-	-	-	-	-	-	-
	bps *(default for FreeBSD)*	-	-	-	X	-	-	-	-	-	-	-

mode ▲ *(compatible only with type in: sps, ops, bps)*	avg1 *(default)*	-	X	X	X	-	-	-	-	-	-	-
	avg5	-	X	X	X	-	-	-	-	-	-	-
	avg15	-	X	X	X	-	-	-	-	-	-	-
vfs.dev.write[<device>,<type>,<mode>]		X	X	X	X	-	X	-	-	X	-	
type ▲	sectors	-	X	X	-	-	-	-	-	-	-	-
	operations *(default for OpenBSD, AIX)*	-	X	X	X	X	-	X	-	-	X	-
	bytes *(default for Solaris)*	-	-	-	X	X	-	X	-	-	X	-
	sps *(default for Linux)*	-	X	X	-	-	-	-	-	-	-	-
	ops	-	X	X	X	-	-	-	-	-	-	-
	bps *(default for FreeBSD)*	-	-	-	X	-	-	-	-	-	-	-
mode ▲ *(compatible only with type in: sps, ops, bps)*	avg1 *(default)*	-	X	X	X	-	-	-	-	-	-	-
	avg5	-	X	X	X	-	-	-	-	-	-	-
	avg15	-	X	X	X	-	-	-	-	-	-	-
vfs.dir.count[dir,<regex_incl>,<regex_excl>,<types_incl>,<types_excl>,<max_depth>,<min_size>,<max_size>,<min_age		X	X	X	X	X	X	X	X	X	X	
vfs.dir.size[dir,<regex_incl>,<regex_excl>,<mode>,<max_depth>,<regex_excl_dir>]		?	?	?	?	?	?	?	?	?	?	
vfs.file.cksum[file]		X	X	X	X	X	X	X	X	X	X	
vfs.file.contents[file,<encoding>]		X	X	X	X	X	X	X	X	X	X	
vfs.file.exists[file]		X	X	X	X	X	X	X	X	X	X	
vfs.file.md5sum[file]		X	X	X	X	X	X	X	X	X	X	
vfs.file.regexp[file,regexp,<encoding>,<output>]		X	X	X	X	X	X	X	X	X	X	
vfs.file.regmatch[file,regexp,<encoding>]		X	X	X	X	X	X	X	X	X	X	
vfs.file.size[file]		X	X	X	X	X	X	X	X	X	X	
		1	2	3	4	5	6	7	8	9	10	11
vfs.file.time[file,<mode>]		X	X	X	X	X	X	X	X	X	X	
mode ▲	modify *(default)*	X	X	X	X	X	X	X	X	X	X	X
	access	X	X	X	X	X	X	X	X	X	X	X

	change	X[5]	X	X	X	X	X	X	X	X	X	X
vfs.fs.discovery		X	X	X	X	X	X	X	-	X	X	X
vfs.fs.get		X	X	X	X	X	X	X	-	X	X	X
vfs.fs.inode[fs,<mode>]		X	X	X	X	X	X	X	X	X	X	X
mode	total	-	X	X	X	X	X	X	X	X	X	X
▲	*(default)*											
	free	-	X	X	X	X	X	X	X	X	X	X
	used	-	X	X	X	X	X	X	X	X	X	X
	pfree	-	X	X	X	X	X	X	X	X	X	X
	pused	-	X	X	X	X	X	X	X	X	X	X
vfs.fs.size[fs,<mode>]		X	X	X	X	X	X	X	X	X	X	X
mode	total	X	X	X	X	X	X	X	X	X	X	X
▲	*(default)*											
	free	X	X	X	X	X	X	X	X	X	X	X
	used	X	X	X	X	X	X	X	X	X	X	X
	pfree	X	X	X	X	X	X	X	X	X	X	X
	pused	X	X	X	X	X	X	X	X	X	X	X
vm.memory.size[<mode>]		X	X	X	X	X	X	X	X	X	X	X
mode	total	X	X	X	X	X	X	X	X	X	X	X
▲	*(default)*											
	active	-	-	-	X	-	X	-	-	X	X	X
	anon	-	-	-	-	-	-	-	-	-	-	X
	buffers	-	X	X	X	-	-	-	-	-	X	X
	cached	X	X	X	X	-	-	X	-	-	X	X
	exec	-	-	-	-	-	-	-	-	-	-	X
	file	-	-	-	-	-	-	-	-	-	-	X
	free	X	X	X	X	X	X	X	X	X	X	X
	inactive	-	-	-	X	-	-	-	-	X	X	X
	pinned	-	-	-	-	-	-	X	-	-	-	-
	shared	-	X	-	X	-	-	-	-	-	X	X
	wired	-	-	-	X	-	-	-	-	X	X	X
	used	X	X	X	X	X	X	X	X	X	X	X
	pused	X	X	X	X	X	X	X	X	X	X	X
	available	X	X	X	X	X	X	X	X	X	X	X
	pavailable	X	X	X	X	X	X	X	X	X	X	X
web.page.get[host,<path>,<port>]		X	X	X	X	X	X	X	X	X	X	X
web.page.perf[host,<path>,<port>]		X	X	X	X	X	X	X	X	X	X	X
web.page.regexp[host,<path>,<port>,regexp,<length>,<output>]		X	X	X	X	X	X	X	X	X	X	X
		1	2	3	4	5	6	7	8	9	10	11

Note:
See also a description of vm.memory.size parameters.

Footnotes

[1] net.if.in, net.if.out and net.if.total items do not provide statistics of loopback interfaces (e.g. lo0).

[2] These values for these items are not supported for loopback interfaces on Solaris systems up to and including Solaris 10 6/06 as byte, error and utilisation statistics are not stored and/or reported by the kernel. However, if you're monitoring a Solaris system via net-snmp, values may be returned as net-snmp carries legacy code from the cmu-snmp dated as old as 1997 that, upon failing to read byte values from the interface statistics returns the packet counter (which does exist on loopback interfaces) multiplied by an arbitrary value of 308. This makes the assumption that the average length of a packet is 308 octets, which is a very rough estimation as the MTU limit on Solaris systems for loopback interfaces is 8892 bytes.

These values should not be assumed to be correct or even closely accurate. They are guestimates. The Zabbix agent does not do any guess work, but net-snmp will return a value for these fields.

[3] The command line on Solaris, obtained from /proc/pid/psinfo, is limited to 80 bytes and contains the command line as it was when the process was started.

[4] Not supported on Windows Event Log.

[5] On Windows XP vfs.file.time[file,change] may be equal to vfs.file.time[file,access].

2 vm.memory.size parameters

Overview

This section provides some parameter details for the vm.memory.size[<mode>] agent item.

Parameters

The following parameters are available for this item:

- **active** - memory currently in use or very recently used, and so it is in RAM
- **anon** - memory not associated with a file (cannot be re-read from it)
- **available** - available memory, calculated differently depending on the platform (see the table below)
- **buffers** - cache for things like file system metadata
- **cached** - cache for various things
- **exec** - executable code, typically from a (program) file
- **file** - cache for contents of recently accessed files
- **free** - memory that is readily available to any entity requesting memory
- **inactive** - memory that is marked as not used
- **pavailable** - 'available' memory as percentage of 'total' (calculated as `available`/`total`*100)
- **pinned** - same as 'wired'
- **pused** - 'used' memory as percentage of 'total' (calculated as `used`/`total`*100)
- **shared** - memory that may be simultaneously accessed by multiple processes
- **slab** - total amount of memory used by the kernel to cache data structures for its own use
- **total** - total physical memory available
- **used** - used memory, calculated differently depending on the platform (see the table below)
- **wired** - memory that is marked to always stay in RAM. It is never moved to disk.

Warning:
Some of these parameters are platform-specific and might not be available on your platform. See Items supported by platform for details.

Platform-specific calculation of **available** and **used**:

Platform	**"available"**	**"used"**
AIX	free + cached	real memory in use
FreeBSD	inactive + cached + free	active + wired + cached
HP UX	free	total - free
Linux<3.14	free + buffers + cached	total - free
Linux 3.14+ (also backported to 3.10 on RHEL 7)	/proc/meminfo, see "MemAvailable" in Linux kernel documentation for details. Note that free + buffers + cached is no longer equal to 'available' due to not all the page cache can be freed and low watermark being used in calculation.	total - free
NetBSD	inactive + execpages + file + free	total - free
OpenBSD	inactive + free + cached	active + wired
OSX	inactive + free	active + wired
Solaris	free	total - free
Win32	free	total - free

Attention:
The sum of *vm.memory.size[used]* and *vm.memory.size[available]* does not necessarily equal total. For instance, on FreeBSD:
* Active, inactive, wired, cached memories are considered used, because they store some useful information.
* At the same time inactive, cached, free memories are considered available, because these kinds of memories can be given instantly to processes that request more memory.

So inactive memory is both used and available simultaneously. Because of this, the *vm.memory.size[used]* item is designed for informational purposes only, while *vm.memory.size[available]* is designed to be used in triggers.

See also

1. Additional details about memory calculation in different OS

3 Passive and active agent checks

Overview

This section provides details on passive and active checks performed by Zabbix agent.

Zabbix uses a JSON based communication protocol for communicating with Zabbix agent.

Passive checks

A passive check is a simple data request. Zabbix server or proxy asks for some data (for example, CPU load) and Zabbix agent sends back the result to the server.

Server request

For definition of header and data length please refer to protocol details.

```
<item key>
```

Agent response

```
<DATA>[\0<ERROR>]
```

Above, the part in square brackets is optional and is only sent for not supported items.

For example, for supported items:

1. Server opens a TCP connection
2. Server sends **<HEADER><DATALEN>agent.ping**
3. Agent reads the request and responds with **<HEADER><DATALEN>1**
4. Server processes data to get the value, '1' in our case
5. TCP connection is closed

For not supported items:

1. Server opens a TCP connection
2. Server sends **<HEADER><DATALEN>vfs.fs.size[/nono]**
3. Agent reads the request and responds with **<HEADER><DATALEN>ZBX_NOTSUPPORTED\0Cannot obtain filesystem information: [2] No such file or directory**
4. Server processes data, changes item state to not supported with the specified error message
5. TCP connection is closed

Active checks

Active checks require more complex processing. The agent must first retrieve from the server(s) a list of items for independent processing.

The servers to get the active checks from are listed in the 'ServerActive' parameter of the agent configuration file. The frequency of asking for these checks is set by the 'RefreshActiveChecks' parameter in the same configuration file. However, if refreshing active checks fails, it is retried after hardcoded 60 seconds.

The agent then periodically sends the new values to the server(s).

Note:
If an agent is behind the firewall you might consider using only Active checks because in this case you wouldn't need to modify the firewall to allow initial incoming connections.

Getting the list of items

Agent request

```
{
    "request":"active checks",
    "host":"<hostname>"
}
```

Server response

```
{
    "response":"success",
    "data":[
        {
            "key":"log[/home/zabbix/logs/zabbix_agentd.log]",
            "delay":30,
            "lastlogsize":0,
            "mtime":0
        },
        {
            "key":"agent.version",
            "delay":600,
            "lastlogsize":0,
            "mtime":0
        },
        {
            "key":"vfs.fs.size[/nono]",
            "delay":600,
            "lastlogsize":0,
            "mtime":0
        }
    ]
}
```

The server must respond with success. For each returned item, all properties **key**, **delay**, **lastlogsize** and **mtime** must exist, regardless of whether item is a log item or not.

For example:

1. Agent opens a TCP connection
2. Agent asks for the list of checks
3. Server responds with a list of items (item key, delay)
4. Agent parses the response
5. TCP connection is closed
6. Agent starts periodical collection of data

Attention:
Note that (sensitive) configuration data may become available to parties having access to the Zabbix server trapper port when using an active check. This is possible because anyone may pretend to be an active agent and request item configuration data; authentication does not take place unless you use encryption options.

Sending in collected data

Agent sends

```
{
    "request":"agent data",
    "session": "12345678901234567890123456789012",
    "data":[
        {
            "host":"<hostname>",
            "key":"agent.version",
            "value":"2.4.0",
            "id": 1,
            "clock":1400675595,
            "ns":76808644
```

```
        },
        {
            "host":"<hostname>",
            "key":"log[/home/zabbix/logs/zabbix_agentd.log]",
            "lastlogsize":112,
            "value":" 19845:20140621:141708.521 Starting Zabbix Agent [<hostname>]. Zabbix 2.4.0 (revision
            "id": 2,
            "clock":1400675595,
            "ns":77053975
        },
        {
            "host":"<hostname>",
            "key":"vfs.fs.size[/nono]",
            "state":1,
            "value":"Cannot obtain filesystem information: [2] No such file or directory",
            "id": 3,
            "clock":1400675595,
            "ns":78154128
        }
    ],
    "clock": 1400675595,
    "ns": 78211329
}
```

A virtual ID is assigned to each value. Value ID is a simple ascending counter, unique within one data session (identified by the session token). This ID is used to discard duplicate values that might be sent in poor connectivity environments.

Server response

```
{
    "response":"success",
    "info":"processed: 3; failed: 0; total: 3; seconds spent: 0.003534"
}
```

Attention:
If sending of some values fails on the server (for example, because host or item has been disabled or deleted), agent will not retry sending of those values.

For example:

1. Agent opens a TCP connection
2. Agent sends a list of values
3. Server processes the data and sends the status back
4. TCP connection is closed

Note how in the example above the not supported status for vfs.fs.size[/nono] is indicated by the ”state” value of 1 and the error message in ”value” property.

Attention:
Error message will be trimmed to 2048 symbols on server side.

Older XML protocol

Note:
Zabbix will take up to 16 MB of XML Base64-encoded data, but a single decoded value should be no longer than 64 KB otherwise it will be truncated to 64 KB while decoding.

4 Trapper items

Overview

Zabbix server uses a JSON- based communication protocol for receiving data from Zabbix sender with the help of trapper item.

Request and response messages must begin with header and data length.

Zabbix sender request

```
{
    "request":"sender data",
    "data":[
        {
            "host":"<hostname>",
            "key":"trap",
            "value":"test value"
        }
    ]
}
```

Zabbix server response

```
{
    "response":"success",
    "info":"processed: 1; failed: 0; total: 1; seconds spent: 0.060753"
}
```

Alternatively Zabbix sender can send request with a timestamp

```
{
    "request":"sender data",
    "data":[
        {
            "host":"<hostname>",
            "key":"trap",
            "value":"test value",
            "clock":1516710794
        },
        {
            "host":"<hostname>",
            "key":"trap",
            "value":"test value",
            "clock":1516710795
        }
    ],
    "clock":1516712029,
    "ns":873386094
}
```

Zabbix server response

```
{
    "response":"success",
    "info":"processed: 2; failed: 0; total: 2; seconds spent: 0.060904"
}
```

5 Minimum permission level for Windows agent items

Overview

When monitoring systems using an agent, a good practice is to obtain metrics from the host on which the agent is installed. To use the principle of least privilege, it is necessary to determine what metrics are obtained from the agent.

The table in this document allows you to select the minimum rights for guaranteed correct operation of Zabbix agent.

If a different user is selected for the agent to work, rather than 'LocalSystem', then for the operation of agent as a Windows service, the new user must have the rights "Log on as a service" from "Local Policy→User Rights Assignment" and the right to create, write and delete the Zabbix agent log file.

> **Note:**
> When working with the rights of an agent based on the "minimum technically acceptable" group, prior provision of rights to objects for monitoring is required.

Common agent items supported on Windows

Item key	User group	
	Recommended	Minimum technically acceptable (functionality is limited)
agent.hostname	Guests	Guests
agent.ping	Guests	Guests
agent.version	Guests	Guests
log	Administrators	Guests
log.count	Administrators	Guests
logrt	Administrators	Guests
logrt.count	Administrators	Guests
net.dns	Guests	Guests
net.dns.record	Guests	Guests
net.if.discovery	Guests	Guests
net.if.in	Guests	Guests
net.if.out	Guests	Guests
net.if.total	Guests	Guests
net.tcp.listen	Guests	Guests
net.tcp.port	Guests	Guests
net.tcp.service	Guests	Guests
net.tcp.service.perf	Guests	Guests
net.udp.service	Guests	Guests
net.udp.service.perf	Guests	Guests
proc.num	Administrators	Guests
system.cpu.discovery	Performance Monitor Users	Performance Monitor Users
system.cpu.load	Performance Monitor Users	Performance Monitor Users
system.cpu.num	Guests	Guests
system.cpu.util	Performance Monitor Users	Performance Monitor Users
system.hostname	Guests	Guests
system.localtime	Guests	Guests
system.run	Administrators	Guests
system.sw.arch	Guests	Guests
system.swap.size	Guests	Guests
system.uname	Guests	Guests
system.uptime	Performance Monitor Users	Performance Monitor Users
vfs.dir.count	Administrators	Guests
vfs.dir.size	Administrators	Guests
vfs.file.cksum	Administrators	Guests
vfs.file.contents	Administrators	Guests
vfs.file.exists	Administrators	Guests
vfs.file.md5sum	Administrators	Guests
vfs.file.regexp	Administrators	Guests
vfs.file.regmatch	Administrators	Guests
vfs.file.size	Administrators	Guests
vfs.file.time	Administrators	Guests
vfs.fs.discovery	Administrators	Guests
vfs.fs.size	Administrators	Guests
vm.memory.size	Guests	Guests
web.page.get	Guests	Guests
web.page.perf	Guests	Guests
web.page.regexp	Guests	Guests
zabbix.stats	Guests	Guests

Windows-specific item keys

Item key	User group	
	Recommended	Minimum technically acceptable (functionality is limited)
eventlog	Event Log Readers	Guests
net.if.list	Guests	Guests
perf_counter	Performance Monitor Users	Performance Monitor Users
proc_info	Administrators	Guests

Item key	User group	
service.discovery	Guests	Guests
service.info	Guests	Guests
services	Guests	Guests
wmi.get	Administrators	Guests
vm.vmemory.size	Guests	Guests

6 Encoding of returned values

Zabbix server expects every returned text value in the UTF8 encoding. This is related to any type of checks: zabbix agent, ssh, telnet, etc.

Different monitored systems/devices and checks can return non-ASCII characters in the value. For such cases, almost all possible zabbix keys contain an additional item key parameter - **<encoding>**. This key parameter is optional but it should be specified if the returned value is not in the UTF8 encoding and it contains non-ASCII characters. Otherwise the result can be unexpected and unpredictable.

A description of behavior with different database back-ends in such cases follows.

MySQL

If a value contains a non-ASCII character in non UTF8 encoding - this character and the following will be discarded when the database stores this value. No warning messages will be written to the *zabbix_server.log*.
Relevant for at least MySQL version 5.1.61

PostgreSQL

If a value contains a non-ASCII character in non UTF8 encoding - this will lead to a failed SQL query (PGRES_FATAL_ERROR:ERROR invalid byte sequence for encoding) and data will not be stored. An appropriate warning message will be written to the *zabbix_server.log*.
Relevant for at least PostgreSQL version 9.1.3

7 Large file support

Large file support, often abbreviated to LFS, is the term applied to the ability to work with files larger than 2 GB on 32-bit operating systems. Since Zabbix 2.0 support for large files has been added. This change affects at least log file monitoring and all vfs.file.* items. Large file support depends on the capabilities of a system at Zabbix compilation time, but is completely disabled on a 32-bit Solaris due to its incompatibility with procfs and swapctl.

8 Sensor

Each sensor chip gets its own directory in the sysfs /sys/devices tree. To find all sensor chips, it is easier to follow the device symlinks from /sys/class/hwmon/hwmon*, where * is a real number (0,1,2,...).

The sensor readings are located either in /sys/class/hwmon/hwmon*/ directory for virtual devices, or in /sys/class/hwmon/hwmon*/device directory for non-virtual devices. A file, called name, located inside hwmon* or hwmon*/device directories contains the name of the chip, which corresponds to the name of the kernel driver used by the sensor chip.

There is only one sensor reading value per file. The common scheme for naming the files that contain sensor readings inside any of the directories mentioned above is: <type><number>_<item>, where

- **type** - for sensor chips is ”in” (voltage), ”temp” (temperature), ”fan” (fan), etc.,
- **item** - ”input” (measured value), ”max” (high threshold), ”min” (low threshold), etc.,
- **number** - always used for elements that can be present more than once (usually starts from 1, except for voltages which start from 0). If files do not refer to a specific element they have a simple name with no number.

The information regarding sensors available on the host can be acquired using **sensor-detect** and **sensors** tools (lm-sensors package: http://lm-sensors.org/). **Sensors-detect** helps to determine which modules are necessary for available sensors. When modules are loaded the **sensors** program can be used to show the readings of all sensor chips. The labeling of sensor readings, used by this program, can be different from the common naming scheme (<type><number>_<item>):

- if there is a file called <type><number>_label, then the label inside this file will be used instead of <type><number><item> name;
- if there is no <type><number>_label file, then the program searches inside the /etc/sensors.conf (could be also /etc/sensors3.conf, or different) for the name substitution.

This labeling allows user to determine what kind of hardware is used. If there is neither <type><number>_label file nor label inside the configuration file the type of hardware can be determined by the name attribute (hwmon*/device/name). The actual names of sensors, which zabbix_agent accepts, can be obtained by running **sensors** program with -u parameter (**sensors -u**).

In **sensor** program the available sensors are separated by the bus type (ISA adapter, PCI adapter, SPI adapter, Virtual device, ACPI interface, HID adapter).

On Linux 2.4:

(Sensor readings are obtained from /proc/sys/dev/sensors directory)

- **device** - device name (if <mode> is used, it is a regular expression);
- **sensor** - sensor name (if <mode> is used, it is a regular expression);
- **mode** - possible values: avg, max, min (if this parameter is omitted, device and sensor are treated verbatim).

Example key: sensor[w83781d-i2c-0-2d,temp1]

Prior to Zabbix 1.8.4, the sensor[temp1] format was used.

On Linux 2.6+:

(Sensor readings are obtained from /sys/class/hwmon directory)

- **device** - device name (non regular expression). The device name could be the actual name of the device (e.g 0000:00:18.3) or the name acquired using sensors program (e.g. k8temp-pci-00c3). It is up to the user to choose which name to use;
- **sensor** - sensor name (non regular expression);
- **mode** - possible values: avg, max, min (if this parameter is omitted, device and sensor are treated verbatim).

Example key:

sensor[k8temp-pci-00c3,temp,max] or sensor[0000:00:18.3,temp1]

sensor[smsc47b397-isa-0880,in,avg] or sensor[smsc47b397.2176,in1]

Obtaining sensor names

Sensor labels, as printed by the *sensors* command, cannot always be used directly because the naming of labels may be different for each sensor chip vendor. For example, *sensors* output might contain the following lines:

```
$ sensors
in0:          +2.24 V  (min =  +0.00 V, max =  +3.32 V)
Vcore:        +1.15 V  (min =  +0.00 V, max =  +2.99 V)
+3.3V:        +3.30 V  (min =  +2.97 V, max =  +3.63 V)
+12V:        +13.00 V  (min =  +0.00 V, max = +15.94 V)
M/B Temp:     +30.0°C  (low  = -127.0°C, high = +127.0°C)
```

Out of these, only one label may be used directly:

```
$ zabbix_get -s 127.0.0.1 -k sensor[lm85-i2c-0-2e,in0]
2.240000
```

Attempting to use other labels (like *Vcore* or *+12V*) will not work.

```
$ zabbix_get -s 127.0.0.1 -k sensor[lm85-i2c-0-2e,Vcore]
ZBX_NOTSUPPORTED
```

To find out the actual sensor name, which can be used by Zabbix to retrieve the sensor readings, run *sensors -u*. In the output, the following may be observed:

```
$ sensors -u
...
Vcore:
  in1_input: 1.15
  in1_min: 0.00
  in1_max: 2.99
  in1_alarm: 0.00
...
+12V:
  in4_input: 13.00
  in4_min: 0.00
  in4_max: 15.94
  in4_alarm: 0.00
...
```

So *Vcore* should be queried as *in1*, and *+12V* should be queried as *in4*.[5]

```
$ zabbix_get -s 127.0.0.1 -k sensor[lm85-i2c-0-2e,in1]
1.301000
```

Not only voltage (in), but also current (curr), temperature (temp) and fan speed (fan) readings can be retrieved by Zabbix.

9 Notes on memtype parameter in proc.mem items

Overview

The **memtype** parameter is supported on Linux, AIX, FreeBSD, and Solaris platforms.

Three common values of 'memtype' are supported on all of these platforms: `pmem`, `rss` and `vsize`. Additionally, platform-specific 'memtype' values are supported on some platforms.

AIX

See values supported for 'memtype' parameter on AIX in the table.

Supported value	Description	Source in procentry64 structure	Tries to be compatible with
vsize ((- default value))	Virtual memory size	pi_size	
pmem	Percentage of real memory	pi_prm	ps -o pmem
rss	Resident set size	pi_trss + pi_drss	ps -o rssize
size	Size of process (code + data)	pi_dvm	"ps gvw" SIZE column
dsize	Data size	pi_dsize	
tsize	Text (code) size	pi_tsize	"ps gvw" TSIZ column
sdsize	Data size from shared library	pi_sdsize	
drss	Data resident set size	pi_drss	
trss	Text resident set size	pi_trss	

FreeBSD

See values supported for 'memtype' parameter on FreeBSD in the table.

Supported value	Description	Source in kinfo_proc structure	Tries to be compatible with
vsize	Virtual memory size	kp_eproc.e_vm.vm_map.size or ki_size	ps -o vsz
pmem	Percentage of real memory	calculated from rss	ps -o pmem
rss	Resident set size	kp_eproc.e_vm.vm_rssize or ki_rssize	ps -o rss
size ((- default value))	Size of process (code + data + stack)	tsize + dsize + ssize	
tsize	Text (code) size	kp_eproc.e_vm.vm_tsize or ki_tsize	ps -o tsiz
dsize	Data size	kp_eproc.e_vm.vm_dsize or ki_dsize	ps -o dsiz
ssize	Stack size	kp_eproc.e_vm.vm_ssize or ki_ssize	ps -o ssiz

Linux

See values supported for 'memtype' parameter on Linux in the table.

[5] According to specification these are voltages on chip pins and generally speaking may need scaling.

Supported value	Description	Source in /proc/<pid>/status file
vsize ((- default value))	Virtual memory size	VmSize
pmem	Percentage of real memory	(VmRSS/total_memory) * 100
rss	Resident set size	VmRSS
data	Size of data segment	VmData
exe	Size of code segment	VmExe
hwm	Peak resident set size	VmHWM
lck	Size of locked memory	VmLck
lib	Size of shared libraries	VmLib
peak	Peak virtual memory size	VmPeak
pin	Size of pinned pages	VmPin
pte	Size of page table entries	VmPTE
size	Size of process code + data + stack segments	VmExe + VmData + VmStk
stk	Size of stack segment	VmStk
swap	Size of swap space used	VmSwap

Notes for Linux:

1. Not all 'memtype' values are supported by older Linux kernels. For example, Linux 2.4 kernels do not support `hwm`, `pin`, `peak`, `pte` and `swap` values.
2. We have noticed that self-monitoring of the Zabbix agent active check process with `proc.mem[...,...,...,...,data]` shows a value that is 4 kB larger than reported by `VmData` line in the agent's /proc/<pid>/status file. At the time of self-measurement the agent's data segment increases by 4 kB and then returns to the previous size.

Solaris

See values supported for 'memtype' parameter on Solaris in the table.

Supported value	Description	Source in psinfo structure	Tries to be compatible with
vsize ((- default value))	Size of process image	pr_size	ps -o vsz
pmem	Percentage of real memory	pr_pctmem	ps -o pmem
rss	Resident set size It may be underestimated - see rss description in "man ps".	pr_rssize	ps -o rss

10 Notes on selecting processes in proc.mem and proc.num items

Processes modifying their commandline

Some programs use modifying their commandline as a method for displaying their current activity. A user can see the activity by running `ps` and `top` commands. Examples of such programs include *PostgreSQL*, *Sendmail*, *Zabbix*.

Let's see an example from Linux. Let's assume we want to monitor a number of Zabbix agent processes.

`ps` command shows processes of interest as

```
$ ps -fu zabbix
UID        PID  PPID  C STIME TTY          TIME CMD
...
zabbix    6318     1  0 12:01 ?        00:00:00 sbin/zabbix_agentd -c /home/zabbix/ZBXNEXT-1078/zabbix_age
zabbix    6319  6318  0 12:01 ?        00:00:01 sbin/zabbix_agentd: collector [idle 1 sec]
zabbix    6320  6318  0 12:01 ?        00:00:00 sbin/zabbix_agentd: listener #1 [waiting for connection]
zabbix    6321  6318  0 12:01 ?        00:00:00 sbin/zabbix_agentd: listener #2 [waiting for connection]
zabbix    6322  6318  0 12:01 ?        00:00:00 sbin/zabbix_agentd: listener #3 [waiting for connection]
zabbix    6323  6318  0 12:01 ?        00:00:00 sbin/zabbix_agentd: active checks #1 [idle 1 sec]
...
```

Selecting processes by name and user does the job:

```
$ zabbix_get -s localhost -k 'proc.num[zabbix_agentd,zabbix]'
6
```

Now let's rename zabbix_agentd executable to zabbix_agentd_30 and restart it.

ps now shows

```
$ ps -fu zabbix
UID        PID  PPID  C STIME TTY          TIME CMD
...
zabbix    6715     1  0 12:53 ?        00:00:00 sbin/zabbix_agentd_30 -c /home/zabbix/ZBXNEXT-1078/zabbix_
zabbix    6716  6715  0 12:53 ?        00:00:00 sbin/zabbix_agentd_30: collector [idle 1 sec]
zabbix    6717  6715  0 12:53 ?        00:00:00 sbin/zabbix_agentd_30: listener #1 [waiting for connection
zabbix    6718  6715  0 12:53 ?        00:00:00 sbin/zabbix_agentd_30: listener #2 [waiting for connection
zabbix    6719  6715  0 12:53 ?        00:00:00 sbin/zabbix_agentd_30: listener #3 [waiting for connection
zabbix    6720  6715  0 12:53 ?        00:00:00 sbin/zabbix_agentd_30: active checks #1 [idle 1 sec]
...
```

Now selecting processes by name and user produces an incorrect result:

```
$ zabbix_get -s localhost -k 'proc.num[zabbix_agentd_30,zabbix]'
1
```

Why a simple renaming of executable to a longer name lead to quite different result ?

Zabbix agent starts with checking the process name. /proc/<pid>/status file is opened and the line Name is checked. In our case the Name lines are:

```
$ grep Name /proc/{6715,6716,6717,6718,6719,6720}/status
/proc/6715/status:Name:   zabbix_agentd_3
/proc/6716/status:Name:   zabbix_agentd_3
/proc/6717/status:Name:   zabbix_agentd_3
/proc/6718/status:Name:   zabbix_agentd_3
/proc/6719/status:Name:   zabbix_agentd_3
/proc/6720/status:Name:   zabbix_agentd_3
```

The process name in status file is truncated to 15 characters.

A similar result can be seen with ps command:

```
$ ps -u zabbix
  PID TTY          TIME CMD
...
 6715 ?        00:00:00 zabbix_agentd_3
 6716 ?        00:00:01 zabbix_agentd_3
 6717 ?        00:00:00 zabbix_agentd_3
 6718 ?        00:00:00 zabbix_agentd_3
 6719 ?        00:00:00 zabbix_agentd_3
 6720 ?        00:00:00 zabbix_agentd_3
 ...
```

Obviously, that is not equal to our proc.num[] name parameter value zabbix_agentd_30. Having failed to match the process name from status file the Zabbix agent turns to /proc/<pid>/cmdline file.

How the agent sees the "cmdline" file can be illustrated with running a command

```
$ for i in 6715 6716 6717 6718 6719 6720; do cat /proc/$i/cmdline | awk '{gsub(/\x0/,"<NUL>"); print};'; d
sbin/zabbix_agentd_30<NUL>-c<NUL>/home/zabbix/ZBXNEXT-1078/zabbix_agentd.conf<NUL>
sbin/zabbix_agentd_30: collector [idle 1 sec]<NUL><NUL><NUL><NUL><NUL><NUL><NUL><NUL><NUL><NUL><NUL><NUL><
sbin/zabbix_agentd_30: listener #1 [waiting for connection]<NUL><NUL><NUL><NUL><NUL><NUL><NUL><NUL><NUL><N
sbin/zabbix_agentd_30: listener #2 [waiting for connection]<NUL><NUL><NUL><NUL><NUL><NUL><NUL><NUL><NUL><N
sbin/zabbix_agentd_30: listener #3 [waiting for connection]<NUL><NUL><NUL><NUL><NUL><NUL><NUL><NUL><NUL><N
sbin/zabbix_agentd_30: active checks #1 [idle 1 sec]<NUL><NUL><NUL><NUL><NUL><NUL><NUL><NUL><NUL><NUL><NUL
```

/proc/<pid>/cmdline files in our case contain invisible, non-printable null bytes, used to terminate strings in *C* language. The null bytes are shown as "<NUL>" in this example.

Zabbix agent checks "cmdline" for the main process and takes a zabbix_agentd_30, which matches our name parameter value zabbix_agentd_30. So, the main process is counted by item proc.num[zabbix_agentd_30,zabbix].

When checking the next process, the agent takes `zabbix_agentd_30: collector [idle 1 sec]` from the `cmdline` file and it does not meet our `name` parameter `zabbix_agentd_30`. So, only the main process which does not modify its commandline, gets counted. Other agent processes modify their command line and are ignored.

This example shows that the `name` parameter cannot be used in `proc.mem[]` and `proc.num[]` for selecting processes in this case.

Using `cmdline` parameter with a proper regular expression produces a correct result:

```
$ zabbix_get -s localhost -k 'proc.num[,zabbix,,zabbix_agentd_30[ :]]'
6
```

Be careful when using `proc.mem[]` and `proc.num[]` items for monitoring programs which modify their commandlines.

Before putting `name` and `cmdline` parameters into `proc.mem[]` and `proc.num[]` items, you may want to test the parameters using `proc.num[]` item and `ps` command.

Linux kernel threads

Threads cannot be selected with `cmdline` parameter in `proc.mem[]` and `proc.num[]` items

Let's take as an example one of kernel threads:

```
$ ps -ef| grep kthreadd
root         2     0  0 09:33 ?        00:00:00 [kthreadd]
```

It can be selected with process `name` parameter:

```
$ zabbix_get -s localhost -k 'proc.num[kthreadd,root]'
1
```

But selection by process `cmdline` parameter does not work:

```
$ zabbix_get -s localhost -k 'proc.num[,root,,kthreadd]'
0
```

The reason is that Zabbix agent takes the regular expression specified in `cmdline` parameter and applies it to contents of process `/proc/<pid>/cmdline`. For kernel threads their `/proc/<pid>/cmdline` files are empty. So, `cmdline` parameter never matches.

Counting of threads in `proc.mem[]` and `proc.num[]` items

Linux kernel threads are counted by `proc.num[]` item but do not report memory in `proc.mem[]` item. For example:

```
$ ps -ef | grep kthreadd
root         2     0  0 09:51 ?        00:00:00 [kthreadd]

$ zabbix_get -s localhost -k 'proc.num[kthreadd]'
1

$ zabbix_get -s localhost -k 'proc.mem[kthreadd]'
ZBX_NOTSUPPORTED: Cannot get amount of "VmSize" memory.
```

But what happens if there is a user process with the same name as a kernel thread ? Then it could look like this:

```
$ ps -ef | grep kthreadd
root         2     0  0 09:51 ?        00:00:00 [kthreadd]
zabbix    9611  6133  0 17:58 pts/1    00:00:00 ./kthreadd

$ zabbix_get -s localhost -k 'proc.num[kthreadd]'
2

$ zabbix_get -s localhost -k 'proc.mem[kthreadd]'
4157440
```

`proc.num[]` counted both the kernel thread and the user process. `proc.mem[]` reports memory for the user process only and counts the kernel thread memory as if it was 0. This is different from the case above when ZBX_NOTSUPPORTED was reported.

Be careful when using `proc.mem[]` and `proc.num[]` items if the program name happens to match one of the thread.

Before putting parameters into `proc.mem[]` and `proc.num[]` items, you may want to test the parameters using `proc.num[]` item and `ps` command.

11 Implementation details of net.tcp.service and net.udp.service checks

Implementation of net.tcp.service and net.udp.service checks is detailed on this page for various services specified in the service parameter.

Item net.tcp.service parameters

ftp

Creates a TCP connection and expects the first 4 characters of the response to be ”220 ”, then sends ”QUIT\r\n”. Default port 21 is used if not specified.

http

Creates a TCP connection without expecting and sending anything. Default port 80 is used if not specified.

https

Uses (and only works with) libcurl, does not verify the authenticity of the certificate, does not verify the host name in the SSL certificate, only fetches the response header (HEAD request). Default port 443 is used if not specified.

imap

Creates a TCP connection and expects the first 4 characters of the response to be ”* OK”, then sends ”a1 LOGOUT\r\n”. Default port 143 is used if not specified.

ldap

Opens a connection to an LDAP server and performs an LDAP search operation with filter set to (objectClass=*). Expects successful retrieval of the first attribute of the first entry. Default port 389 is used if not specified.

nntp

Creates a TCP connection and expects the first 3 characters of the response to be ”200” or ”201”, then sends ”QUIT\r\n”. Default port 119 is used if not specified.

pop

Creates a TCP connection and expects the first 3 characters of the response to be ”+OK”, then sends ”QUIT\r\n”. Default port 110 is used if not specified.

smtp

Creates a TCP connection and expects the first 3 characters of the response to be ”220”, followed by a space, the line ending or a dash. The lines containing a dash belong to a multi-line response and the response will be re-read until a line without the dash is received. Then sends ”QUIT\r\n”. Default port 25 is used if not specified.

ssh

Creates a TCP connection. If the connection has been established, both sides exchange an identification string (SSH-major.minor-XXXX), where major and minor are protocol versions and XXXX is a string. Zabbix checks if the string matching the specification is found and then sends back the string ”SSH-major.minor-zabbix_agent\r\n” or ”0\n” on mismatch. Default port 22 is used if not specified.

tcp

Creates a TCP connection without expecting and sending anything. Unlike the other checks requires the port parameter to be specified.

telnet

Creates a TCP connection and expects a login prompt (’:’ at the end). Default port 23 is used if not specified.

Item net.udp.service parameters

ntp

Sends an SNTP packet over UDP and validates the response according to RFC 4330, section 5. Default port 123 is used if not specified.

12 Unreachable/unavailable host settings

Overview

Several configuration parameters define how Zabbix server should behave when an agent check (Zabbix, SNMP, IPMI, JMX) fails and a host becomes unreachable.

Unreachable host

A host is treated as unreachable after a failed check (network error, timeout) by Zabbix, SNMP, IPMI or JMX agents. Note that Zabbix agent active checks do not influence host availability in any way.

From that moment **UnreachableDelay** defines how often a host is rechecked using one of the items (including LLD rules) in this unreachability situation and such rechecks will be performed already by unreachable pollers (or IPMI pollers for IPMI checks). By default it is 15 seconds before the next check.

In the Zabbix server log unreachability is indicated by messages like these:

```
Zabbix agent item "system.cpu.load[percpu,avg1]" on host "New host" failed: first network error, wait for
Zabbix agent item "system.cpu.load[percpu,avg15]" on host "New host" failed: another network error, wait f
```

Note that the exact item that failed is indicated and the item type (Zabbix agent).

Note:
The *Timeout* parameter will also affect how early a host is rechecked during unreachability. If the Timeout is 20 seconds and UnreachableDelay 30 seconds, the next check will be in 50 seconds after the first attempt.

The **UnreachablePeriod** parameter defines how long the unreachability period is in total. By default UnreachablePeriod is 45 seconds. UnreachablePeriod should be several times bigger than UnreachableDelay, so that a host is rechecked more than once before a host becomes unavailable.

Switching host back to available

When unreachability period is over, the host is polled again, decreasing priority for item, that turned host into unreachable state. If the unreachable host reappears, the monitoring returns to normal automatically:

```
resuming Zabbix agent checks on host "New host": connection restored
```

Note:
Once host becomes available, it does not poll all its items immediately for two reasons:

- It might overload the host.
- The host restore time is not always matching planned item polling schedule time.

So, after the host becomes available, items are not polled immediately, but they are getting rescheduled to their next polling round.

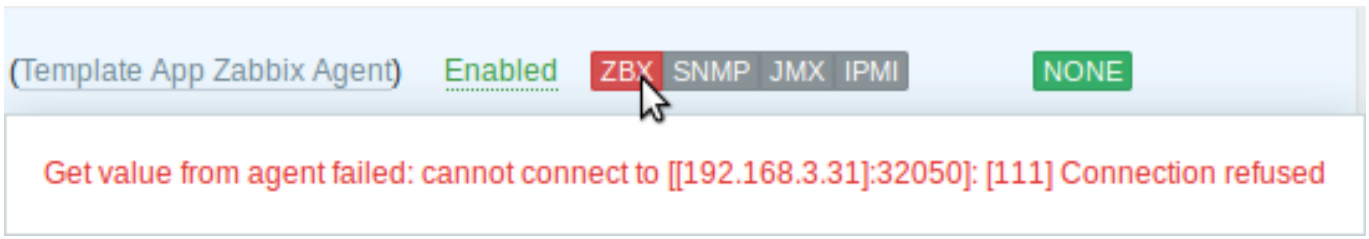
Unavailable host

After the UnreachablePeriod ends and the host has not reappeared, the host is treated as unavailable.

In the server log it is indicated by messages like these:

```
temporarily disabling Zabbix agent checks on host "New host": host unavailable
```

and in the frontend the host availability icon for the respective interface goes from green (or gray) to red (note that on mouseover a tooltip with the error description is displayed):



The **UnavailableDelay** parameter defines how often a host is checked during host unavailability.

By default it is 60 seconds (so in this case ”temporarily disabling”, from the log message above, will mean disabling checks for one minute).

When the connection to the host is restored, the monitoring returns to normal automatically, too:

```
enabling Zabbix agent checks on host "New host": host became available
```

13 Remote monitoring of Zabbix stats

Overview

It is possible to make some internal metrics of Zabbix server and proxy accessible remotely by another Zabbix instance or a third party tool. This can be useful so that supporters/service providers can monitor their client Zabbix servers/proxies remotely or, in organizations where Zabbix is not the main monitoring tool, that Zabbix internal metrics can be monitored by a third party system in an umbrella-monitoring setup.

Zabbix internal stats are exposed to a configurable set of addresses listed in the new 'StatsAllowedIP' server/proxy parameter. Requests will be accepted only from these addresses.

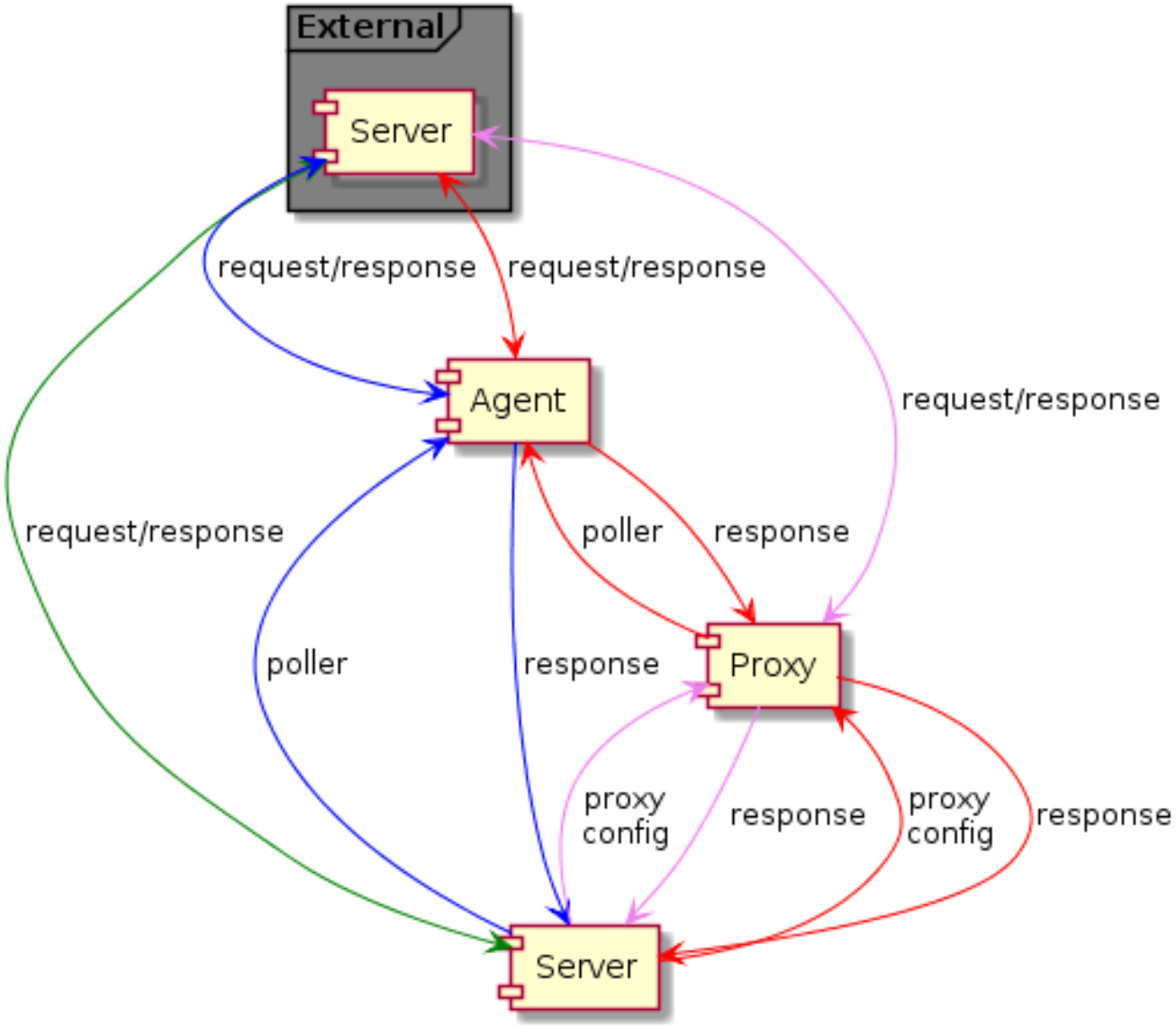
Items

To configure querying of internal stats on another Zabbix instance, you may use two items:

- `zabbix[stats,<ip>,<port>]` internal item - for direct remote queries of Zabbix server/proxy. <ip> and <port> are used to identify the target instance.
- `zabbix.stats[<ip>,<port>]` agent item - for agent-based remote queries of Zabbix server/proxy. <ip> and <port> are used to identify the target instance.

See also: Internal items, Zabbix agent items

The following diagram illustrates the use of either item depending on the context.



- - Server → external Zabbix instance (`zabbix[stats,<ip>,<port>]`)
- - Server → proxy → external Zabbix instance (`zabbix[stats,<ip>,<port>]`)

-  - Server → agent → external Zabbix instance (`zabbix.stats[<ip>,<port>]`)
-  - Server → proxy → agent → external Zabbix instance (`zabbix.stats[<ip>,<port>]`)

To make sure that the target instance allows querying it by the external instance, list the address of the external instance in the 'StatsAllowedIP' parameter on the target instance.

Exposed metrics

The stats items gather the statistics in bulk and return a JSON, which is the basis for dependent items to get their data from. The following internal metrics are returned by either of the two items:

- `zabbix[boottime]`
- `zabbix[hosts]`
- `zabbix[items]`
- `zabbix[items_unsupported]`
- `zabbix[preprocessing_queue]` (server only)
- `zabbix[process,<type>,<mode>,<state>]` (only process type based statistics)
- `zabbix[rcache,<cache>,<mode>]`
- `zabbix[requiredperformance]`
- `zabbix[triggers]` (server only)
- `zabbix[uptime]`
- `zabbix[vcache,buffer,<mode>]` (server only)
- `zabbix[vcache,cache,<parameter>]`
- `zabbix[vmware,buffer,<mode>]`
- `zabbix[wcache,<cache>,<mode>]` ('trends' cache type server only)

Templates

Templates are available for remote monitoring of Zabbix server or proxy internal metrics from an external instance:

- Template App Remote Zabbix server
- Template App Remote Zabbix proxy

Note that in order to use a template for remote monitoring of multiple external instances, a separate host is required for each external instance monitoring.

Trapper process

Receiving internal metric requests from an external Zabbix instance is handled by the trapper process that validates the request, gathers the metrics, creates the JSON data buffer and sends the prepared JSON back, for example, from server:

```
{
  "response": "success",
  "data": {
    "boottime": N,
    "hosts": N,
    "items": N,
    "items_unsupported": N,
    "preprocessing_queue": N,
    "process": {
      "alert manager": {
        "busy": {
          "avg": N,
          "max": N,
          "min": N
        },
        "idle": {
          "avg": N,
          "max": N,
          "min": N
        },
        "count": N
      },
...
    },
    "queue": N,
    "rcache": {
      "total": N,
```

```
    "free": N,
    "pfree": N,
    "used": N,
    "pused": N
  },
  "requiredperformance": N,
  "triggers": N,
  "uptime": N,
  "vcache": {
    "buffer": {
      "total": N,
      "free": N,
      "pfree": N,
      "used": N,
      "pused": N
    },
    "cache": {
      "requests": N,
      "hits": N,
      "misses": N,
      "mode": N
    }
  },
  "vmware": {
    "total": N,
    "free": N,
    "pfree": N,
    "used": N,
    "pused": N
  },
  "wcache": {
    "values": {
      "all": N,
      "float": N,
      "uint": N,
      "str": N,
      "log": N,
      "text": N,
      "not supported": N
    },
    "history": {
      "pfree": N,
      "free": N,
      "total": N,
      "used": N,
      "pused": N
    },
    "index": {
      "pfree": N,
      "free": N,
      "total": N,
      "used": N,
      "pused": N
    },
    "trend": {
      "pfree": N,
      "free": N,
      "total": N,
      "used": N,
      "pused": N
    }
  }
```

```
  }
}
```

Internal queue items

There are also another two items specifically allowing to remote query internal queue stats on another Zabbix instance:

- `zabbix[stats,<ip>,<port>,queue,<from>,<to>]` internal item - for direct internal queue queries to remote Zabbix server/proxy
- `zabbix.stats[<ip>,<port>,queue,<from>,<to>]` agent item - for agent-based internal queue queries to remote Zabbix server/proxy

See also: Internal items, Zabbix agent items

14 Configuring Kerberos with Zabbix

Overview

Kerberos authentication can be used in web monitoring and HTTP items in Zabbix since version 4.4.0.

This section describes an example of configuring Kerberos with Zabbix server to perform web monitoring of `www.example.com` with user 'zabbix'.

Steps

Step 1

Install Kerberos package.

For Debian/Ubuntu:

```
apt install krb5-user
```

For RHEL/CentOS:

```
yum install krb5-workstation
```

Step 2

Configure Kerberos configuration file (see MIT documentation for details)

```
cat /etc/krb5.conf
[libdefaults]
    default_realm = EXAMPLE.COM

#### The following krb5.conf variables are only for MIT Kerberos.
    kdc_timesync = 1
    ccache_type = 4
    forwardable = true
    proxiable = true

[realms]
    EXAMPLE.COM = {
    }

[domain_realm]
    .example.com=EXAMPLE.COM
    example.com=EXAMPLE.COM
```

Step 3

Create a Kerberos ticket for user *zabbix*. Run the following command as user *zabbix*:

```
kinit zabbix
```

> **Attention:**
> It is important to run the above command as user *zabbix*. If you run it as *root* the authentication will not work.

Step 4

Create a web scenario or HTTP agent item with Kerberos authentication type.

Optionally can be tested with the following curl command:

```
curl -v --negotiate -u : http://example.com
```

Note that for lengthy web monitoring it is necessary to take care of renewing the Kerberos ticket. Default time of ticket expiration is 10h.

6 Preprocessing

1 Preprocessing details

Overview

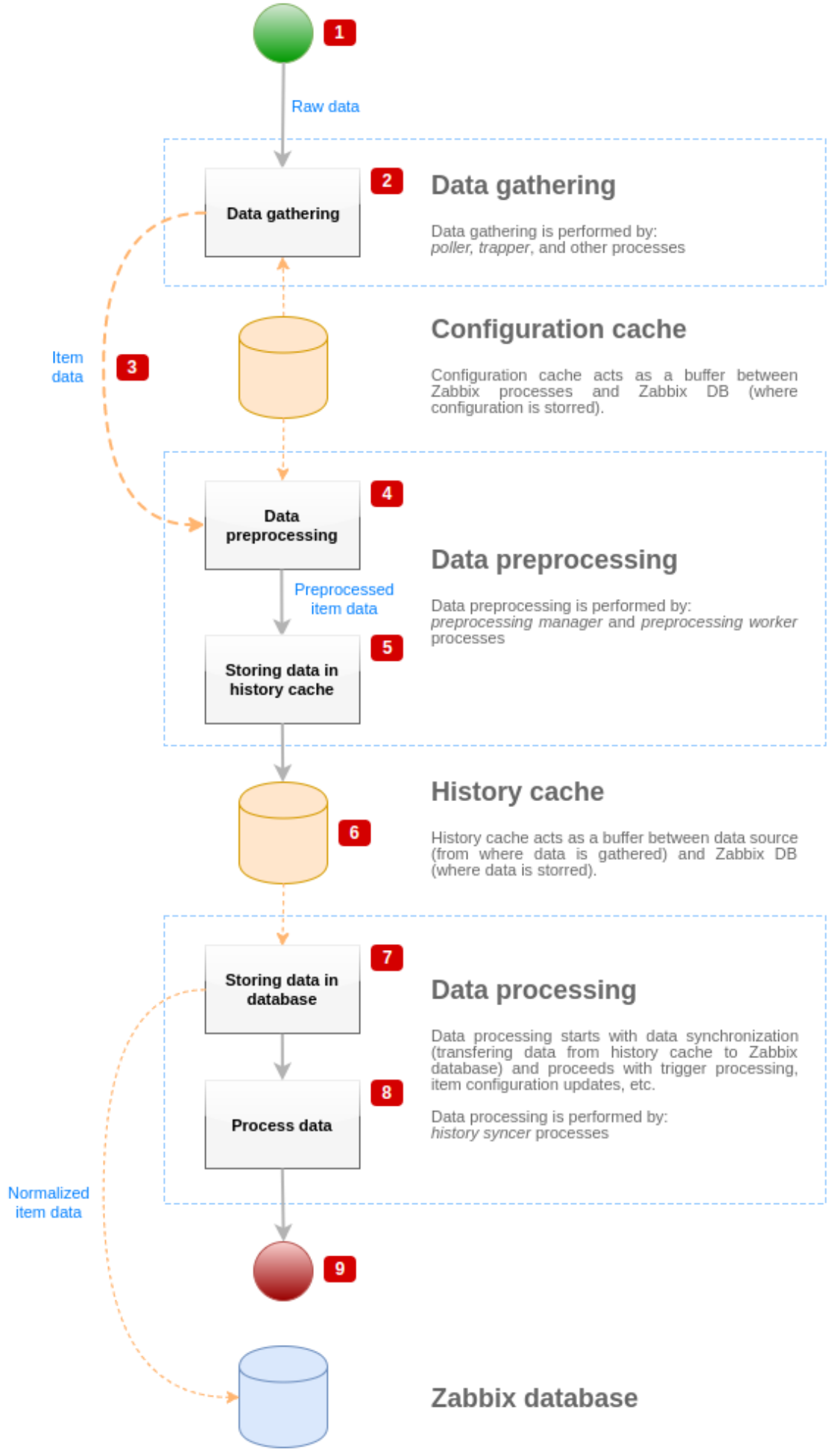
This section provides item value preprocessing details. Item value preprocessing allows to define and execute transformation rules for the received item values.

To learn about configuring basic preprocessing steps, see: Item value preprocessing.

Preprocessing is managed by a preprocessing manager process, which was added in Zabbix 3.4, along with preprocessing workers that perform the preprocessing steps. All values (with or without preprocessing) from different data gatherers pass through the preprocessing manager before being added to the history cache. Socket-based IPC communication is used between data gatherers (pollers, trappers, etc) and the preprocessing process. Either Zabbix server or Zabbix proxy (for items monitored by the proxy) is performing preprocessing steps.

Item value processing

To visualize the data flow from data source to the Zabbix database, we can use the following simplified diagram:


1
Raw data
Data gathering
2
Data gathering
Data gathering is performed by:
poller, trapper, and other processes
Item data
3
Configuration cache
Configuration cache acts as a buffer between Zabbix processes and Zabbix DB (where configuration is storred).
Data preprocessing
4
Data preprocessing
Data preprocessing is performed by:
preprocessing manager and preprocessing worker processes
Preprocessed item data
Storing data in history cache
5
History cache
6
History cache acts as a buffer between data source (from where data is gathered) and Zabbix DB (where data is storred).
Storing data in database
7
Data processing
Data processing starts with data synchronization (transfering data from history cache to Zabbix database) and proceeds with trigger processing, item configuration updates, etc.
Process data
8
Data processing is performed by:
history syncer processes
Normalized item data
9
Zabbix database

The diagram above shows only processes, objects and actions related to item value processing in a **simplified** form. The diagram does not show conditional direction changes, error handling or loops. Local data cache of preprocessing manager is not shown either because it doesn't affect data flow directly. The aim of this diagram is to show processes involved in item value processing and the way they interact.

- Data gathering starts with raw data from a data source. At this point, data contains only ID, timestamp and value (can be multiple values as well)
- No matter what type of data gatherer is used, the idea is the same for active or passive checks, for trapper items and etc, as it only changes the data format and the communication starter (either data gatherer is waiting for a connection and data, or data gatherer initiates the communication and requests the data). Raw data is validated, item configuration is retrieved from configuration cache (data is enriched with the configuration data).
- Socket-based IPC mechanism is used to pass data from data gatherers to preprocessing manager. At this point data gatherer continue to gather data without waiting for the response from preprocessing manager.
- Data preprocessing is performed. This includes execution of preprocessing steps and dependent item processing.

Note:
Item can change its state to NOT SUPPORTED while preprocessing is performed if any of preprocessing steps fail.

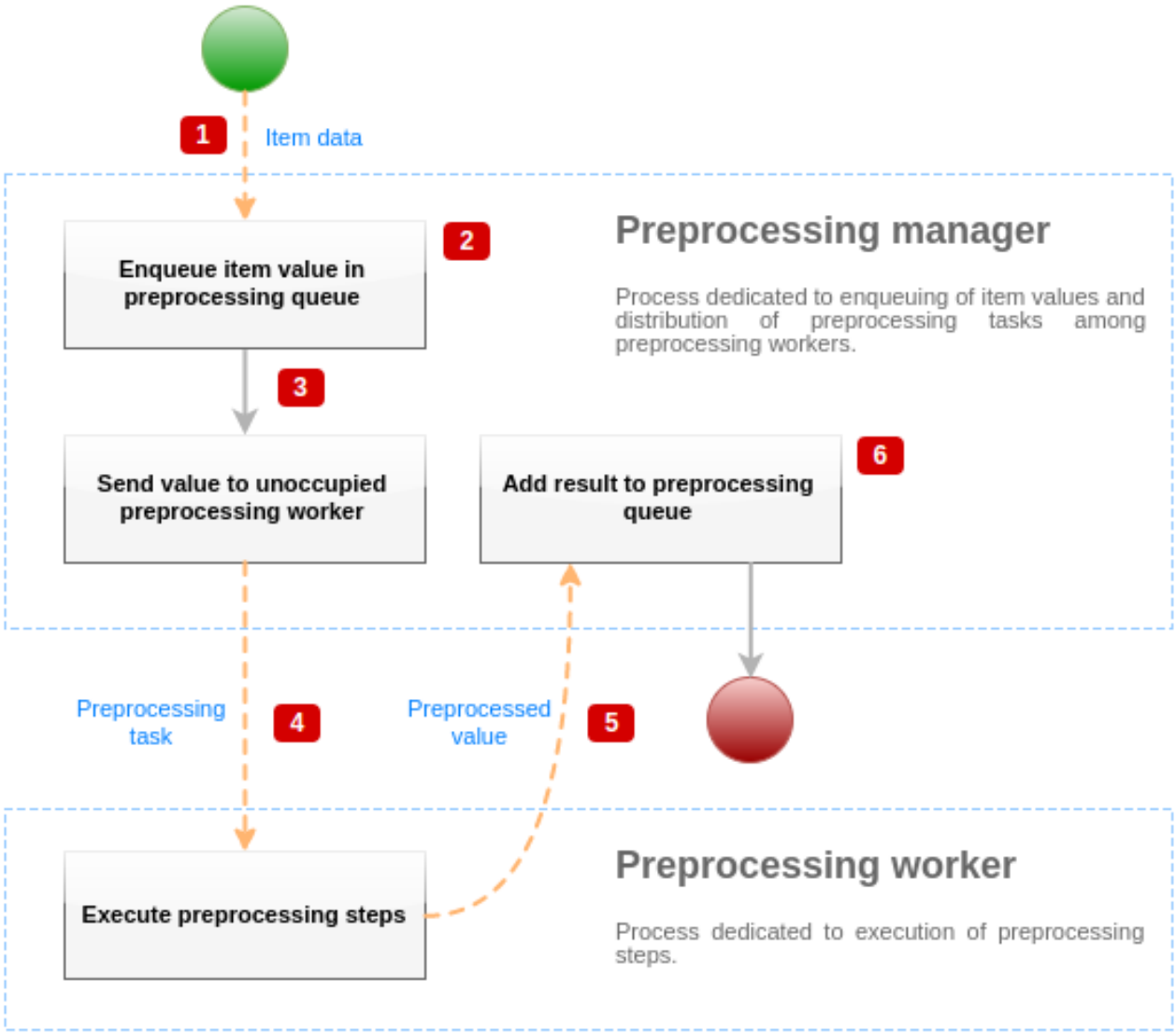
- History data from local data cache of preprocessing manager is being flushed into history cache.
- At this point data flow stops until the next synchronization of history cache (when history syncer process performs data synchronization).
- Synchronization process starts with data normalization storing data in Zabbix database. Data normalization performs conversions to desired item type (type defined in item configuration), including truncation of textual data based on predefined sizes allowed for those types (HISTORY_STR_VALUE_LEN for string, HISTORY_TEXT_VALUE_LEN for text and HISTORY_LOG_VALUE_LEN for log values). Data is being sent to Zabbix database after normalization is done.

Note:
Item can change its state to NOT SUPPORTED if data normalization fails (for example, when textual value cannot be converted to number).

- Gathered data is being processed - triggers are checked, item configuration is updated if item becomes NOT SUPPORTED, etc.
- This is considered the end of data flow from the point of view of item value processing.

Item value preprocessing

To visualize the data preprocessing process, we can use the following simplified diagram:



The diagram above shows only processes, objects and main actions related to item value preprocessing in a **simplified** form. The diagram does not show conditional direction changes, error handling or loops. Only one preprocessing worker is shown on this diagram (multiple preprocessing workers can be used in real-life scenarios), only one item value is being processed and we assume that this item requires to execute at least one preprocessing step. The aim of this diagram is to show the idea behind item value preprocessing pipeline.

- Item data and item value is passed to preprocessing manager using socket-based IPC mechanism.
- Item is placed in the preprocessing queue.

Note:
Item can be placed at the end or at the beginning of the preprocessing queue. Zabbix internal items are always placed at the beginning of preprocessing queue, while other item types are enqueued at the end.

- At this point data flow stops until there is at least one unoccupied (that is not executing any tasks) preprocessing worker.
- When preprocessing worker is available, preprocessing task is being sent to it.
- After preprocessing is done (both failed and successful execution of preprocessing steps), preprocessed value is being passed back to preprocessing manager.
- Preprocessing manager converts result to desired format (defined by item value type) and places result in preprocessing queue. If there are dependent items for current item, then dependent items are added to preprocessing queue as well. Dependent items are enqueued in preprocessing queue right after the master item, but only for master items with value set and not in NOT SUPPORTED state.

Value processing pipeline

Item value processing is executed in multiple steps (or phases) by multiple processes. This can cause:

- Dependent item can receive values, while THE master value cannot. This can be achieved by using the following use case:

```
* Master item has value type ''UINT'', (trapper item can be used), dependent item has value type ''TEXT
* No preprocessing steps are required for both master and dependent items.
* Textual value (like, "abc") should be passed to master item.
* As there are no preprocessing steps to execute, preprocessing manager checks if master item is not in
* When both master and dependent items reach history synchronization phase, master item becomes NOT SUP
```

As a result, dependent item receives a value, while master item changes its state to NOT SUPPORTED.

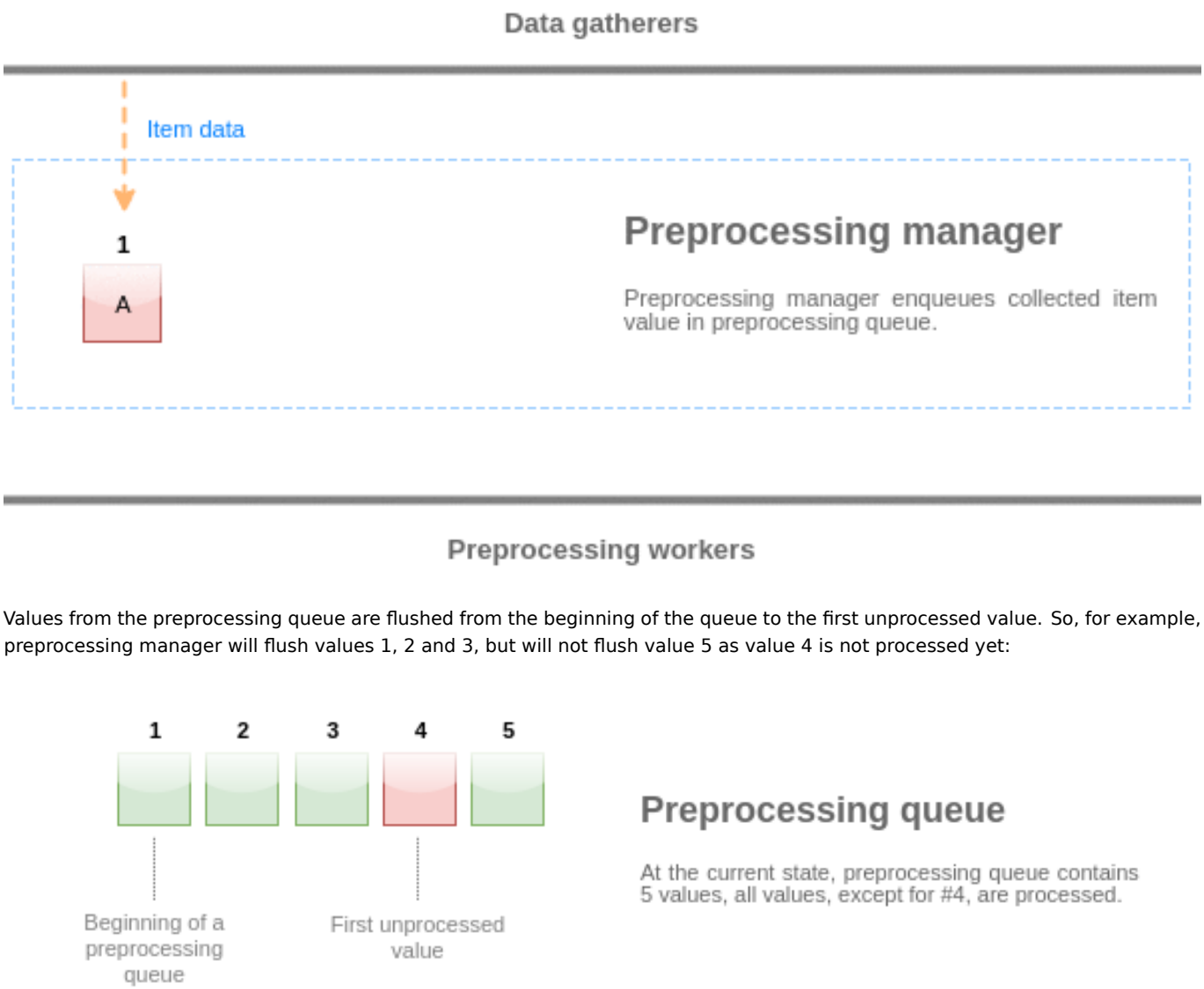
- Dependent item receives value that is not present in master item history. The use case is very similar to the previous one, except for the master item type. For example, if CHAR type is used for master item, then master item value will be truncated at the history synchronization phase, while dependent items will receive their value from the initial (not truncated) value of master item.

Preprocessing queue

Preprocessing queue is a FIFO data structure that stores values preserving the order in which values are revieved by preprocessing manager. There are multiple exceptions to FIFO logic:

- Internal items are enqueued at the beginning of the queue
- Dependent items are always enqueued after the master item

To visualize the logic of preprocessing queue, we can use the following diagram:



Values from the preprocessing queue are flushed from the beginning of the queue to the first unprocessed value. So, for example, preprocessing manager will flush values 1, 2 and 3, but will not flush value 5 as value 4 is not processed yet:

Only two values will be left in queue (4 and 5) after flushing, values are added into local data cache of preprocessing manager and then values are transferred from local cache into history cache. Preprocessing manager can flush values from local data cache in single item mode or in bulk mode (used for dependent items and values received in bulk).

Preprocessing workers

Zabbix server configuration file allows users to set count of preprocessing worker processes. StartPreprocessors configuration parameter should be used to set number of pre-forked instances of preprocessing workers. Optimal number of preprocessing workers can be determined by many factors, including the count of "preprocessable" items (items that require to execute any preprocessing steps), count of data gathering processes, average step count for item preprocessing, etc.

But assuming that there is no heavy preprocessing operations like parsing of large XML / JSON chunks, number of preprocessing workers can match total number of data gatherers. This way, there will mostly (except for the cases when data from gatherer comes in bulk) be at least one unoccupied preprocessing worker for collected data.

Warning:
Too many data gathering processes (pollers, unreachable pollers, HTTP pollers, Java pollers, pingers, trappers, proxypollers) together with IPMI manager, SNMP trapper and preprocessing workers can exhaust the per-process file descriptor limit for the preprocessing manager. This will cause Zabbix server to stop (usually shortly after the start, but sometimes it can take more time). The configuration file should be revised or the limit should be raised to avoid this situation.

2 JSONPath functionality

Overview

This section provides details of supported JSONPath functionality in item value preprocessing steps.

JSONPath consists of segments separated with dots. A segment can be either a simple word like a JSON value name, `*` or a more complex construct enclosed within square brackets `[]`. The separating dot before bracket segment is optional and can be omitted. For example:

Path	Description
`$.object.name`	Return the object.name contents.
`$.object['name']`	Return the object.name contents.
`$.object.['name']`	Return the object.name contents.
`$["object"]['name']`	Return the object.name contents.
`$.['object'].["name"]`	Return the object.name contents.
`$.object.history.length()`	Return the number of object.history array elements.
`$[?(@.name == 'Object')].price.first()`	Return the price field of the first object with name 'Object'.
`$[?(@.name == 'Object')].history.first().length()`	Return the number of history array elements of the first object with name 'Object'.
`$[?(@.price > 10)].length()`	Return the number of objects with price being greater than 10.

See also: Escaping special characters from LLD macro values in JSONPath.

Supported segments

Segment	Description
`<name>`	Match object property by name.
`*`	Match all object properties.
`['<name>']`	Match object property by name.
`['<name>', '<name>', ...]`	Match object property by any of the listed names.
`[<index>]`	Match array element by the index.
`[<number>, <number>, ...]`	Match array element by any of the listed indexes.
`[*]`	Match all object properties or array elements.
`[<start>:<end>]`	Match array elements by the defined range: **<start>** - the first index to match (including). If not specified matches all array elements from the beginning. If negative specifies starting offset from the end of array. **<end>** - the last index to match (excluding). If not specified matches all array elements to the end. If negative specifies starting offset from the end of array.
`[?(<expression>)]`	Match objects/array elements by applying filter expression.

To find a matching segment ignoring its ancestry (detached segment) it must be prefixed with '..' , for example `$..name` or `$..['name']` return values of all 'name' properties.

Since Zabbix 4.4.7, matched element names can be extracted by adding a ~ suffix to the JSONPath. It returns the name of the matched object or an index in string format of the matched array item. The output format follows the same rules as other JSONPath queries - definite path results are returned 'as is' and indefinite path results are returned in array. However there is not much point of extracting the name of an element matching a definite path - it's already known.

Filter expression

Filter expression is a arithmetical expression in infix notation.

Supported operands:

Operand	Description	Example
"<text>" '<text>'	Text constant.	'value: \'1\'" "value: '1'"
<number>	Numeric constant supporting scientific notation.	123
<jsonpath starting with $>	Value referred to by the JSONPath from the input document root node; only definite paths are supported.	$.object.name
<jsonpath starting with @>	Value referred to by the JSONPath from the current object/element; only definite paths are supported.	@.name

Supported operators:

Operator	Type	Description	Result
-	binary	Subtraction.	Number.
+	binary	Addition.	Number.
/	binary	Division.	Number.
*	binary	Multiplication.	Number.
==	binary	Is equal to.	Boolean (1 or 0).
!=	binary	Is not equal to.	Boolean (1 or 0).
	binary	Is less than.	Boolean (1 or 0).
<=	binary	Is less than or equal to.	Boolean (1 or 0).
>	binary	Is greater than.	Boolean (1 or 0).
>=	binary	Is greater than or equal to.	Boolean (1 or 0).
=~	binary	Matches regular expression.	Boolean (1 or 0).
!	unary	Boolean not.	Boolean (1 or 0).
||	binary	Boolean or.	Boolean (1 or 0).
&&	binary	Boolean and.	Boolean (1 or 0).

Functions

Functions can be used at the end of JSONPath. Multiple functions can be chained if the preceding function returns value that is accepted by the following function.

Supported functions:

Function	Description	Input	Output
avg	Average value of numbers in input array.	Array of numbers.	Number.
min	Minimum value of numbers in input array.	Array of numbers.	Number.
max	Maximum value of numbers in input array.	Array of numbers.	Number.
sum	Sum of numbers in input array.	Array of numbers.	Number.
length	Number of elements in input array.	Array.	Number.
first	The first array element.	Array.	A JSON construct (object, array, value) depending on input array contents.

Quoted numeric values are accepted by the JSONPath aggregate functions. It means that the values are converted from string type to numeric if aggregation is required.

Incompatible input will cause the function to generate error.

Output value

JSONPaths can be divided in definite and indefinite paths. A definite path can return only null or a single match. An indefinite path can return multiple matches, basically JSONPaths with detached, multiple name/index list, array slice or expression segments. However, when a function is used the JSONPath becomes definite, as functions always output single value.

A definite path returns the object/array/value it's referencing, while indefinite path returns an array of the matched objects/arrays/values.

Whitespace

Whitespace (space, tab characters) can be freely used in bracket notation segments and expressions, for example, `$[ 'a' ][ 0 ][ ?( $.b == 'c' ) ][ : -1 ].first( )`.

Strings

Strings should be enclosed with single ' or double " quotes. Inside the strings, single or double quotes (depending on which are used to enclose it) and backslashes \ are escaped with the backslash \ character.

Examples

Input data


```
{
  "books": [
    {
      "category": "reference",
      "author": "Nigel Rees",
      "title": "Sayings of the Century",
      "price": 8.95,
      "id": 1
    },
    {
      "category": "fiction",
      "author": "Evelyn Waugh",
      "title": "Sword of Honour",
      "price": 12.99,
      "id": 2
    },
    {
      "category": "fiction",
      "author": "Herman Melville",
      "title": "Moby Dick",
      "isbn": "0-553-21311-3",
      "price": 8.99,
      "id": 3
    },
    {
      "category": "fiction",
      "author": "J. R. R. Tolkien",
      "title": "The Lord of the Rings",
      "isbn": "0-395-19395-8",
      "price": 22.99,
      "id": 4
    }
  ],
  "services": {
    "delivery": {
      "servicegroup": 1000,
      "description": "Next day delivery in local town",
      "active": true,
      "price": 5
    },
    "bookbinding": {
      "servicegroup": 1001,
      "description": "Printing and assembling book in A5 format",
      "active": true,
```

```
      "price": 154.99
    },
    "restoration": {
      "servicegroup": 1002,
      "description": "Various restoration methods",
      "active": false,
      "methods": [
        {
          "description": "Checmical cleaning",
          "price": 46
        },
        {
          "description": "Pressing pages damaged by moisture",
          "price": 24.5
        },
        {
          "description": "Rebinding torn book",
          "price": 99.49
        }
      ]
    }
  },
  "filters": {
    "price": 10,
    "category": "fiction",
    "no filters": "no \"filters\""
  },
  "closed message": "Store is closed",
  "tags": [
    "a",
    "b",
    "c",
    "d",
    "e"
  ]
}
```

JSONPath	Type	Result	Comments
`$.filters.price`	definite	10	
`$.filters.category`	definite	fiction	
`$.filters['no filters']`	definite	no ”filters”	
`$.filters`	definite	{ ”price”: 10, ”category”: ”fiction”, ”no filters”: ”no \”filters\”” }	
`$.books[1].title`	definite	Sword of Honour	
`$.books[-1].author`	definite	J. R. R. Tolkien	
`$.books.length()`	definite	4	
`$.tags[:]`	indefinite	[”a”, ”b”, ”c”, ”d”, ”e”]	
`$.tags[2:]`	indefinite	[”c”, ”d”, ”e”]	
`$.tags[:3]`	indefinite	[”a”, ”b”, ”c”]	
`$.tags[1:4]`	indefinite	[”b”, ”c”, ”d”]	
`$.tags[-2:]`	indefinite	[”d”, ”e”]	
`$.tags[:-3]`	indefinite	[”a”, ”b”]	
`$.tags[:-3].length()`	definite	2	
`$.books[0, 2].title`	indefinite	[”Sayings of the Century”, ”Moby Dick”]	
`$.books[1]['author', "title"]`	indefinite	[”Evelyn Waugh”, ”Sword of Honour”]	
`$..id`	indefinite	[1, 2, 3, 4]	

JSONPath	Type	Result	Comments
`$.services..price`	indefinite	[5, 154.99, 46, 24.5, 99.49]	
`$.books[?(@.id == 4 - 0.4 * 5)].title`	indefinite	[”Sword of Honour”]	This query shows that arithmetical operations can be used in queries. Of course this query can be simplified to `$.books[?(@.id == 2)].title`
`$.books[?(@.id == 2 || @.id == 4)].title`	indefinite	[”Sword of Honour”, ”The Lord of the Rings”]	
`$.books[?(!(@.id == 2))].title`	indefinite	[”Sayings of the Century”, ”Moby Dick”, ”The Lord of the Rings”]	
`$.books[?(@.id != 2)].title`	indefinite	[”Sayings of the Century”, ”Moby Dick”, ”The Lord of the Rings”]	
`$.books[?(@.title =~ " of ")].title`	indefinite	[”Sayings of the Century”, ”Sword of Honour”, ”The Lord of the Rings”]	
`$.books[?(@.price > 12.99)].title`	indefinite	[”The Lord of the Rings”]	
`$.books[?(@.author > "Herman Melville")].title`	indefinite	[”Sayings of the Century”, ”The Lord of the Rings”]	
`$.books[?(@.price > $.filters.price)].title`	indefinite	[”Sword of Honour”, ”The Lord of the Rings”]	
`$.books[?(@.category == $.filters.category)].title`	indefinite	[”Sword of Honour”,”Moby Dick”,”The Lord of the Rings”]	

JSONPath	Type	Result	Comments

`$..[?(@.id)]`	indefinite	[
		{
		”category”: ”reference”,
		”author”: ”Nigel Rees”,
		”title”: ”Sayings of the Century”,
		”price”: 8.95,
		”id”: 1
		},
		{
		”category”: ”fiction”,
		”author”: ”Evelyn Waugh”,
		”title”: ”Sword of Honour”,
		”price”: 12.99,
		”id”: 2
		},
		{
		”category”: ”fiction”,
		”author”: ”Herman Melville”,
		”title”: ”Moby Dick”,
		”isbn”: ”0-553-21311-3”,
		”price”: 8.99,
		”id”: 3
		},
		{
		”category”: ”fiction”,
		”author”: ”J. R. R. Tolkien”,
		”title”: ”The Lord of the Rings”,
		”isbn”: ”0-395-19395-8”,
		”price”: 22.99,
		”id”: 4
		}
		]	

`$.services..[?(@.price > 50)].description`	indefinite	’[”Printing and assembling book in A5 format”, ”Rebinding torn book”]	
`$..id.length()`	definite	4	
`$.books[?(@.id == 2)].title.first()`	definite	Sword of Honour	
`$..tags.first().length()`	definite	5	$..tags is indefinite path, so it returns an array of matched elements - [[”a”, ”b”, ”c”, ”d”, ”e”]], first() returns the first element - [”a”, ”b”, ”c”, ”d”, ”e”] and finally length() calculates its length - 5.
`$.books[*].price.min()`	definite	8.95	
`$..price.max()`	definite	154.99	
`$.books[?(@.category == "fiction")].price.avg()`	definite	14.99	
`$.books[?(@.category == $.filters.xyz)].title`	indefinite		A query without match returns NULL for definite and indefinite paths.
`$.services[?(@.active=="true")].servicegroup`	indefinite	[1000,1001]	Text constants must be used in boolean value comparisons.
`$.services[?(@.active=="false")].servicegroup`	indefinite	[1002]	Text constants must be used in boolean value comparisons.

JSONPath	Type	Result	Comments
`$.services[?(@.servicegroup=="dfn02")]~.first()`		restoration	This example with a ~ suffix is supported since Zabbix 4.4.7.

Escaping special characters from LLD macro values in JSONPath

Starting with Zabbix 4.4.4, when low-level discovery macros are used in JSONPath preprocessing and their values are resolved, the following rules of escaping special characters are applied:

- only backslash (\) and double quote (") characters are considered for escaping;
- if the resolved macro value contains these characters, each of them is escaped with a backslash;
- if they are already escaped with a backslash, it is not considered as escaping and both the backslash and the following special characters are escaped once again.

For example:

JSONPath	LLD macro value	After substitution
$.[?(@.value == "{#MACRO}")]	special "value"	$.[?(@.value == "special \"value\"")]
	c:\temp	$.[?(@.value == "c:\\temp")]
	a\\b	$.[?(@.value == "a\\\\b")]

When used in the expression the macro that may have special characters should be enclosed in double quotes:

JSONPath	LLD macro value	After substitution	Result
$.[?(@.value == "{#MACRO}")]	special "value"	$.[?(@.value == "special \"value\"")]	OK
$.[?(@.value == {#MACRO})]		$.[?(@.value == special \"value\")]	**Bad JSONPath expression**

When used in the path the macro that may have special characters should be enclosed in square brackets **and** double quotes:

JSONPath	LLD macro value	After substitution	Result
$.["{#MACRO}"].value	c:\temp	$.["c:\\temp"].value	OK
$.{#MACRO}.value		$.c:\\temp.value	**Bad JSONPath expression**

3 Javascript preprocessing

Overview

This section provides details of preprocessing by Javascript.

Javascript preprocessing

Javascript preprocessing is done by invoking JavaScript function with a single parameter 'value' and user provided function body. The preprocessing step result is the value returned from this function, for example, to perform Fahrenheit to Celsius conversion user must enter

```
return (value - 32)  * 5 / 9
```

in JavaScript preprocessing parameters, which will be wrapped into a JavaScript function by server:

```
function (value)
{
   return (value - 32) * 5 / 9
}
```

The input parameter 'value' is always passed as a string. The return value is automatically coerced to string via ToString() method (if it fails then the error is returned as string value), with a few exceptions:

- returning undefined value will result in an error
- returning null value will cause the input value to be discarded, much like 'Discard value' preprocessing on 'Custom on fail' action.

Errors can be returned by throwing values/objects (normally either strings or Error objects).

For example:

```
if (value == 0)
    throw "Zero input value"
return 1/value
```

Each script has a 10 second execution timeout (depending on the script it might take longer for the timeout to trigger); exceeding it will return error. Also a 10 megabyte heap limit is enforced.

The JavaScript preprocessing step bytecode is cached and reused when the step is applied next time. Any changes to the item's preprocessing steps will cause the cached script to be reset and recompiled later.

Consecutive runtime failures (3 in a row) will cause the engine to be reinitialized to mitigate the possibility of one script breaking the execution environment for the next scripts (this action is logged with DebugLevel 4 and higher).

JavaScript preprocessing is implemented with Duktape (https://duktape.org/) JavaScript engine.

Using macros in scripts

It is possible to use user macros in JavaScript code. If a script contains user macros, these macros are resolved by server/proxy before executing specific preprocessing steps. Note, that when testing preprocessing steps in the frontend, macro values will not be pulled and need to be entered manually.

> **Note:**
> Context is ignored when a macro is replaced with its value. Macro value is inserted in the code as is, it is not possible to add additional escaping before placing the value in the JavaScript code. Please be advised, that this can cause JavaScript errors in some cases.

In an example below, if received value exceeds a {$THRESHOLD} macro value, the threshold value (if present) will be returned instead:

```
var threshold = '{$THRESHOLD}';
return (!isNaN(threshold) && value > threshold) ? threshold : value;
```

Global Javascript functions

Since Zabbix 4.4.8, additional global Javascript functions have been implemented with Duktape:

- btoa(string) - encodes string to base64 string
- atob(base64_string) - decodes base64 string

```
try {
    b64 = btoa("utf8 string");
    utf8 = atob(b64);
}
catch (error) {
    return {'error.name' : error.name, 'error.message' : error.message}
}
```

See also: Additional Javascript objects

Additional Javascript objects

Overview

This section describes Zabbix additions to the Javascript language implemented with Duktape.

Built-in objects

Zabbix

The Zabbix object provides interaction with the internal Zabbix functionality.

Method	Description
`Log(loglevel, message)`	Writes <message> into Zabbix log using <loglevel> log level (see configuration file DebugLevel parameter).

Example:

```
Zabbix.Log(3, "this is a log entry written with 'Warning' log level")
```

CurlHttpRequest

This object encapsulates cURL handle allowing to make simple HTTP requests. Errors are thrown as exceptions.

Method	Description
`AddHeader(name, value)`	Adds HTTP header field. This field is used for all following requests until cleared with the ClearHeader() method.
`ClearHeader()`	Clears HTTP header. If no header fields are set CurlHttpRequest will set Content-Type to application/json if the data being posted is json formatted and text/plain otherwise.
`Get(url, data)`	Sends HTTP GET request to the URL with optional *data* payload and returns the response.
`Put(url, data)`	Sends HTTP PUT request to the URL with optional *data* payload and returns the response.
`Post(url, data)`	Sends HTTP POST request to the URL with optional *data* payload and returns the response.
`Delete(url, data)`	Sends HTTP DELETE request to the URL with optional *data* payload and returns the response.
`Status()`	Returns the status code of the last HTTP request.

Example:

```
try {
    Zabbix.Log(4, 'jira webhook script value='+value);

    var result = {
        'tags': {
            'endpoint': 'jira'
        }
    },
    params = JSON.parse(value),
    req = new CurlHttpRequest(),
    fields = {},
    resp;

    req.AddHeader('Content-Type: application/json');
    req.AddHeader('Authorization: Basic '+params.authentication);

    fields.summary = params.summary;
    fields.description = params.description;
    fields.project = {"key": params.project_key};
    fields.issuetype = {"id": params.issue_id};
    resp = req.Post('https://tsupport.zabbix.lan/rest/api/2/issue/',
        JSON.stringify({"fields": fields})
    );

    if (req.Status() != 201) {
        throw 'Response code: '+req.Status();
    }

    resp = JSON.parse(resp);
    result.tags.issue_id = resp.id;
    result.tags.issue_key = resp.key;
} catch (error) {
```

```
    Zabbix.Log(4, 'jira issue creation failed json : '+JSON.stringify({"fields": fields}));
    Zabbix.Log(4, 'jira issue creation failed : '+error);

    result = {};
}

return JSON.stringify(result);
```

4 CSV to JSON preprocessing

Overview

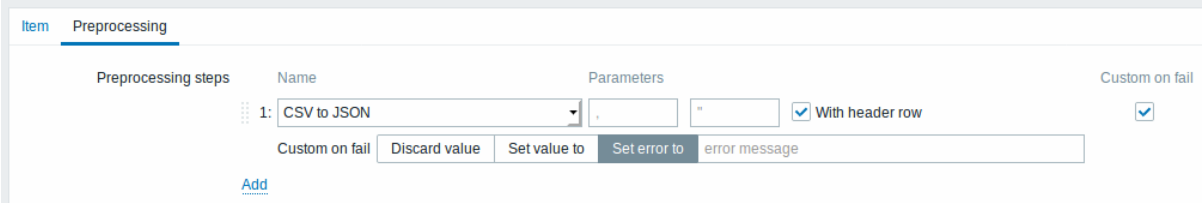
In this preprocessing step it is possible to convert CSV file data into JSON format. It's supported in:

- items (item prototypes)
- low-level discovery rules

Configuration

To configure a CSV to JSON preprocessing step:

- Go to the Preprocessing tab in item/discovery rule configuration
- Click on *Add*
- Select the *CSV to JSON* option



The first parameter allows to set a custom delimiter. Note that if the first line of CSV input starts with "Sep=" and is followed by a single UTF-8 character then that character will be used as the delimiter in case the first parameter is not set. If the first parameter is not set and a delimiter is not retrieved from the "Sep=" line, then a comma is used as a separator.

The second optional parameter allows to set a quotation symbol.

If the *With header row* checkbox is marked, the header line values will be interpreted as column names (see Header processing for more information).

If the *Custom on fail* checkbox is marked, the item will not become unsupported in case of a failed preprocessing step. Additionally custom error handling options may be set: discard the value, set a specified value or set a specified error message.

Header processing

The CSV file header line can be processed in two different ways:

- If the *With header row* checkbox is marked - header line values are interpreted as column names. In this case the column names must be unique and the data row should not contain more columns than the header row;
- If the *With header row* checkbox is not marked - the header line is interpreted as data. Column names are generated automatically (1,2,3,4...)

CSV file example:

```
Nr,Item name,Key,Qty
1,active agent item,agent.hostname,33
"2","passive agent item","agent.version","44"
3,"active,passive agent items",agent.ping,55
```

Note:
A quotation character within a quoted field in the input must be escaped by preceding it with another quotation character.

Processing header line

JSON output when a header line is expected:

```
[
   {
      "Nr":"1",
      "Item name":"active agent item",
      "Key":"agent.hostname",
      "Qty":"33"
   },
   {
      "Nr":"2",
      "Item name":"passive agent item",
      "Key":"agent.version",
      "Qty":"44"
   },
   {
      "Nr":"3",
      "Item name":"active,passive agent items",
      "Key":"agent.ping",
      "Qty":"55"
   }
]
```

No header line processing

JSON output when a header line is not expected:

```
[
   {
      "1":"Nr",
      "2":"Item name",
      "3":"Key"
      "4":"Qty"
   },
   {
      "1":"1",
      "2":"active agent item",
      "3":"agent.hostname"
      "4":"33"
   },
   {
      "1":"2",
      "2":"passive agent item",
      "3":"agent.version"
      "4":"44"
   },
   {
      "1":"3",
      "2":"active,passive agent items",
      "3":"agent.ping"
      "4":"55"
   }
]
```

7 Triggers

1 Supported trigger functions

All functions supported in trigger expressions are listed here.

FUNCTION	Description	Parameters	Comments
abschange	The amount of absolute difference between last and previous values.		Supported value types: float, int, str, text, log For example: (previous value;last value=abschange) 1;5=4 3;1=2 0;-2.5=2.5 For strings returns: 0 - values are equal 1 - values differ
avg (sec|#num,<time_shift>)			

FUNCTION				
	Average value of an item within the defined evaluation period.	**sec** or **#num** - maximum evaluation period[1] in seconds or in latest collected values (preceded by a hash mark) **time_shift** (optional) - evaluation point is moved the number of seconds back in time	Supported value types: float, int Examples: => avg(#5) → average value for the five latest values => avg(1h) → average value for an hour => avg(1h,1d) → average value for an hour one day ago. The `time_shift` parameter is supported since Zabbix 1.8.2. It is useful when there is a need to compare the current average value with the average value time_shift seconds back.
band (<sec|#num>,mask,<time_shift>)				

FUNCTION				
		Value of "bitwise AND" of an item value and mask.	**sec** (ignored, equals #1) or **#num** (optional) - the Nth most recent value **mask** (mandatory) - 64-bit unsigned integer (0 - 18446744073709551615) **time_shift** (optional) - evaluation point is moved the number of seconds back in time	Supported value types: int Take note that `#num` works differently here than with many other functions (see last()). Although the comparison is done in a bitwise manner, all the values must be supplied and are returned in decimal. For example, checking for the 3rd bit is done by comparing to 4, not 100. Examples: => band(,12)=8 or band(,12)=4 → 3rd or 4th bit set, but not both at the same time => band(,20)=16 → 3rd bit not set and 5th bit set. This function is supported since Zabbix 2.2.0.

FUNCTION		
change	The amount of difference between last and previous values.	Supported value types: float, int, str, text, log For example: (previous value;last value=change) 1;5=+4 3;1=-2 0;-2.5=-2.5 See also: abschange for comparison For strings returns: 0 - values are equal 1 - values differ
count (sec|#num,<pattern>,<operator>,<time_shift>)		

FUNCTION				
		Number of values within the defined evaluation period.	**sec** or **#num** - maximum evaluation period[1] in seconds or in latest collected values (preceded by a hash mark) **pattern** (optional) - required pattern **operator** (optional) Supported `operators`: *eq* - equal *ne* - not equal *gt* - greater *ge* - greater or equal *lt* - less *le* - less or equal *like* - matches if contains pattern (case-sensitive) *band* - bitwise AND *regexp* - case sensitive match of regular expression given in `pattern` *iregexp* - case insensitive match of regular expression given in `pattern` Note that: *eq*	Supported value types: float, integer, string, text, log Float items match with the precision of 0.000001. With *band* as third parameter, the second `pattern` parameter can be specified as two numbers, separated by '/': **number_to_compare_with/** count() calculates "bitwise AND" from the value and the *mask* and compares the result to *number_to_compare_with*. If the result of "bitwise AND" is equal to *number_to_compare_with*, the value is counted. If *number_to_compare_with* and *mask* are equal, only the *mask* need be specified (without '/'). With *regexp* or

FUNCTION			
date	Current date in YYYYMMDD format.		Supported value types: *any* Example of returned value: 20150731
dayofmonth	Day of month in range of 1 to 31.		Supported value types: *any* This function is supported since Zabbix 1.8.5.
dayofweek	Day of week in range of 1 to 7 (Mon - 1, Sun - 7).		Supported value types: *any*
delta (sec|#num,<time_shift>)	Difference between the maximum and minimum values within the defined evaluation period ('max()' minus 'min()').	**sec** or **#num** - maximum evaluation period[1] in seconds or in latest collected values specified (preceded by a hash mark) **time_shift** (optional) - evaluation point is moved the number of seconds back in time	Supported value types: float, int The `time_shift` parameter is supported since Zabbix 1.8.2.
diff			

FUNCTION			
		Checking if last and previous values differ.	Supported value types: float, int, str, text, log Returns: 1 - last and previous values differ 0 - otherwise

forecast (sec|#num,<time_shift>,time,<fit>,<mode>)

FUNCTION				
		Future value, max, min, delta or avg of the item.	**sec** or **#num** - maximum evaluation period[1] in seconds or in latest collected values specified (preceded by a hash mark) **time_shift** (optional) - evaluation point is moved the number of seconds back in time **time** - forecasting horizon in seconds **fit** (optional) - function used to fit historical data Supported `fits`: *linear* - linear function *polynomialN* - polynomial of degree N (1 <= N <= 6) *exponential* - exponential function *logarithmic* - logarithmic function *power* - power function Note that: *linear* is default, *polynomial1* is	Supported value types: float, int If value to return is larger than 999999999999.9999 or less than -999999999999.9999, return value is cropped to 999999999999.9999 or -999999999999.9999 correspondingly. Becomes not supported only if misused in expression (wrong item type, invalid parameters), otherwise returns -1 in case of errors. Examples: => forecast(#10,,1h) → forecast of item value after one hour based on last 10 values => forecast(1h,,30m) → forecast of item value after 30 minutes based on last hour data => forecast(1h,1d,12h) → forecast

FUNCTION

fuzzytime (sec)

FUNCTION				
		Checking how much the passive agent time differs from the Zabbix server/proxy time.	**sec** - seconds	Supported value types: float, int Returns: 1 - difference between the passive item value (as times-tamp) and Zabbix server/proxy times-tamp is less than or equal to T seconds 0 - otherwise Usually used with the 'sys-tem.localtime' item to check that local time is in sync with the local time of Zabbix server. *Note* that 'sys-tem.localtime' must be config-ured as a passive check. Can be used also with vfs.file.time[/path/file,mo key to check that file didn't get updates for long time. Example: => fuzzy-time(60)=0 → detect a problem if time

FUNCTION			
iregexp (<pattern>,<sec|#num>)	This function is a non case-sensitive analogue of regexp().	see regexp()	Supported value types: str, log, text
last (<sec|#num>,<time_shift>)			

FUNCTION				
		The most recent value.	**sec** (ignored, equals #1) or **#num** (optional) - the Nth most recent value **time_shift** (optional) - evaluation point is moved the number of seconds back in time	Supported value types: float, int, str, text, log Take note that `#num` works differently here than with many other functions. For example: last() is always equal to last(#1) last(#3) - third most recent value (*not* three latest values) Zabbix does not guarantee exact order of values if more than two values exist within one second in history. The `#num` parameter is supported since Zabbix 1.6.2. The `time_shift` parameter is supported since Zabbix 1.8.2.
logeventid (<pattern>)				

FUNCTION			
	Checking if event ID of the last log entry matches a regular expression.	**pattern** (optional) - regular expression describing the required pattern, Perl Compatible Regular Expression (PCRE) style.	Supported value types: log Returns: 0 - does not match 1 - matches This function is supported since Zabbix 1.8.5.
logseverity	Log severity of the last log entry.		Supported value types: log Returns: 0 - default severity N - severity (integer, useful for Windows event logs: 1 - Information, 2 - Warning, 4 - Error, 7 - Failure Audit, 8 - Success Audit, 9 - Critical, 10 - Verbose). Zabbix takes log severity from **Information** field of Windows event log.
logsource (<pattern>)			

FUNCTION			
	Checking if log source of the last log entry matches a regular expression.	**pattern** (optional) - regular expression describing the required pattern, Perl Compatible Regular Expression (PCRE) style.	Supported value types: log Returns: 0 - does not match 1 - matches Normally used for Windows event logs. For example, logsource("VMware Server").
max (sec|#num,<time_shift>)	Highest value of an item within the defined evaluation period.	**sec** or **#num** - maximum evaluation period[1] in seconds or in latest collected values (preceded by a hash mark) **time_shift** (optional) - evaluation point is moved the number of seconds back in time	Supported value types: float, int The `time_shift` parameter is supported since Zabbix 1.8.2.
min (sec|#num,<time_shift>)			

FUNCTION				
		Lowest value of an item within the defined evaluation period.	**sec** or **#num** - maximum evaluation period[1] in seconds or in latest collected values (preceded by a hash mark) **time_shift** (optional) - evaluation point is moved the number of seconds back in time	Supported value types: float, int The `time_shift` parameter is supported since Zabbix 1.8.2.
nodata (sec)				

FUNCTION				
		Checking for no data received.	**sec** - evaluation period in seconds. The period should not be less than 30 seconds because the history syncer process calculates this function only every 30 seconds. nodata(0) is disallowed.	Supported value types: *any* Returns: 1 - if no data received during the defined period of time 0 - otherwise Note that this function will display an error if, within the period of the 1st parameter: - there's no data and Zabbix server was restarted - there's no data and maintenance was completed - there's no data and the item was added or re-enabled Errors are displayed in the *Info* column in trigger configuration. This function may not work properly if there are time differences between Zabbix server,

FUNCTION			
now	Number of seconds since the Epoch (00:00:00 UTC, January 1, 1970).		Supported value types: *any*
percentile (sec|#num,<time_shift>,percentage)	P-th percentile of a period, where P (percentage) is specified by the third parameter.	**sec** or **#num** - maximum evaluation period[1] in seconds or in latest collected values (preceded by a hash mark) **time_shift** (optional) - evaluation point is moved the number of seconds back in time **percentage** - a floating-point number between 0 and 100 (inclusive) with up to 4 digits after the decimal point	Supported value types: float, int This function is supported since Zabbix 3.0.0.
prev	Previous value.		Supported value types: float, int, str, text, log Returns the same as last(#2).
regexp (<pattern>,<sec|#num>)			

FUNCTION			
	Checking if the latest (most recent) value matches regular expression.	**pattern** (optional) - regular expression, Perl Compatible Regular Expression (PCRE) style. **sec** or **#num** (optional) - maximum evaluation period[1] in seconds or in latest collected values (preceded by a hash mark). In this case, more than one value may be processed.	Supported value types: str, text, log Returns: 1 - found 0 - otherwise If more than one value is processed, '1' is returned if there is at least one matching value. This function is case-sensitive.

str (<pattern>,<sec|#num>)

FUNCTION			
	Finding a string in the latest (most recent) value.	**pattern** (optional) - required string **sec** or **#num** (optional) - maximum evaluation period[1] in seconds or in latest collected values (preceded by a hash mark). In this case, more than one value may be processed.	Supported value types: str, text, log Returns: 1 - found 0 - otherwise If more than one value is processed, '1' is returned if there is at least one matching value. This function is case-sensitive. *Tip*: You may use the 'count' function with the *like* operator to count string values that match a pattern.
strlen (<sec|#num>,<time_shift>)			

FUNCTION				
		Length of the latest (most recent) value in characters (not bytes).	**sec** (ignored, equals #1) or **#num** (optional) - the Nth most recent value **time_shift** (optional) - evaluation point is moved the number of seconds back in time	Supported value types: str, text, log Take note that `#num` works differently here than with many other functions. Examples: => strlen()(is equal to strlen(#1)) → length of the latest value => strlen(#3) → length of the third most recent value => strlen(,1d) → length of the most recent value one day ago. This function is supported since Zabbix 1.8.4.
sum (sec|#num,<time_shift>)				

FUNCTION			
	Sum of collected values within the defined evaluation period.	**sec** or **#num** - maximum evaluation period[1] in seconds or in latest collected values (preceded by a hash mark) **time_shift** (optional) - evaluation point is moved the number of seconds back in time	Supported value types: float, int The `time_shift` parameter is supported since Zabbix 1.8.2.
time	Current time in HHMMSS format.		Supported value types: *any* Example of returned value: 123055
timeleft (sec|#num,<time_shift>,threshold,<fit>)			

FUNCTION				
		Time in seconds needed for an item to reach a specified threshold.	**sec** or **#num** - maximum evaluation period[1] in seconds or in latest collected values (preceded by a hash mark) **time_shift** (optional) - evaluation point is moved the number of seconds back in time **threshold** - value to reach **fit** (optional) - see forecast()	Supported value types: float, int If value to return is larger than 999999999999.9999, return value is cropped to 999999999999.9999. Returns 999999999999.9999 if threshold cannot be reached. Becomes not supported only if misused in expression (wrong item type, invalid parameters), otherwise returns -1 in case of errors. Examples: => timeleft(#10,,0) → time until item value reaches zero based on last 10 values => timeleft(1h,,100) → time until item value reaches 100 based on last hour data => timeleft(1h,1d,0) → time until item value

FUNCTION

Warning:
Important notes:
1) All functions return numeric values only. Comparison to strings is not supported.
2) Some of the functions cannot be used for non-numeric values!
3) String arguments should be double quoted. Otherwise, they might get misinterpreted.
4) For all trigger functions **sec** and **time_shift** must be an integer with an optional time unit suffix and has absolutely nothing to do with the item's data type.

Footnotes

[1] The function is evaluated starting with the first received value (unless the `time_shift` parameter is used).

Functions and unsupported items

Since Zabbix 3.2, **nodata()**, **date()**, **dayofmonth()**, **dayofweek()**, **now()** and **time()** functions are calculated for unsupported items, too. Other functions require that the referenced item is in a supported state.

8 Macros

1 Supported macros

Overview

The table contains a complete list of macros supported by Zabbix.

Note:
To see all macros supported in a location (for example, in "map URL"), you may paste the location name into the search box at the bottom of your browser window (accessible by pressing CTRL+F) and do a search for *next*.

Macro	Supported in	Description
{ACTION.ID}	→ Trigger-based notifications and commands → Problem update notifications and commands → Discovery notifications and commands → Autoregistration notifications and commands → Internal notifications	*Numeric ID of the triggered action.* Supported since 2.2.0.
{ACTION.NAME}	→ Trigger-based notifications and commands → Problem update notifications and commands → Discovery notifications and commands → Autoregistration notifications and commands → Internal notifications	*Name of the triggered action.* Supported since 2.2.0.
{ALERT.MESSAGE}	→ Alert script parameters	*'Default message' value from action configuration.* Supported since 3.0.0.
{ALERT.SENDTO}	→ Alert script parameters	*'Send to' value from user media configuration.* Supported since 3.0.0.
{ALERT.SUBJECT}	→ Alert script parameters	*'Default subject' value from action configuration.* Supported since 3.0.0.
{DATE}	→ Trigger-based notifications and commands → Problem update notifications and commands → Discovery notifications and commands → Autoregistration notifications and commands → Internal notifications	*Current date in yyyy.mm.dd. format.*
{DISCOVERY.DEVICE.IPADDRESS}	→ Discovery notifications and commands	*IP address of the discovered device.* Available always, does not depend on host being added.

Macro	Supported in	Description
{DISCOVERY.DEVICE.DNS}	→ Discovery notifications and commands	*DNS name of the discovered device.* Available always, does not depend on host being added.
{DISCOVERY.DEVICE.STATUS}	→ Discovery notifications and commands	*Status of the discovered device*: can be either UP or DOWN.
{DISCOVERY.DEVICE.UPTIME}	→ Discovery notifications and commands	*Time since the last change of discovery status for a particular device.* For example: 1h 29m. For devices with status DOWN, this is the period of their downtime.
{DISCOVERY.RULE.NAME}	→ Discovery notifications and commands	*Name of the discovery rule that discovered the presence or absence of the device or service.*
{DISCOVERY.SERVICE.NAME}	→ Discovery notifications and commands	*Name of the service that was discovered.* For example: HTTP.
{DISCOVERY.SERVICE.PORT}	→ Discovery notifications and commands	*Port of the service that was discovered.* For example: 80.
{DISCOVERY.SERVICE.STATUS}	→ Discovery notifications and commands	*Status of the discovered service:// can be either UP or DOWN.* | |*{DISCOVERY.SERVICE.UPTIME}* |→ *Discovery notifications and commands* |Time since the last change of discovery status for a particular service.* For example: 1h 29m. For services with status DOWN, this is the period of their downtime.* | |*{ESC.HISTORY}* |→ *Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications* |Escalation history. Log of previously sent messages.* Shows previously sent notifications, on which escalation step they were sent and their status (*sent*/, *in progress* or *failed*).
{EVENT.ACK.STATUS}	→ Trigger-based notifications and commands → Problem update notifications and commands	*Acknowledgement status of the event (Yes/No).*
{EVENT.AGE}	→ Trigger-based notifications and commands → Problem update notifications and commands → Discovery notifications and commands → Autoregistration notifications and commands → Internal notifications	*Age of the event that triggered an action.* Useful in escalated messages.
{EVENT.DATE}	→ Trigger-based notifications and commands → Problem update notifications and commands → Discovery notifications and commands → Autoregistration notifications and commands → Internal notifications	*Date of the event that triggered an action.*
{EVENT.ID}	→ Trigger-based notifications and commands → Problem update notifications and commands → Discovery notifications and commands → Autoregistration notifications and commands → Internal notifications → Trigger URLs	*Numeric ID of the event that triggered an action.*
{EVENT.NAME}	→ Trigger-based notifications and commands → Problem update notifications and commands	*Name of the problem event that triggered an action.* Supported since 4.0.0.
{EVENT.NSEVERITY}	→ Trigger-based notifications and commands → Problem update notifications and commands	*Numeric value of the event severity.* Possible values: 0 - Not classified, 1 - Information, 2 - Warning, 3 - Average, 4 - High, 5 - Disaster. Supported since 4.0.0.
{EVENT.OBJECT}	→ Trigger-based notifications and commands → Problem update notifications and commands	*Numeric value of of the event object.* Possible values: 0 - Trigger, 1 - Discovered host, 2 - Discovered service, 3 - Autoregistration, 4 - Item, 5 - Low-level discovery rule. Supported since 4.4.0.

Macro	Supported in	Description
{EVENT.OPDATA}	→ Trigger-based notifications and commands → Problem update notifications and commands	*Operational data of the underlying trigger of a problem.* Supported since 4.4.0.
{EVENT.RECOVERY.DATE}	→ Problem recovery notifications and commands	*Date of the recovery event.* Supported since 2.2.0.
{EVENT.RECOVERY.ID}	→ Problem recovery notifications and commands	*Numeric ID of the recovery event.* Supported since 2.2.0.
{EVENT.RECOVERY.NAME}	→ Problem recovery notifications and commands	*Name of the recovery event.* Supported since 4.4.1.
{EVENT.RECOVERY.STATUS}	→ Problem recovery notifications and commands	*Verbal value of the recovery event.* Supported since 2.2.0.
{EVENT.RECOVERY.TAGS}	→ Problem recovery notifications and commands	*A comma separated list of recovery event tags.* Expanded to an empty string if no tags exist. Supported since 3.2.0.
{EVENT.RECOVERY.TIME}	→ Problem recovery notifications and commands	*Time of the recovery event.* Supported since 2.2.0.
{EVENT.RECOVERY.VALUE}	→ Problem recovery notifications and commands	*Numeric value of the recovery event.* Supported since 2.2.0.
{EVENT.SEVERITY}	→ Trigger-based notifications and commands → Problem update notifications and commands	*Name of the event severity.* Supported since 4.0.0.
{EVENT.SOURCE}	→ Trigger-based notifications and commands → Problem update notifications and commands	*Numeric value of the event source.* Possible values: 0 - Trigger, 1 - Discovery, 2 - Autoregistration, 3 - Internal. Supported since 4.4.0.
{EVENT.STATUS}	→ Trigger-based notifications and commands → Problem update notifications and commands → Discovery notifications and commands → Autoregistration notifications and commands → Internal notifications	*Verbal value of the event that triggered an action.* Supported since 2.2.0.
{EVENT.TAGS}	→ Trigger-based notifications and commands → Problem update notifications and commands	*A comma separated list of event tags.* Expanded to an empty string if no tags exist. Supported since 3.2.0.
{EVENT.TAGS.<tag name>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Webhook media type URL names and URLs	*Event tag value referenced by the tag name.* A tag name containing non-alphanumeric characters (including non-English multibyte-UTF characters) should be double quoted. Quotes and backslashes inside a quoted tag name must be escaped with a backslash. Supported since 4.4.2.
{EVENT.TIME}	→ Trigger-based notifications and commands → Problem update notifications and commands → Discovery notifications and commands → Autoregistration notifications and commands → Internal notifications	*Time of the event that triggered an action.*
{EVENT.UPDATE.ACTION}	→ Problem update notifications and commands	*Human-readable name of the action(s)* performed during problem update. Resolves to the following values: *acknowledged*, *commented*, *changed severity from (original severity) to (updated severity)* and *closed* (depending on how many actions are performed in one update). Supported since 4.0.0.
{EVENT.UPDATE.DATE}	→ Problem update notifications and commands	*Date of problem update (acknowledgement, etc).* Deprecated name: {ACK.DATE}
{EVENT.UPDATE.HISTORY}	→ Trigger-based notifications and commands → Problem update notifications and commands	*Log of problem updates (acknowledgements, etc).* Deprecated name: {EVENT.ACK.HISTORY}
{EVENT.UPDATE.MESSAGE}	→ Problem update notifications and commands	*Problem update message.* Deprecated name: {ACK.MESSAGE}

Macro	Supported in	Description
{EVENT.UPDATE.STATUS}	→ Trigger-based notifications and commands → Problem update notifications and commands	*Numeric value of of the problem update status.* Possible values: 0 - Webhook was called because of problem/recovery event, 1 - Update operation. Supported since 4.4.0.
{EVENT.UPDATE.TIME}	→ Problem update notifications and commands	*Time of problem update (acknowledgement, etc).* Deprecated name: {ACK.TIME}
{EVENT.VALUE}	→ Trigger-based notifications and commands → Problem update notifications and commands → Discovery notifications and commands → Autoregistration notifications and commands → Internal notifications	*Numeric value of the event that triggered an action (1 for problem, 0 for recovering).* Supported since 2.2.0.
{HOST.CONN<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Global scripts (including confirmation text) → Map element labels, map URL names and values → Item key parameters[1] → Host interface IP/DNS → Trapper item "Allowed hosts" field → Database monitoring additional parameters → SSH and Telnet scripts → JMX item endpoint field → Web monitoring[4] → Low-level discovery rule filter regular expressions → URL field of dynamic URL dashboard widget/screen element → Trigger names, operational data and descriptions → Trigger URLs → Tag names and values → HTTP agent type item, item prototype and discovery rule fields: URL, Query fields, Request body, Headers, Proxy, SSL certificate file, SSL key file, Allowed hosts.	*Host IP address or DNS name, depending on host settings*[2]. Supported in trigger names since 2.0.0.
{HOST.DESCRIPTION<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Map element labels	*Host description.* Supported since 2.4.0.

Macro	Supported in	Description
{HOST.DNS<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Global scripts (including confirmation text) → Map element labels, map URL names and values → Item key parameters[1] → Host interface IP/DNS → Trapper item "Allowed hosts" field → Database monitoring additional parameters → SSH and Telnet scripts → JMX item endpoint field → Web monitoring[4] → Low-level discovery rule filter regular expressions → URL field of dynamic URL dashboard widget/screen element → Trigger names, operational data and descriptions → Trigger URLs → Tag names and values → HTTP agent type item, item prototype and discovery rule fields: URL, Query fields, Request body, Headers, Proxy, SSL certificate file, SSL key file, Allowed hosts.	*Host DNS name*[2]. Supported in trigger names since 2.0.0.
{HOST.HOST<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Autoregistration notifications and commands → Internal notifications → Global scripts (including confirmation text) → Item key parameters → Map element labels, map URL names and values → Host interface IP/DNS → Trapper item "Allowed hosts" field → Database monitoring additional parameters → SSH and Telnet scripts → JMX item endpoint field → Web monitoring[4] → Low-level discovery rule filter regular expressions → URL field of dynamic URL dashboard widget/screen element → Trigger names, operational data and descriptions → Trigger URLs → Tag names and values → HTTP agent type item, item prototype and discovery rule fields: URL, Query fields, Request body, Headers, Proxy, SSL certificate file, SSL key file, Allowed hosts.	*Host name.* `{HOSTNAME<1-9>}` is deprecated.
{HOST.ID<1-9>}	→ Map element labels, map URL names and values → URL field of dynamic URL dashboard widget/screen element → Trigger URLs → Tag names and values	*Host ID.*

Macro	Supported in	Description
{HOST.IP<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Autoregistration notifications and commands → Internal notifications → Global scripts (including confirmation text) → Map element labels, map URL names and values → Item key parameters[1] → Host interface IP/DNS → Trapper item "Allowed hosts" field → Database monitoring additional parameters → SSH and Telnet scripts → JMX item endpoint field → Web monitoring[4] → Low-level discovery rule filter regular expressions → URL field of dynamic URL dashboard widget/screen element → Trigger names, operational data and descriptions → Trigger URLs → Tag names and values → HTTP agent type item, item prototype and discovery rule fields: URL, Query fields, Request body, Headers, Proxy, SSL certificate file, SSL key file, Allowed hosts.	*Host IP address*[2]. Supported since 2.0.0. {IPADDRESS<1-9>} is deprecated.
{HOST.METADATA}	→ Autoregistration notifications and commands	*Host metadata.* Used only for active agent autoregistration. Supported since 2.2.0.
{HOST.NAME<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Global scripts (including confirmation text) → Map element labels, map URL names and values → Item key parameters → Host interface IP/DNS → Trapper item "Allowed hosts" field → Database monitoring additional parameters → SSH and Telnet scripts → Web monitoring[4] → Low-level discovery rule filter regular expressions → URL field of dynamic URL dashboard widget/screen element → Trigger names, operational data and descriptions → Trigger URLs → Tag names and values → HTTP agent type item, item prototype and discovery rule fields: URL, Query fields, Request body, Headers, Proxy, SSL certificate file, SSL key file, Allowed hosts.	*Visible host name.* Supported since 2.0.0.
{HOST.PORT<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Autoregistration notifications and commands → Internal notifications → Trigger names, operational data and descriptions → Trigger URLs → JMX item endpoint field → Tag names and values	*Host (agent) port*[2]. Supported in autoregistration since 2.0.0. Supported in trigger names, trigger descriptions, internal and trigger-based notifications since 2.2.2.
{HOSTGROUP.ID}	→ Map element labels, map URL names and values	*Host group ID.*

Macro	Supported in	Description
{INVENTORY.ALIAS<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Alias field in host inventory.*
{INVENTORY.ASSET.TAG<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Asset tag field in host inventory.*
{INVENTORY.CHASSIS<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Chassis field in host inventory.*
{INVENTORY.CONTACT<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Contact field in host inventory.* `{PROFILE.CONTACT<1-9>}` is deprecated.
{INVENTORY.CONTRACT.NUMBER<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Contract number field in host inventory.*
{INVENTORY.DEPLOYMENT.STATUS<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Deployment status field in host inventory.*
{INVENTORY.HARDWARE<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Hardware field in host inventory.* `{PROFILE.HARDWARE<1-9>}` is deprecated.
{INVENTORY.HARDWARE.FULL<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Hardware (Full details) field in host inventory.*
{INVENTORY.HOST.NETMASK<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Host subnet mask field in host inventory.*
{INVENTORY.HOST.NETWORKS<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Host networks field in host inventory.*
{INVENTORY.HOST.ROUTER<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Host router field in host inventory.*
{INVENTORY.HW.ARCH<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Hardware architecture field in host inventory.*

Macro	Supported in	Description
{INVENTORY.HW.DATE.DECOMM<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Date hardware decommissioned field in host inventory.*
{INVENTORY.HW.DATE.EXPIRY<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Date hardware maintenance expires field in host inventory.*
{INVENTORY.HW.DATE.INSTALL<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Date hardware installed field in host inventory.*
{INVENTORY.HW.DATE.PURCHASE<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Date hardware purchased field in host inventory.*
{INVENTORY.INSTALLER.NAME<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Installer name field in host inventory.*
{INVENTORY.LOCATION<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Location field in host inventory.* {PROFILE.LOCATION<1-9>} is deprecated.
{INVENTORY.LOCATION.LAT<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Location latitude field in host inventory.*
{INVENTORY.LOCATION.LON<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Location longitude field in host inventory.*
{INVENTORY.MACADDRESSA<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*MAC address A field in host inventory.* {PROFILE.MACADDRESS<1-9>} is deprecated.
{INVENTORY.MACADDRESSB<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*MAC address B field in host inventory.*
{INVENTORY.MODEL<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Model field in host inventory.*
{INVENTORY.NAME<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Name field in host inventory.* {PROFILE.NAME<1-9>} is deprecated.

Macro	Supported in	Description
{INVENTORY.NOTES<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Notes field in host inventory.* `{PROFILE.NOTES<1-9>}` is deprecated.
{INVENTORY.OOB.IP<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*OOB IP address field in host inventory.*
{INVENTORY.OOB.NETMASK<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*OOB subnet mask field in host inventory.*
{INVENTORY.OOB.ROUTER<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*OOB router field in host inventory.*
{INVENTORY.OS<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*OS field in host inventory.* `{PROFILE.OS<1-9>}` is deprecated.
{INVENTORY.OS.FULL<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*OS (Full details) field in host inventory.*
{INVENTORY.OS.SHORT<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*OS (Short) field in host inventory.*
{INVENTORY.POC.PRIMARY.CELL<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Primary POC cell field in host inventory.*
{INVENTORY.POC.PRIMARY.EMAIL<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Primary POC email field in host inventory.*
{INVENTORY.POC.PRIMARY.NAME<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Primary POC name field in host inventory.*
{INVENTORY.POC.PRIMARY.NOTES<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Primary POC notes field in host inventory.*
{INVENTORY.POC.PRIMARY.PHONE.A<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Primary POC phone A field in host inventory.*

Macro	Supported in	Description
{INVENTORY.POC.PRIMARY.PHONE.B<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Primary POC phone B field in host inventory.*
{INVENTORY.POC.PRIMARY.SCREEN<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Primary POC screen name field in host inventory.*
{INVENTORY.POC.SECONDARY.CELL<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Secondary POC cell field in host inventory.*
{INVENTORY.POC.SECONDARY.EMAIL<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Secondary POC email field in host inventory.*
{INVENTORY.POC.SECONDARY.NAME<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Secondary POC name field in host inventory.*
{INVENTORY.POC.SECONDARY.NOTES<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Secondary POC notes field in host inventory.*
{INVENTORY.POC.SECONDARY.PHONE.A<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Secondary POC phone A field in host inventory.*
{INVENTORY.POC.SECONDARY.PHONE.B<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Secondary POC phone B field in host inventory.*
{INVENTORY.POC.SECONDARY.SCREEN<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Secondary POC screen name field in host inventory.*
{INVENTORY.SERIALNO.A<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Serial number A field in host inventory.* `{PROFILE.SERIALNO<1-9>}` is deprecated.
{INVENTORY.SERIALNO.B<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Serial number B field in host inventory.*
{INVENTORY.SITE.ADDRESS.A<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Site address A field in host inventory.*

Macro	Supported in	Description
{INVENTORY.SITE.ADDRESS<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Site address B field in host inventory.*
{INVENTORY.SITE.ADDRESS<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Site address C field in host inventory.*
{INVENTORY.SITE.CITY<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Site city field in host inventory.*
{INVENTORY.SITE.COUNTRY<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Site country field in host inventory.*
{INVENTORY.SITE.NOTES<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Site notes field in host inventory.*
{INVENTORY.SITE.RACK<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Site rack location field in host inventory.*
{INVENTORY.SITE.STATE<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Site state/province field in host inventory.*
{INVENTORY.SITE.ZIP<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Site ZIP/postal field in host inventory.*
{INVENTORY.SOFTWARE<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Software field in host inventory.* {PROFILE.SOFTWARE<1-9>} is deprecated.
{INVENTORY.SOFTWARE.APP.A<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Software application A field in host inventory.*
{INVENTORY.SOFTWARE.APP.B<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Software application B field in host inventory.*
{INVENTORY.SOFTWARE.APP.C<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Software application C field in host inventory.*

Macro	Supported in	Description
{INVENTORY.SOFTWARE.APP.D<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Software application D field in host inventory.*
{INVENTORY.SOFTWARE.APP.E<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Software application E field in host inventory.*
{INVENTORY.SOFTWARE.FULL<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Software (Full details) field in host inventory.*
{INVENTORY.TAG<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Tag field in host inventory.* `{PROFILE.TAG<1-9>}` is deprecated.
{INVENTORY.TYPE<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Type field in host inventory.* `{PROFILE.DEVICETYPE<1-9>}` is deprecated.
{INVENTORY.TYPE.FULL<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Type (Full details) field in host inventory.*
{INVENTORY.URL.A<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*URL A field in host inventory.*
{INVENTORY.URL.B<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*URL B field in host inventory.*
{INVENTORY.URL.C<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*URL C field in host inventory.*
{INVENTORY.VENDOR<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → Tag names and values → Map element labels, map URL names and values	*Vendor field in host inventory.*
{ITEM.DESCRIPTION<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications	*Description of the Nth item in the trigger expression that caused a notification.* Supported since 2.0.0.
{ITEM.ID<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → HTTP agent type item, item prototype and discovery rule fields: URL, query fields, request body, headers, proxy, SSL certificate file, SSL key file.	*Numeric ID of the Nth item in the trigger expression that caused a notification.* Supported since 1.8.12.

Macro	Supported in	Description
{ITEM.KEY<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications → HTTP agent type item, item prototype and discovery rule fields: URL, query fields, request body, headers, proxy, SSL certificate file, SSL key file.	*Key of the Nth item in the trigger expression that caused a notification.* Supported since 2.0.0. `{TRIGGER.KEY}` is deprecated.
{ITEM.KEY.ORIG<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications	*Original key (with macros not expanded) of the Nth item in the trigger expression that caused a notification.* Supported since 2.0.6.
{ITEM.LASTVALUE<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Trigger names, operational data and descriptions → Tag names and values → Trigger URLs[7]	*The latest value of the Nth item in the trigger expression that caused a notification.* It will resolve to *UNKNOWN* in the frontend if the latest history value has been collected more than the *ZBX_HISTORY_PERIOD* time ago (defined in defines.inc.php). Note that since 4.0, when used in the problem name, it will not resolve to the latest item value when viewing problem events, instead it will keep the item value from the time of problem happening. Supported since 1.4.3. It is alias to `{{HOST.HOST}:{ITEM.KEY}.last()}`. Customizing the macro value is supported for this macro; starting with Zabbix 3.2.0.
{ITEM.LOG.AGE<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands	*Age of the log item event.*
{ITEM.LOG.DATE<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands	*Date of the log item event.*
{ITEM.LOG.EVENTID<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands	*ID of the event in the event log.* For Windows event log monitoring only.
{ITEM.LOG.NSEVERITY<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands	*Numeric severity of the event in the event log.* For Windows event log monitoring only.
{ITEM.LOG.SEVERITY<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands	*Verbal severity of the event in the event log.* For Windows event log monitoring only.
{ITEM.LOG.SOURCE<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands	*Source of the event in the event log.* For Windows event log monitoring only.
{ITEM.LOG.TIME<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands	*Time of the log item event.*
{ITEM.NAME<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications	*Name of the Nth item (with macros resolved) in the trigger expression that caused a notification.*
{ITEM.NAME.ORIG<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Internal notifications	*Original name (i.e. without macros resolved) of the Nth item in the trigger expression that caused a notification.* Supported since 2.0.6.
{ITEM.STATE<1-9>}	→ Item-based internal notifications	*The latest state of the Nth item in the trigger expression that caused a notification.* Possible values: **Not supported** and **Normal**. Supported since 2.2.0.

Macro	Supported in	Description
{ITEM.VALUE<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Trigger names, operational data and descriptions → Tag names and values → Trigger URLs[7]	Resolved to either: 1) the historical (at-the-time-of-event) value of the Nth item in the trigger expression, if used in the context of trigger status change, for example, when displaying events or sending notifications. 2) the latest value of the Nth item in the trigger expression, if used without the context of trigger status change, for example, when displaying a list of triggers in a pop-up selection window. In this case works the same as {ITEM.LASTVALUE} In the first case it will resolve to *UNKNOWN* if the history value has already been deleted or has never been stored. In the second case, and in the frontend only, it will resolve to *UNKNOWN* if the latest history value has been collected more than the *ZBX_HISTORY_PERIOD* time ago (defined in defines.inc.php). Supported since 1.4.3. Customizing the macro value is supported for this macro, starting with Zabbix 3.2.0.
{LLDRULE.DESCRIPTION}	→ LLD-rule based internal notifications	*Description of the low-level discovery rule which caused a notification.* Supported since 2.2.0.
{LLDRULE.ID}	→ LLD-rule based internal notifications	*Numeric ID of the low-level discovery rule which caused a notification.* Supported since 2.2.0.
{LLDRULE.KEY}	→ LLD-rule based internal notifications	*Key of the low-level discovery rule which caused a notification.* Supported since 2.2.0.
{LLDRULE.KEY.ORIG}	→ LLD-rule based internal notifications	*Original key (with macros not expanded) of the low-level discovery rule which caused a notification.* Supported since 2.2.0.
{LLDRULE.NAME}	→ LLD-rule based internal notifications	*Name of the low-level discovery rule (with macros resolved) that caused a notification.* Supported since 2.2.0.
{LLDRULE.NAME.ORIG}	→ LLD-rule based internal notifications	*Original name (i.e. without macros resolved) of the low-level discovery rule that caused a notification.* Supported since 2.2.0.
{LLDRULE.STATE}	→ LLD-rule based internal notifications	*The latest state of the low-level discovery rule.* Possible values: **Not supported** and **Normal**. Supported since 2.2.0.
{MAP.ID}	→ Map element labels, map URL names and values	*Network map ID.*
{MAP.NAME}	→ Map element labels, map URL names and values → Text field in map shapes	*Network map name.* Supported since 3.4.0.
{PROXY.DESCRIPTION<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Discovery notifications and commands → Autoregistration notifications and commands → Internal notifications	*Description of the proxy*. Resolves to either: 1) proxy of the Nth item in the trigger expression (in trigger-based notifications). You may use indexed macros here. 2) proxy, which executed discovery (in discovery notifications). Use {PROXY.DESCRIPTION} here, without indexing. 3) proxy to which an active agent registered (in autoregistration notifications). Use {PROXY.DESCRIPTION} here, without indexing. Supported since 2.4.0.

Macro	Supported in	Description
{PROXY.NAME<1-9>}	→ Trigger-based notifications and commands → Problem update notifications and commands → Discovery notifications and commands → Autoregistration notifications and commands → Internal notifications	*Name of the proxy*. Resolves to either: 1) proxy of the Nth item in the trigger expression (in trigger-based notifications). You may use indexed macros here. 2) proxy, which executed discovery (in discovery notifications). Use {PROXY.NAME} here, without indexing. 3) proxy to which an active agent registered (in autoregistration notifications). Use {PROXY.NAME} here, without indexing. Supported since 1.8.4.
{TIME}	→ Trigger-based notifications and commands → Problem update notifications and commands → Discovery notifications and commands → Autoregistration notifications and commands → Internal notifications	*Current time in hh:mm:ss.*
{TRIGGER.DESCRIPTION}	→ Trigger-based notifications and commands → Problem update notifications and commands → Trigger-based internal notifications	*Trigger description.* Supported since 2.0.4. Starting with 2.2.0, all macros supported in a trigger description will be expanded if {TRIGGER.DESCRIPTION} is used in notification text. {TRIGGER.COMMENT} is deprecated.
{TRIGGER.EVENTS.ACK}	→ Trigger-based notifications and commands → Problem update notifications and commands → Map element labels	*Number of acknowledged events for a map element in maps, or for the trigger which generated current event in notifications.* Supported since 1.8.3.
{TRIGGER.EVENTS.PROBLEM.ACK}	→ Trigger-based notifications and commands → Problem update notifications and commands → Map element labels	*Number of acknowledged PROBLEM events for all triggers disregarding their state.* Supported since 1.8.3.
{TRIGGER.EVENTS.PROBLEM.UNACK}	→ Trigger-based notifications and commands → Problem update notifications and commands → Map element labels	*Number of unacknowledged PROBLEM events for all triggers disregarding their state.* Supported since 1.8.3.
{TRIGGER.EVENTS.UNACK}	→ Trigger-based notifications and commands → Problem update notifications and commands → Map element labels	*Number of unacknowledged events for a map element in maps, or for the trigger which generated current event in notifications.* Supported in map element labels since 1.8.3.
{TRIGGER.HOSTGROUP.NAME}	→ Trigger-based notifications and commands → Problem update notifications and commands → Trigger-based internal notifications	*A sorted (by SQL query), comma-space separated list of host groups in which the trigger is defined.* Supported since 2.0.6.
{TRIGGER.PROBLEM.EVENTS.ACK}	→ Map element labels	*Number of acknowledged PROBLEM events for triggers in PROBLEM state.* Supported since 1.8.3.
{TRIGGER.PROBLEM.EVENTS.UNACK}	→ Map element labels	*Number of unacknowledged PROBLEM events for triggers in PROBLEM state.* Supported since 1.8.3.
{TRIGGER.EXPRESSION}	→ Trigger-based notifications and commands → Problem update notifications and commands → Trigger-based internal notifications	*Trigger expression.* Supported since 1.8.12.
{TRIGGER.EXPRESSION.RECOVERY}	→ Trigger-based notifications and commands → Problem update notifications and commands → Trigger-based internal notifications	*Trigger recovery expression* if *OK event generation* in trigger configuration is set to 'Recovery expression'; otherwise an empty string is returned. Supported since 3.2.0.
{TRIGGER.ID}	→ Trigger-based notifications and commands → Problem update notifications and commands → Trigger-based internal notifications → Map element labels, map URL names and values → Trigger URLs → Trigger tag values	*Numeric trigger ID which triggered this action.* Supported in trigger URLs since Zabbix 1.8.8, in trigger tag values since 4.4.1.

Macro	Supported in	Description
{TRIGGER.NAME}	→ Trigger-based notifications and commands → Problem update notifications and commands → Trigger-based internal notifications	*Name of the trigger* (with macros resolved). Note that since 4.0.0 {EVENT.NAME} can be used in actions to display the triggered event/problem name with macros resolved.
{TRIGGER.NAME.ORIG}	→ Trigger-based notifications and commands → Problem update notifications and commands → Trigger-based internal notifications	*Original name of the trigger* (i.e. without macros resolved). Supported since 2.0.6.
{TRIGGER.NSEVERITY}	→ Trigger-based notifications and commands → Problem update notifications and commands → Trigger-based internal notifications	*Numerical trigger severity.* Possible values: 0 - Not classified, 1 - Information, 2 - Warning, 3 - Average, 4 - High, 5 - Disaster. Supported starting from Zabbix 1.6.2.
{TRIGGER.SEVERITY}	→ Trigger-based notifications and commands → Problem update notifications and commands → Trigger-based internal notifications	*Trigger severity name.* Can be defined in *Administration → General → Trigger severities*.
{TRIGGER.STATE}	→ Trigger-based internal notifications	*The latest state of the trigger.* Possible values: **Unknown** and **Normal**. Supported since 2.2.0.
{TRIGGER.STATUS}	→ Trigger-based notifications and commands → Problem update notifications and commands	*Current trigger value.* Can be either PROBLEM or OK. {STATUS} is deprecated.
{TRIGGER.TEMPLATE.NAME}	→ Trigger-based notifications and commands → Problem update notifications and commands → Trigger-based internal notifications	*A sorted (by SQL query), comma-space separated list of templates in which the trigger is defined, or *UNKNOWN* if the trigger is defined in a host.* Supported since 2.0.6.
{TRIGGER.URL}	→ Trigger-based notifications and commands → Problem update notifications and commands → Trigger-based internal notifications	*Trigger URL.*
{TRIGGER.VALUE}	→ Trigger-based notifications and commands → Problem update notifications and commands → Trigger expressions	*Current trigger numeric value*: 0 - trigger is in OK state, 1 - trigger is in PROBLEM state.
{TRIGGERS.UNACK}	→ Map element labels	*Number of unacknowledged triggers for a map element, disregarding trigger state.* A trigger is considered to be unacknowledged if at least one of its PROBLEM events is unacknowledged.
{TRIGGERS.PROBLEM.UNACK}	→ Map element labels	*Number of unacknowledged PROBLEM triggers for a map element.* A trigger is considered to be unacknowledged if at least one of its PROBLEM events is unacknowledged. Supported since 1.8.3.
{TRIGGERS.ACK}	→ Map element labels	*Number of acknowledged triggers for a map element, disregarding trigger state.* A trigger is considered to be acknowledged if all of it's PROBLEM events are acknowledged. Supported since 1.8.3.
{TRIGGERS.PROBLEM.ACK}	→ Map element labels	*Number of acknowledged PROBLEM triggers for a map element.* A trigger is considered to be acknowledged if all of it's PROBLEM events are acknowledged. Supported since 1.8.3.
{USER.FULLNAME}	→ Problem update notifications and commands	*Name and surname of the user* who added event acknowledgement. Supported since 3.4.0.
{host:key.func(param)}	→ Trigger-based notifications and commands → Problem update notifications and commands → Map element/shape labels [3] → Link labels in maps[3] → Graph names[5] → Trigger expressions[6]	*Simple macros, as used in building trigger expressions*. Supported for shape labels in maps since 3.4.2.
{$MACRO}	→ See: User macros supported by location	*User-definable macros.*

Macro	Supported in	Description
{#MACRO}	→ See: Low-level discovery macros	*Low-level discovery macros.* Supported since 2.0.0. Customizing the macro value is supported for this macro, starting with Zabbix 4.0.0.

Footnotes

[1] The {HOST.*} macros supported in item key parameters will resolve to the interface that is selected for the item. When used in items without interfaces they will resolve to either the Zabbix agent, SNMP, JMX or IPMI interface of the host in this order of priority.

[2] In remote commands, global scripts, interface IP/DNS fields and web scenarios the macro will resolve to the main agent interface, however, if it is not present, the main SNMP interface will be used. If SNMP is also not present, the main JMX interface will be used. If JMX is not present either, the main IPMI interface will be used.

[3] Only the **avg**, **last**, **max** and **min** functions, with seconds as parameter are supported in this macro in map labels.

[4] Supported since Zabbix 2.2.0, {HOST.*} macros are supported in web scenario *Name*, *Variables*, *Headers*, *SSL certificate file* and *SSL key file* fields and in scenario step *Name*, *URL*, *Post*, *Headers* and *Required string* fields.

[5] Supported since Zabbix 2.2.0. Only the **avg**, **last**, **max** and **min** functions, with seconds as parameter are supported within this macro in graph names. The {HOST.HOST<1-9>} macro can be used as host within the macro. For example:

```
* {Cisco switch:ifAlias[{#SNMPINDEX}].last()}
* {{HOST.HOST}:ifAlias[{#SNMPINDEX}].last()}
```

[6] While supported to build trigger expressions, simple macros may not be used inside each other.

[7] Supported since 4.0.0.

Indexed macros

The indexed macro syntax of {MACRO**<1-9>**} is limited to the context of **trigger expressions**. It can be used to reference hosts in the order in which they appear in the expression. Macros like {HOST.IP1}, {HOST.IP2}, {HOST.IP3} will resolve to the IP of the first, second and third host in the trigger expression (providing the trigger expression contains those hosts).

Additionally the {HOST.HOST<1-9>} macro is also supported within the {host:key.func(param)} macro in **graph names**. For example, {{HOST.HOST2}:key.func()} in the graph name will refer to the host of the second item in the graph.

Warning:
Use macros **without** index (i. e.{HOST.HOST}, {HOST.IP}, etc) in all other contexts.

2 User macros supported by location

Overview

This section contains a list of locations, where user-definable macros are supported.

Actions

In actions, user macros can be used in the following fields:

Location		Multiple macros/mix with text[1]
Trigger-based notifications and commands		yes
Trigger-based internal notifications		yes
Problem update notifications		yes
Time period condition		no
Operations		
	Default operation step duration	no
	Step duration	no

Hosts

In a host configuration, user macros can be used in the following fields:

Location		Multiple macros/mix with text[1]
Interface IP/DNS		DNS only
Interface port		no
SNMP v1, v2		
	Interface community	yes
SNMP v3		
	Interface context name	yes
	Security name	yes
	Authentication passphrase	yes
	Privacy passphrase	yes
IPMI		
	Username	yes
	Password	yes
//Tags //		
	Tag names	yes
	Tag values	yes

Items / item prototypes

In an item or an item prototype configuration, user macros can be used in the following fields:

Location		Multiple macros/mix with text[1]
Name (deprecated)		yes
Item key parameters		yes
Update interval		no
Custom intervals		no
History storage period		no
Trend storage period		no
//Calculated item //		
	Formula	yes
Database monitor		
	Username	yes
	Password	yes
	SQL query	yes
//HTTP agent //		
	URL	yes
	Query fields	yes
	Timeout	no
	Request body	yes
	Headers (names and values)	yes
	Required status codes	yes
	HTTP proxy	yes
	HTTP authentication username	yes
	HTTP authentication password	yes
	SSL certificate file	yes
	SSL key file	yes
	SSL key password	yes
	Allowed hosts	yes
JMX agent		
	JMX endpoint	yes
//SNMP agent //		
	SNMP OID	yes
//SSH agent //		
	Username	yes
	Public key file	yes
	Private key file	yes
	Password	yes
	Script	yes
//TELNET agent //		
	Username	yes
	Password	yes

Location		Multiple macros/mix with text[1]
	Script	yes
//Zabbix trapper //		
	Allowed hosts	yes
Preprocessing		
	Step parameters (including custom scripts)	yes

Low-level discovery

In a low-level discovery rule, user macros can be used in the following fields:

Location		Multiple macros/mix with text[1]
Name		yes
Key parameters		yes
Update interval		no
Custom interval		no
Keep lost resources period		no
SNMP agent		
	SNMP OID	yes
SSH agent		
	Username	yes
	Public key file	yes
	Private key file	yes
	Password	yes
	Script	yes
TELNET agent		
	Username	yes
	Password	yes
	Script	yes
Zabbix trapper		
	Allowed hosts	yes
Database monitor		
	Additional parameters	yes
JMX agent		
	JMX endpoint	yes
HTTP agent		
	URL	yes
	Query fields	yes
	Timeout	no
	Request body	yes
	Headers (names and values)	yes
	Required status codes	yes
	HTTP authentication username	yes
	HTTP authentication password	yes
//Filters //		
	Regular expression	yes

Network discovery

In a network discovery rule, user macros can be used in the following fields:

Location		Multiple macros/mix with text[1]
Update interval		no
SNMP v1, v2		
	SNMP community	yes
	SNMP OID	yes
SNMP v3		
	Context name	yes
	Security name	yes
	Authentication passphrase	yes

Location		Multiple macros/mix with text[1]
	Privacy passphrase	yes
	SNMP OID	yes

Proxies

In a proxy configuration, user macros can be used in the following field:

Location	Multiple macros/mix with text[1]
Interface port (for passive proxy)	no

Templates

In a template configuration, user macros can be used in the following fields:

Location		Multiple macros/mix with text[1]
//Tags //		
	Tag names	yes
	Tag values	yes

Triggers

In a trigger configuration, user macros can be used in the following fields:

Location		Multiple macros/mix with text[1]
Name		yes
Operational data		yes
Expression (only in constants and function parameters; secret macros are not supported).		yes
Description		yes
URL		yes
Tag for matching		yes
//Tags //		
	Tag names	yes
	Tag values	yes

Web scenario

In a web scenario configuration, user macros can be used in the following fields:

Location	Multiple macros/mix with text[1]
Name	yes
Update interval	no
Agent	yes
HTTP proxy	yes

Location		Multiple macros/mix with text[1]
Variables (names and values)		values only
Headers (names and values)		yes
//Steps //		
	Name	yes
	URL	yes
	Variables (names and values)	values only
	Headers (names and values)	yes
	Timeout	no
	Required string	yes
	Required status codes	no
//Authentication //		
	User	yes
	Password	yes
	SSL certificate	yes
	SSL key file	yes
	SSL key password	yes

Other locations

In addition to the locations listed here, user macros can be used in the following fields:

Location		Multiple macros/mix with text[1]
Global scripts (including confirmation text)		yes
Monitoring → Screens		
	URL field of *dynamic URL* screen element	yes
Administration → Users → Media		
	When active	no
Administration → General → Working time		
	Working time	no

For a complete list of all macros supported in Zabbix, see supported macros.

Footnotes

[1] If multiple macros in a field or macros mixed with text are not supported for the location, a single macro has to fill the whole field.

9 Unit symbols

Overview

Having to use some large numbers, for example ’86400’ to represent the number of seconds in one day, is both difficult and error-prone. This is why you can use some appropriate unit symbols (or suffixes) to simplify Zabbix trigger expressions and item keys.

Instead of ’86400’ for the number of seconds you can simply enter ’1d’. Suffixes function as multipliers.

Time suffixes

For time you can use:

- **s** - seconds (when used, works the same as the raw value)
- **m** - minutes
- **h** - hours
- **d** - days
- **w** - weeks

Time suffixes are supported in:

- trigger expression constants and function parameters
- constants of calculated item formulas
- parameters of the **zabbix[queue,<from>,<to>]** internal item
- last parameter of aggregate checks

- item configuration ('Update interval', 'Custom intervals', 'History storage period' and 'Trend storage period' fields)
- item prototype configuration ('Update interval', 'Custom intervals', 'History storage period' and 'Trend storage period' fields)
- low-level discovery rule configuration ('Update interval', 'Custom intervals', 'Keep lost resources' fields)
- network discovery configuration ('Update interval' field)
- web scenario configuration ('Update interval', 'Timeout' fields)
- action operation configuration ('Default operation step duration', 'Step duration' fields)
- slide show configuration ('Default delay' field)
- user profile settings ('Auto-logout', 'Refresh', 'Message timeout' fields)
- graph widget of *Monitoring* → *Dashboard* ('Time shift' field)
- *Administration* → *General* → *Housekeeping* (storage period fields)
- *Administration* → *General* → *Trigger displaying options* ('Display OK triggers for', 'On status change triggers blink for' fields)
- *Administration* → *General* → *Other* ('Refresh unsupported items' field)

Memory suffixes

Memory size suffixes are supported in:

- trigger expression constants and function parameters
- constants of calculated item formulas

For memory size you can use:

- **K** - kilobyte
- **M** - megabyte
- **G** - gigabyte
- **T** - terabyte

Other uses

Unit symbols are also used for a human-readable representation of data in the frontend.

In both Zabbix server and frontend these symbols are supported:

- **K** - kilo
- **M** - mega
- **G** - giga
- **T** - tera

When item values in B, Bps are displayed in the frontend, base 2 is applied (1K = 1024). Otherwise a base of 10 is used (1K = 1000).

Additionally the frontend also supports the display of:

- **P** - peta
- **E** - exa
- **Z** - zetta
- **Y** - yotta

Usage examples

By using some appropriate suffixes you can write trigger expressions that are easier to understand and maintain, for example these expressions:

```
{host:zabbix[proxy,zabbix_proxy,lastaccess]}>120
{host:system.uptime[].last()}<86400
{host:system.cpu.load.avg(600)}<10
{host:vm.memory.size[available].last()}<20971520
```

could be changed to:

```
{host:zabbix[proxy,zabbix_proxy,lastaccess]}>2m
{host:system.uptime.last()}<1d
{host:system.cpu.load.avg(10m)}<10
{host:vm.memory.size[available].last()}<20M
```

10 Setting time periods

Overview

To set a time period, the following format has to be used:

`d-d,hh:mm-hh:mm`

where the symbols stand for the following:

Symbol	Description
d	Day of the week: 1 - Monday, 2 - Tuesday ,... , 7 - Sunday
hh	Hours: 00-24
mm	Minutes: 00-59

You can specify more than one time period using a semicolon (;) separator:

`d-d,hh:mm-hh:mm;d-d,hh:mm-hh:mm...`

Leaving the time period empty equals 01-07,00:00-24:00, which is the default value.

Attention:
The upper limit of a time period is not included. Thus, if you specify 09:00-18:00 the last second included in the time period is 17:59:59. This is true starting from version 1.8.7, for everything, while Working time has always worked this way.

Examples

Working hours. Monday - Friday from 9:00 till 18:00:

`1-5,09:00-18:00`

Working hours plus weekend. Monday - Friday from 9:00 till 18:00 and Saturday, Sunday from 10:00 till 16:00:

`1-5,09:00-18:00;6-7,10:00-16:00`

11 Command execution

Zabbix uses common functionality for external checks, user parameters, system.run items, custom alert scripts, remote commands and user scripts.

Execution steps

The command/script is executed similarly on both Unix and Windows platforms:

1. Zabbix (the parent process) creates a pipe for communication
2. Zabbix sets the pipe as the output for the to-be-created child process
3. Zabbix creates the child process (runs the command/script)
4. A new process group (in Unix) or a job (in Windows) is created for the child process
5. Zabbix reads from the pipe until timeout occurs or no one is writing to the other end (ALL handles/file descriptors have been closed). Note that the child process can create more processes and exit before they exit or close the handle/file descriptor.
6. If the timeout has not been reached, Zabbix waits until the initial child process exits or timeout occurs
7. If the initial child process exited and the timeout has not been reached, Zabbix checks exit code of the initial child process and compares it to 0 (non-zero value is considered as execution failure, only for custom alert scripts, remote commands and user scripts executed on Zabbix server and Zabbix proxy)
8. At this point it is assumed that everything is done and the whole process tree (i.e. the process group or the job) is terminated

Attention:
Zabbix assumes that a command/script has done processing when the initial child process has exited AND no other process is still keeping the output handle/file descriptor open. When processing is done, ALL created processes are terminated.

All double quotes and backslashes in the command are escaped with backslashes and the command is enclosed in double quotes.

Exit code checking

Exit code are checked with the following conditions:

```
*Only for custom alert scripts, remote commands and user scripts executed on Zabbix server and Zabbix prox
*Any exit code that is different from 0 is considered as execution failure.
*Contents of standard error and standard output for failed executions are collected and available in front
*Additional log entry is created for remote commands on Zabbix server to save script execution output and
```

Possible frontend messages and log entries for failed commands/scripts:

- Contents of standard error and standard output for failed executions (if any).
- "Process exited with code: N." (for empty output, and exit code not equal to 0).
- "Process killed by signal: N." (for process terminated by a signal, on Linux only).
- "Process terminated unexpectedly." (for process terminated for unknown reasons).

Read more about:

- External checks
- User parameters
- system.run items
- Custom alert scripts
- Remote commands
- Global scripts

12 Recipes for monitoring

General

Monitoring server availability

At least three methods (or combination of all methods) may be used in order to monitor availability of a server.

- ICMP ping ("icmpping" key)
- "zabbix[host,agent,available]" item
- trigger function nodata() for monitoring the availability of hosts that use active checks only

Sending alerts via WinPopUps

WinPopUps maybe very useful if you're running Windows OS and want to get quick notification from Zabbix. It could be good addition for email-based alert messages. Details about enabling of WinPopUps can be found at http://www.zabbix.com/forum/showthread.php?t=2147.

Monitoring specific applications

AS/400

IBM AS/400 platform can be monitored using SNMP. More information is available at http://publib-b.boulder.ibm.com/Redbooks.nsf/RedbookAbstracts/sg244504.html?Open.

MySQL

Several user parameters can be used for the monitoring of MySQL in the agent configuration file: /usr/local/etc/zabbix_agentd.conf

```
### Set of parameters for monitoring MySQL server (v3.23.42 and later)
### Change -u and add -p if required
#UserParameter=mysql.ping,mysqladmin -uroot  ping|grep alive|wc -l
#UserParameter=mysql.uptime,mysqladmin -uroot status|cut -f2 -d":"|cut -f2 -d" "
#UserParameter=mysql.threads,mysqladmin -uroot status|cut -f3 -d":"|cut -f2 -d" "
#UserParameter=mysql.questions,mysqladmin -uroot status|cut -f4 -d":"|cut -f2 -d" "
#UserParameter=mysql.slowqueries,mysqladmin -uroot status|cut -f5 -d":"|cut -f2 -d" "
#UserParameter=mysql.qps,mysqladmin -uroot status|cut -f9 -d":"|cut -f2 -d" "
#UserParameter=mysql.version,mysql -V
```

- *mysql.ping*

Check whether MySQL is alive.

```
Result: 0 - not started 1 - alive
```

- *mysql.uptime*

Number of seconds MySQL is running.

- *mysql.threads*

Number of MySQL threads.

- *mysql.questions*

Number of processed queries.

- *mysql.slowqueries*

Number of slow queries.

- *mysql.qps*

Queries per second.

- *mysql.version*

Version of MySQL. For example: mysql Ver 14.14 Distrib 5.1.53, for pc-linux-gnu (i686)

For additional information see also the userparameter_mysql.conf file in conf/zabbix_agentd directory.

Mikrotik routers

Use SNMP agent provided by Mikrotik. See http://www.mikrotik.com for more information.

Windows

Use Zabbix Windows agent included (pre-compiled) into Zabbix distribution.

Tuxedo

Tuxedo command line utilities tmadmin and qmadmin can be used in definition of a UserParameter in order to return per server/service/queue performance counters and availability of Tuxedo resources.

Informix

Standard Informix utility **onstat** can be used for monitoring of virtually every aspect of Informix database. Also, Zabbix can retrieve information provided by Informix SNMP agent.

HP OpenView

Zabbix can be configured to send messages to OpenView server. The following steps must be performed:

Step 1

Define new media.

The media will execute a script which will send required information to OpenView.

Step 2

Define new user.

The user has to be linked with the media.

Step 3

Configure actions.

Configure actions to send all (or selected) trigger status changes to the user.

Step 4

Write media script.

The script will have the following logic. If trigger is ON, then execute OpenView command *opcmsg -id application=<application> msg_grp=<msg_grp> object=<object> msg_text=<text>*. The command will return unique message ID which has to be stored somewhere, preferrably in a new table of ZABBIX database. If trigger is OFF then *opcmack <message id>* has to be executed with message ID retrieved from the database.

Refer to OpenView official documentation for more details about opcmsg and opcmack. The media script is not given here.

13 Performance tuning

Attention:
This is a work in progress.

Overview

It is very important to have Zabbix system properly tuned for maximum performance.

Hardware

General advice on hardware:

- Use fastest processor available
- SCSI or SAS is better than IDE (performance of IDE disks may be significantly improved by using utility hdparm) and SATA
- 15K RPM is better than 10K RPM which is better than 7200 RPM
- Use fast RAID storage
- Use fast Ethernet adapter
- Having more memory is always better

Operating system

- Use latest (stable!) version of OS
- Exclude unnecessary functionality from kernel
- Tune kernel parameters

Zabbix configuration parameters

Many parameters may be tuned to get optimal performance.

zabbix_server

StartPollers

General rule - keep value of this parameter as low as possible. Every additional instance of zabbix_server adds known overhead, in the same time, parallelism is increased. Optimal number of instances is achieved when queue, on average, contains minimum number of parameters (ideally, 0 at any given moment). This value can be monitored by using internal check zabbix[queue].

> **Note:**
> See the "See also" section at the bottom of this page to find out how to configure optimal count of zabbix processes.

DebugLevel

Optimal value is 3.

DBSocket

MySQL only. It is recommended to use DBSocket for connection to the database. That is the fastest and the most secure way.

Database engine

This is probably the most important part of Zabbix tuning. Zabbix heavily depends on the availability and performance of database engine.

- use fastest database engine, i.e. MySQL or PostgreSQL
- use stable release of a database engine
- rebuild MySQL or PostgreSQL from sources to get maximum performance
- follow performance tuning instructions taken from MySQL or PostgreSQL documentation
- for MySQL, use InnoDB table structure
- ZABBIX works at least 1.5 times faster (comparing to MyISAM) if InnoDB is used. This is because of increased parallelism. However, InnoDB requires more CPU power.
- tuning the database server for the best performance is highly recommended.
- keep database tables on different hard disks
- 'history', 'history_str, 'items' 'functions', triggers', and 'trends' are most heavily used tables.
- for large installations keeping MySQL temporary files in tmpfs is:
  - MySQL >= 5.5: not recommended (MySQL bug #58421)
  - MySQL < 5.5: recommended

GUI debugging

Problems related to the frontend performance may be diagnosed using the frontend debug mode.

General advice

- monitor required parameters only
- tune 'Update interval' for all items. Keeping a small update interval may be good for nice graphs, however, this may overload Zabbix
- tune parameters for default templates
- tune housekeeping parameters
- do not monitor parameters which return the same information.
- avoid the use of triggers with long period given as function argument. For example, max(3600) will be calculated significantly slower than max(60).

Viewing Zabbix process performance with "ps" and "top"

Since Zabbix 2.2 processes change their commandlines to display current activity and meaningful statistics, like:

```
UID        PID  PPID  C STIME TTY      TIME CMD
zabbix22  4584     1  0 14:55 ?    00:00:00 zabbix_server -c /home/zabbix22/zabbix_server.conf
zabbix22  4587  4584  0 14:55 ?    00:00:00 zabbix_server: configuration syncer [synced configuration in 0
zabbix22  4588  4584  0 14:55 ?    00:00:00 zabbix_server: db watchdog [synced alerts config in 0.018748 s
zabbix22  4608  4584  0 14:55 ?    00:00:00 zabbix_server: timer #1 [updated 0 hosts, suppressed 0 events
zabbix22  4637  4584  0 14:55 ?    00:00:01 zabbix_server: history syncer #3 [processed 0 values, 0 trigge
zabbix22  4657  4584  0 14:55 ?    00:00:00 zabbix_server: vmware collector #1 [updated 0, removed 0 VMwar
zabbix22  4670     1  0 14:55 ?    00:00:00 zabbix_proxy -c /home/zabbix22/zabbix_proxy.conf
zabbix22  4673  4670  0 14:55 ?    00:00:00 zabbix_proxy: configuration syncer [synced config 15251 bytes
zabbix22  4674  4670  0 14:55 ?    00:00:00 zabbix_proxy: heartbeat sender [sending heartbeat message succ
zabbix22  4688  4670  0 14:55 ?    00:00:00 zabbix_proxy: icmp pinger #1 [got 1 values in 1.811128 sec, id
zabbix22  4690  4670  0 14:55 ?    00:00:00 zabbix_proxy: housekeeper [deleted 9870 records in 0.233491 se
zabbix22  4701  4670  0 14:55 ?    00:00:08 zabbix_proxy: http poller #2 [got 1 values in 0.024105 sec, id
zabbix22  4707  4670  0 14:55 ?    00:00:00 zabbix_proxy: history syncer #4 [processed 0 values, 0 trigger
zabbix22  4738     1  0 14:55 ?    00:00:00 zabbix_agentd -c /home/zabbix22/zabbix_agentd.conf
zabbix22  4739  4738  0 14:55 ?    00:00:00 zabbix_agentd: collector [idle 1 sec]
zabbix22  4740  4738  0 14:55 ?    00:00:00 zabbix_agentd: listener #1 [waiting for connection]
zabbix22  4741  4738  0 14:55 ?    00:00:00 zabbix_agentd: listener #2 [processing request]
```

The main process is an exception. Instead of current activity the original commandline is shown. This helps to distinguish processes on systems with multiple Zabbix instances.

This feature is not implemented for Microsoft Windows.

If logging level is set to **DebugLevel=4** these activity and statistics messages are also written into log file.

Linux

On Linux systems `ps` command can be used together with `watch` command for observing how Zabbix is doing. For example, to run `ps` command 5 times per second to see process activities:

```
watch -n 0.2 ps -fu zabbix
```

To show only Zabbix proxy and agent processes:

```
watch -tn 0.2 'ps -f -C zabbix_proxy -C zabbix_agentd'
```

To show only history syncer processes:

```
watch -tn 0.2 'ps -fC zabbix_server | grep history'
```

The `ps` command produces a wide output (approximately 190 columns) as some activity messages are long. If your terminal has less than 190 columns of text you can try

```
watch -tn 0.2 'ps -o cmd -C zabbix_server -C zabbix_proxy -C zabbix_agentd'
```

to display only commandlines without UID, PID, start time etc.

`top` command also can be used for observing Zabbix performance. Pressing 'c' key in `top` shows processes with their commandlines. In our tests on Linux `top` and `atop` correctly displayed changing activities of Zabbix processes, but `htop` was not displaying changing activities.

BSD systems

If `watch` command is not installed, a similar effect can be achieved with

```
while [ 1 ]; do ps x; sleep 0.2; clear; done
```

AIX, HP-UX

If `watch` command is not available, one can try

```
while [ 1 ]; do ps -fu zabbix; sleep 1; clear; done
```

Solaris

By default the `ps` command does not show changing activities. One option is to use `/usr/ucb/ps` instead. If `watch` command is not installed, a periodically updated list of processes can be shown with

```
while [ 1 ]; do /usr/ucb/ps gxww; sleep 1; clear; done
```

On Solaris 11:

- `/usr/ucb/ps` is not installed by default. You may need to install *ucb* package, e.g. `pkg install compatibility/ucb`,
- if Zabbix daemon has been started by privileged user its activities are not shown to non-privileged user.
- the `sleep` command accepts not only whole seconds but also fractions of second (e.g. `sleep 0.2`).

See also

1. How to configure optimal count of zabbix processes

14 Version compatibility

Supported agents

Zabbix agents starting with version 1.4 are compatible with Zabbix 4.4. However, you may need to review the configuration of older agents as some parameters have changed, for example, parameters related to logging for versions before 3.0.

To take full advantage of new and improved items, improved performance and reduced memory usage, use the latest 4.4 agent.

Note that Zabbix agent newer than 4.4 cannot be used with Zabbix server 4.4.

Supported Zabbix proxies

Zabbix 4.4.x server can only work with Zabbix 4.4.x proxies. Zabbix 4.4.x proxies can only work with Zabbix 4.4.x server.

Attention:
It is no longer possible to start the upgraded server and have older, yet unupgraded proxies report data to a newer server. This approach, which was never recommended nor supported by Zabbix, now is officially disabled, as the server will ignore data from unupgraded proxies. For more information, see the upgrade procedure.

Warnings about using incompatible Zabbix daemon versions are logged.

Supported XML files

XML files, exported with 1.8, 2.0, 2.2, 2.4, 3.0, 3.2, 3.4, 4.0 and 4.2 are supported for import in Zabbix 4.4.

Attention:
In Zabbix 1.8 XML export format, trigger dependencies are stored by name only. If there are several triggers with the same name (for example, having different severities and expressions) that have a dependency defined between them, it is not possible to import them. Such dependencies must be manually removed from the XML file and re-added after import.

15 Database error handling

If Zabbix detects that the backend database is not accessible, it will send a notification message and continue the attempts to connect to the database. For some database engines, specific error codes are recognised.

MySQL

- CR_CONN_HOST_ERROR
- CR_SERVER_GONE_ERROR
- CR_CONNECTION_ERROR
- CR_SERVER_LOST
- CR_UNKNOWN_HOST
- ER_SERVER_SHUTDOWN
- ER_ACCESS_DENIED_ERROR
- ER_ILLEGAL_GRANT_FOR_TABLE
- ER_TABLEACCESS_DENIED_ERROR
- ER_UNKNOWN_ERROR

16 Zabbix sender dynamic link library for Windows

In a Windows environment applications can send data to Zabbix server/proxy directly by using the Zabbix sender dynamic link library (zabbix_sender.dll) instead of having to launch an external process (zabbix_sender.exe).

The dynamic link library with the development files is located in bin\winXX\dev folders. To use it, include the zabbix_sender.h header file and link with the zabbix_sender.lib library. An example file with Zabbix sender API usage can be found in build\win32\examples\zabbix_sender folder.

The following functionality is provided by the Zabbix sender dynamic link library:

```
int zabbix_sender_send_values(const char *address, unsigned short port,const char *source, const zabbix_
char **result);‘{.c}
```

The following data structures are used by the Zabbix sender dynamic link library:

```
typedef struct
{
    /* host name, must match the name of target host in Zabbix */
    char    *host;
    /* the item key */
    char    *key;
    /* the item value */
    char    *value;
}
zabbix_sender_value_t;

typedef struct
{
    /* number of total values processed */
    int total;
    /* number of failed values */
    int failed;
    /* time in seconds the server spent processing the sent values */
    double  time_spent;
}
zabbix_sender_info_t;
```

17 Issues with SELinux

Socket-based inter-process communication has been added since Zabbix 3.4. On systems where SELinux is enabled it may be required to add SELinux rules to allow Zabbix create/use UNIX domain sockets in the `SocketDir` directory. Currently socket files are used by server (alerter, preprocessing, IPMI) and proxy (IPMI). Socket files are persistent, meaning are present while the process is running.

18 Other issues

Login and systemd

We recommend creating a *zabbix* user as system user, that is, without ability to log in. Some users ignore this recommendation and use the same account to log in (e. g. using SSH) to host running Zabbix. This might crash Zabbix daemon on log out. In this case you will get something like the following in Zabbix server log:

```
zabbix_server [27730]: [file:'selfmon.c',line:375] lock failed: [22] Invalid argument
zabbix_server [27716]: [file:'dbconfig.c',line:5266] lock failed: [22] Invalid argument
zabbix_server [27706]: [file:'log.c',line:238] lock failed: [22] Invalid argument
```

and in Zabbix agent log:

```
zabbix_agentd [27796]: [file:'log.c',line:238] lock failed: [22] Invalid argument
```

This happens because of default systemd setting `RemoveIPC=yes` configured in `/etc/systemd/logind.conf`. When you log out of the system the semaphores created by Zabbix previously are removed which causes the crash.

A quote from systemd documentation:

```
RemoveIPC=

Controls whether System V and POSIX IPC objects belonging to the user shall be removed when the
user fully logs out. Takes a boolean argument. If enabled, the user may not consume IPC resources
after the last of the user's sessions terminated. This covers System V semaphores, shared memory
and message queues, as well as POSIX shared memory and message queues. Note that IPC objects of the
root user and other system users are excluded from the effect of this setting. Defaults to "yes".
```

There are 2 solutions to this problem:

1. (recommended) Stop using *zabbix* account for anything else than Zabbix processes, create a dedicated account for other things.
2. (not recommended) Set `RemoveIPC=no` in `/etc/systemd/logind.conf` and reboot the system. Note that `RemoveIPC` is a system-wide parameter, changing it will affect the whole system.

Using Zabbix frontend behind proxy

If Zabbix frontend runs behind proxy server, the cookie path in the proxy configuration file needs to be rewritten in order to match the reverse-proxied path. See examples below. If the cookie path is not rewritten, users may experience authorization issues, when trying to login to Zabbix frontend.

Example configuration for nginx

```
# ..
location / {
# ..
proxy_cookie_path /zabbix /;
proxy_pass http://192.168.0.94/zabbix/;
# ..
```

Example configuration for Apache

```
# ..
ProxyPass "/" http://host/zabbix/
ProxyPassReverse "/" http://host/zabbix/
ProxyPassReverseCookiePath /zabbix /
ProxyPassReverseCookieDomain host zabbix.example.com
# ..
```

Zabbix manpages

These are Zabbix manpages for Zabbix processes.

zabbix_agent2

Section: Maintenance Commands (8)
Updated: 2019-01-29
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NAME

zabbix_agent2 - Zabbix agent 2

SYNOPSIS

zabbix_agent2 [**-c** *config-file*]
zabbix_agent2 [**-c** *config-file*] **-p**
zabbix_agent2 [**-c** *config-file*] **-t** *item-key*

zabbix_agent2 [**-c** *config-file*] **-R** *runtime-option*
zabbix_agent2 -h
zabbix_agent2 -V

DESCRIPTION

zabbix_agent2 is an application for monitoring parameters of various services.

OPTIONS

-c, **--config** *config-file*
Use the alternate *config-file* instead of the default one.

-R, **--runtime-control** *runtime-option*
Perform administrative functions according to *runtime-option*.

Runtime control options: loglevel increase
Increase log level

loglevel decrease
Decrease log level

help
List available runtime control options

metrics
List available metrics

version
Display version

-p, **--print**
Print known items and exit. For each item either generic defaults are used, or specific defaults for testing are supplied. These defaults are listed in square brackets as item key parameters. Returned values are enclosed in square brackets and prefixed with the type of the returned value, separated by a pipe character. For user parameters type is always **t**, as the agent can not determine all possible return values. Items, displayed as working, are not guaranteed to work from the Zabbix server or zabbix_get when querying a running agent daemon as permissions or environment may be different. Returned value types are:

d
Number with a decimal part.

m
Not supported. This could be caused by querying an item that only works in the active mode like a log monitoring item or an item that requires multiple collected values. Permission issues or incorrect user parameters could also result in the not supported state.

s
Text. Maximum length not limited.

t
Text. Same as **s**.

u
Unsigned integer.

-t, **--test** *item-key*
Test single item and exit. See **--print** for output description.

-h, **--help**
Display this help and exit.

-V, **--version**
Output version information and exit.

FILES

/usr/local/etc/zabbix_agent2.conf
Default location of Zabbix agent 2 configuration file (if not modified during compile time).

SEE ALSO

Documentation https://www.zabbix.com/manuals

zabbix_agent(8), **zabbix_get**(8), **zabbix_proxy**(8), **zabbix_sender**(8), **zabbix_server**(8)

AUTHOR

Zabbix LLC

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AUTHOR

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zabbix_agentd

Section: Maintenance Commands (8)
Updated: 2019-01-29
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NAME

zabbix_agentd - Zabbix agent daemon

SYNOPSIS

zabbix_agentd [**-c** *config-file*]
zabbix_agentd [**-c** *config-file*] **-p**
zabbix_agentd [**-c** *config-file*] **-t** *item-key*
zabbix_agentd [**-c** *config-file*] **-R** *runtime-option*
zabbix_agentd -h
zabbix_agentd -V

DESCRIPTION

zabbix_agentd is a daemon for monitoring of various server parameters.

OPTIONS

-c, **--config** *config-file*
Use the alternate *config-file* instead of the default one.

-f, **--foreground**
Run Zabbix agent in foreground.

-R, **--runtime-control** *runtime-option*
Perform administrative functions according to *runtime-option*.

Runtime control options

log_level_increase[=*target*]
Increase log level, affects all processes if target is not specified

log_level_decrease[=*target*]
Decrease log level, affects all processes if target is not specified

Log level control targets

process-type
All processes of specified type (active checks, collector, listener)

process-type,N
Process type and number (e.g., listener,3)

pid
Process identifier, up to 65535. For larger values specify target as ”process-type,N”

-p, **--print**
Print known items and exit. For each item either generic defaults are used, or specific defaults for testing are supplied. These defaults are listed in square brackets as item key parameters. Returned values are enclosed in square brackets and prefixed with the type of the returned value, separated by a pipe character. For user parameters type is always **t**, as the agent can not determine all possible return values. Items, displayed as working, are not guaranteed to work from the Zabbix server or zabbix_get when querying a running agent daemon as permissions or environment may be different. Returned value types are:

d
Number with a decimal part.

m
Not supported. This could be caused by querying an item that only works in the active mode like a log monitoring item or an item that requires multiple collected values. Permission issues or incorrect user parameters could also result in the not supported state.

s
Text. Maximum length not limited.

t
Text. Same as **s**.

u
Unsigned integer.

-t, **--test** *item-key*
Test single item and exit. See **--print** for output description.

-h, **--help**
Display this help and exit.

-V, **--version**
Output version information and exit.

FILES

/usr/local/etc/zabbix_agentd.conf
Default location of Zabbix agent configuration file (if not modified during compile time).

SEE ALSO

Documentation https://www.zabbix.com/manuals

zabbix_get(1), **zabbix_proxy**(8), **zabbix_sender**(1), **zabbix_server**(8), **zabbix_js**(1), **zabbix_agent2**(8)

AUTHOR

Alexei Vladishev <alex@zabbix.com>

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zabbix_get

Section: User Commands (1)
Updated: 2020-02-29
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NAME

zabbix_get - Zabbix get utility

SYNOPSIS

zabbix_get -s *host-name-or-IP* [**-p** *port-number*] [**-I** *IP-address*] **-k** *item-key*
zabbix_get -s *host-name-or-IP* [**-p** *port-number*] [**-I** *IP-address*] **--tls-connect cert --tls-ca-file** *CA-file* [**--tls-crl-file** *CRL-file*] [**--tls-agent-cert-issuer** *cert-issuer*] [**--tls-agent-cert-subject** *cert-subject*] **--tls-cert-file** *cert-file* **--tls-key-file** *key-file* [**--tls-cipher13** *cipher-string*] [**--tls-cipher** *cipher-string*] **-k** *item-key*
zabbix_get -s *host-name-or-IP* [**-p** *port-number*] [**-I** *IP-address*] **--tls-connect psk --tls-psk-identity** *PSK-identity* **--tls-psk-file** *PSK-file* [**--tls-cipher13** *cipher-string*] [**--tls-cipher** *cipher-string*] **-k** *item-key*
zabbix_get -h
zabbix_get -V

DESCRIPTION

zabbix_get is a command line utility for getting data from Zabbix agent.

OPTIONS

-s, **--host** *host-name-or-IP*
Specify host name or IP address of a host.

-p, **--port** *port-number*
Specify port number of agent running on the host. Default is 10050.

-I, **--source-address** *IP-address*
Specify source IP address.

-k, **--key** *item-key*
Specify key of item to retrieve value for.

--tls-connect *value*
How to connect to agent. Values:

unencrypted
connect without encryption (default)

psk
connect using TLS and a pre-shared key

cert
connect using TLS and a certificate

--tls-ca-file *CA-file*
Full pathname of a file containing the top-level CA(s) certificates for peer certificate verification.

--tls-crl-file *CRL-file*
Full pathname of a file containing revoked certificates.

--tls-agent-cert-issuer *cert-issuer*
Allowed agent certificate issuer.

--tls-agent-cert-subject *cert-subject*
Allowed agent certificate subject.

--tls-cert-file *cert-file*
Full pathname of a file containing the certificate or certificate chain.

--tls-key-file *key-file*
Full pathname of a file containing the private key.

--tls-psk-identity *PSK-identity*
PSK-identity string.

--tls-psk-file *PSK-file*
Full pathname of a file containing the pre-shared key.

--tls-cipher13 *cipher-string*
Cipher string for OpenSSL 1.1.1 or newer for TLS 1.3. Override the default ciphersuite selection criteria. This option is not available if OpenSSL version is less than 1.1.1.

--tls-cipher *cipher-string*
GnuTLS priority string (for TLS 1.2 and up) or OpenSSL cipher string (only for TLS 1.2). Override the default ciphersuite selection criteria.

-h, **--help**
Display this help and exit.

-V, **--version**
Output version information and exit.

EXAMPLES

zabbix_get -s 127.0.0.1 -p 10050 -k ”system.cpu.load[all,avg1]”
zabbix_get -s 127.0.0.1 -p 10050 -k ”system.cpu.load[all,avg1]” --tls-connect cert --tls-ca-file /home/zabbix/zabbix_ca_file --tls-agent-cert-issuer ”CN=Signing CA,OU=IT operations,O=Example Corp,DC=example,DC=com” --tls-agent-cert-subject ”CN=server1,OU=IT operations,O=Example Corp,DC=example,DC=com” --tls-cert-file /home/zabbix/zabbix_get.crt

--tls-key-file /home/zabbix/zabbix_get.key
zabbix_get -s 127.0.0.1 -p 10050 -k ”system.cpu.load[all,avg1]” --tls-connect psk --tls-psk-identity ”PSK ID Zabbix agentd” --tls-psk-file /home/zabbix/zabbix_agentd.psk

SEE ALSO

Documentation https://www.zabbix.com/manuals

zabbix_agentd(8), **zabbix_proxy**(8), **zabbix_sender**(1), **zabbix_server**(8), **zabbix_js**(1), **zabbix_agent2**(8)

AUTHOR

Alexei Vladishev <alex@zabbix.com>

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zabbix_js

Section: User Commands (1)
Updated: 2019-01-29
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NAME

zabbix_js - Zabbix JS utility

SYNOPSIS

zabbix_js -s *script-file* **-p** *input-param* [**-l** *log-level*] [**-t** *timeout*]
zabbix_js -s *script-file* **-i** *input-file* [**-l** *log-level*] [**-t** *timeout*]
zabbix_js -h
zabbix_js -V

DESCRIPTION

zabbix_js is a command line utility that can be used for embedded script testing.

OPTIONS

-s, **--script** *script-file*
Specify the file name of the script to execute. If '-' is specified as file name, the script will be read from stdin.

-p, **--param** *input-param*
Specify the input parameter.

-i, **--input** *input-file*
Specify the file name of the input parameter. If '-' is specified as file name, the input will be read from stdin.

-l, **--loglevel** *log-level*
Specify the log level.

-t, **--timeout** *timeout*
Specify the timeout in seconds.

-h, **--help**
Display this help and exit.

-V, **--version**
Output version information and exit.

EXAMPLES

zabbix_js -s script-file.js -p example

SEE ALSO

Documentation https://www.zabbix.com/manuals

zabbix_agentd(8), **zabbix_proxy**(8), **zabbix_sender**(1), **zabbix_server**(8), **zabbix_get**(1), **zabbix_agent2**(8)

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zabbix_proxy

Section: Maintenance Commands (8)
Updated: 2019-01-29
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NAME

zabbix_proxy - Zabbix proxy daemon

SYNOPSIS

zabbix_proxy [**-c** *config-file*]
zabbix_proxy [**-c** *config-file*] **-R** *runtime-option*
zabbix_proxy -h
zabbix_proxy -V

DESCRIPTION

zabbix_proxy is a daemon that collects monitoring data from devices and sends it to Zabbix server.

OPTIONS

-c, **--config** *config-file*
Use the alternate *config-file* instead of the default one.

-f, **--foreground**
Run Zabbix proxy in foreground.

-R, **--runtime-control** *runtime-option*
Perform administrative functions according to *runtime-option*.

Runtime control options

config_cache_reload
Reload configuration cache. Ignored if cache is being currently loaded. Active Zabbix proxy will connect to the Zabbix server and request configuration data. Default configuration file (unless **-c** option is specified) will be used to find PID file and signal will be sent to process, listed in PID file.

housekeeper_execute
Execute the housekeeper. Ignored if housekeeper is being currently executed.

log_level_increase[=*target*]
Increase log level, affects all processes if target is not specified

log_level_decrease[=*target*]
Decrease log level, affects all processes if target is not specified

Log level control targets

process-type
All processes of specified type (configuration syncer, data sender, discoverer, heartbeat sender, history syncer, housekeeper, http poller, icmp pinger, ipmi manager, ipmi poller, java poller, poller, self-monitoring, snmp trapper, task manager, trapper, unreachable poller, vmware collector)

process-type,N
Process type and number (e.g., poller,3)

pid
Process identifier, up to 65535. For larger values specify target as ”process-type,N”

-h, **--help**
Display this help and exit.

-V, **--version**
Output version information and exit.

FILES

/usr/local/etc/zabbix_proxy.conf
Default location of Zabbix proxy configuration file (if not modified during compile time).

SEE ALSO

Documentation https://www.zabbix.com/manuals

zabbix_agentd(8), **zabbix_get**(1), **zabbix_sender**(1), **zabbix_server**(8), **zabbix_js**(1), **zabbix_agent2**(8)

AUTHOR

Alexei Vladishev <alex@zabbix.com>

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zabbix_sender

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Updated: 2020-02-29
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NAME

zabbix_sender - Zabbix sender utility

SYNOPSIS

zabbix_sender [**-v**] **-z** *server* [**-p** *port*] [**-I** *IP-address*] **-s** *host* **-k** *key* **-o** *value*
zabbix_sender [**-v**] **-z** *server* [**-p** *port*] [**-I** *IP-address*] [**-s** *host*] [**-T**] [**-r**] **-i** *input-file*
zabbix_sender [**-v**] **-c** *config-file* [**-z** *server*] [**-p** *port*] [**-I** *IP-address*] [**-s** *host*] **-k** *key* **-o** *value*
zabbix_sender [**-v**] **-c** *config-file* [**-z** *server*] [**-p** *port*] [**-I** *IP-address*] [**-s** *host*] [**-T**] [**-r**] **-i** *input-file*
zabbix_sender [**-v**] **-z** *server* [**-p** *port*] [**-I** *IP-address*] **-s** *host* **--tls-connect cert** **--tls-ca-file** *CA-file* [**--tls-crl-file** *CRL-file*] [**--tls-server-cert-issuer** *cert-issuer*] [**--tls-server-cert-subject** *cert-subject*] **--tls-cert-file** *cert-file* **--tls-key-file** *key-file* [**--tls-cipher13** *cipher-string*] [**--tls-cipher** *cipher-string*] **-k** *key* **-o** *value*
zabbix_sender [**-v**] **-z** *server* [**-p** *port*] [**-I** *IP-address*] [**-s** *host*] **--tls-connect cert** **--tls-ca-file** *CA-file* [**--tls-crl-file** *CRL-file*] [**--tls-server-cert-issuer** *cert-issuer*] [**--tls-server-cert-subject** *cert-subject*] **--tls-cert-file** *cert-file* **--tls-key-file** *key-file* [**--tls-cipher13** *cipher-string*] [**--tls-cipher** *cipher-string*] [**-T**] [**-r**] **-i** *input-file*
zabbix_sender [**-v**] **-c** *config-file* [**-z** *server*] [**-p** *port*] [**-I** *IP-address*] [**-s** *host*] **--tls-connect cert** **--tls-ca-file** *CA-file* [**--tls-crl-file** *CRL-file*] [**--tls-server-cert-issuer** *cert-issuer*] [**--tls-server-cert-subject** *cert-subject*] **--tls-cert-file** *cert-file* **--tls-key-file** *key-file* [**--tls-cipher13** *cipher-string*] [**--tls-cipher** *cipher-string*] **-k** *key* **-o** *value*
zabbix_sender [**-v**] **-c** *config-file* [**-z** *server*] [**-p** *port*] [**-I** *IP-address*] [**-s** *host*] **--tls-connect cert** **--tls-ca-file** *CA-file* [**--tls-crl-file** *CRL-file*] [**--tls-server-cert-issuer** *cert-issuer*] [**--tls-server-cert-subject** *cert-subject*] **--tls-cert-file** *cert-file* **--tls-key-file** *key-file* [**--tls-cipher13** *cipher-string*] [**--tls-cipher** *cipher-string*] [**-T**] [**-r**] **-i** *input-file*
zabbix_sender [**-v**] **-z** *server* [**-p** *port*] [**-I** *IP-address*] **-s** *host* **--tls-connect psk** **--tls-psk-identity** *PSK-identity* **--tls-psk-file** *PSK-file* [**--tls-cipher13** *cipher-string*] [**--tls-cipher** *cipher-string*] **-k** *key* **-o** *value*

zabbix_sender [**-v**] **-z** *server* [**-p** *port*] [**-I** *IP-address*] [**-s** *host*] **--tls-connect psk --tls-psk-identity** *PSK-identity* **--tls-psk-file** *PSK-file* [**--tls-cipher13** *cipher-string*] [**--tls-cipher** *cipher-string*] [**-T**] [**-r**] **-i** *input-file*
zabbix_sender [**-v**] **-c** *config-file* [**-z** *server*] [**-p** *port*] [**-I** *IP-address*] [**-s** *host*] **--tls-connect psk --tls-psk-identity** *PSK-identity* **--tls-psk-file** *PSK-file* [**--tls-cipher13** *cipher-string*] [**--tls-cipher** *cipher-string*] **-k** *key* **-o** *value*
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zabbix_sender -h
zabbix_sender -V

DESCRIPTION

zabbix_sender is a command line utility for sending monitoring data to Zabbix server or proxy. On the Zabbix server an item of type **Zabbix trapper** should be created with corresponding key. Note that incoming values will only be accepted from hosts specified in **Allowed hosts** field for this item.

OPTIONS

-c, **--config** *config-file*
Use *config-file*. **Zabbix sender** reads server details from the agentd configuration file. By default **Zabbix sender** does not read any configuration file. Only parameters **Hostname**, **ServerActive**, **SourceIP**, **TLSConnect**, **TLSCAFile**, **TLSCRLFile**, **TLSServerCertIssuer**, **TLSServerCertSubject**, **TLSCertFile**, **TLSKeyFile**, **TLSPSKIdentity** and **TLSPSKFile** are supported. All addresses defined in the agent **ServerActive** configuration parameter are used for sending data. If sending of batch data fails to one address, the following batches are not sent to this address.

-z, **--zabbix-server** *server*
Hostname or IP address of Zabbix server. If a host is monitored by a proxy, proxy hostname or IP address should be used instead. When used together with **--config**, overrides the entries of **ServerActive** parameter specified in agentd configuration file.

-p, **--port** *port*
Specify port number of Zabbix server trapper running on the server. Default is 10051. When used together with **--config**, overrides the port entries of **ServerActive** parameter specified in agentd configuration file.

-I, **--source-address** *IP-address*
Specify source IP address. When used together with **--config**, overrides **SourceIP** parameter specified in agentd configuration file.

-s, **--host** *host*
Specify host name the item belongs to (as registered in Zabbix frontend). Host IP address and DNS name will not work. When used together with **--config**, overrides **Hostname** parameter specified in agentd configuration file.

-k, **--key** *key*
Specify item key to send value to.

-o, **--value** *value*
Specify item value.

-i, **--input-file** *input-file*
Load values from input file. Specify **-** as **<input-file>** to read values from standard input. Each line of file contains whitespace delimited: **<hostname> <key> <value>**. Each value must be specified on its own line. Each line must contain 3 whitespace delimited entries: **<hostname> <key> <value>**, where ”hostname” is the name of monitored host as registered in Zabbix frontend, ”key” is target item key and ”value” - the value to send. Specify **-** as **<hostname>** to use hostname from agent configuration file or from **--host** argument.

An example of a line of an input file:

”Linux DB3” db.connections 43

The value type must be correctly set in item configuration of Zabbix frontend. Zabbix sender will send up to 250 values in one connection. Contents of the input file must be in the UTF-8 encoding. All values from the input file are sent in a sequential order top-down. Entries must be formatted using the following rules:

•
Quoted and non-quoted entries are supported.

•
Double-quote is the quoting character.

•
Entries with whitespace must be quoted.

- Double-quote and backslash characters inside quoted entry must be escaped with a backslash.
- Escaping is not supported in non-quoted entries.
- Linefeed escape sequences (\n) are supported in quoted strings.
- Linefeed escape sequences are trimmed from the end of an entry.

-T, **--with-timestamps**
This option can be only used with **--input-file** option.

Each line of the input file must contain 4 whitespace delimited entries: **<hostname> <key> <timestamp> <value>**. Timestamp should be specified in Unix timestamp format. If target item has triggers referencing it, all timestamps must be in an increasing order, otherwise event calculation will not be correct.

An example of a line of the input file:

"Linux DB3" db.connections 1429533600 43

For more details please see option **--input-file**.

If a timestamped value is sent for a host that is in a "no data" maintenance type then this value will be dropped; however, it is possible to send a timestamped value in for an expired maintenance period and it will be accepted.

-r, **--real-time**
Send values one by one as soon as they are received. This can be used when reading from standard input.

--tls-connect *value*
How to connect to server or proxy. Values:

unencrypted
connect without encryption (default)

psk
connect using TLS and a pre-shared key

cert
connect using TLS and a certificate

--tls-ca-file *CA-file*
Full pathname of a file containing the top-level CA(s) certificates for peer certificate verification.

--tls-crl-file *CRL-file*
Full pathname of a file containing revoked certificates.

--tls-server-cert-issuer *cert-issuer*
Allowed server certificate issuer.

--tls-server-cert-subject *cert-subject*
Allowed server certificate subject.

--tls-cert-file *cert-file*
Full pathname of a file containing the certificate or certificate chain.

--tls-key-file *key-file*
Full pathname of a file containing the private key.

--tls-psk-identity *PSK-identity*
PSK-identity string.

--tls-psk-file *PSK-file*
Full pathname of a file containing the pre-shared key.

--tls-cipher13 *cipher-string*
Cipher string for OpenSSL 1.1.1 or newer for TLS 1.3. Override the default ciphersuite selection criteria. This option is not available if OpenSSL version is less than 1.1.1.

--tls-cipher *cipher-string*
GnuTLS priority string (for TLS 1.2 and up) or OpenSSL cipher string (only for TLS 1.2). Override the default ciphersuite selection criteria.

-v, **--verbose**
Verbose mode, **-vv** for more details.

-h, **--help**
Display this help and exit.

-V, **--version**
Output version information and exit.

EXIT STATUS

The exit status is 0 if the values were sent and all of them were successfully processed by server. If data was sent, but processing of at least one of the values failed, the exit status is 2. If data sending failed, the exit status is 1.

EXAMPLES

zabbix_sender -c /etc/zabbix/zabbix_agentd.conf -k mysql.queries -o 342.45

Send **342.45** as the value for **mysql.queries** item of monitored host. Use monitored host and Zabbix server defined in agent configuration file.

zabbix_sender -c /etc/zabbix/zabbix_agentd.conf -s ”Monitored Host” -k mysql.queries -o 342.45

Send **342.45** as the value for **mysql.queries** item of **Monitored Host** host using Zabbix server defined in agent configuration file.

zabbix_sender -z 192.168.1.113 -i data_values.txt

Send values from file **data_values.txt** to Zabbix server with IP **192.168.1.113**. Host names and keys are defined in the file.

echo ”- hw.serial.number 1287872261 SQ4321ASDF” | zabbix_sender -c /usr/local/etc/zabbix_agentd.conf -T -i -

Send a timestamped value from the commandline to Zabbix server, specified in the agent configuration file. Dash in the input data indicates that hostname also should be used from the same configuration file.

echo ’”Zabbix server” trapper.item ””’ | zabbix_sender -z 192.168.1.113 -p 10000 -i -

Send empty value of an item to the Zabbix server with IP address **192.168.1.113** on port **10000** from the commandline. Empty values must be indicated by empty double quotes.

zabbix_sender -z 192.168.1.113 -s ”Monitored Host” -k mysql.queries -o 342.45 --tls-connect cert --tls-ca-file /home/zabbix/zabbix_ca_file --tls-cert-file /home/zabbix/zabbix_agentd.crt --tls-key-file /home/zabbix/zabbix_agentd.key

Send **342.45** as the value for **mysql.queries** item in **Monitored Host** host to server with IP **192.168.1.113** using TLS with certificate.

zabbix_sender -z 192.168.1.113 -s ”Monitored Host” -k mysql.queries -o 342.45 --tls-connect psk --tls-psk-identity ”PSK ID Zabbix agentd” --tls-psk-file /home/zabbix/zabbix_agentd.psk

Send **342.45** as the value for **mysql.queries** item in **Monitored Host** host to server with IP **192.168.1.113** using TLS with pre-shared key (PSK).

SEE ALSO

Documentation https://www.zabbix.com/manuals

zabbix_agentd(8), **zabbix_get**(1), **zabbix_proxy**(8), **zabbix_server**(8), **zabbix_js**(1), **zabbix_agent2**(8)

AUTHOR

Alexei Vladishev <alex@zabbix.com>

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zabbix_server

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NAME

zabbix_server - Zabbix server daemon

SYNOPSIS

zabbix_server [**-c** *config-file*]
zabbix_server [**-c** *config-file*] **-R** *runtime-option*
zabbix_server -h
zabbix_server -V

DESCRIPTION

zabbix_server is the core daemon of Zabbix software.

OPTIONS

-c, **--config** *config-file*
Use the alternate *config-file* instead of the default one.

-f, **--foreground**
Run Zabbix server in foreground.

-R, **--runtime-control** *runtime-option*
Perform administrative functions according to *runtime-option*.

Runtime control options

config_cache_reload
Reload configuration cache. Ignored if cache is being currently loaded. Default configuration file (unless **-c** option is specified) will be used to find PID file and signal will be sent to process, listed in PID file.

housekeeper_execute
Execute the housekeeper. Ignored if housekeeper is being currently executed.

log_level_increase[=*target*]
Increase log level, affects all processes if target is not specified

log_level_decrease[=*target*]
Decrease log level, affects all processes if target is not specified

Log level control targets

process-type
All processes of specified type (alerter, alert manager, configuration syncer, discoverer, escalator, history syncer, housekeeper, http poller, icmp pinger, ipmi manager, ipmi poller, java poller, lld manager, lld worker, poller, preprocessing manager, preprocessing worker, proxy poller, self-monitoring, snmp trapper, task manager, timer, trapper, unreachable poller, vmware collector)

process-type,N
Process type and number (e.g., poller,3)

pid
Process identifier, up to 65535. For larger values specify target as ”process-type,N”

-h, **--help**
Display this help and exit.

-V, **--version**
Output version information and exit.

FILES

/usr/local/etc/zabbix_server.conf
Default location of Zabbix server configuration file (if not modified during compile time).

SEE ALSO

Documentation https://www.zabbix.com/manuals

zabbix_agentd(8), **zabbix_get**(1), **zabbix_proxy**(8), **zabbix_sender**(1), **zabbix_js**(1), **zabbix_agent2**(8)

AUTHOR

Alexei Vladishev <alex@zabbix.com>

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