ZABBIX

Release 012

ZABBIX Manual v1.4

Review and Approval			
	Name	**Signature**	**Date**
For ZABBIX SIA:			

Table of Contents

About this Manual

Introduction

Purpose of this Document

The purpose of this document is to provide a comprehensive introduction and overview of ZABBIX, its architecture, the features it offers and their functions. This document contains all information necessary for the successful administration of ZABBIX.

What you should already know

No deep technical knowledge is required, although an understanding of UNIX is essential.

Who Should Use this Document

Anyone involved in installation and administration of ZABBIX, and anyone else wishing to get an insight into how it works.

Contacts

ZABBIX SIA

Location: Neretas 2/1-109, LV-1004, Riga, Latvia

Tel: +371 7743943

Fax: +371 7743944

Email: **sales@zabbix.com**

ZABBIX SIA, Product Manager, Director

Alexei Vladishev

Tel: +371 7743943

Fax: +371 7743944

Email: **alexei.vladishev@zabbix.com**

ZABBIX SIA, Sales Department

Email: **sales@zabbix.com**

ZABBIX SIA, Customer Support Department

Email: **support@zabbix.com**

Glossary

TERM	DESCRIPTION
Active	Active refers to a mode that the ZABBIX Agent can run in. When running actively, the agent keeps track of what items to send to the server and at what intervals. The agent can poll the server at set intervals in order to keep track of what items it should be sending.
Active checker	Active checker gather operational information from the system where ZABBIX Agent is running, and report this data to the ZABBIX for further processing.
Action	An action is a response taken when a Trigger has been triggered. Actions can be configured to send messages to specific user groups as defined in ZABBIX, based on their Media Type settings, or execute remote commands.
Agent	Agent refers to the program that is run on hosts that want to be monitored. It is run as a service and can process both active and passive checks simultaneously.
Alerter	Alerter is a server process which is responsible for execution of actions (emails, jabber, SMS, scripts).
Auto-registration	Auto-registration refers to a feature of ZABBIX that allows Hosts to automatically register themselves with the ZABBIX server. This is configured via the web interface by an administrator that defines a particular Hostname patter such as '*-Linux' and define Items for that host based on a Template of items.
Auto-discovery	ZABBIX auto-discovery module is a module which performs automated discovery of hosts and services and generating events for further processing.
Event	An event is when a trigger is triggered.
Graphs	Graphs can refer to the simple graphs that are available for each numerical Item that is monitored, or it can refer to custom graphs which can be used to show several numerical Items in one graph.
Host	Host refers to the machine that is being monitored.
Housekeeper	Housekeeper refers to the service within the ZABBIX server that cleans the ZABBIX database of old actions, events, history, and trend data as defined by the user. Housekeeping of Actions and Events is defined in General settings. History and trend data is defined per item.

IT Services	IT Services refers to a feature within ZABBIX that allows users to define an SLA and have ZABBIX keep track of the expected SLA and actual SLA. IT Services are defined as groups of triggers and can be configured to calculate the minimum of a group or maximum of a group.
Item	Item refers to an individual item that is monitored on a host, such as load average or response time. Item can refer to an item obtained via the ZABBIX agent, SNMP, or other means. Items can be configured as float, 64-bit integers, character strings, or log values.
Location	Environment monitored by a single Node.
Map	Map refers to a feature of ZABBIX that allows users to create customized graphics via the web interface to create network maps and define links between Hosts on the map. Links can be configured to change color or style based on Triggers.
Master or Master Node	Master Node. Master Node may have one or several Childs. Master Node can control configuration of the Childs.
Media Type	Media Types are used to notify ZABBIX users when an Action has occurred. Media types can be via email or custom scripts. Media Types are configured globally to be made available to all Users, and then specified per User to allow certain Users to be notified via one media type, and other users to be notified via another media type.
Node	ZABBIX Server in distributed setup monitoring number of hosts.
Node ID	Node ID is a unique number which identifies Node. Each Node must have its own unique Node ID.
Node Watcher	ZABBIX Server process which takes care of inter-node communications.
Queue	Queue refers to the internal queue of items the ZABBIX server is monitoring. Based on the specified intervals of items the ZABBIX server maintains a queue to keep track of the items and when it should poll them.
Passive	Passive refers to a mode that the ZABBIX Agent can run in. When running passively, the agent waits for requests for items from the server and sends them back as requested. It should be noted that typically the agent runs in both modes, and the modes are defined by the Item when it is configured.
Pinger	ZABBIX Server process which processes ICMP pings.
Poller	ZABBIX Server process which is responsible for retrieval of data from ZABBIX and SNMP agents and processing remote (simple) checks.
ROI	Return on Investment.

Screen	Screen refers to another customizable feature of ZABBIX which allows users to create custom pages within ZABBIX for displaying information. A screen can consist of graphs (custom), simple graphs, maps, or plain text such as the last 5 values of a particular item.
Sender	ZABBIX utility which sends data to ZABBIX Server for further processing. It usually used in user scripts.
Server	Server refers to the program that is run on a centralized machine that has been deemed the “monitoring station”. The server is run as a service and is in charge of keeping track of all the configured hosts, items, actions, alerts, etc.
SLA	SLA refers to Service Level Agreement. These are typically used in contracts between companies and clients in order to define a certain level of service such as 99.5% availability of a particular Host.
Child or Child Node	Child Node is linked to a Master Node. Child Nodes reports to Master Node.
Template	A Template is a Host that has a defined set of Items, Triggers, etc. which Hosts can be linked to. This allows easier configuration of hosts and changes to hosts without having to change each individual host. Host Templates are no different from other hosts except that their status is set to ‘Template’ during configuration and as such no Host is actually monitored.
Timer	ZABBIX Server process responsible for processing of date and time related functions of trigger expressions.
Trapper	ZABBIX Server process responsible for processing of ZABBIX Agent (active) checks, log files and data sent by sender.
Trigger	A trigger is used to define constraints on items and provide notifications when these constraints are exceeded. For example, you could be monitoring load average on a specific host and want to know when load average exceeds 1.0. Triggers are very flexible and can allow for multiple constraints.
User	The ZABBIX web front-end can be configured to allow access to multiple users at varying levels of access. Users can be allowed anonymous access via the guest account and be allowed to view all available data but not modify any changes, or users can be given access to only view or modify specific sections of ZABBIX.

User parameter	User Parameter (UserParameter) refers to custom scripts defined in an agent’s configuration file. User parameters are defined by a key and command. The key refers to the item defined in the web interface and can be configured to accept arguments as sent by the server.
ZABBIX	ZABBIX Software
ZABBIX SIA	Latvian company that develops and provides support for ZABBIX.

References

The following publications provide further information on technical aspects of ZABBIX.

Internal documents

1. ZABBIX Manual v1.1

   URL: **http://www.zabbix.com/manual/v1.1/index.php**

External References

- hdparm resources at **http://freshmeat.net/projects/hdparm/**
- Microsoft home page at **http://www.microsoft.com**
- MySQL home page at **http://www.mysql.com**
- Oracle home page at **www.oracle.com**
- PHP home page at **http://www.php.net**
- PostgreSQL home page at **http://www.postgresql.org**
- SQLite home page at **http://www.sqlite.org**
- Sqlora8 home page at **http://www.poitschke.de**
- SuSE Linux home page at **http://www.suse.com**
- Ubuntu Linux home page at **http://www.ubuntu.com**
- ZABBIX home page at **http://www.zabbix.com**

1. About

1.1. Revision History

Version	Date	Reason	Who
1.1 (alpha)	16/11/2004	Transforming to 1.1	Alexei Vladishev
1.1	25/10/2005	Misc improvements	Alexei Vladishev
1.4 (beta)	10/12/2006	Release of ZABBIX 1.3.1	Alexei Vladishev

1.2. Conventions

Document conventions

The ZABBIX Manual uses the typographical conventions shown in the following table.

Format	**Definition**
`file name`	Name of file or directory
bold text	Notes, important information, strong emphasis
Shell commands	Shell commands, paths, configuration files
`Constants`	Constants, configuration parameters
Note: Note	Notes, comments, additional details.

1.3. Distribution list

Author	Changes
Alexei Vladishev	Author and maintainer of the Manual.
Charlie Collins	Significant improvements of initial (LyX) versions of the document.
Shawn Marriott	Proofreading of the ZABBIX Manual v1.0.

1.4. Overview of ZABBIX

1.4.1. What is ZABBIX?

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 front end. A web-based front end 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. Both free and commercial support is available and provided by ZABBIX Company.

1.4.2. What does ZABBIX offer?

ZABBIX offers:

- auto-discovery of servers and network devices
- distributed monitoring with centralised WEB administration
- support for both polling and trapping mechanisms
- server software for Linux, Solaris, HP-UX, AIX, Free BSD, Open BSD, OS X
- native high performance agents (client software for Linux ,Solaris, HP-UX, AIX, Free BSD, Open BSD, OS X, Tru64/OSF1, Windows NT4.0, Windows 2000, Windows 2003, Windows XP, Windows Vista)
- agent-less monitoring
- secure user authentication
- flexible user permissions
- web-based interface
- flexible e-mail notification of predefined events
- high-level (business) view of monitored resources

- audit log

1.4.3. Why use ZABBIX?

- Open Source solution
- highly efficient agents for UNIX and WIN32 based platforms
- low learning curve
- high ROI. Downtimes are very expensive.
- low cost of ownership
- very simple configuration
- Centralised monitoring system. All information (configuration, performance data) is stored in relational database
- high-level service tree
- very easy setup
- support for SNMP (v1,v2). Both trapping and polling.
- visualisation capabilities
- built-in housekeeping procedure

1.4.4. Users of ZABBIX

Many organisations of different size around the World rely on ZABBIX as primary monitoring platform.

1.5. Goals and Principles

1.5.1. Main Goals and Principles of ZABBIX Development

There are several goals ZABBIX is trying to achieve:

- become recognized Open Source monitoring tool
- create ZABBIX user group, which helps making the software even better
- provide high-quality commercial support

1.5.2. Main principles of ZABBIX development

- be user friendly
- keep things simple

- use as few processing resources as possible
- react fast
- document every aspect of the software

1.6. Use of ZABBIX

1.6.1. Distributed monitoring

1.6.2. Auto-discovery

1.6.3. Pro-active monitoring

1.6.4. Monitoring of WEB applications

ZABBIX provides very efficient scenarios-based way of monitoring WEB applications. Both HTTP and HTTPS are supported.

1.6.5. Performance monitoring

One of most important uses of ZABBIX is performance monitoring. Processor load, number of running processes, number of processes, disk activity, status of swap space, and memory availability are some of the numerous system parameters ZABBIX is able to monitor.

ZABBIX provides a system administrator with timely information about performance of a server. In addition, ZABBIX can produce trend graphs to help identify bottlenecks in system performance.

1.6.6. Alerting users

Having performance monitoring is good, but it is almost useless without a powerful notification mechanism. With ZABBIX, an administrator can define virtually any possible condition for a trigger, using flexible expressions. Any time these expressions become true (or false), an alert will be emailed to any address defined by the administrator.

External programs can be used for user-defined notification methods such as SMS, phone notifications, etc.

ZABBIX can predict future behavior of monitored parameters using Least Square Algorithm. This allows user to be notified even before system state achieves critical level. *Note: This functionality will be completed in future versions of ZABBIX*

1.6.7. Monitoring of log files

ZABBIX can be used for centralized monitoring of log files. Note: This functionality will be completed in future versions of ZABBIX

1.6.8. Integrity Checking

ZABBIX is capable of server integrity monitoring. All critical configuration files, binaries, kernel, scripts, and web server HTML pages can be monitored by ZABBIX so that the administrator can be alerted to modifications made to these files.

1.6.9. Logging services

All values of monitored parameters are stored in a database. The collected data can be used later for any purposes.

1.6.10. Capacity planning

Viewing trends of process load, disk usage, database activity, or other important metrics allows a system administrator to clearly see when the next hardware upgrade should be made.

1.6.11. Assuring and monitoring of SLA

ZABBIX is able to monitor Service Level Agreements (SLA). It also keeps SLA-related historical data that helps to identify and improve weak areas of an IT infrastructure.

1.6.12. High level view of IT resources and services

A High level service tree allows the creation of dependencies between various IT resources. Such representation enables the following questions to be answered:

What IT services depends on availability of resource X?

Example: If processor load is too high on server A, then these IT services will be affected: Oracle server, WEB banking, online transaction processing, etc.

What resources specific IT service depends on?

Example: WEB portal may depend on the following resources:

processor load on server A

connection to ISP provider

disk space on volume /data on server A

availability of Oracle DB engine on server B

speed of execution of user requests

availability of Apache server on server C

etc etc

Such a dependency tree helps identify weak points in IT infrastructure.

Example: If several critical services offered by IT department depends on, for example, availability of disk space on some server, then it is time to think about distribution of the volume across different servers or disk arrays to eliminate possible risks.

1.6.13. Other

- availability analysis
- graphical representation of collected information
- Network maps
- custom screens

2. ZABBIX 1.4

ZABBIX 1.4 is the next generation of the open source distributed monitoring system from ZABBIX SIA.

These Release Notes cover what's new, installation and upgrade notes for ZABBIX 1.4.

2.1. What's new in 1.4

2.1.1. Auto-discovery

ZABBIX distributed monitoring module allows to deploy ZABBIX systems easily. The discovery supports IP ranges, service checks, agent and SNMP checks for efficient auto-discovery.

2.1.2. Distributed monitoring

ZABBIX distributed monitoring is made for complex environments consisting of different locations.

ZABBIX supports monitoring of an unlimited number of nodes. Centralized configuration allows easy all the nodes to be configured from a single location easily.

2.1.3. WEB monitoring

WEB monitoring module enables flexible and easy monitoring of availability and performance of WEB sites and WEB-based applications. It supports passing of GET and POST variables.

2.1.4. Installation Wizard

Installation Wizard automatically checks pre-requisites, database connectivity and generates a configuration file for WEB front end.

2.1.5. Support of new database engines

SQLite support has been implemented. It allows to use ZABBIX in embedded environments.

2.1.6. WEB interface improvements

WEB interface speed and usability have been improved greatly.

2.1.7. New notification methods

Native support of Jabber messaging has been introduced.

2.1.8. Many-to-many template linkage

More flexible host-template linkage saves time and makes the configuration of hosts more flexible and straight forward.

2.1.9. Database watchdog

ZABBIX server will automatically warns the group of users if the database is down and continues normal operations when the database is back. Implemented for MySQL only.

2.1.10. XML data import/export

New XML data import and export functionality is an excellent way of sharing templates, hosts configuration and items/triggers related information.

2.1.11. Windows Vista Support

ZABBIX Windows agent supports Windows Vista, both 32 and 64 bit versions.

2.1.12. More flexible actions

Multiple operations (notifications, script execution) per action are supported. The choice of action calculation algorithm was introduced.

2.1.13. Server-side external checks

The server-side external checks can be used to introduce custom checks executed on ZABBIX server side.

2.1.14. New user permission schema

The old user permission schema is no longer supported. It was replaced by a new more efficient, yet simple, schema working on the level of user groups and host groups.

2.1.15. Hysteresis support

ZABBIX supports the use of different trigger expressions for going to ON and OFF states.

2.1.16. Slide show support

Several screens can be grouped into a slide show for better presentation.

2.1.17. ZABBIX server can spread the workload across several servers

Groups of server side processes (discoverer, poller, HTTP poller, trapper, etc) can be located on different physical servers for better performance and availability.

2.1.18. Other improvements

2.1.18.1. The same code for UNIX and Windows agents

Sharing of agent code means better testing and stability.

2.1.18.2. New communication protocol

New communication protocol, compatible with 1.0 and 1.1.x, was developed.

2.1.18.3. Increased maximum size of background images

Maximum size of background images for maps was increased to 1.5-2MB, depending on configuration settings in php.ini.

2.1.18.4. New default templates

Built-in template got new naming, several new templates were introduced.

2.1.18.5. Flexible refresh intervals

ZABBIX support different refresh intervals for items for different days of week and time.

2.1.18.6. Stacked graphs

Stacked graphs are supported.

2.1.18.7. More flexible log rotation

New parameter, LogFileSize, controls parameters of log rotation for ZABBIX server and agents.

2.1.18.8. Support of static linkage

Static linkage of server and agent binaries was fixed.

2.1.18.9. Colour selection for graphs

Graphs support moredefaul colors and selection of RGB style color.

2.1.18.10. Log filtering on agent side

Log filtering by Posix style regular expression was implemented for more efficient monitoring of log files.

2.1.18.11. Improved configuration script

2.1.18.12. ZABBIX sender to read configuration parameter from agent's configuration file

ZABBIX sender (zabbix_sender) can read server related parameters from agent's configuration file.

2.1.18.13. Support of macros in remote commands

Standard macros can be also used in remote commands.

2.1.18.14. New configuration parameters

Several server-side configuration parameters were introduced.

2.1.18.15. avg() will support integer type

Function avg() can be used for integer items.

2.1.18.16. An icon can be assigned to hosts having 'unknown' status

An icon for hosts in 'unknown' status can be defined for use in maps.

2.2. What's no longer supported

2.2.1.1. Repeated actions and notifications

Repeated actions and notification, poorly working in 1.1.x, are no longer supported. This functionality will be replaced by new escalation module in future releases of ZABBIX.

2.2.1.2. Bulk loader was replaces by XML Data Import/Export

Plain text bulk loader was replaced by more flexible XML Data Import/Export module.

2.2.1.3. User permissions on per-element level

User permissions of per-element level are no longer supported. It has been replaced by new user permission schema.

2.3. Installation and Upgrade Notes

2.3.1. Installation

See the INSTALLATION section for full details.

2.3.2. Version compatibility

Agents from ZABBIX 1.0 and ZABBIX 1.1.x can be used with ZABBIX 1.4. No modification required.

ZABBIX 1.4 agents can be used with earlier versions of ZABBIX. Note that the newest agents do not support old keys of ZABBIX 1.0.

2.3.3. Upgrade procedure

The following steps have to be performed for successful upgrade from ZABBIX 1.1.x to 1.4.

The whole upgrade procedure may take several hours depending on size of ZABBIX database.

2.3.3.1. Stop ZABBIX server

Stop ZABBIX server to make sure that no new data are coming to database.

2.3.3.2. Backup existing ZABBIX database

This is very important step. Make sure that you have backup of your database. It will help if upgrade procedure fails (lack of disk space, power off, any unexpected problem).

2.3.3.3. Backup configuration files, PHP files and ZABBIX binaries

Make a backup copy of ZABBIX binaries, configuration files and PHP files.

2.3.3.4. Install new server binaries

You may use pre-compiled binaries or compile your own.

2.3.3.5. Review Server configuration parameters

Some parameters of zabbix_server.conf were changed in 1.4, new parameters added. You may want to review them.

2.3.3.6. Upgrade database

Database upgrade scripts are located in directory upgrade/dbpatches/1.4/<db engine>:

MySQL: upgrade/dbpatches/1.4/mysql/patch.sql

Oracle: upgrade/dbpatches/1.4/oracle/patch.sql

PostgreSQL: upgrade/dbpatches/1.4/postgresql/patch.sql

Note: Database upgrade may take quite significant time, several hours or more. It is recommended to test the upgrade in test environment.

Make sure that you have enough permissions (create table, drop table, create index, drop index). Also make sure that you have enough free disk space.

Normally you should have at least 2x more disk space than size of existing database.

Note: These scripts are for upgrade from ZABBIX 1.1.x to 1.4 only!

2.3.3.7. Install new ZABBIX GUI

Follow Installation Instructions.

2.3.3.8. Start new ZABBIX binaries

Start new binaries. Check log files to see if the binaries are started successfully.

2.4. Commercial support

ZABBIX SIA offers a full range of support options to meet your specific needs.

ZABBIX Support Services provide direct access to our expert Support Engineers who are ready to assist you in the development, deployment, and management of ZABBIX.

Visit **http://www.zabbix.com/services.php** or contact **sales@zabbix.com** for more details.

3. Installation

3.1. How to Get ZABBIX

Check the ZABBIX Home Page at **http://www.zabbix.com** for information about the current version and for downloading instructions.

3.2. Requirements

3.2.1. Hardware Requirements

3.2.1.1. Memory Requirements

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!

3.2.1.2. CPU Requirements

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

3.2.1.3. Other hardware

A serial communication port and a serial GSM Modem required for using SMS notifications built-in ZABBIX.

3.2.1.4. Examples of hardware configuration

The table provides several hardware configurations:

Name	Platform	CPU/Memory	Database	Monitored hosts
Small	Ubuntu Linux	P2 350MHz 256MB	MySQL MyISAM	20
Medium	Ubuntu Linux 64 bit	AMD Athlon 3200+ 2GB	MySQL InnoDB	500
Large	Ubuntu Linux 64 bit	Intel Dual Core 6400 4GB RAID	MySQL InnoDB or PostgreSQL	>1000
Very large	RedHat Enterprise	Intel Xeon 2 CPU 8GB RAID	MySQL InnoDB or PostgreSQL	>10000

Note: Actual configuration depends on number of active items and refresh rates very much. It is recommended to keep database engine on a separate box for large installations.

3.2.2. 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:

- AIX
- FreeBSD
- HP-UX
- Linux
- Mac OS/X
- OpenBSD
- SCO Open Server
- Solaris

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

3.2.3. Software Requirements

ZABBIX is built around modern Apache WEB server, leading database engines, and the PHP scripting language.

The following software is required to run ZABBIX:

Software	Version	Comments
Apache	1.3.12 or later	
PHP	4.3 or later	
PHP modules: **php-gd** **php-bcmath**	4.3 or later	PHP GD module must support PNG images.
MySQL **php-mysql**	3.22 or later	Required if MySQL is used as ZABBIX backend database.
Oracle **php-sqlora8**	9.2.0.4 or later	Required if Oracle is used as ZABBIX backend database.
PostgreSQL **php-pgsql**	7.0.2 or later	Required if PostgreSQL is used as ZABBIX backend database. Consider using PostgreSQL 8.x or later for much better performance.
SQLite **php-sqlite3**	3.3.5 or later	Required if SQLite is used as ZABBIX backend database.

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

WEB browser on client side

Support for HTML and PNG images required. MS Explorer (5.xx and 6.xx) and Mozilla 1.x work perfectly. Cookies and JavaScript must be enabled. Other browsers may work with ZABBIX as well.

3.2.4. Choice of database engine

ZABBIX supports four database engines:

- MySQL
- Oracle
- PostgreSQL
- SQLite

Each database engine has its own advantages. We cannot recommend one over another. Choice of database engine depends on the following aspects:

- how powerful is your hardware
- free or commercial database engine
- how busy is ZABBIX Server

The table can be used as a general recommendation on choice of database engine.

Usage of ZABBIX Server	**Database engine of choice**
Heavy duty Node/Standalone	MySQL InnoDB PostgreSQL
Light duty Node/Standalone	MySQL MyISAM PostgreSQL
Remote zero-admin Node	SQLite
Standalone light duty	MySQL MyISAM

3.2.5. Database size

ZABBIX configuration data requires fixed amount of disk space and does not grow much.

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

- Number of processed values per second

  This is average number of new values ZABBIX server receives every second. For example, if we have 4000 items for monitoring with refresh rate of 60 seconds, number of values per seconds 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 required 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 seconds, total number of values will be around (**30***24*3600)***50** = 129.600.000, or about 130M of values.

  Depending on used database engine, type of received values (floats, integers, strings, log files, etc), disk space for keeping a single value may vary from 40 bytes to hundreds of bytes. Normally it is around 50 bytes per value.

  In our case, it means that 130M of values will require 130M * 50 bytes = **6.5GB** of disk space.

- Housekeeper setting for trends

  ZABBIX keeps 30 minutes max/min/avg/count statistics for each item in table **trends**. The data is used for trending and long period graphs.

  ZABBIX database, depending on database type, requires about 128 bytes per each total.

  Suppose we would like to keep trend data for 5 years. 3000 values will require (3000/1800)*(24*3600***365**)***128** = **6.3GB** per year, or **31.5GB** for 5 years.

- Housekeeper settings for events

  Each ZABBIX event requires approximately 130 bytes of disk space. It is hard number of events generated by ZABBIX daily. In worst case scenario, we may assume that ZABBIX generates one event per second.

  It means that if we want to keep 3 years of events, this would require **3***365*24*3600***130** = **11GB**

The table contains formulas that can be used to calculate 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 50 bytes.
Trends	days*(items/1800)*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 128 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 130 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 hosekeeper settings.

Note: Disk space requirements for nodes in distributed setup are calculated in a similar way, but this also depends on a total number of child nodes linked to a node.

3.2.6. Time synchronisation

It is very important to have precise system date on server with ZABBIX running. **timed** is one of most popular daemons that synchronises the host's time with the time of other machines.

3.3. Components

3.3.1. ZABBIX Components

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

3.3.2. ZABBIX Server

This is the centre of the ZABBIX software. The Server can remotely check networked services (such as web servers and mail servers) using simple service checks, but it is also the central component to which the Agents will report availability and integrity information and statistics. The Server is the central repository in which all configuration, statistical and operational data are stored, and it is the entity in the ZABBIX software that will actively alert administrators when problems arise in any of the monitored systems.

ZABBIX can also perform agent-less monitoring and also monitor network devices using SNMP agents.

3.3.3. ZABBIX Agent

In order to actively monitor local resources and applications (such as harddrives, memory, processor statistics etc.) on networked systems, those systems must run the ZABBIX Agent. The Agent will gather operational information from the system on which it is running, and report these data to the ZABBIX for further processing. In case of failures (such as a harddisk running full, or a crashed service process), the ZABBIX Server can actively alert the administrators of the particular machine that reported the failure.

The ZABBIX Agents are extremely efficient because of use of native system calls for gathering statistical information.

3.3.4. The WEB Interface

In order to allow easy access to the monitoring data and then configuration of ZABBIX from anywhere and from any platform, the Web-based Interface is provided. The Interface is a part of the ZABBIX Server, and is usually (but not necessarily) run on the same physical machine as the one running the ZABBIX Server.

Note: ZABBIX front-end must run on the same physical machine of SQLite is used.

3.4. Installation from Source

3.4.1. Software requirements

Building of ZABBIX server or agents from sources requires additional software.

The following software is required to compile ZABBIX:

One of the following database engines:

MySQL Headers and Libraries

Version 3.22 or later required.

Oracle Headers and Libraries

Sqlora8 headers and libraries are required.

PostgreSQL Headers and Libraries

Version 7.0.2 or later required. Consider using PostgreSQL 8.x for much better performance.

SQLite Headers and Libraries

Version 3.3.5 or later required.

Note: Usually provided as part of mysql-dev, postgresql-dev, sqlite3-dev packages.

NET-SNMP (or UCD-SNMP) library and header files

Required for SNMP support. Optional.

Iksemel library and header files

Required to enable Jabber messaging. Optional.

Libcurl library and header files

Version 7.13.1 or higher required for WEB monitoring module. Optional.

C Compiler

C compiler is required. GNU C compiler is the best choice for open platforms. Other (HP, IBM) C compilers may be used as well.

GNU Make

GNU make is required to process ZABBIX Makefiles.

3.4.2. Structure of ZABBIX distribution

docs

The directory contains this Manual in PDF format

src

The directory contains sources for all ZABBIX processes except frontends.

src/zabbix_server

The directory contains Makefile and sources for zabbix_server.

src/zabbix_agent

The directory contains Makefile and sources for zabbix_agent and zabbix_agentd.

src/zabbix_get

The directory contains Makefile and sources for zabbix_get.

src/zabbix_sender

The directory contains Makefile and sources for zabbix_sender.

include

The directory contains include ZABBIX files.

misc

misc/init.d

The directory contains start-up scripts for different platforms.

frontends

frontends/php

The directory contains files of PHP frontend.

create

The directory contains SQL script for initial database creation.

create/schema

Database creation schemas.

create/data

Data for initial database creation.

upgrades

The directory contains upgrade procedures for different versions of ZABBIX.

3.4.3. ZABBIX Server

Server side

Step 1	Create the ZABBIX superuser account

This is the user the server will run as. For production use you should create a dedicated unprivileged account ('zabbix' is commonly used). Running ZABBIX as 'root','bin', or any other account with special rights is a security risk. Do not do it!

Note: ZABBIX server process (zabbix_server) is protected from being run under root account.

Step 2	Untar ZABBIX sources

```
shell> gunzip zabbix-1.4.tar.gz && tar -xvf zabbix-1.4.tar
```

Step 3 Create the ZABBIX database

ZABBIX comes with SQL scripts used to create the required database schema and also to insert a default configuration. There are separate scripts for MySQL, Oracle, PostgreSQL and SQLite.

For MySQL:

```
shell> mysql -u<username> -p<password>
mysql> create database zabbix;
mysql> quit;
shell> cd create/schema
shell> cat mysql.sql | mysql -u<username> -p<password> zabbix
shell> cd ../data
shell> cat data.sql | mysql -u<username> -p<password> zabbix
shell> cat images_mysql.sql | mysql -u<username> -p<password> zabbix
```

For Oracle (we assume that user ‘zabbix’ with password ‘password’ exists and has permissions to create database objects):

```
shell> cd create/schema
shell> cat oracle.sql | sqlplus zabbix/password >out.log
```

Note: Check file out.log for any error messages.

```
shell> cd ../data
shell> cat data.sql | sqlplus zabbix/password >out.log
shell> cat images_oracle.sql | sqlplus zabbix/password >>out.log
```

For PostgreSQL:

```
shell> psql -U <username>
psql> create database zabbix;
psql> \q
shell> cd create/schema
shell> cat postgresql.sql | psql -U <username> zabbix
shell> cd ../data
shell> cat data.sql | psql -U <username> zabbix
shell> cat images_pgsql.sql | psql -U <username> zabbix
```

For SQLite:

```
shell> cd create/schema
shell> cat sqlite.sql | sqlite3 /var/lib/sqlite/zabbix.db
shell> cd ../data
shell> cat data.sql | sqlite3 /var/lib/sqlite/zabbix.db
shell> cat images_sqlite3.sql | sqlite3 /var/lib/sqlite/zabbix.db
```

Note: The database will be automatically created if not exists.

Step 4 Configure and compile the source code for your system

The sources must be compiled for both the server (monitoring machine) as well as the clients (monitored machines). To configure the source for the server, you must specify which database will be used.

```
shell> ./configure --enable-server --with-mysql --with-net-snmp –with-jabber –with-libcurl # for MySQL + Jabber + WEB monitoring
```

or

```
shell> ./configure --enable-server --with-pgsql --with-net-snmp –with-jabber –with-libcurl # for PostgreSQL  + Jabber + WEB monitoring
```

or

```
shell> ./configure --enable-server --with-oracle=/home/zabbix/sqlora8 --with-net-snmp –with-jabber –with-libcurl # for Oracle + Jabber + WEB monitoring
```

Note: Use flag --with-oracle to specify location of sqlora8 library. The libary is required for Oracle support. The library can be found at libsqlora8 homepage

Note: Use flag --enable-static 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. --enable-static does not work under Solaris. Flag --with-ucd-snmp can be used instead of --with-net-snmp. If no SNMP support required, both --with-net-snmp and --with-ucd-snmp may be skipped.

However, if you want to compile client binaries along with server binaries, run:

```
shell> ./configure  --enable-server --enable-agent --with-mysql --with-net-snmp –with-jabber –with-libcurl
```

Parameter —enable-static may be used to force static linkage.

Step 5 Make and install everything

```
shell> make install
```

By default,

```
make install
```

will install all the files in /usr/local/bin, /usr/local/lib etc. You can specify an installation prefix other than /usr/local using --prefix

Step 6 Configure /etc/services

The step is not real requirement. However, it is recommended. On the client (monitored) machines, add the following lines to /etc/services:

```
zabbix_agent 10050/tcp
```

zabbix_trap 10051/tcp

Step 7	Configure /etc/inetd.conf

If you plan to use zabbix_agent instead of the recommended zabbix_agentd, the following line must be added:

```
zabbix_agent stream tcp nowait.3600 zabbix /opt/zabbix/bin/zabbix_agent
```

Restart inetd

```
shell> killall -HUP inetd
```

Modify default settings in configuration files

Step 8	Configure /etc/zabbix/zabbix_agent.conf

You need to configure this file for every host having zabbix_agent installed. The file should contain IP address of ZABBIX server. Connections from other hosts will be denied. You may take misc/conf/zabbix_agent.conf as example.

Step 9	Configure /etc/zabbix/zabbix_agentd.conf

You need to configure this file for every host with zabbix_agentd installed. The file should contain the IP address of the ZABBIX server. Connectionsfrom other hosts will be denied. You may take misc/conf/zabbix_agentd.conf as example.

Step 10	Configure /etc/zabbix/zabbix_server.conf

For small installations (up to ten monitored hosts), default parameters are sufficient. However, you should change default parameters to maximize performance from ZABBIX. See section [Performance tuning] for more details.

You may take misc/conf/zabbix_server.conf as example.

Step	Run server processes

11

Run zabbix_server on server side.

```
shell> cd bin
shell> ./zabbix_server
```

Step 12 Run agents

Run zabbix_agentd where necessary.

```
shell> cd bin
shell> ./zabbix_agentd
```

3.4.4. ZABBIX Agent

Client side

Step 1 Create the ZABBIX account

This is the user the agent will run as. For production use you should create a dedicated unprivileged account (“zabbix” is commonly used). ZABBIX agents have protection against running under root account.

Step 2 Untar ZABBIX sources

```
shell> gunzip zabbix-1.4.tar.gz && tar xvf zabbix-1.4.tar
```

Step 3 Configure and compile the source code for your system

The sources must be compiled for the client only.

To configure the source for the client:

```
shell> ./configure --enable-agent
```

Note: Use flag --enable-static 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.

Step 4 Build agent

```
shell> make
```

Copy created binaries from bin/ to /opt/zabbix/bin or any other directory Other common directories are /usr/local/bin or /usr/local/zabbix/bin.

Step 5 Configure /etc/services

The step is not real requirement. However, it is recommended.

On the client (monitored) machines, add the following lines to /etc/services:

```
zabbix_agent 10050/tcp
zabbix_trap 10051/tcp
```

Step 6 Configure /etc/inetd.conf

If you plan to use zabbix_agent instead of the recommended zabbix_agentd, the following line must be added:

```
zabbix_agent stream tcp nowait.3600 zabbix /opt/zabbix/bin/zabbix_agent
```

Restart inetd

```
shell> killall -HUP inetd
```

Step 7 Configure /etc/zabbix/zabbix_agent.conf

You need to configure this file for every host having zabbix_agent installed. The file should contain IP address of ZABBIX server. Connections from other hosts will be denied. Note, that no end of line character should present in the file.

You may take misc/conf/zabbix_agent.conf as example.

Step 8 Configure /etc/zabbix/zabbix_agentd.conf

You need to configure this file for every host with zabbix_agentd installed. The file should contain IP address of ZABBIX server. Connections from other hosts will be denied. You may take misc/conf/zabbix_agentd.conf as example.

Step 9 Run zabbix_agentd on all monitored machines

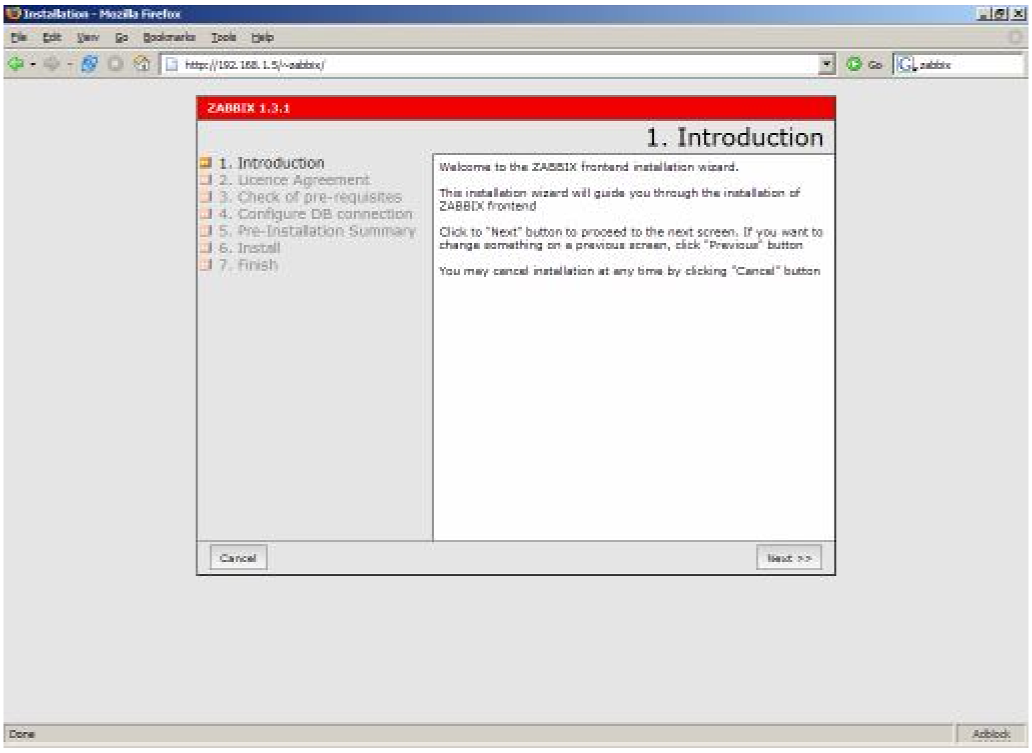
```
shell> /opt/zabbix/bin/zabbix_agentd
```

Note: You should not run zabbix_agentd if you have chosen to use zabbix_agent!

Note: Make sure that your system allows allocation of 2MB of shared memory, otherwise the agent may not start and you will see “Can't allocate shared memory for collector.” in agent’s log file. This may happen on Solaris 8.

3.4.5. ZABBIX WEB Interface

Step 1 Point your browser to ZABBIX URL.


Installation - Mozilla Firefox
File Edit View Go Bookmarks Tools Help
http://192.168.1.5/~zabbix/
ZABBIX 1.3.1
1. Introduction
1. Introduction
2. Licence Agreement
3. Check of pre-requisites
4. Configure DB connection
5. Pre-Installation Summary
6. Install
7. Finish
Cancel
Next >>
Done

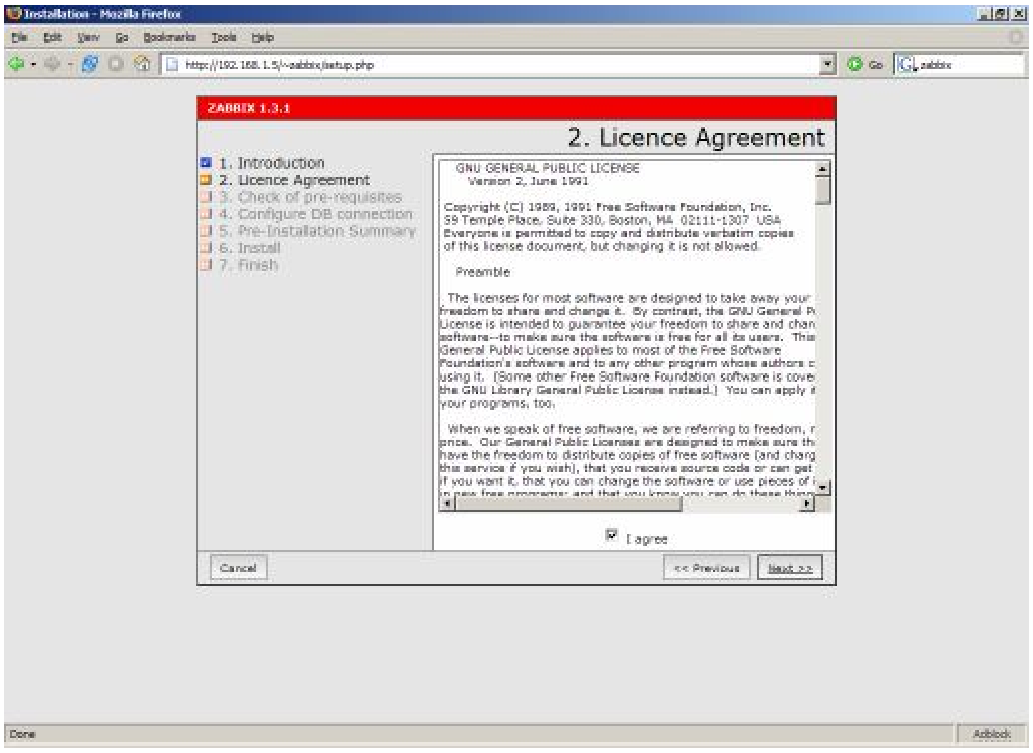
Welcome to the ZABBIX frontend installation wizard.

This installation wizard will guide you through the installation of ZABBIX frontend

Click to "Next" button to proceed to the next screen. If you want to change something on a previous screen, click "Previous" button

You may cancel installation at any time by clicking "Cancel" button

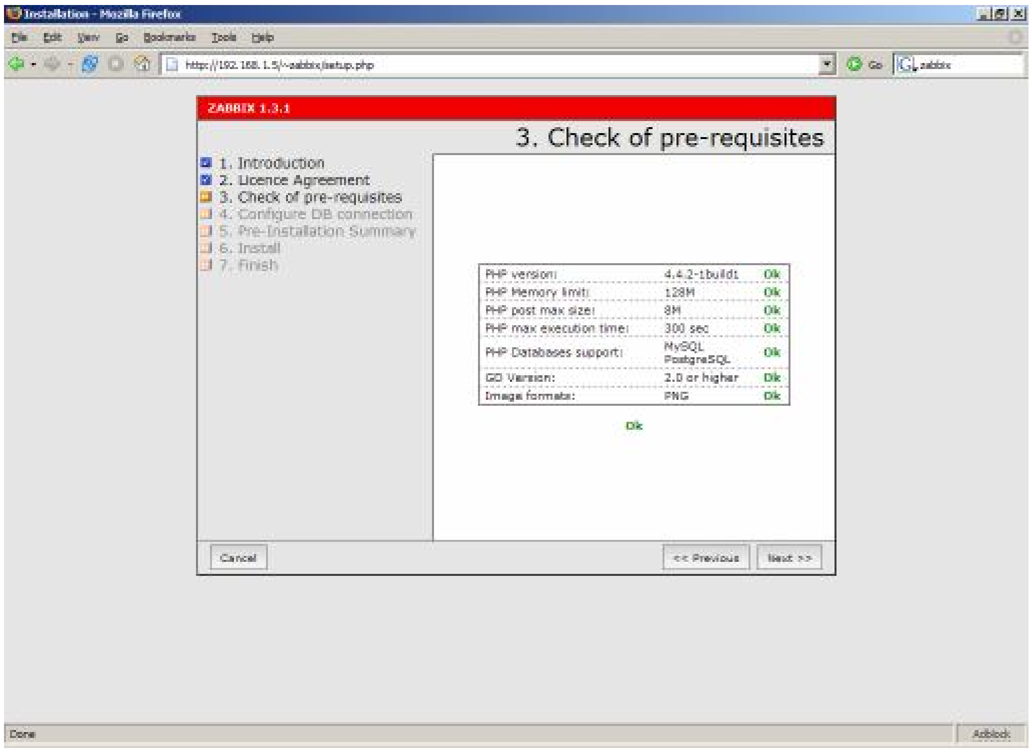
Step 2 Read and accept GPL v2.


Installation - Mozilla Firefox
File Edit View Go Bookmarks Tools Help
http://192.168.1.5/~zabbix/setup.php
ZABBIX 1.3.1
1. Introduction
2. Licence Agreement
3. Check of pre-requisites
4. Configure DB connection
5. Pre-Installation Summary
6. Install
7. Finish
I agree
Cancel
<< Previous
Next >>
Done
Adblock

2. Licence Agreement

```
   GNU GENERAL PUBLIC LICENSE
      Version 2, June 1991

 Copyright (C) 1989, 1991 Free Software Foundation, Inc.
 59 Temple Place, Suite 330, Boston, MA  02111-1307  USA
 Everyone is permitted to copy and distribute verbatim copies
 of this license document, but changing it is not allowed.

   Preamble

  The licenses for most software are designed to take away your
freedom to share and change it.  By contrast, the GNU General P
License is intended to guarantee your freedom to share and chan
software--to make sure the software is free for all its users.  This
General Public License applies to most of the Free Software
Foundation's software and to any other program whose authors c
using it.  (Some other Free Software Foundation software is cove
the GNU Library General Public License instead.)  You can apply i
your programs, too.

  When we speak of free software, we are referring to freedom, r
price.  Our General Public Licenses are designed to make sure th
have the freedom to distribute copies of free software (and charg
this service if you wish), that you receive source code or can get
if you want it, that you can change the software or use pieces of i
```

Step 3 Make sure that all software pre-requisites are met.


ZABBIX 1.3.1

3. Check of pre-requisites

1. Introduction
2. Licence Agreement
3. Check of pre-requisites
4. Configure DB connection
5. Pre-Installation Summary
6. Install
7. Finish

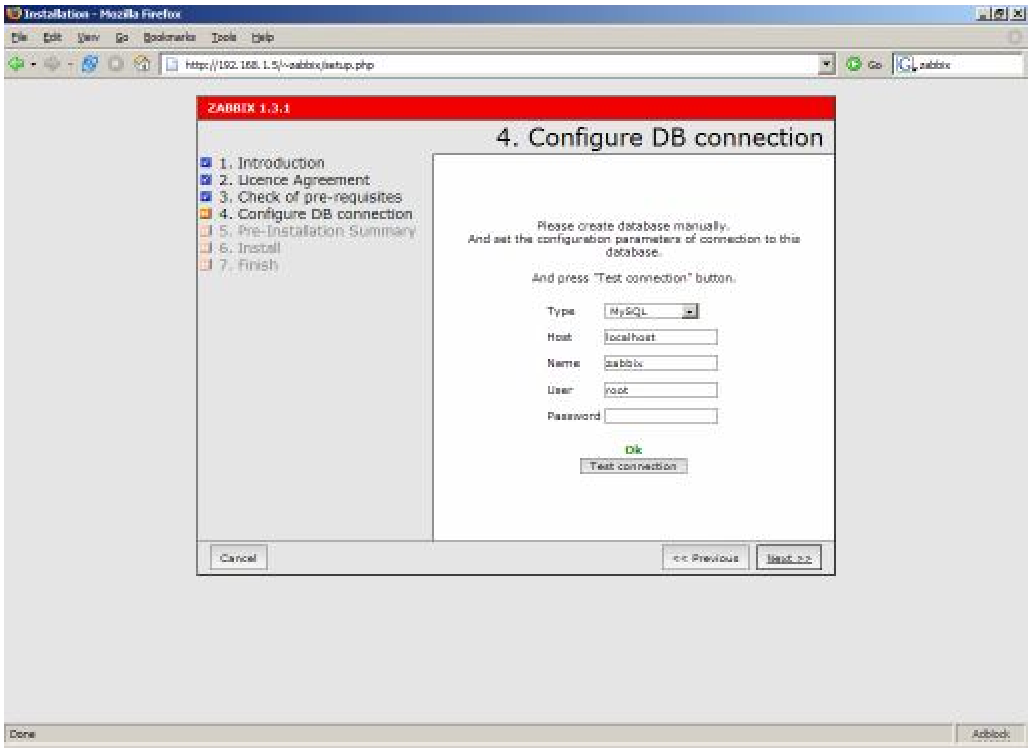
PHP version:	4.4.2-1build1	Ok
PHP Memory limit:	128M	Ok
PHP post max size:	8M	Ok
PHP max execution time:	300 sec	Ok
PHP Databases support:	MySQL PostgreSQL	Ok
GD Version:	2.0 or higher	Ok
Image formats:	PNG	Ok

Ok

Installation - Mozilla Firefox
http://192.168.1.5/~zabbix/setup.php
Cancel
<< Previous
Next >>
Done

Pre-requisite	Minimum value	Description
PHP version	4.3.0	
PHP Memory limit	8MB	In php.ini: memory_limit = 128M
PHP post max size	8MB	In php.ini: post_max_size = 8M
PHP max execution time	300 seconds	In php.ini: max_execution_time = 300
PHP database support	One of: MySQL, Oracle, PostgreSQL, SQLite	One of the following modules must be installed: php-mysql, php-sqlora8, php-pgsql, php-sqlite3
PHP BC math	Any	Compiled in PHP5.
GD Version	2.0 or higher	Module php-gd.
Image formats	At least PNG	Module php-gd.

Step 4	Configure database settings. ZABBIX database must already be created.


Installation - Mozilla Firefox
http://192.168.1.5/~zabbix/setup.php
ZABBIX 1.3.1
1. Introduction
2. Licence Agreement
3. Check of pre-requisites
4. Configure DB connection
5. Pre-Installation Summary
6. Install
7. Finish
Cancel
<< Previous
Next >>
Done

4. Configure DB connection

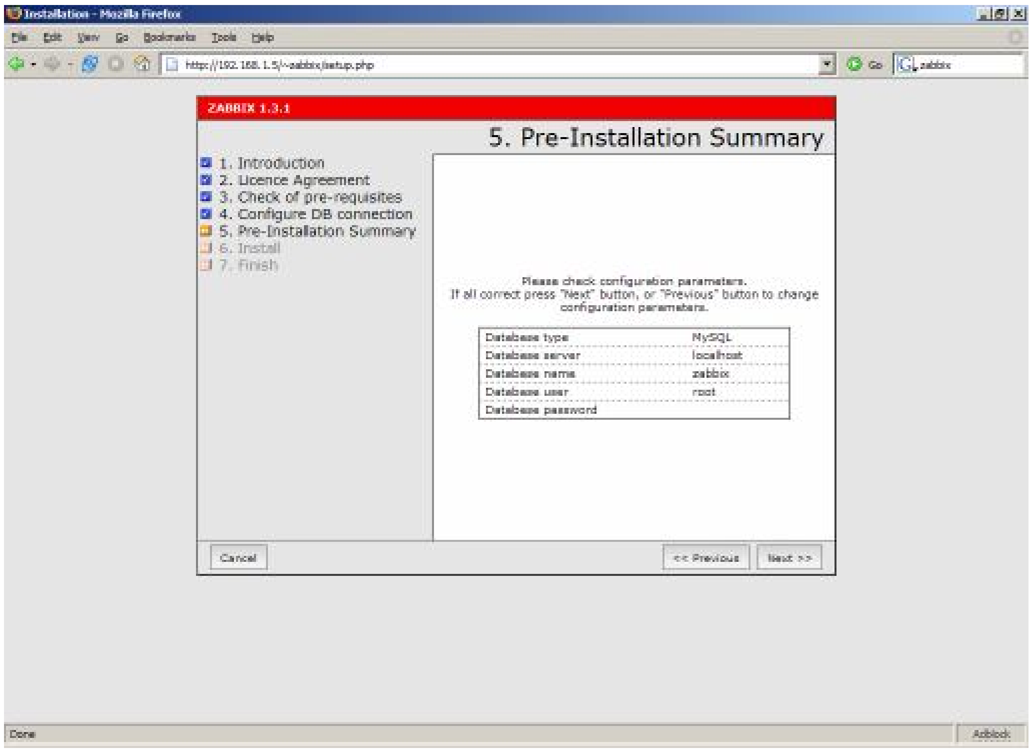
Please create database manually.
And set the configuration parameters of connection to this database.

And press "Test connection" button.

Type	MySQL
Host	localhost
Name	zabbix
User	root
Password	

Ok
Test connection

Step 5 See summary of settings.

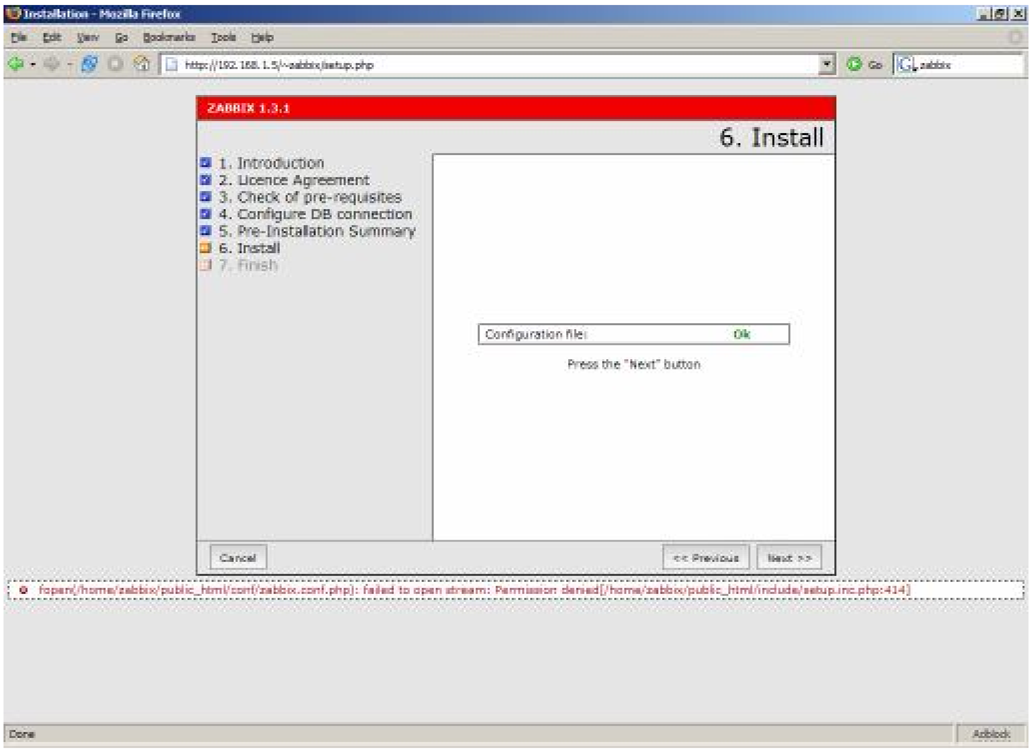

Installation - Mozilla Firefox
File Edit View Go Bookmarks Tools Help
http://192.168.1.5/~zabbix/setup.php
Go
zabbix
ZABBIX 1.3.1
1. Introduction
2. Licence Agreement
3. Check of pre-requisites
4. Configure DB connection
5. Pre-Installation Summary
6. Install
7. Finish
Cancel
<< Previous
Next >>
Done
Adblock

5. Pre-Installation Summary

Please check configuration parameters.
If all correct press "Next" button, or "Previous" button to change configuration parameters.

Database type	MySQL
Database server	localhost
Database name	zabbix
Database user	root
Database password	

Step 6 Download configuration file and place it under conf/.



ZABBIX 1.3.1

6. Install

- 1. Introduction
- 2. Licence Agreement
- 3. Check of pre-requisites
- 4. Configure DB connection
- 5. Pre-Installation Summary
- 6. Install
- 7. Finish

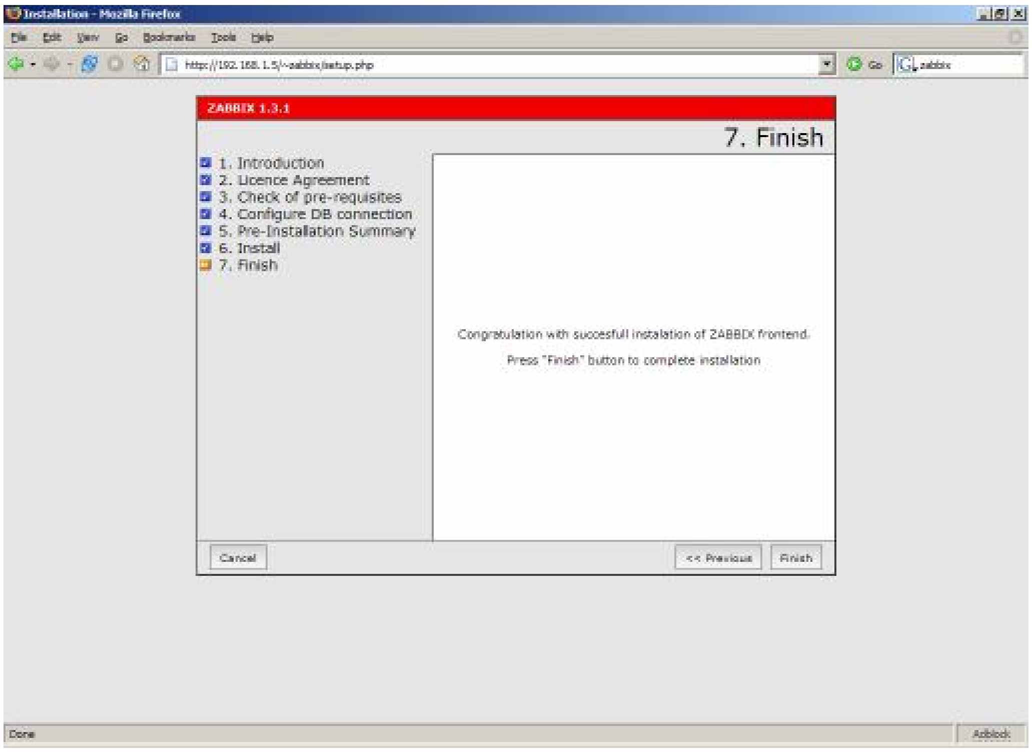
Configuration file:	Ok

Press the "Next" button

```
fopen(/home/zabbix/public_html/conf/zabbix.conf.php): failed to open stream: Permission denied[/home/zabbix/public_html/include/setup.inc.php:414]
```

Installation - Mozilla Firefox
File Edit View Go Bookmarks Tools Help
http://192.168.1.5/~zabbix/setup.php
Cancel
<< Previous
Next >>
Done
Adblock

Step 7 Check if everything is fine.



Installation - Mozilla Firefox
File Edit View Go Bookmarks Tools Help
http://192.168.1.5/~zabbix/setup.php
ZABBIX 1.3.1
7. Finish
1. Introduction
2. Licence Agreement
3. Check of pre-requisites
4. Configure DB connection
5. Pre-Installation Summary
6. Install
7. Finish
Cancel
<< Previous
Finish
Done
Adblock

Congratulation with succesfull instalation of ZABBIX frontend.

Press "Finish" button to complete installation

Step 9 For distributed monitoring only!

If used in a distributed environment you have to run:

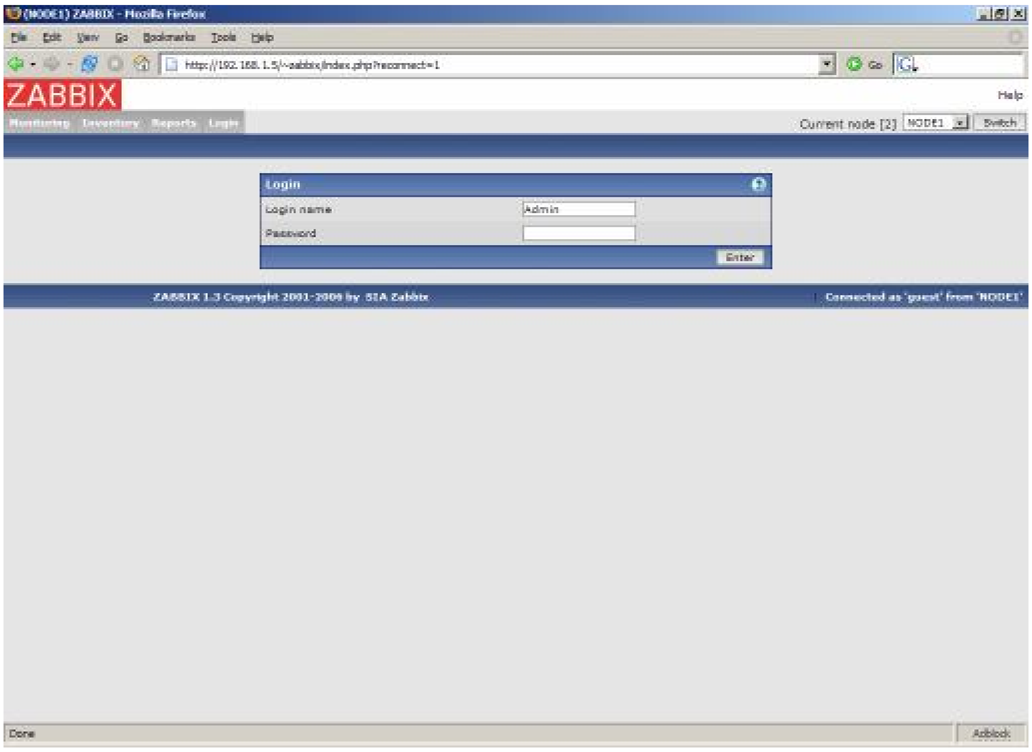
```
shell> ./zabbix_server –n <nodeid>
```

where Node ID is an unique Node identificator. For example:

```
shell> ./zabbix_server –n 1
```

This will convert database data for use with Node ID ‘1’ and also adds a local node.

Step 10	ZABBIX frontend is ready! Default username is 'Admin' with no password.


(NODE1) ZABBIX - Mozilla Firefox

http://192.168.1.5/~zabbix/index.php?reconnect=1

Current node [2] NODE1

Login

Login name: Admin

Password:

ZABBIX 1.3 Copyright 2001-2006 by SIA Zabbix

Connected as 'guest' from 'NODE1'

3.5. Upgrading

The upgrade procedure is quite simple. New binaries and frontend should be installed according to latest installation instructions. In order to update database structure, the following steps should be performed.

The upgrade process can take from 0 seconds (if no patches required) to several hours. Note that before applying database patches, all ZABBIX processes must be stopped.

Database upgrade is usually required for upgrade from one major stable release to another. For example, from 1.1.x to 1.4.x.

For production installations a database backup is required!

3.5.1. Database upgrade

Go to the upgrades/dbpatches directory. In this directory are subdirectories named according to a version upgrade (e.g. 1.0beta3_to_1.0beta4). Enter the directory corresponding to your upgrade (if you are upgrading through multiple versions, you will need to apply the upgrades one at a time). Depending on which database you use:

```
shell> cd mysql; cat patch.sql |mysql zabbix -u<username> -p<password>
```

or

```
shell> cd postgresql; cat patch.sql|psql -U <username> zabbix
```

Do not forget to upgrade PHP front-end files.

Finally, read version specific notes below for any extra procedures and useful information.

4. ZABBIX Processes

4.1. ZABBIX Server

ZABBIX Server is a central process of ZABBIX software. ZABBIX Server can be started by executing:

```
shell> cd bin
shell> ./zabbix_server
```

ZABBIX Server runs as a daemon process.

ZABBIX Server accepts the following command line parameters:

-c --config <file>	specify configuration file, default is /etc/zabbix/zabbix_server.conf
-h --help	give this help
-v --version	display version number

In order to get this help run:

```
shell> zabbix_server -h
```

Example of command line parameters:

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

The configuration file contains parameters for **zabbix_server**. The file must exist and it should have read permissions for user ‘zabbix’. Supported parameters:

Parameter	Mandatory	Default value	Description
AlertScriptsPath	No	/home/zabbix/bin	Location of scripts for user-defined media types.

Parameter	Mandatory	Default value	Description
DBHost	Yes	-	Database name. Usually ‘zabbix’.
DBName	Yes	-	Database name. Usually ‘zabbix’.
DBSocket	No	-	DB socket name. Used for non-TCP connection to MySQL database. Example: /tmp/mysql.sock
DBPassword	No	NULL	Database password. If password is not used, then this parameter must be commented.
DBUser	No	NULL	User name for connecting to the database.
DebugLevel	No	3	Debug level, one of 0 – none 1 – critical 2 – errors 3 – warnings 4 – debug
DisableHousekeeping	No	0	If set to 1, housekeeper will be disabled.
ExternalScripts	No	/etc/zabbix/externalscripts	Location of scripts for external checks.
FpingLocation	No	/usr/sbin/fping	Location of ICMP pinger. It must have setuid flag set.
HousekkepingFrequency	No	1	The parameter defines how often the daemon must perform housekeeping procedure (in hours). If PostgreSQL is used set the value to 24 as it will perform command VACUUM.
Include	No	-	Use this parameter to include a file into the configuration file. Number of parameters **Include** is not limited. For example: Include=/etc/zabbix/db_conn.

Parameter	Mandatory	Default value	Description
			conf
ListenIP	No	-	Interface to listen by trapper processes. Trapper will listen to all interfaces if this parameter is not set.
ListenPort	No	10051	Port number to listen by trapper processes.
LogFile	No	-	Name of log file. If not set, syslog is used.
LogFileSize	No	1	This parameter controls log rotation setting for **LogFile**. By default, ZABBIX automatically roatates log file when it reaches 1MB. This parameter is in MB. If set to 0, no log rotation will be performed.
NodeID	No	0	Unique NodeID (0-999). Must be ‘0’ or missing for standalone ZABBIX Server.
NodeNoEvents	No	0	If set to ‘1’ local events won’t be sent to master node.
NodeNoHistory	No	0	If set to ‘1’ local history won’t be sent to master node.
PidFile	No	/tmp/zabbix_server.pid	Name of file to store PID
PingerFrequency	No	30	ZABBIX server ping servers once per PingerFrequency seconds (1-3600).
SenderFrequency	No	30	The parameter defines how often the daemon must try to send alerts (in seconds)
StartDiscoverers	No	1	Number of discoverers to start (0-255).
StartHTTPPollers	No	5	Number of HTTP pollers to start (0-255).
StartPollers	No	5	Number of pollers to start (0-255).
StartPollersUnreachable	No	1	Number of pollers for unreachable hosts to start

Parameter	Mandatory	Default value	Description
			(0-255).
StartTrappers	No	5	Number of trappers to start (0-255)
Timeout	No	5	Do not spend more than Timeout seconds on retrieving requested value (1-255) Note: Example of the configuration file can be found at misc/conf/zabbix_server.conf
TrapperTimeout	No	5	Do not spend more than Timeout seconds on processing of traps (1-255)
UnavailableDelay	No	60	How ofter try to connect to unavailable host
UnreachableDelay	No	15	How often try to connect to unreachable host
UnreachablePeriod	No	45	If a host was unreachable for more than UnreachablePeriod seconds, change host status to Unavailable

4.2. ZABBIX Agent (UNIX, standalone daemon)

ZABBIX UNIX Agent runs on a host being monitored. The agent provides host's performance and availability information for ZABBIX Server.

ZABBIX Agent processes items of type 'ZABBIX Agent' or 'ZABBIX Agent (active)'.

ZABBIX Agent can be started by executing:

```
shell> cd bin
shell> ./zabbix_agentd
```

ZABBIX Agent runs as a daemon process.

ZABBIX Agent accepts the following command line parameters:

-c --config <file>	specify configuration file, default is /etc/zabbix/zabbix_agentd.conf
-h --help	give this help
-v --version	display version number
-p --print	print supported metrics and exit
-t --test <metric>	test specified metric and exit

In order to get this help run:

```
shell> zabbix_agentd –h
```

Example of command line parameters:

```
shell> zabbix_agentd –c /usr/local/etc/zabbix_agentd.conf
shell> zabbix_agentd –help
shell> zabbix_agentd –print
shell> zabbix_agentd –t “system.cpu.load[all,avg1]”
```

The configuration file contains configuration parameters for **zabbix_agentd**. The file must exist and it should have read permissions for user ‘zabbix’. Supported parameters:

Parameter	Mandatory	Default value	Description
DebugLevel	No	3	Debug level: 0 – none 1 – critical 2 – errors 3 – warnings 4 – debug
DisableActive	No	0	Disable processing of active checks. The agent will not connect to ZABBIX server to get list of active items.
EnableRemoteCommands	No	0	Enable remote commands. ZABBIX server will be able to

Parameter	Mandatory	Default value	Description
			send commands for execution by the agent.
Hostname	No	System hostname.	Unique host name. The hostname is used for active checks only. If missing, system hostname (**system.hostname**) is used.
Include	No	-	Use this parameter to include a file into the configuration file. Number of parameters **Include** is not limited. For example: Include=/etc/zabbix/user_parameters.conf
ListenIP	No	-	IP address to bind agent to. Useful if the host has multiple interfaces.
ListenPort	No	10050	Port number to listen.
LogFile	No	-	Name of log file. If not set, syslog is used.
LogFileSize	No	1	This parameter controls log rotation setting for **LogFile**. By default, ZABBIX automatically roatates log file when it reaches 1MB. This parameter is in MB. If set to 0, no log rotation will be performed.
PidFile	No	/tmp/zabbix_agentd.pid	Name of PID file.
RefreshActiveChecks	No	120	The agent will refresh list of active checks once per 120 (default) seconds.
Server	Yes	-	Comma-delimited list of IP addresses of ZABBIX servers. Connections from other IP addresses will be rejected.
ServerPort	No	10051	The agent will connect to this server port for processing active checks.

Parameter	Mandatory	Default value	Description
StartAgents	No	5	Number of agents to start.
Timeout	No	3	Do not spend more that Timeout seconds on getting requested value (1-255). The agent does not kill timeouted User Parameters processes!
UserParameter	No	-	User-defined parameter to monitor. There can be several user-defined parameters. Value has form , Example:UserParameter=users,who|wc -l Note: Example of the configuration file can be found at misc/conf/zabbix_agentd.conf.

4.3. ZABBIX Agent (UNIX, Inetd version)

The file contains configuration parameters for **zabbix_agent**. The file must exist and it should have read permissions for user 'zabbix'. Supported parameters:

Parameter	Mandatory	Default value	Description
Server	Yes	-	Comma-delimited list of IP addresses of ZABBIX servers. Connections from other IP addresses will be rejected.
Timeout	No	3	Do not spend more that Timeout seconds on getting requested value (1-255). The agent does not kill timeouted User Parameters processes!
UserParameter	No	-	User-defined parameter to monitor. There can be several user-defined parameters. Example:UserParameter=users,who|wc -l

Parameter	Mandatory	Default value	Description

Note: Example of the configuration file can be found at misc/conf/zabbix_agent.conf

4.4. ZABBIX Agent (Windows)

Zabbix_agentd is ZABBIX agent for Win32/64 systems. It will work on Windows NT 4.0, Windows 2000, Windows XP, and Windows Vista.

4.4.1. Installation

Installation is very simple and includes 3 steps:

Step 1 Create configuration file.

Create configuration file c:/zabbix_agentd.conf (it has the same syntax as UNIX agent).

Step 2 Install agent as a Windows service.

```
zabbix_agentd.exe --install
```

If you wish to use configuration file other that c:\zabbix_agentd.conf, you should use the following command for service installation:

```
zabbix_agentd.exe --config <your_configuration_file> install
```

Full path to configuration file should be specified.

Step 2 Run agent.

Now you can use Control Panel to start agent's service or run:

```
zabbix_agentd.exe --start
```

Note: Windows NT 4.0 note. Zabbix_agentd.exe uses PDH (Performance Data Helper) API to gather various system information, so PDH.DLL is needed. This DLL is not supplied with Windows NT 4.0, so you need to download and install it by yourself. Microsoft Knowledge Base article number 284996 describes this in detail and contains a download link. You can find this article at http://support.microsoft.com/default.aspx?scid=kb;en-us;284996

4.4.2. Usage

Command line syntax:

```
zabbix_agentd.exe [-Vhp] [-idsx] [-c <file>] [-t <metric>]
```

ZABBIX Windows Agent accepts the following command line parameters:

Options:

-c –config <file>	Specify alternate configuration file (default is c:\zabbix_agentd.conf).
-h --help	Display help information.
-V --version	Display version number.
-p --print	Print list of supported checks (metrics) and exit.
-t –test <metric>	Test single check (metric) and exit.

Functions:

-I --install	Install ZABBIX agent as a service.
-d --uninstall	Uninstall ZABBIX agent service.
-s --start	Start ZABBIX agent service.
-x --stop	Stop ZABBIX agent service.

The file contains configuration parameters for Zabbix_agentd.exe. Supported parameters:

Parameter	Mandatory	Default value	Description
Alias	No	-	Sets the alias for parameter. It can be useful to substitute long and complex parameter name with a smaller and simpler one. For example, if you wish to retrieve paging file usage in percents from the server, you may use parameter "perf_counter[\Paging File(_Total)\% Usage]", or you may define an alias by adding the following line to configuration file: Alias = pg_usage:perf_counter[\Paging File(_Total)\% Usage] After that you can use parameter name "pg_usage" to retrieve the same information. You can specify as many "Alias" records as you wish. Please note that aliases cannot be used for parameters defined in "PerfCounter" configuration file records.
DebugLevel	No	3	Debug level, one of 0 – none 1 – critical 2 – errors 3 – warnings 4 – debug
Include	No	-	Use this parameter to include a file into the configuration file. Number of parameters **Include** is not limited. For example: Include=c:\user_parameters.conf

Parameter	Mandatory	Default value	Description
ListenPort	No	10050	Port number to listen.
LogFile	No	-	Name of log file. If not set, syslog is used.
LogUnresolvedSymbols	No	-	Controls logging of unresolved symbols during agent startup. Values can be strings 'yes' or 'no' (without quotes).
MaxCollectorProcessingTime	No	100	Sets maximum acceptable processing time of one data sample by collector thread (in milliseconds). If processing time will exceed specified value, warning message will be written to the log file.
NoTimeWait	No	-	The parameter has no effect.
PerfCounter	No	-	<parameter_name>,"<perf_counter_path>",<period> Defines new parameter <parameter_name> which is an average value for system performance counter <perf_counter_path> for the specified time period <period> (in seconds). For example, if you wish to receive average number of processor interrupts per second for last minute, you can define new parameter "interrupts" as following: PerfCounter = interrupts,"\Processor(0)\Interrupts/sec",60 Please note double quotes around performance counter path. Samples for calculating average value will be taken every second.

Parameter	Mandatory	Default value	Description
			You may run **typeperf –qx** to get list of all performance counters available in Windows.
PidFile	No	-	The parameter has no effect.
Server	Yes	-	Comma-delimited list of IP addresses of ZABBIX servers. Connections from other IP addresses will be rejected.
StartAgents	No	-	The parameter has no effect.
UserParameter	No	-	User-defined parameter to monitor. There can be several user-defined parameters. Value has form <key>,<shell command>. Do not use spaces around pipe ('|') characters! Example:UserParameter=test,echo 1

4.5. ZABBIX Sender (UNIX)

ZABBIX UNIX Sender is a command line utility which 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.

ZABBIX Sender can be started by executing:

```
shell> cd bin

shell> ./zabbix_sender –z zabbix –p 10051 –s LinuxDB3 –k db.connections –o 43
```

ZABBIX Sender accepts the following command line parameters:

-z –zabbix-server <zabbix server>	Hostname or IP address of ZABBIX Server.
-p --port <zabbix server port>	Specify port number of server trapper running on the server. Default is 10051.

-s –host <host name or IP>	Specify host name. Host IP address and DNS name will not work.
-k –key <key of metric>	Specify metric name (key) we want to send.
-o –value <value>	Specify value of the key.
-i –input-file <input file>	Load values from input file.
-h –help	Give this help.
-v –version	Display version number.

In order to get this help run:

```
shell> zabbix_sender -h
```

4.6. ZABBIX Get (UNIX)

ZABBIX UNIX Get is a process which communicates with ZABBIX Agent and retrieves required information.

The utility is usually used for troubleshooting of ZABBIX Agents.

ZABBIX Get can be started by executing:

```
shell> cd bin
shell> ./zabbix_get -s127.0.0.1 -p10050 -k"system.cpu.load[all,avg1]"
```

ZABBIX Get accepts the following command line parameters:

-p --port <port number>	Specify port number of agent running on the host. Default is 10050.
-s –host <host name or IP>	Specify host name or IP address of a host.
-k –key <key of metric>	Specify metric name (key) we want to retrieve.
-h --help	Give this help.
-v --version	Display version number.

In order to get this help run:

```
shell> zabbix_get -h
```

5. Configuration

5.1. Development Environment

Ubuntu Linux is used as a primary development platform for ZABBIX.

Four servers are used for test purposes:

- Debain Linux 2.1, Intel PII/350Mhz, 192MB, IDE
- SuSe 8.1, Intel P4/1.6Mhz, 512MB, IDE
- Ubuntu 6.06, AMD Athlon 64 3200+, 2GB, SATA
- Ubuintu 6.10, Intel Core2 6400 2.13 GHz, 2GB, SATA

If you have difficulties choosing between Linux and other OS, go for the following Linux distributions, you will get better support:

- Debian Linux
- RedHat Linux
- SuSE Linux
- Ubuntu Linux

5.2. General Configuration

5.2.1. Housekeeper

The Housekeeper is a periodical process which is executed by ZABBIX Server. The process removes outdated information and information deleted by user.

Configuration parameters:

Parameter	**Description**
Do not keep actions older than (in days)	This parameter defines how many days of executed actions (emails, jabber, SMS, etc) history ZABBIX will keep in the database. Older actions will be removed.
Do not keep events	This parameter defines how many days of events

Parameter	Description
older than (in days)	history ZABBIX will keep in the database. Older events will be removed.

5.2.2. Images

ZABBIX images are stored in the database. There are two types of images:

- Icon
- Background

Icons are used in for displaying System Map elements.

Backgrounds are used as background images of System Maps.

Image attributes:

Parameter	Description
Name	Unique name of an image.
Type	Either **Icon** or **Background**
Upload	Name of local file (PNG, JPEG) to be uploaded to ZABBIX

Note that you may upload image of any size, however images bigger than 1.5MB may not be displayed in maps. Increase value of **max_memory_size** in **php.ini** if you have this problem.

5.2.3. Value mapping

Value maps are used to create a mapping between numeric values and string representations.

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'

Note: Value mapping can be used only for items having type 'Unsigned integer'.

Value mappings are used for representation of data in both ZABBIX front-end and information sent by email/jabber/SMS/whatever.

Parameters of a value mapping:

Parameter	Description
Name	Unique name of set of value mappings.
Mapping	Set of mappings.
New mapping	Single mapping for addition.

5.2.4. Working time

Working time is system-wide parameter which defines working time.

This is used for graphs. Working time is displayed as a white background, while non-working time is displayed as grey.

Working time has the following format:

dd-dd,hh:mm-hh:mm;dd-dd,hh:mm-hh:mm,…

FORMAT	DESCRIPTION
dd	Day of week: **1** – Monday, **2** – Tuesday ,… , **7** – Sunday
hh	Hours: **00-24**
mm	Minutes: **00-59**

Empty format is equal to 01-07,00:00-23:59

For example:

1-5,09:00-18:00

1-5,09:00-18:00;6-7,10:00-16:00

5.2.5. Refresh unsupported items

Some items may become unsupported due to errors in User Parameters or possible an item is not supported by an agent.

ZABBIX can be configured to periodically make unsupported items active.

Parameter	Description

Parameter	Description
Refresh unsupported items (in sec)	ZABBIX will activate unsupported item every N seconds. If set to 0, the activation will be disabled.

5.2.6. Database watchdog

Availability of ZABBIX server depends on availability of back-end database very much. It cannot work without a database.

Database watchdog, a special ZABBIX server process, is created in order to alarm ZABBIX administrators in case of disaster.

The watchdog will send notifications to a user group in case if the database is down. ZABBIX server will not stop; it will wait until the database is back again to continue processing.

Parameter	Description
User group for database down message	User group for sending alarm message or 'None'.

Note: This functionality is supported for MySQL only!

5.3. Actions

ZABBIX reacts to events by executing set of operations. An action can be defined for any event or set of events generated by ZABBIX.

Action attributes:

Parameter	Description
Action type	Type of action: **Send message**, **Execute command**
Event Source	Source of event. Currently two sources are supported: **Triggers** – events generated by trigger status changes **Discovery** – events generated by auto-discovery module
Type of calculation	Rule for calculation of conditions: **AND** – actions are executed if an event matches all conditions **OR** – actions are executed if an event matches at least one condition

Parameter	Description
	AND/OR - action is executed if an events matches all conditions having different types. If an action contains several conditions of the same type, at least one condition with this type must be true.
Conditions	List of conditions for activation of the action.
Send message to	Send message either to **User group** or **Single user**.
Group	User group. The message will be sent to all users of this group.
User	The message will be sent to this user.
Subject	Subject of the message. The subject may contain macros as well.
Message	The message itself. The message may contain macros.
Repeat	Send repeat messages. ZABBIX stops sending repeated messages if the trigger changes its status.
Number of repeats	Number of repeated messages to send.
Delay between repeats	Delay (in seconds) before sending next repeat message.
Status	Action status: **Enabled**, **Disabled**.

5.3.1. Action conditions

An action is executed only in case if an event matches defined set of conditions.

The following conditions can be defined for **Trigger** based events:

Condition type	Supported operators	Description
Host group	**=**, **<>**	Compare against Host Group having a trigger which generated event. **=** - event came from this Host Group **<>** - event did not come from this Host Group
Host	**=**, **<>**	Compare against Host having a trigger which generated event. **=** - event came from this Host

Condition type	Supported operators	Description
		<> - event did not come from this Host
Trigger	**=**, **<>**	Compare against Trigger which generated event. **=** - event generated by this Trigger **<>** - event generated by other Trigger
Trigger name	**like**, **not like**	Compare against Trigger Name which generated event. **like** – String can be found in Trigger Name. Case sensitive. **not like** – String cannot be found in Trigger Name. Case sensitive.
Trigger severity	**=**, **<>**, **>=**, **<=**	Compare about Trigger Severity. **=** - equal to trigger severity **<>** - not equal to trigger severity **>=** - more or equal to trigger severity **<=** - less or equal to trigger severity
Trigger value	**=**	Compare against Trigger Value. **=** - equal to trigger value (**ON** or **OFF**)
Time period in	**in**	Even is in time period. **in** – event time matches the time period Time period is given in format: **dd-dd,hh:mm-hh:mm;dd-dd,hh:mm:hh:mm;…**

Trigger value:

- Trigger changes status from FALSE to TRUE (trigger value is TRUE)
- Trigger changes status from TRUE to FALSE (trigger value is FALSE)

Note: Status change FALSE->UNKNOWN->TRUE is treated as FALSE->TRUE, and TRUE->UNKNOWN->FALSE as TRUE->FALSE.

The following conditions can be defined for **Discovery** based events:

Condition type	**Supported operators**	**Description**
Host IP	=, <>	Check if IP address of a discovered Host is or is not in the range of IP addresses. **=** - Host IP is in the range **<>** - Host IP is out of the range
Service type	=, <>	Check of a discovered service. **=** - matches discovered service **<>** - event came from a different service
Service port	=, <>	Check if TCP port number of a discovered service is or is not in the range of ports. **=** - service port is in the range **<>** - service port is out of the range
Discovery status	=	**Up** – matches Host Up and Service Up events **Down** – matches Host Down and Service Down events
Uptime/Downtime	>=, <=	Downtime for Host Down and Service Down events. Uptime for Host Up and Service Up events. **>=** - uptime/downtime is more or equal **<=** - uptime/downtime is less or equal Parameter is given in seconds.
Received value	= <> >= <= like not like	Compare with value received from an agent (ZABBIX, SNMP). String comparison. **=** - equal to the value **<>** - not equal to the value **>=** - more or equal to the value **<=** - less or equal to the value **like** – has a substring **not like** – does not have a substring

Condition type	Supported operators	Description
		Parameter is given as a string.

For example this set of conditions (caltulation type: AND/OR):

Host group = Oracle servers

Host group = MySQL servers

Trigger name like 'Database is down'

Trigger name like 'Database is anavailable'

is evaluated as

(Host group = Oracle servers **or**

Host group = MySQL servers) **and**

(Trigger name like 'Database is down' **or**

Trigger name like 'Database is unavailable')

5.3.2. Operations

Operation or a set of operations is executed when event matches conditions.

ZABBIX supports the following operations:

- Send message
- Remote command(s)

Additional operations available for discovery events:

- Add host
- Remove host
- Add to group
- Delete from group
- Link to template
- Unlink from template

5.3.3. Macros for messages and remote commands

The macros can be used for more efficient reporting.

Example 1	Subject: {TRIGGER.NAME}: {TRIGGER.STATUS}

Message subject will be replaced by something like:

'Processor load is too high on server zabbix.zabbix.com: ON'

Example 2	Message: Processor load is: {zabbix.zabbix.com:system.cpu.load[,avg1].last(0)}

The message will be replaced by something like:

'Processor load is: 1.45'

5.4. Macros

ZABBIX supports number of macros which may be used in various situations. Effective use of macros allows to save time and make ZABBIX configuration more transparent.

5.4.1. List of supported macros

The table contains complete list of macros supported by ZABBIX.

MACRO	Can be used in			DESCRIPTION
	[illegible]	[illegible]	[illegible]	
{DATE}	**X**			Current date in yyyy.mm.dd. format.

{EVENT.ID}	**X**		Numeric event ID which triggered this action.
{HOSTNAME}	**X**		Hostname of first item of the trigger which caused a notification.
{IPADDRESS}	**X**		IP address of first item of the trigger which caused a notification.
{ITEM.LASTVALUE}	**X**	**X**	The latest value of first item of the trigger expression which caused a notification. Supported from ZABBIX 1.4.3. It is alias to {{HOSTNAME}:{TRIGGER.KEY}.last(0)}
{ITEM.NAME}	**X**		Name of first item of the trigger which caused a notification.
{ITEM.VALUE} **{ITEM.VALUE1}** **…** **{ITEM.VALUE9}**		**X**	The latest value of Nth item of the trigger expression if used for displaying triggers. Historical (when event happenned) value of Nth item of the trigger expression if used for displaying events. Supported from ZABBIX 1.4.3.
{PROFILE.CONTACT}	**X**		Contact from host profile.
{PROFILE.DEVICETYPE}	**X**		Device type from of host profile.
{PROFILE.HARDWARE}	**X**		Hardware from host profile.
{PROFILE.NAME}	**X**		Name from host profile.
{PROFILE.LOCATION}	**X**		Location from host profile.
{PROFILE.MACADDRESS}	**X**		Mac Address from host profile.
{PROFILE.NOTES}	**X**		Notes from host profile.
{PROFILE.OS}	**X**		OS from host profile.
{PROFILE.SERIALNO}	**X**		Serial No from host profile.
{PROFILE.SOFTWARE}	**X**		Software from host profile.
{PROFILE.TAG}	**X**		Tag from host profile.
{STATUS}	**X**		Alias for {TRIGGER.STATUS}.
{TIME}	**X**		Current time in hh:mm.ss.
{TRIGGER.COMMENT}	**X**		Trigger comment.
{TRIGGER.ID}	**X**		Numeric trigger ID which triggered this action.

{TRIGGER.KEY}	**X**			Key of first item of the trigger which caused a notification.
{TRIGGER.NAME}	**X**			Name (description) of the trigger.
{TRIGGER.SEVERITY}	**X**			Trigger severity. For example, ‘Disaster’.
{TRIGGER.STATUS}	**X**			Trigger state. ON - if trigger is in TRUE state, OFF - if trigger is in FALSE state.
{TRIGGER.URL}	**X**			Trigger URL.
{TRIGGER.VALUE}	**X**	**X**	**X**	Current trigger value: **0** - trigger is in OFF state **1** – trigger is in ON state **2** – trigger UNKNOWN This macro can also be used in trigger expressions.
{host:key.func(param)}	**X**			Simple macros as used in trigger expressions.

5.5. Applications

Application is asset of host items. For example, application ‘MySQL Server’ may contain all items which are related to the MySQL server: availability of MySQL, disk space, processor load, transactions per second, number of slow queries, etc.

An item may be linked with one or more applications.

Applications are used in ZABBIX front-end to group items.

5.6. Graphs

User-defined graphs allow the creation of complex graphs. These graphs can be easily accessed via the menu item “Graphs”.

5.7. Medias

Media is a delivery channel for ZABBIX alerts. None, one or more media types can be assigned to user.

5.7.1. EMAIL

Email notification

5.7.2. JABBER

Notifications using Jabber messaging.

5.7.3. SCRIPT

Custom script. ZABBIX passes three command line parameters to the script: Recipient, Subject and Message.

5.7.4. GSM Modem

ZABBIX supports sending of SMS messages using Serial GSM Modem connected to ZABBIX Server's serial port.

Make sure that:

- Speed of a serial device (normally /dev/ttyS0 under Linux) matches GSM Modem

  ZABBIX does not set speed of the serial link. It uses default settings.

- The serial device has read/write access for user **zabbix**.

  Run commans **ls –l /dev/ttyS0** to see current permission of the serial device.

- 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 present) in a terminal software, such as Unix **minicom** or Windows **HyperTerminal**.

ZABBIX has been tested with the following GSM modems:

- Siemens MC35
- Teltonika ModemCOM/G10

5.8. Hosts

Host attributes:

Parameter	Description
Name	Unique host name. The name must be unique within ZABBIX Node.
Groups	List of host groups the host belongs to.
New group	Assign new host group.
DNS	DNS name of the host. The name is used as a DNS name for accessing host ZABBIX or SNMP agent or performing Simple Checks.
IP address	IP address.
Connect to	**DNS name** – use DNS name for connections to the host **IP address** – use IP address for connections to the host (recommended)
Port	Port number of ZABBIX Agent running on this host. If no ZABBIX agent is used, the port is ignored. Use standard ZABBIX port number 10050.
Status	**Monitored** – the host is monitored **Not monitored** – the host is not monitored
Link with templates	Link host with one or many templates.
Use profile	Use host profile.

5.9. Host templates

Use of templates is an excellent way of making maintenance of ZABBIX much easier.

A template can be linked to a number of hosts. Item, triggers and graphs of the template will be automatically added to the linked hosts. Change definition of a template item (trigger, graphs) and the change will be automatically applied to the hosts.

Host template attributes:

Parameter	Description
Name	Unique template (host) name. The name must be unique within ZABBIX Node.
Groups	List of host groups the template belongs to.

Parameter	Description
New group	Assign new host group to the template.
Link with template	Used to create hierarchical templates.

5.10. Host groups

Host group may have zero, one or more hosts.

Host group attributes:

Parameter	Description
Group name	Unique host group name. The name must be unique within ZABBIX Node.
Hosts	List of hosts of this group.

5.11. Host and trigger dependencies

ZABBIX does not support host dependencies. Host dependencies can be defined using more flexible option, i.e. trigger dependencies.

How it works?

A trigger may have list of one or more triggers it depends on. It means that the trigger will still change its status regardless of state of the triggers in the list, yet the trigger won’t generate notifications and actions in case if one of the trigger in the list has state TRUE.

Example 1 Host dependency

Suppose you have two hosts: a router and a server. The server is behind the router. So, we want to receive only one notification if the route is down:

“The router is down”

instead of:

“The router is down” and “The host is down”

In order to achieve this, we create a trigger dependency:

“The host is down” depends on “The router is down”

In case if both the server and the server is down, ZABBIX will not execute actions for trigger “The host is down”.

5.12. Items

Item is a single performance or availability check.

Item attributes:

Parameter	**Description**
Description	Item description. It may contain macros: **$1** – first parameter of item key **$2** – second parameter **$N** - Nth parameter For example: Free disk space on $1 If item key is “vfs.fs.size[/,free]”, the description will be automatically changed to “Free disk space on /”
Type	Item type. See sections below for detailed description of each type.
Key	Item key. The key must be unique within a single host. For The key value must be supported by an agent or ZABBIX server, if key type is ZABBIX Agent, ZABBIX Agent (active), Simple check, or ZABBIX aggregate.
Type of information	Type of received data. **Numeric (integer 64bit)** – 64bit unsigned integer **Numeric (float)** – floating point number **Character** – character (string) data limited to 255 bytes **Log** – log file. Must be set for keys log[]. **Text** – text of unlimited size
Units	If set, ZABBIX will add prefix K,M or G if required and the unit postfix to all received values (1024 is 1K). For example, if units set to ‘B’, ZABBIX will display: 1 as 1B 1024 as 1KB 1536 as 1.5KB Some units have special processing: **b, bps** - 1000 is 1K, special processing for bits. **unixtime** – translated to “yyyy.mm.dd hh:mm:ss”

Parameter	Description
	uptime – translated to “hh:mm:ss” or N days, hh:mm:dd”, parameter is treated as number of seconds since 01/01/1970. **s** – translated to “yy**y**mm**m**dd**d**hh**h**mm**m**”, parameter is treated as number of seconds since 01/01/1970. For example, 2y10m14d3h54m1s
Use multiplier	Pre-process received values. **Do not use** - do not pre-process received values **Custom multiplier** – multiply received values by value defined in **Custom multiplier** Use this option to convert values received in KB, MBps, etc into B, Bps. Otherwise ZABBIX cannot correctly set prefixes (K, M and G).
Custom multiplier	Multiply all received value by this integer or floating pint value.
Update interval (in sec)	Refresh this item every N seconds.
Flexible intervals	List of exceptions for **Update Interval**. For example: 10 sec, 1-5,09:00-18:00 – refresh set to 10 seconds for working hours. Otherwise default update interval will be used. Period format: dd-dd,hh:mm-hh:mm;dd-dd,hh:mm-hh-mm For example, 1-5,09:00-18:00;6-7,10:00-12:00 1- Monday, …,7 - Sunday
Keep history (in days)	Keep detailed history N days in the database. Older data will be removed by Housekeeper.
Keep trends (in days)	Keep aggregated (hourly min,max,avg,count) etailed history N days in the database. Older data will be removed by Housekeeper.
Status	**Active** - active (normal) status. ZABBIX will process this item. **Disabled** – item is disabled. This item will not be processed. **Not supported** – item is not supported by ZABBIX or SNMP agent. This item will not be processed, however ZABBIX may try to periodically set status of such items to **Active** if configured.
Store value	**As is** – no pre-processing

Parameter	Description
	Delta (speed per second) – evaluate value as (val-prev_value)/(time-prev_time), where value – current value value_prev – previously received value time – current timestamp prev_time – timestamp of previous value This setting is extremely useful to get speed per second based on constantly growing value. **Delta (simple change)** – evaluate as (value-prev_value), where value – current value value_prev – previously received value
Show value	Apply value mapping to this item. Value mapping does not change received values, it is for displaying data only. It works with integer items only. For example, “Windows service states”.
Applications	Link item to one or more applications.

5.12.1. Item key

Flexible and non-flexible parameters

Flexible parameter is parameter which accepts argument. For example, vfs.fs.free[*] is flexible parameter. * is any string that will be passed as argument of the parameter. vfs.fs.free[/], vfs.fs.free[/opt] - correct definitions.

Allowed characters

The following characters are allowed:

0-9a-zA-Z_.,:-$<space>

Note: Use of the ‘,’ and ‘:’ is not recommended and can be dropped in future releases. Support of Novell parameters will be maintained.

5.12.2. Supported by Platform

Please consult ZABBIX Manual for Windows parameters. The table is valid for ZABBIX 1.1beta3 and higher.

Parameter system		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
agent.ping		X	X	X	X	X	X	X	X	X
agent.varsion		X	X	X	X	X	X	X	X	X
kernel.maxfiles		-	X	X	X	-	-	-	-	-
kernel.maxproc		-	-	-	X	X	-	-	-	-
net.if.collisions[if]		-	X	X	X	X	-	-	-	-
net.if.in[if<,mode>]		-	X	X	-	X	-	-	-	-
mode	**bytes**	-	X	X	-	X	-	-	-	-
	packets	-	X	X	-	X	-	-	-	-
	errors	-	X	X	-	X	-	-	-	-
	dropped	-	X	X	-	-	-	-	-	-
net.if.out[if<,mode>]		-	X	X	-	X	-	-	-	-
mode	**bytes**	-	X	X	-	X	-	-	-	-
	packets	-	X	X	-	X	-	-	-	-
	errors	-	X	X	-	X	-	-	-	-

Parameter system		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	dropped	-	X	X	-	-	-	-	-	-
net.tcp.dns[ip,zone]		-	X	X	X	X	X	X	X	-
net.tcp.listen[port]		-	-	-	X	X	-	-	-	-
net.tcp.port[<ip,>port]		X	X	X	X	X	X	X	X	X
net.tcp.service.perf[service<,ip><,port>		-	X	X	X	X	X	X	X	-
net.tcp.services[service<,ip><,port>]		-	X	X	X	X	X	X	X	-
proc.mem[<name><,user><,mode><,cmdline>]		-	X	X	-	X	-	X	X	-
mode	sum	-	X	X	-	X	-	X	X	-
	avg	-	X	X	-	X	-	X	X	-
	max	-	X	X	-	X	-	X	X	-
	min	-	X	X	-	X	-	X	X	-
proc.num[<name><,user><,state><,cmdline>]		-	X	X	-	X	-	X	X	-
state	all	-	X	X	-	X	-	X	X	-
	sleep	-	X	X	-	X	-	X	X	-
	zomb	-	X	X	-	X	-	X	X	-
	run	-	X	X	-	X	-	X	X	-
system.boottime		-	X	X	-	-	-	-	-	-
system.cpu.intr		-	X	X	X	X	-	-	-	-
system.cpu.load[<cpu> <,mode>]		X	X	X	-	X	X	-	-	-
mode	avg1	-	X	X	-	X	X	-	-	-

Parameter system		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	avg5	-	X	X	-	X	X	-	-	-
	avg15	-	X	X	-	X	X	-	-	-
system.cpu.num		X	X	X	-	X	X	-	-	-
system.cpu.switches		-	-	-	X	X	-	-	-	-
system.cpu.util[<cpu><,type><,mode>]		X	-	X	X	X	-	-	-	-
type	**user**	-	-	X	X	X	X	-	-	-
	nice	-	-	X	X	-	X	-	-	-
	idle	-	-	X	X	X	X	-	-	-
	system	-	-	X	X	-	X	-	-	-
	kernel	-	-	-	-	X	X	-	-	-
	wait	-	-	-	-	X	X	-	-	-
mode	**avg1**	-	X	X	-	-	X	-	-	-
	avg5	-	X	X	-	-	X	-	-	-
	avg15	-	X	X	-	-	X	-	-	-
system.run[command<,mode>]		X	X	X	X	X	X	X	X	X
mode	**wait**	X	X	X	X	X	X	X	X	X
	nowait	X	X	X	X	X	X	X	X	X
system.hostname		X	X	X	X	X	X	X	X	X
system.localtime		X	X	X	-	X	X	X	X	X
system.swap.in[<swap><,type>]		-	-	X	-	X	-	-	-	-
type	**count**	-	-	-	-	X	-	-	-	-
	pages	-	-	-	-	X	-	-	-	-

Parameter system		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
system.swap.out[<swap><,type>]		-	-	X	-	X	-	-	-	-
type	**count**	-	-	-	-	X	-	-	-	-
	pages	-	-	-	-	X	-	-	-	-
system.swap.size[<swap><,type>]		X	X	X	X	X	-	-	X	-
mode	**free**	-	X	X	X	X	-	-	X	-
	total	-	X	X	X	X	-	-	X	-
system.uname		X	X	X	X	X	X	X	X	-
system.uptime		-	X	X	-	X	-	-	-	-
system.users.num		-	X	X	-	X	X	X	X	-
vfs.dev.read[device<,type><,mode>]		-	X	X	X	X	-	-	-	-
type	sectors	-	X	X	-	-	-	-	-	-
	operations	-	X	X	-	X	-	-	-	-
	bytes	-	-	-	-	X	-	-	-	-
	ops	-	-	-	X	-	-	-	-	-
	bps	-	-	-	X	-	-	-	-	-
mode	**avg1**	-	-	-	X	-	-	-	-	-
	avg5	-	-	-	X	-	-	-	-	-
	avg15	-	-	-	X	-	-	-	-	-
vfs.dev.write[device<,type><,mode>]		-	X	X	X	X	-	-	-	-
type	sectors	-	X	X	-	-	-	-	-	-

Parameter system		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	operations	-	X	X	-	X	-	-	-	-
	bytes	-	-	-	-	X	-	-	-	-
	ops	-	-	-	X	-	-	-	-	-
	bps	-	-	-	X	-	-	-	-	-
mode	**avg1**	-	-	-	X	-	-	-	-	-
	avg5	-	-	-	X	-	-	-	-	-
	avg15	-	-	-	X	-	-	-	-	-
vfs.file.cksum[file]		X	X	X	X	X	X	X	X	-
vfs.file.exists[file]		X	X	X	X	X	X	X	X	X
vfs.file.md5sum[file]		X	X	X	X	X	X	X	X	-
vfs.file.regexp[file, user]		-	X	X	-	X	X	X	X	-
vfs.file.regmatch[file, user]		-	X	X	-	X	X	X	X	-
vfs.file.size[file]		X	X	X	-	X	X	X	X	-
vfs.file.time[file,<,mode>]		-	X	X	X	X	X	X	X	-
mode	**modify**	-	X	X	X	X	X	X	X	-
	access	-	X	X	X	X	X	X	X	-
	change	-	X	X	X	X	X	X	X	-
vfs.file.inode[fs,<,mode>]		-	X	X	X	X	X	X	X	-
mode	**total**	-	X	X	X	X	X	X	X	-
	free	-	X	X	X	X	X	X	X	-
	used	-	X	X	X	X	X	X	X	-
	pfree	-	X	X	X	X	X	X	X	-

Parameter system		Win32	Linux 2.4	Linux 2.6	FreeBSD	Solaris	HP-UX	AIX	Tru64	Mac OS X
	pused	-	X	X	X	X	X	X	X	-
vfs.file.size[fs,<,mode>]		-	X	X	X	X	X	X	X	-
mode	**total**	-	X	X	X	X	X	X	X	-
	free	-	X	X	X	X	X	X	X	-
	used	-	X	X	X	X	X	X	X	-
	pfree	-	X	X	X	X	X	X	X	-
	pused	-	X	X	X	X	X	X	X	-
vm.memory.size[fs,<,mode>]		X	X	X	X	X	X	X	-	-
mode	**total**	-	X	X	X	X	X	X	X	-
	free	-	X	X	X	X	X	X	X	-
	shared	-	X	X	X	-	X	X	-	-
	buffers	-	X	X	X	-	X	X	-	-
	cached	-	X	X	X	-	X	X	-	-

5.12.3. ZABBIX Agent

Flexible and non-flexible parameters

Flexible parameter is parameter which accepts argument. For example, `vfs.fs.free[*]` is flexible parameter. `*` is any string that will be passed as argument of the parameter. `vfs.fs.free[/]`, `vfs.fs.free[/opt]` - correct definitions.

String between [] may contain the following characters:

```
0-9a-zA-Z.:,()_/[space]
```

List of supported parameters

ZABBIX AGENT

Key	**Description**	**Return value**	**Parameters**	**Comments**
agent.ping	Check the agent usability.	Always return '1'.	-	Can be used as a TCP ping.
agent.version	Version of ZABBIX Agent.	String	-	Example of returned value: 1.3.2
kernel.maxfiles	Maximum number of opened file supported by OS.	Number of files. Integer.		
kernel.maxproc	Maximum number of processes supported by OS.	Number of processes. Integer.		
log[file<,regexp>]	Monitoring of log file.	Log.	**file** – full file name **regexp** – regual expression	Must be Active Check.
net.if.collisions[if]	Out-of-window collision.	Number of collisions. Integer.	**if** - interface	
net.if.in[if <,mode>]	Network interface incoming statistic.	Integer.	**if** - interface **mode** – **bytes** number of bytes (default) **packets** number of packets **errors** number of errors **dropped** number of dropped packets	
net.if.out[if <,mode>]	Network interface outgoing	Integer.	**if** - interface **mode** –	Examples: net.if.out[eth0,errors]

Key	Description	Return value	Parameters	Comments
	statistic.		**bytes** number of bytes (default) **packets** number of packets **errors** number of errors **dropped** number of dropped packets	net.if.out[eth0] You may use this key with Delta (speed per second) in order to get bytes per second statistics.
net.tcp.dns[ip, zone]	Checks if DNS service is up.	0 - DNS is down 1 - DNS is up	**ip** - IP address of DNS server **zone** - zone to test the DNS	Example: net.tcp.dns[127.0.0.1 ,zabbix.com]
net.tcp.listen[port]	Checks if this port is in LISTEN state.	0 - it is not 1 - it is in LISTEN state	port - port number	Example: net.tcp.listen[80]
net.tcp.port[<ip>, port]	Check, if it is possible to make TCP connection to port number 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. Old naming: check_port[*]
net.tcp.service[service <,ip> <,port>]	Check if service is running and accepting TCP connections.	0 - service is down 1 - service is running 2 - timeout connecting to the service	service - one of ssh, service.ntp, ldap, smtp, ftp, http, pop, nntp, imap, tcp 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 availability of FTP server on TCP port 45. Old naming: check_service[*]
net.tcp.service.perf[service <,ip> <,port>]	Check performance of service	0 - service is down sec - number of seconds spent while connecting to	service - one of ssh, service.ntp, ldap, smtp, ftp, http, pop, nntp, imap, tcp ip - IP address (default is 127.0.0.1)	Example: `net.tcp.service.perf[ssh]` can be used to test speed of initial response from SSH server.

Key	Description	Return value	Parameters	Comments
		the service	port - port number (by default standard service port number is used)	Old naming: `check_service[*]`
proc.mem[<name> <,user> <,mode><,cmdline>]	Memory used by process name running under user	Memory used by process.	name - process name user - user name (default is all users) mode - one of avg, max, min, sum (default) cmdline - filter by command line	Example: proc.mem[,root] - memory used by all processes running under user "root". proc.mem[zabbix_server,zabbix] - memory used by all processes zabbix_server running under user zabbix proc.mem[,oracle,max,oracleZABBIX] - memory used by most memory hungry process running under oracle having oracleZABBIX in its command line
proc.num[<name> <,user> <,state><,cmdline>]	Number of processes name having state running under user	Number of processes.	name - process name user - user name (default is all users) state - one of all (default), run, sleep, zomb cmdline - filter by command line	Example: proc.num[,mysql] - number of processes running under user mysql proc.num[apache2,www-data] - number of apache2 running under user www-data proc.num[,oracle,sleep,oracleZABBIX] - number of processes in sleep state running under oracle having oracleZABBIX in its command line
system.cpu.intr	Device interrupts.	Integer.		

Key	Description	Return value	Parameters	Comments
system.boottime	Timestamp of system boot.	Integer.		Time is seconds.
system.cpu.load[<cpu> <,mode>]	CPU(s) load.	Processor load. Float.	cpu - CPU number (default is all CPUs) mode - one of avg1 (default),avg5 (average within 5 minutes), avg15	Example: system.cpu.load[] Note that returned value is not percentage. Old naming: system.cpu.loadX
system.cpu.num	Number of CPUs.	Number of available proccessors.		Example: system.cpu.num
system.cpu.switches	Context switches.	Switches count.		Old naming: system[switches]
system.cpu.util[<cpu> <,type> <,mode>]	CPU(s) utilisation.	Processor load in percents	cpu - CPU number (default is all CPUs) type - one of idle, nice, user (default), system mode - one of avg1 (default),avg5 (average within 5 minutes), avg15	Old naming: system.cpu.idleX, system.cpu.niceX, system.cpu.systemX, system.cpu.userX Example: system.cpu.util[0,user,avg5]
system.run[command<,mode>]	Run specified command on the host.	Text result of the command	command - command for execution mode - one of wait (default, wait end of execution), nowait (do no wait)	Example: system.run[ls -l /] - detailed file list of root directory. Note: To enable this functionality, agent configuration file must have EnableRemoteComm

Key	Description	Return value	Parameters	Comments
				ands=1 option.
system.hostname	Return host name.	String value		Example of returned value www.zabbix.com
system.localtime	System local time.	Time in seconds.		
system.swap.in[<device> <,type>]	Swap in.	Swap statistics	device - swap device (default is all), type - one of count (default, number of swapins), pages (pages swapped in)	Example: system.swap.in[,bytes] Old naming: swap[in]
system.swap.out[<device> <,type>]	Swap in.	Swap statistics	device - swap device (default is all), type - one of count (default, number of swapouts), pages (pages swapped out)	Example: system.swap.out[,pages] Old naming: swap[out]
system.swap.size[<device> <,mode>]	Swap space.	Number of bytes or percentage	device - swap device (default is all), type - one of free (default, free swap space), total (total swap space), pfree (free swap space, percentage), pused (used swap space, percentage)	Example: system.swap.size[,pfree] - percentage of free swap space Old naming: system.swap.free, system.swap.total
system.uname	Returns detailed host information.	String value		Example of returned value: *FreeBSD localhost 4.4-RELEASE FreeBSD 4.4-RELEASE #0: Tue Sep 18 11:57:08 PDT 2001 murray@builder.FreeBSD.org: /usr/src/sys/compile/GENERIC i386*

Key	Description	Return value	Parameters	Comments
system.uptime	System's uptime in seconds.	Number of seconds		Use Units s or uptime to get readable values.
system.users.num	Number of users connected.	Number of users		Command who is used on agent side.
vfs.dev.read[device <,type>]	Disk read statistics.	Numeric value	device - disk device (default is all), type - one of sectors (default), operations	Example: vfs.dev.read[,operations] Old naming: io[*]
vfs.dev.write[device <,type>]	Disk write statistics.	Numeric value	device - disk device (default is all), type - one of sectors (default), operations	Example: vfs.dev.write[,operations] Old naming: io[*]
vfs.file.cksum[file]	Calculate file check sum	File check sum calculated by algorithm used by UNIX cksum.	file - full path to file	Example of returned value: *1938292000* Example: vfs.file.cksum[/etc/passwd]
vfs.file.exists[file]	Check if file exists	0 - file does not exist 1 - file exists	file - full path to file	Example: vfs.file.exists[/tmp/application.pid]
vfs.file.md5sum[file]	File's MD5 check sum	MD5 hash of the file. Can be used only for files less than 64MB, unsupported otherwise.		Example of returned value: *b5052decb577e0fffd622d6ddc017e82* Example: vfs.file.md5sum[/etc/zabbix/zabbix_agentd.conf]
vfs.file.regexp[file, regexp]	Find string in a file	Matched string	file - full path to file, regexp - GNU regular expression	Example: vfs.file.regexp[/etc/passwd,zabbix]
vfs.file.regmatch[file, regexp]	Find string in a file	0 - expression not found 1 - found	file - full path to file, regexp - GNU regular expression	Example: vfs.file.regexp[/var/log/app.log,error]
vfs.file.size[file]	File size	Size in bytes.	file - full path to file	File must have read permissions for user zabbix Example: vfs.file.size[/var/log/syslog]

Key	Description	Return value	Parameters	Comments
vfs.file.time[file <, mode>]	File time information.	Number of seconds.	file - full path to file mode - one of modify (default, modification time), access - last access time, change - last change time	Example: vfs.file.time[/etc/passwd,modify]
vfs.fs.inode[fs <,mode>]	Number of inodes	Numeric value	fs - filesystem, mode - one of 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	Disk space in KB	fs - filesystem, mode - one of 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] Old naming: vfs.fs.free[*], vfs.fs.total[*], vfs.fs.used[*], vfs.fs.pfree[*], vfs.fs.pused[*]
vm.memory.size [<mode>]	Memory size	Memory size in bytes	mode - one of total (default), shared, free, buffers, cached	Old naming: vm.memory.buffers, vm.memory.cached, vm.memory.free, vm.memory.shared, vm.memory.total
web.page.get[host,<path>,<port>]	Get content of WEB page	host - hostname, path - path to HTML document (default is /), port - port number (default is 80)	WEB page source as text	Returns EOF on fail. Example: web.page.get[www.zabbix.com,index.php,80]
web.page.perf[host,<path>,<port>]	Get timing of loading full WEB page	Time in seconds	host - hostname, path - path to HTML document (default is /), port - port number (default is 80)	Example: web.page.perf[www.zabbix.com,index.php,80]

Key	Description	Return value	Parameters	Comments
web.page.regexp[host, <path>, <port>, <regexp>, <length>,]	Get first occurence of regexp in WEB page	Matched string	host - hostname, path - path to HTML document (default is /), port - port number (default is 80), regexp - GNU regular expression, length - number of characters to return	Returns EOF on fail. Example: web.page.get[www.zabbix.com, index.php, 80, OK, 2]

Linux-specific note. ZABBIX agent must have read-onle access to filesystem `/proc`. Kernel patches from **www.grsecurity.org** limit access rights of non-privileged users.

WIN32-SPECIFIC PARAMETERS

This section contains description of parameter supported by ZABBIX WIN32 agent only.

Key	Description	Return value	Comments
agent[avg_collector_time]	Average time spent by collector thread on each sample processing for last minute.	Time in milliseconds	
agent[max_collector_time]	Maximum time spent by collector thread on each sample processing for last minute.	Time in milliseconds	
agent[accepted_requests]	Total number of requests accepted by agent for processing.	Number of requests	
agent[rejected_requests]	Total number of requests rejected by agent for processing.	Number of requests	

Key	Description	Return value	Comments
agent[timed_out_requests]	Total number of requests timed out in processing.	Number of requests	
agent[accept_errors]	Total number of accept() system call errors.	Number of system calls	
agent[processed_requests]	Total number of requests successfully processed by agent.	Number of requests	
agent[failed_requests]	Total number of requests with errors in processing.	Number of requests	These requests generated ZBX_ERROR return code
agent[unsupported_requests]	Total number of requests for unsupported parameters.	Number of requests	These requests generated ZBX_UNSUPPORTED return code
perf_counter[*]	Value of any performance counter, where parameter is the counter path.	Value of the counter	Performance Monitor can be used to obtain list of available counters. Note that 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.
service_state[*]	State of service. Parameter is service name.	0 – running 1 – paused 2 - start pending 3 - pause pending 4 - continue pending 5 - stop pending 6 – stopped 7 - unknown 255 – no such	Parameter must be real service name as it seen in service properties under "Name:" or name of EXE file.

Key	Description	Return value	Comments
		service	
proc_info[<process>,<attribute>,<type>]	Different information about specific process(es).	<process> - process name (same as in proc_cnt[] parameter) <attribute> - requested process attribute.	The following attributes are currenty supported: vmsize - 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 by process userobj - Number of USER objects used by process <type> - representation type (meaningful when more than one process with the same name exists). Valid values are: min - minimal value among all processes named <process> max - maximal value among all processes named <process> avg - average value for all processes named <process> sum - sum of values for all processes named <process> Examples: 1. In order to get the amount of physical memory taken by all Internet Explorer processes, use the following parameter: proc_info[iexplore.exe,wkset,sum] 2. In order to get the average number of page faults for Internet Explorer processes, use the following parameter: proc_info[iexplore.exe,pf,avg] Note: All io_xxx,gdiobj and userobj attributes available only on Windows 2000 and later versions of Windows, not on Windows NT 4.0.

5.12.4. SNMP Agent

ZABBIX must be configured with SNMP support in order to be able to retrieve data provided by SNMP agents.

The following steps have to be performed in order to add monitoring of SNMP parameters:

Step 1 Create a host for the SNMP device.

Enter an IP address and a port of 161. Set the host Status to NOT MONITORED. You can use the host.SNMP template which would automatically add set of items. However, the template may not be compatible with the host.

Step 2 Find out the SNMP string of the item you want to monitor.

After creating the host, use 'snmpwalk' (part of ucd-snmp/net-snmp software which you should have installed as part of the ZABBIX installation) or equivalent tool:

```
shell> snmpwalk <host or host IP> public
```

This will 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 to the standard public in which case you will need to find out what it is. You would then go through the list until you find the string you want to monitor, e.g. you wanted to monitor the bytes coming in to your switch on port 3 you would use:

```
interfaces.ifTable.ifEntry.ifOctetsIn.3 = Counter 32: 614794138
```

You should now use the snmpget command to find the OID for interfaces.ifTable.ifEntry.ifInOctets.3:

```
shell> snmpget -On 10.62.1.22 interfaces.ifTable.ifEntry.ifOctetsIn.3
```

where the last number in the string is the port number you are looking to monitor. This should give you something like the following:

```
.1.3.6.1.2.1.2.2.1.10.3 = Counter32: 614794138
```

again the last number in the OID is the port number.

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

Step 3 Create an item for monitoring.

So, now go back to ZABBIX and click on Items, selecting 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 a new item box. 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 enter a plain English description in the 'Description' field of the new item box. Make sure the 'Host' field has your switch/router in it and change the 'Type' field to "SNMPv1 agent" (I had difficulty with SNMPv2 agent so I don't use it). Enter the community (usually public) and enter the numeric OID that you retrieved earlier in to the 'SNMP OID' field being sure to include the leading dot, i.e. .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. Choose the Multiplier if you want one and enter an 'update interval' and 'keep history' if you want it to be different from the default. Set the 'Status' to MONITORED, the 'Type of information' to NUMERIC and the 'Store value' to DELTA (important otherwise you will get cumulative values from the SNMP device instead of the latest change).

Now ADD the item and go back to the hosts area of ZABBIX. From here set the SNMP device to be MONITORED and check in LATEST VALUES for your SNMP data!

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 either -with-net-snmp or -with-ucd-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

5.12.5. Simple checks

Simple checks

Simple checks are normally used for agent-less monitoring or for remote checks of services. Note that ZABBIX Agent is not needed for simple checks. ZABBIX Server is responsible for processing of simple checks (making external connections, etc).

All simple check accepts two optional parameters:

`ip` - IP address. Dafult value is `127.0.0.1`

`port` - Port number. If missing, standard default service port is used.

Examples of using simple checks:

```
ftp,127.0.0.1,155
http,11.22.33.44
http_perf,11.22.33.44,8080
```

List of supported simple checks:

Key	**Description**	**Return value**
icmpping	Checks if server	0 – ICMP ping fails

Key	Description	Return value
	is accessible by ICMP ping	1 – ICMP ping successful
icmppingsec	Return ICMP ping response time	Number of seconds
ftp,<ip>,<port>	Checks if FTP server is running and accepting connections	0 – FTP server is down 1 – FTP server is running 2 – timeout
http,<ip>,<port>	Checks if HTTP server is running and accepting connections	0 – HTTP server is down 1 – HTTP server is running 2 – timeout
imap,<ip>,<port>	Checks if IMAP server is running and accepting connections	0 – IMAP server is down 1 – IMAP server is running 2 – timeout
nntp,<ip>,<port>	Checks if NNTP server is running and accepting connections	0 – NNTP server is down 1 – NNTP server is running 2 – timeout
pop,<ip>,<port>	Checks if POP server is running and accepting connections	0 – POP server is down 1 – POP server is running 2 – timeout
smtp,<ip>,<port>	Checks if SMTP server is running and accepting connections	0 – SMTP server is down 1 – SMTP server is running 2 – timeout
ssh,<ip>,<port>	Checks if SSH server is running and accepting connections	0 – SSH server is down 1 – SSH server is running 2 – timeout
tcp,<ip>,<port>	Checks if TCP service is running and accepting	0 – TCP service is down 1 – TCP service is running 2 – timeout

Key	Description	Return value
	connections	
ftp_perf,<ip>,<port>	Checks if FTP server is running and accepting connections	0 – FTP server is down Otherwise number of millisecond spent connecting to FTP server.
http_perf,<ip>,<port>	Checks if HTTP (WEB) server is running and accepting connections	0 – HTTP (WEB) server is down Otherwise number of millisecond spent connecting to HTTP server.
imap_perf,<ip>,<port>	Checks if IMAP server is running and accepting connections	0 – IMAP server is down Otherwise number of millisecond spent connecting to IMAP server.
nntp_perf,<ip>,<port>	Checks if NNTP server is running and accepting connections	0 – NNTP server is down Otherwise number of millisecond spent connecting to NNTP server.
pop_perf,<ip>,<port>	Checks if POP server is running and accepting connections	0 – POP server is down Otherwise number of millisecond spent connecting to POP server.
smtp_perf,<ip>,<port>	Checks if SMTP server is running and accepting connections	0 – SMTP server is down Otherwise number of millisecond spent connecting to SMTP server.
ssh_perf,<ip>,<port>	Checks if SSH server is running and accepting connections	0 – SSH server is down Otherwise number of millisecond spent connecting to SSH server.

5.12.5.1. Timeout processing

ZABBIX will not process a simple check longer than Timeout seconds defined in ZABBIX Server configuration file.

In case if Timeout time succeeded, ‘2’ is returned.

5.12.5.2. 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 FpingLocation defined in configuration file, ICPM pings (icmpping and icmppingsec) will not be processed.

Run these commands as user 'root' in order to setup correct permissions:

```
shell> chown root:zabbix /usr/sbin/fping
shell> chmod 710 /usr/sbin/fping
shell> chmod ug+s /usr/sbin/fping
```

5.12.6. Internal Checks

Internal checks allow monitoring of internals of ZABBIX. Internal checks are calculated by ZABBIX Server.

Key	**Description**	**Comments**
zabbix[history]	Number of values stored in table HISTORY	Do not use if MySQL InnoDB, Oracle or PostgreSQL is used!
zabbix[history_str]	Number of values stored in table HISTORY_STR	Do not use if MySQL InnoDB, Oracle or PostgreSQL is used!
zabbix[items]	Number of items in ZABBIX database	
zabbix[items_unsupported]	Number of unsupported items in ZABBIX database	
zabbix[log]	Stores warning and error messages generated by ZABBIX server.	Character. Add item with this key to have ZABBIX internal messages stored.
zabbix[queue]	Number of items in the Queue.	

Key	Description	Comments
zabbix[trends]	Number of values stored in table TRENDS	Do not use if MySQL InnoDB, Oracle or PostgreSQL is used!
zabbix[triggers]	Number of triggers in ZABBIX database	

5.12.7. Aggregated checks

Aggregate checks do not require any agent running on a host being monitored. ZABBIX server collects aggregate information by doing direct database queries.

Syntax of aggregate item's key

```
groupfunc[“Host group”,”Item key”,”item func”,”parameter”]
```

Supported group functions:

GROUP FUNCTION	DESCRIPTION
grpavg	Average value
grpmax	Maximum value
grpmin	Minimum value
grpsum	Sum of values

Supported item functions:

ITEM FUNCTION	DESCRIPTION
avg	Average value
count	Number of values
last	Last value
max	Maximum value
min	Minimum value
sum	Sum of values

Examples of keys for aggregate items:

Example 1	Total disk space of host group 'MySQL Servers'.

```
grpsum["MySQL Servers","vfs.fs.size[/,total]","last","0"]
```

Example 2	Average processor load of host group 'MySQL Servers'.

```
grpavg["MySQL Servers","system.cpu.load[,avg1]","last","0"]
```

Example 3	Average (5min) number of queries per second for host group 'MySQL Servers'

```
grpavg["MySQL Servers","mysql.qps","avg","300"]
```

5.12.8. External checks

External check is a check executed by ZABBIX Server by running a shell script or a binary.

External checks do not require any agent running on a host being monitored.

Syntax of item's key:

```
script[parameters]
```

script – name of the script.

parameters – list of command line parameters.

ZABBIX server will find and executed the script in directory defined in configuration parameter **ExternalScripts**. First command line parameter is host name, other parameters are substituted by **parameters.**

Note: Do not overuse external checks! It can decrease performance for ZABBIX system very much.

Example 1	Execute script check_oracle.sh with parameters "-h 192.168.1.4". Host name 'www1.company.com'.

```
check_oracle.sh[-h 192.168.1.4]
```

ZABBIX will execute:

```
check_oracle.sh www1.company.com -h 192.168.1.4.
```

5.13. User Parameters

Functionality of ZABBIX agents can be enhanced by defining user parameters (UserParameter) in agent's configuration file.

5.13.1. Simple user parameters

In order to define a new parameter for monitoring, one line has to be added to configuration file of ZABBIX agent and the agent must be restarted.

User parameter has the following syntax:

UserParameter=key,command

Parameter	Description
Key	Unique item key.
Command	Command to be executed to evaluate value of the Key.

Example 1 Simple command

```
UserParameter=ping,echo 1
```

The agent will always return '1' for item with key 'ping'.

Example 2 More complex example

```
UserParameter=mysql.ping,mysqladmin -uroot ping|grep alive|wc –l
```

The agent will return '1', if MySQL server is alive, '0' – otherwise.

5.13.2. Flexible user parameters

Flexible user parameters can be used for more control and flexibility.

For flexible user parameters,

UserParameter=key[*],command

Parameter	Description
Key	Unique item key. The [*] defines that this key accepts parameters.
Command	Command to be executed to evaluate value of the Key. ZABBIX parses content of [] and substitutes $1,…,$10 in the command.

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 alive|wc –l
```

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 "$2" $1|wc -l
```

This parameter can be used to calculate number of lines in a file.

wc[/etc/passwd,root]

wc[/etc/services|zabbix]]

5.14. Triggers

Trigger is defined as a logical expression and represents system state.

Trigger attributes:

Parameter	Description
Name	Trigger name. The name may contain macros.
Expression	Logical expression used for calculation of trigger state.
The trigger depends on	List of triggers the trigger depends on.
New dependency	Add new dependency.
Severity	Trigger severity.
Comments	Text field used to provide more information about this trigger. May contain instructions for fixing specific problem, contact detail of responsible staff, etc.
URL	If not empty, the URL is used in the screen 'Status of Triggers'.
Disabled	Trigger can be disable if required.

Expression is recalculated every time ZABBIX server receives new value, if this value is part of this expression. The expression may have the following values:

VALUE	DESCRIPTION
TRUE	Normally means that something happened. For example, processor load is too high.
FALSE	This is normal trigger state.
UNKNOWN	In this case, ZABBIX cannot evaluate trigger expression. This may happen because of several reasons: ▪ server is unreachanble ▪ trigger expression cannot be evaluated ▪ trigger expression has been recently changed

5.14.1. Expression for triggers

The expressions used in triggers are very flexible. You can use them to create complex logical tests regarding monitored statistics.

The following operators are supported for triggers (**sorted by priority of execution**):

PRIORITY	OPERATOR	DEFINITION
1	**/**	Division
2	*****	Multiplication
3	**-**	Arithmetical minus
4	**+**	Arithmetical plus
5	**<**	Less than
6	**>**	More than
7	**#**	Not equal. The operator is defined as: A=B ⇔ (A<B-0.000001) | (A>B+0.000001)
8	**=**	Is equal. The operator is defined as: A=B ⇔ (A>B-0.000001) & (A<B+0.000001)
9	**&**	Logical AND
10	**|**	Logical OR

The following functions are supported:

FUNCTION	ARGUMENT	SUPPORTED VALUE TYPES	DEFINITION
abschange	ignored	float, int, str, text	Returns absolute difference between last and previous values. For strings: 0 – values are equal 1 – values differ

FUNCTION	ARGUMENT	SUPPORTED VALUE TYPES	DEFINITION
avg	sec or #num	float, int	Average value for period of time. Parameter defines length of the period in seconds.
delta	sec or #num	float, int	Same as max()-min()
change	ignored	float, int, str, text	Returns difference between last and previous values. For strings: 0 – values are equal 1 – values differ

FUNCTION	ARGUMENT	SUPPORTED VALUE TYPES	DEFINITION
count	sec	float, int, log, str	Number of successfully retrieved values for period of time in seconds. The function accepts second optional parameter **pattern** and third parameter **operation**. For example, **count(600,12)** will return exact number of values equal to '12' stored in the history. Integer items: exact match Float items: match within 0.00001 String and log items: matches if contains pattern For example, **count(600,12,"gt")** will return exact number of values which are more than '12' stored in the history. Third parameter works for integer and float values only. Supported operators: **eq** – equal **ne** – not equal **gt** – greater **ge** – greater or equal **lt** – less **le** – less or equal
date	ignored	any	Returns current date in YYYYMMDD format. For example: 20031025
dayofweek	ignored	any	Returns day of week in range of 1 to 7. Mon – 1, Sun – 7.
diff	ignored	float, int, str, text	Returns: ▪ 1 – last and previous values differ ▪ 0 – otherwise

FUNCTION	ARGUMENT	SUPPORTED VALUE TYPES	DEFINITION
fuzzytime	sec	float, int	Returns 1 if timestamp (item value) does not differ from ZABBIX server time for more than N seconds, 0 – otherwise. Usually used with system.localtime to check that local time is in sync with local time of ZABBIX server.
iregexp	string	str, log	Check if last value matches regular expression. Parameter defines regular expression, Posix style. This function is not case-sensitive. Returns: ▪ 1 – found ▪ 0 - otherwise
last	ignored	float, int, str, text	Last (most recent) value. Parameter is ignored.
logseverity	ignored	log	Returns log severity of the last log entry. Parameter is ignored. ▪ 0 – default severity ▪ N – severity (integer, useful for Windows event logs). ZABBIX takes log severity from field **Information** of Windows event log.
logsource	string	log	Check if log source of the last log entry matches parameter. ▪ 0 – does not match ▪ 1 – matches Normally used for Windows event logs. For example, logsource(“VMWare Server”)
max	sec, #num	float, int	Maximal value for period of time. Parameter defines length of the period in seconds.
min	sec, #num	float, int	Minimal value for period of time. Parameter defines length of the period in seconds.

FUNCTION	ARGUMENT	SUPPORTED VALUE TYPES	DEFINITION
nodata	sec	any	Returns: ▪ 1 – if no data received during period of time in seconds. The period should not be less than 30 seconds. ▪ 0 - otherwise
now	ignored	any	Returns number of seconds since the Epoch (00:00:00 UTC, January 1, 1970).
prev	ignored	float, int, str, text	Returns previous value. Parameter is ignored.
regexp	string	str, log	Check if last value matches regular expression. Parameter defines regular expression, Posix style. This function is case-sensitive. Returns: ▪ 1 – found ▪ 0 - otherwise
str	string	str, log	Find string in last (most recent) value. Parameter defines string to find. Case sensitive! Returns: ▪ 1 – found ▪ 0 – otherwise
sum	sec, #num	float, int	Sum of values for period of time. Parameter defines length of the period in seconds.
time	ignored	any	Returns current time in HHMMSS format. Example: 123055

Note: Note that all above functions (except diff and str) cannot be used for non-numeric parameters!

Most of numeric functions accept number of seconds as an argument. You may also use prefix # to specify that argument has a different meaning:

ARGUMENT	DEFINITION
sum(600)	Sum of all values within 600 seconds
sum(#600)	Sum of last 600 values

The following constants are supported for triggers:

CONSTANT	DEFINITION
<number>	Positive float number. Examples: 0, 1, 0.15, 123.55
<number><K|M|G>	K – 1024*N M – 1024*1024*N G – 1024*1024*1024*N Examples: 2K, 4G, 0.5M

A simple useful expression might look like:

```
{<server>:<key>.<function>(<parameter>)}<operator><const>
```

Parameter must be given even for those functions, which ignore it. Example: last(0)

Example 1 Processor load is too high on www.zabbix.com

```
{www.zabbix.com: system.cpu.load[all,avg1].last(0)}>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 true 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(0)}>5)|({www.zabbix.com:
system.cpu.load[all,avg1].min(600)}>2)
```

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(0)})>0
```

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 downloads a big file for the internet

Use of function min:

```
({www.zabbix.com: net.if.in[eth0,bytes].min(300)})>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)}=0)&({smtp2.zabbi
x.com:net.tcp.service[smtp].last(0)}=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)}=0
```

The expression is true if ZABBIX agent has version beta8 (presumably 1.0beta8).

Example 7 Server is unreachable

```
{zabbix.zabbix.com:status.last(0)}=2
```

Note: The ‘status’ is a special parameter which is calculated if and only if corresponding host has at least one parameter for monitoring. See description of ‘status’ for more details.

Example 8 No heart beats within last 3 minutes

Use of function `nodata()`:

```
{zabbix.zabbix.com:tick.nodata(180)}=1
```

‘tick’ must have type ‘ZABBIX trapper’’. In order to make this trigger work, item ‘tick’ must be defined. The host should periodically send data for this parameter using zabbix_sender. If no data is received within 180 seconds, the trigger value becomes TRUE.

Example 9 CPU activity at night time

Use of function `time()`:

```
({zabbix:      system.cpu.load[all,avg1].nodata(180)}=1)&({zabbix:
system.cpu.load[all,avg1].time(0)}>000000)&             ({zabbix:
system.cpu.load[all,avg1].time(0)}<060000)
```

The trigger may change its status to true, only at night (00:00-06:00) time.

5.14.2. Trigger dependencies

Trigger dependencies can be used to define relationship between triggers.

Trigger dependencies is a very convenient way of limiting number of messages to be sent in case if an event belongs to several resources.

For example, a host Host is behind router Router2 and the Router2 is behind Router1.

ZABBIX - Router1 – Router2 - Host

If the Router1 is down, then obviously the Host and the Router2 are also unreachable. One does not want to receive three notifications about the Host, the Router1 and the Router2. This is when Trigger dependencies may be handy.

In this case, we define these dependencies:

- trigger ‘Host is down’ depends on trigger ‘Router2 is down’
- trigger ‘Router2 is down’ depends on trigger ‘Router1 is down’

Before changing status of trigger ‘Host is down’, ZABBIX will check if there are corresponding trigger dependencies defined. If so, and one of the triggers is in TRUE state, then trigger status will not be changed and thus actions will not be executed and notifications will not be sent.

ZABBIX perform this check recursively. If Router1 or Router2 is unreachable, the Host trigger won't be updated.

5.14.3. Trigger severity

Trigger severity defines how important is a trigger. ZABBIX supports following trigger severities:

SEVERITY	DEFINITION	COLOR
Not classified	Unknown severity.	Gray.
Information	For information purposes.	Light greed.
Warning	Be warned.	Light yellow.
Average	Average problem.	Dark red.
High	Something important has happened.	Red.
Disaster	Disaster. Financial losses, etc.	Bright red.

The severities are used to:

- visual representation of triggers. Different colors for different severities.
- audio alarms in Status of Triggers screen. Different audio for different severities.
- user medias. Different media (notification channel) for different severities. For example, SMS – high severity, email – other.

5.14.4. Hysteresis

Sometimes a trigger must have different conditions for different states. For example, we would like to define a trigger which would become TRUE when server room temperature is higher than 20C while it should stay in the state until temperature will not become lower than 15C.

In order to do this, we define the following trigger:

Example 1 Temperature in server room is too high

```
({TRIGGER.VALUE}=0&{server:temp.last(0)}>20)|
({TRIGGER.VALUE}=1&{server:temp.last(0)}>15)
```

Note use of macro {TRIGGER.VALUE}. The macro returns current value of the trigger itself.

5.15. Screens and Slide Shows

ZABBIX screens allow grouping of various information for quick access and display on one screen. Easy-to-use screen builder makes creation of the screens easy and intuitive.

Screen is a table which may contain the following elements in each cell:

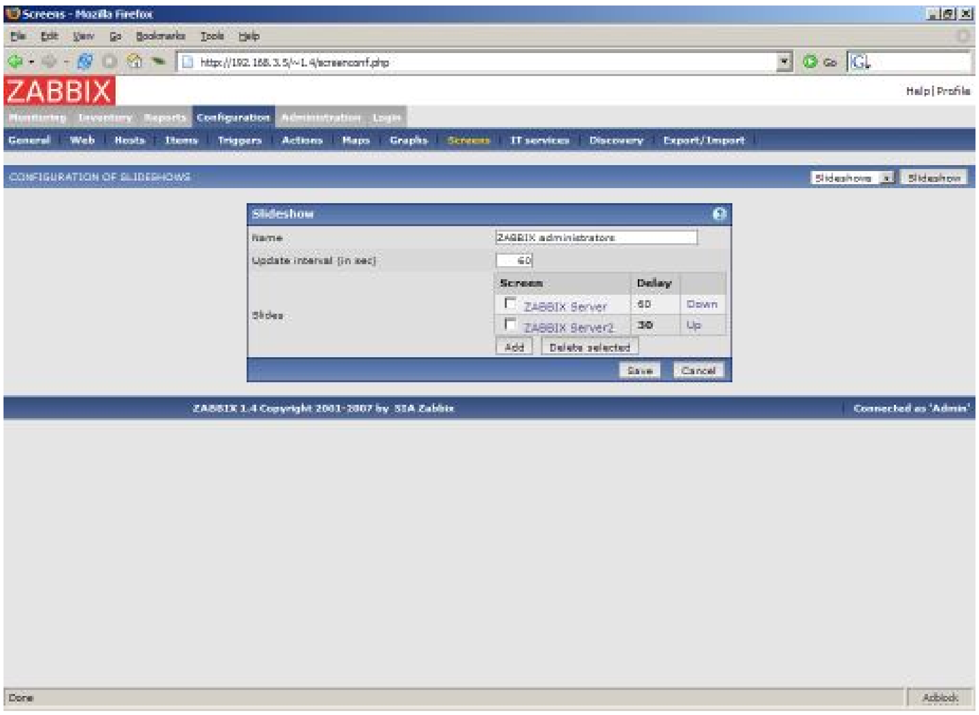
- simple graphs
- user-defined graphs
- maps
- other screens
- plain text information
- server information (overview)
- trigger information (overview)
- data overview
- clock
- history of events
- history of actions
- URL (data taken from other location)

Number of elements in each screen is unlimited.

Slide Show is a set of screens which be automatically rotated according to configured update intervals.

PARAMETER	Description
Name	Name of slide show.
Update interval (in sec)	This parameter defines default interval between screen rotations in seconds.
Slides	List of individual slides (screens):
Screen	Screen name

PARAMETER	Description
Delay	How long the screen will be displayed, in seconds. If set to 0, **Update Interval** of the slide show will be used.



Slideshow

Name	ZABBIX administrators
Update interval (in sec)	60

Slides

Screen	Delay	
ZABBIX Server	60	Down
ZABBIX Server2	30	Up

Screens - Mozilla Firefox
File Edit View Go Bookmarks Tools Help
http://192.168.3.5/~1.4/screenconf.php
ZABBIX
Help | Profile
Monitoring Inventory Reports Configuration Administration Login
General Web Hosts Items Triggers Actions Maps Graphs Screens IT services Discovery Export/Import
CONFIGURATION OF SLIDESHOWS
Slideshows
Slideshow
Add
Delete selected
Save
Cancel
ZABBIX 1.4 Copyright 2001-2007 by SIA Zabbix
Connected as 'Admin'
Done
Adblock

Example 1 Slide show "ZABBIX administrators"

The slide show consists of two screens which will be displayed in the follwing order:

ZABBIX Server ➔ Pause 60 seconds ➔ ZABBIX Server2 ➔ Pause 30 seconds ➔ ZABBIX Server ➔ Pause 60 seconds ➔ ZABBIX Server2 ➔ ...

5.16. IT Services

IT Services are 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 lack of disk space, high processor load, etc. What we are interested is 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, structure of existing IT infrastructure, and many other information of higher level.

ZABBIX IT Services provides answers to all mentioned questions.

IT Services is hierarchy representation of monitored data.

A very simple IT Service structure may look like:

```
IT Service
|
|-Workstations
| |
| |-Workstation1
| |
| |-Workstation2
|
|-Servers
```

Each node of the structure has attribute status. The status is calculated and propagated to upper levels according to selected algorithm. Triggers create lowest level of the IT Services. [To be finished...]

User permissions

All ZABBIX users access the ZABBIX application through the Web-based front end. Each ZABBIX user is assigned a unique user identity and a password. All user passwords are encrypted and stored on the ZABBIX database. Users can not 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's browser can be protected using SSL.

Access permissions on screen within the menu may be set for each user. By default, no permissions are granted on a screen when user is registered to the ZABBIX.

Note that the user is automatically disconnected after 30 minutes of inactivity.

[To be finished...]

5.17. User permissions

5.17.1. Overview

ZABBIX has a flexible user permission schema which can be efficiently used to manage user permission within one ZABBIX installation or in a distributed environment.

Permissions are granted to user groups on a host group level.

ZABBIX has also several types of users. The type controls what administrative functions a user has permission to.

5.17.2. User types

User types are used to define access to administrative functions and to specify default permissions.

USER TYPE	Description
ZABBIX User	The user has access to **Monitoring** menu. The user has **no access** to any resources by default. Permissions to host groups must be explicitly given.
ZABBIX Admin	The user has access to **Monitoring** and **Configuration**. The user has **Read-Write** access to all host groups by default. Permissions can be revoked by denying access to specific host groups.
ZABBIX Super Admin	The user has access to **Monitoring, Configuration** and **Administration**. The user has **Read-Write** access to all host groups by default. Permissions can be revoked by denying access to specific host groups.

5.18. The Queue

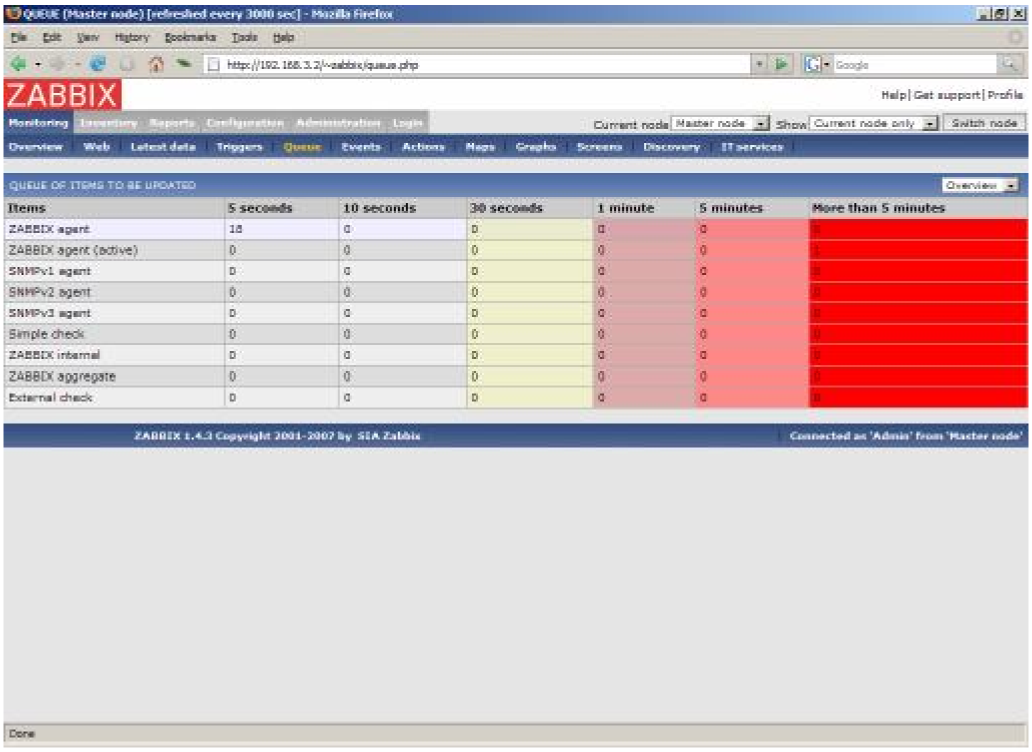
5.18.1. Overview

ZABBIX Queue displays items that are waiting for a refresh. The Queue is just a **logical** representation of data from the database. There is no IPC queue or any other queue mechanism in ZABBIX.

Statistics shown by the Queue is a good indicator of performance of ZABBIX server.

5.18.2. How to read

The Queue on a standalone application or when displayed for a master node shows items waiting for a refresh.



QUEUE OF ITEMS TO BE UPDATED

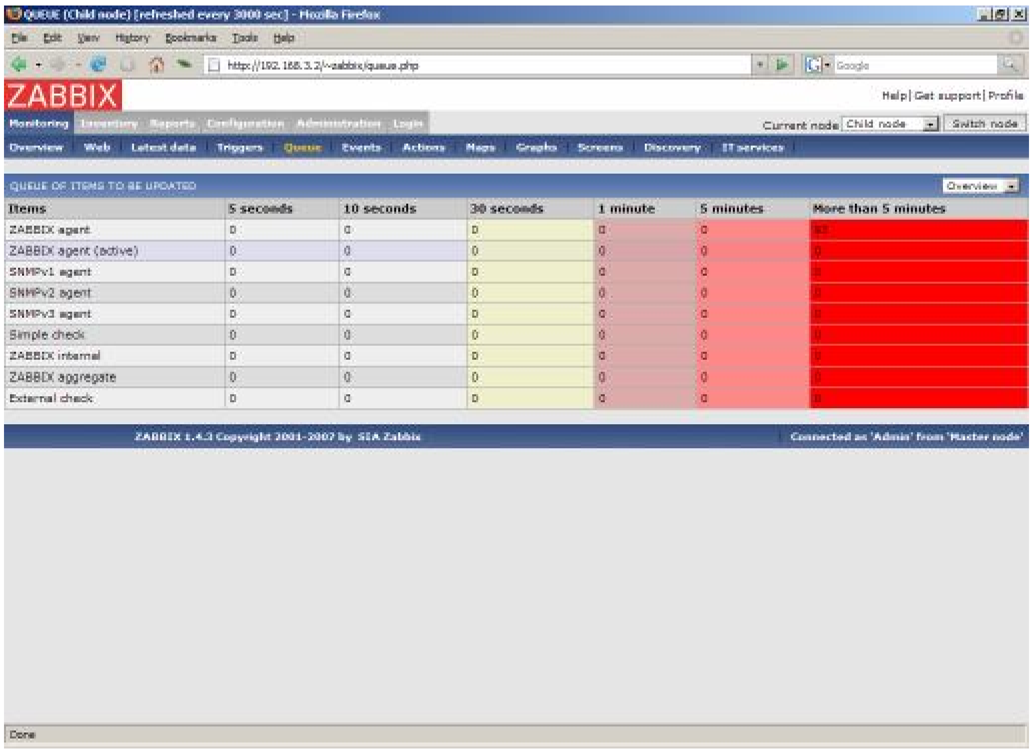
Items	5 seconds	10 seconds	30 seconds	1 minute	5 minutes	More than 5 minutes
ZABBIX agent	18	0	0	0	0	0
ZABBIX agent (active)	0	0	0	0	0	1
SNMPv1 agent	0	0	0	0	0	0
SNMPv2 agent	0	0	0	0	0	0
SNMPv3 agent	0	0	0	0	0	0
Simple check	0	0	0	0	0	0
ZABBIX internal	0	0	0	0	0	0
ZABBIX aggregate	0	0	0	0	0	0
External check	0	0	0	0	0	0

ZABBIX 1.4.3 Copyright 2001-2007 by SIA Zabbix

Connected as 'Admin' from 'Master node'

In this case, we see that we have three items of type **ZABBIX agent** waiting to be refreshed 0-5 seconds, and one otem of type **ZABBIX agent (active)** watining more than five minutes (perhaps the agent is down?).

Note that information diplayed for a child node is not up-to-date. The master node receives historical data with a certain delay (normally, up-to 10 seconds for inter-node data transfer), so the information is delayed.


QUEUE (Child node) [refreshed every 3000 sec] - Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://192.168.3.2/~zabbix/queue.php
Help | Get support | Profile
Monitoring Inventory Reports Configuration Administration Login
Current node Child node
Switch node
Overview Web Latest data Triggers Queue Events Actions Maps Graphs Screens Discovery IT services
QUEUE OF ITEMS TO BE UPDATED
Overview
ZABBIX 1.4.3 Copyright 2001-2007 by SIA Zabbix
Connected as 'Admin' from 'Master node'
Done

Items	5 seconds	10 seconds	30 seconds	1 minute	5 minutes	More than 5 minutes
ZABBIX agent	0	0	0	0	0	93
ZABBIX agent (active)	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
Simple check	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

On the screenshot we see that there are 93 items waiting more than 5 minutes for refresh on node "Child", however we should not trust the information as it depends on:

- performance of the Child node
- communications between Master and Child nodes
- possible local time difference between Master and Child nodes

Note: A special item key **zabbix[queue]** can be used to monitor health of the queue by ZABBIX.

5.19. Utilities

5.19.1. 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`.

5.19.2. snmptrap.sh

The script is used to receive SNMP traps. The script must be used in combination with `snmptrapd`, which is part of package net-snmp.

Configuration guide:

- Install `snmptrapd` (part of net-snmp or ucd-snmp)
- Edit `snmptrapd.conf`.

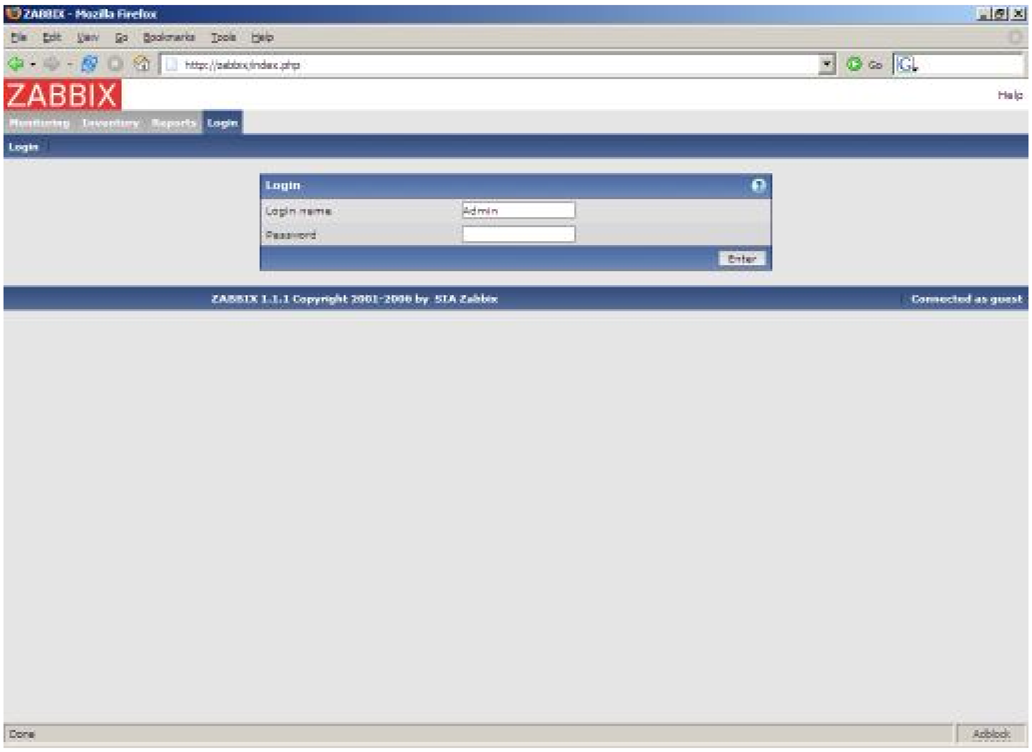
  Add this line:

  ```
  traphandle default /bin/bash /home/zabbix/bin/snmptrap.sh
  ```
- Copy `misc/snmptrap/snmptrap.sh` to `~zabbix/bin`
- Edit snmptrap.sh to configure some basic parameters
- Add special host and trapper (type "string") item to ZABBIX. See snmptrap.sh for the item's key.
- Run `snmptrapd`

6. Quick Start Guide

6.1. Login

This is Welcome ZABBIX screen. When installed use user name "Admin" with no password to connect as ZABBIX superuser.

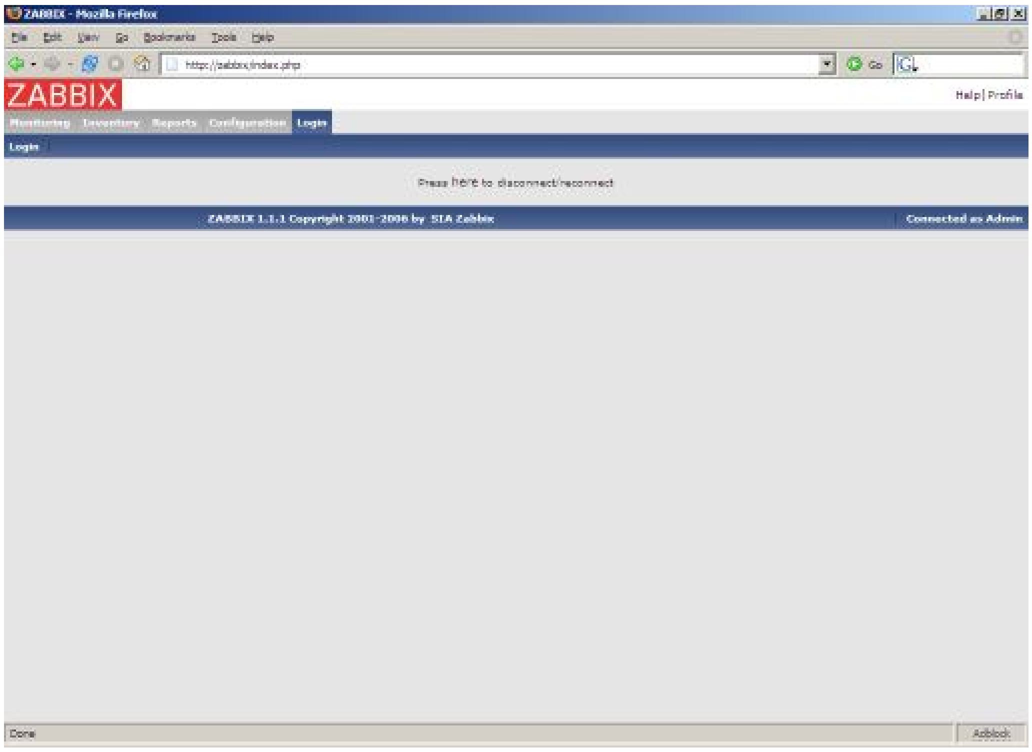


Login name	Admin
Password	

ZABBIX 1.1.1 Copyright 2001-2006 by SIA Zabbix

Connected as guest

When logged in, you will see "Connected as Admin" and access to "Configuration" area will be granted:


ZABBIX - Mozilla Firefox
File Edit View Go Bookmarks Tools Help
http://zabbix/index.php
Go
ZABBIX
Help | Profile
Monitoring Inventory Reports Configuration Login
Login
Done
Adblock

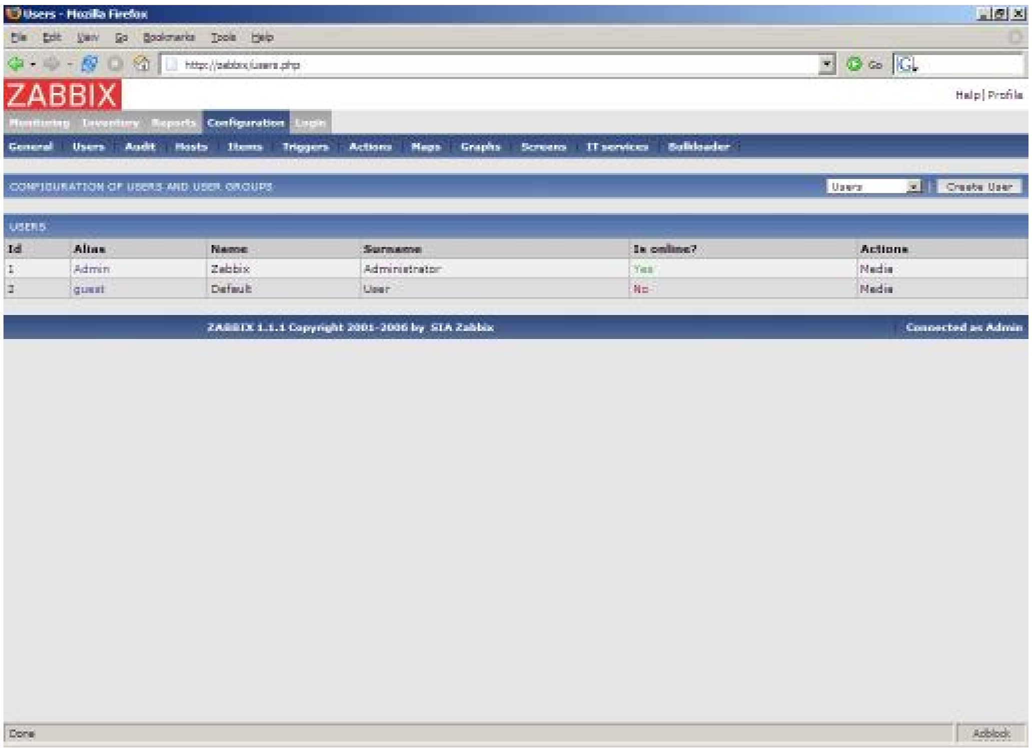
Press here to disconnect/reconnect

ZABBIX 1.1.1 Copyright 2001-2006 by SIA Zabbix

Connected as Admin

6.2. Add user

After initital installation, ZABBIX has only two users defined. User "Admin" is ZABBIX superuser. User "Admin" has all permissions. User "guest" is a special default user. If an user does not log in, the user will be granted with "guest" permissions. By default, "guest" has only read-only permissions.

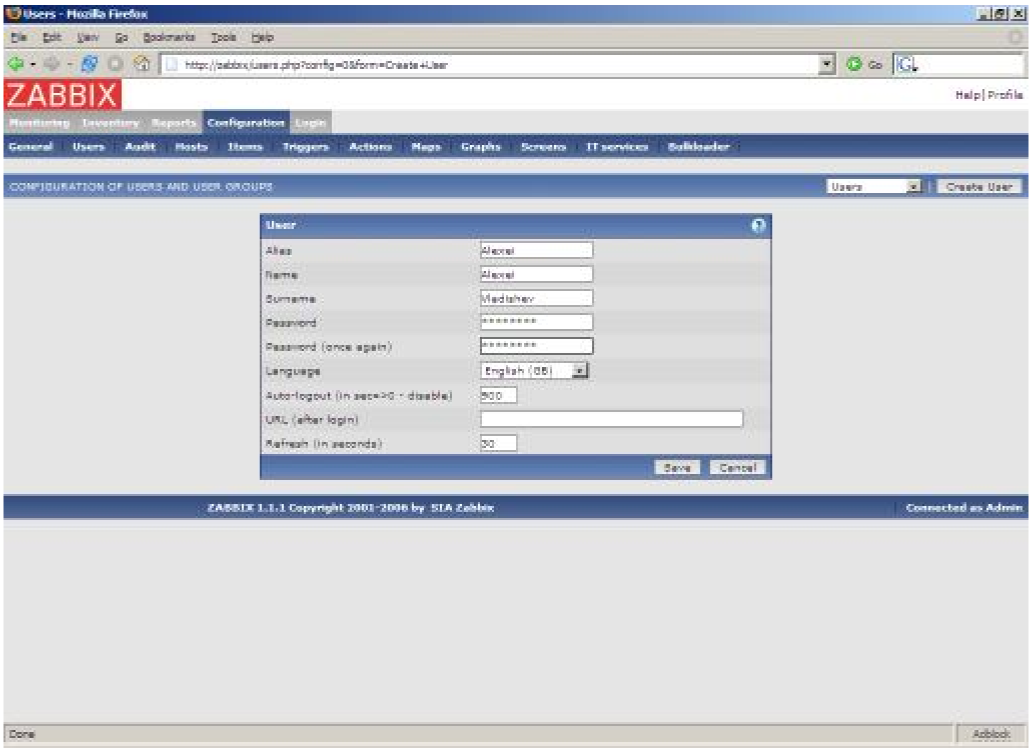

Users - Mozilla Firefox
http://zabbix/users.php
ZABBIX
Help | Profile
Monitoring Inventory Reports Configuration Login
General Users Audit Hosts Items Triggers Actions Maps Graphs Screens IT services Bulkloader
CONFIGURATION OF USERS AND USER GROUPS
Users
Create User
Done
Adblock

USERS

Id	Alias	Name	Surname	Is online?	Actions
1	Admin	Zabbix	Administrator	Yes	Media
2	guest	Default	User	No	Media

ZABBIX 1.1.1 Copyright 2001-2006 by SIA Zabbix   Connected as Admin

In order to add new user, press "Create user".

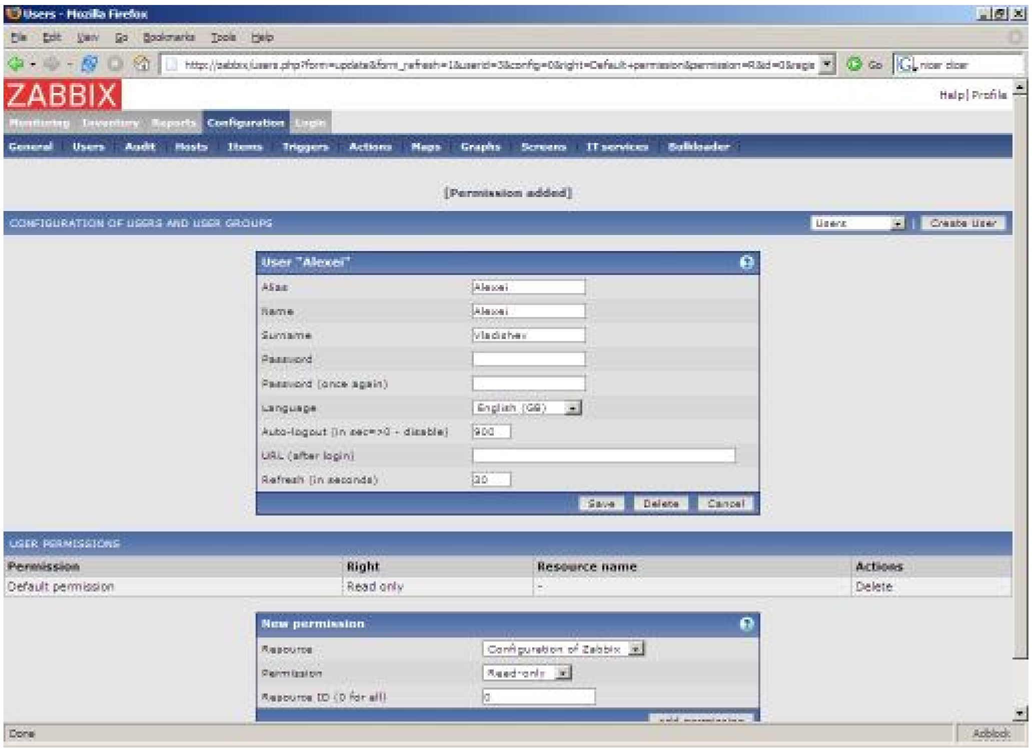

Users - Mozilla Firefox
http://zabbix/users.php?config=0&form=Create+User
ZABBIX
Help | Profile
Monitoring Inventory Reports Configuration Login
General Users Audit Hosts Items Triggers Actions Maps Graphs Screens IT services Bulkloader
CONFIGURATION OF USERS AND USER GROUPS
Users
Create User
Save
Cancel
Done
Adblock

User

Alias	Alexei
Name	Alexei
Surname	Vladishev
Password	********
Password (once again)	********
Language	English (GB)
Auto-logout (in sec=0 - disable)	900
URL (after login)	
Refresh (in seconds)	30

ZABBIX 1.1.1 Copyright 2001-2006 by SIA Zabbix   Connected as Admin

By default, new user has no permissions. Grant user rights.



[Permission added]

CONFIGURATION OF USERS AND USER GROUPS

User "Alexei"

Alias	Alexei
Name	Alexei
Surname	Vladishev
Password	
Password (once again)	
Language	English (GB)
Auto-logout (in sec=>0 - disable)	900
URL (after login)	
Refresh (in seconds)	30

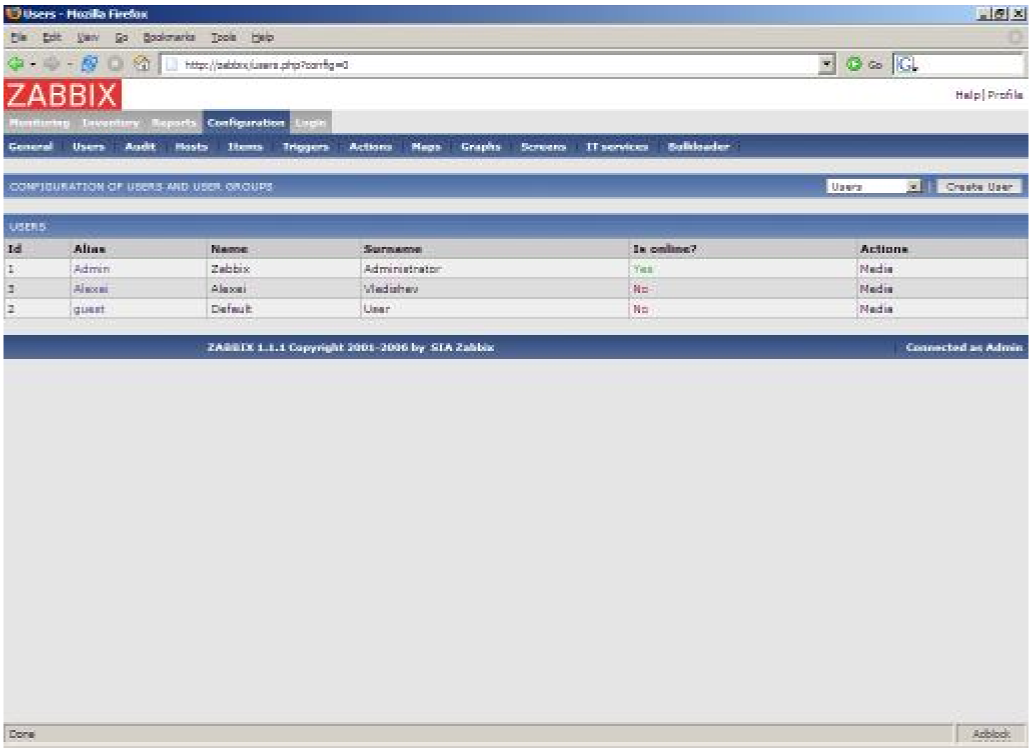
USER PERMISSIONS

Permission	Right	Resource name	Actions
Default permission	Read only	-	Delete

New permission

Resource	Configuration of Zabbix
Permission	Read-only
Resource ID (0 for all)	0

The user is added.



CONFIGURATION OF USERS AND USER GROUPS

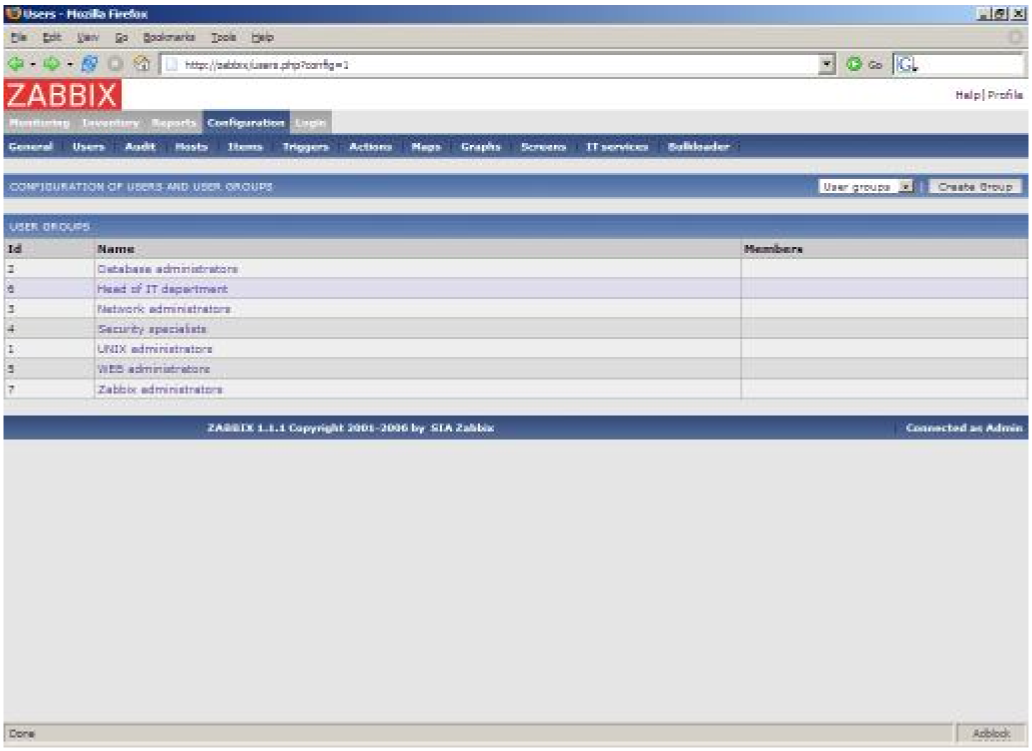
USERS

Id	Alias	Name	Surname	Is online?	Actions
1	Admin	Zabbix	Administrator	Yes	Media
3	Alexei	Alexei	Vladishev	No	Media
2	guest	Default	User	No	Media

ZABBIX 1.1.1 Copyright 2001-2006 by SIA Zabbix

Connected as Admin

Select "user groups" from drop-down to edit user group membership.



CONFIGURATION OF USERS AND USER GROUPS

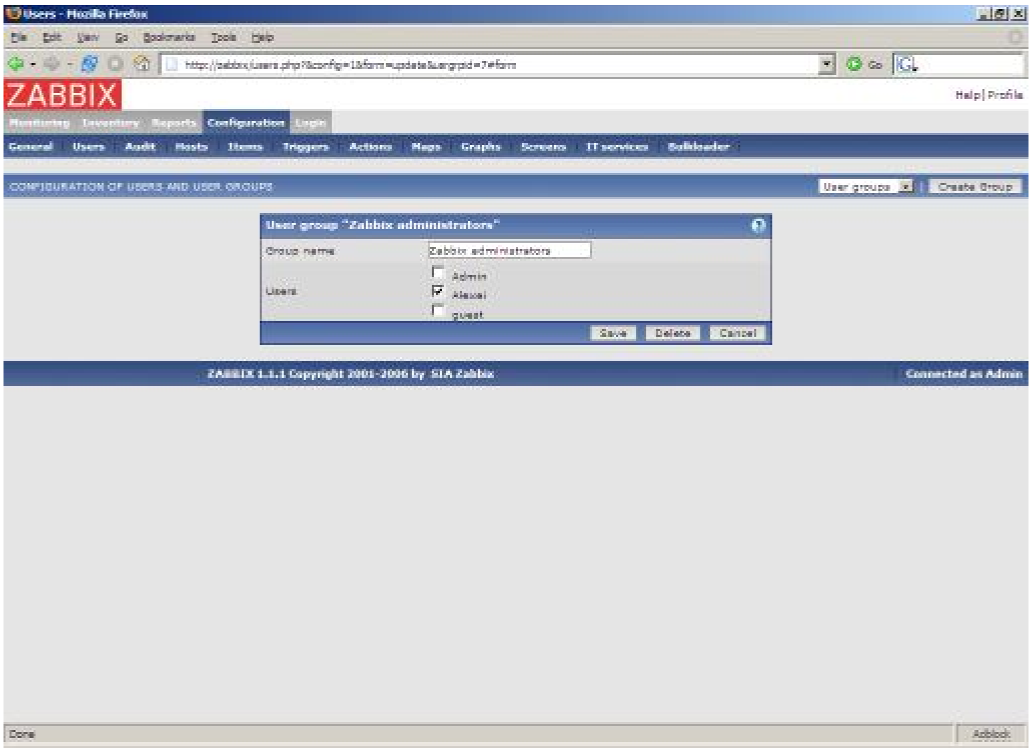
USER GROUPS

Id	Name	Members
2	Database administrators	
6	Head of IT department	
3	Network administrators	
4	Security specialists	
1	UNIX administrators	
5	WEB administrators	
7	Zabbix administrators	

ZABBIX 1.1.1 Copyright 2001-2006 by SIA Zabbix

Connected as Admin

Click on a group to change membership of the group.



CONFIGURATION OF USERS AND USER GROUPS

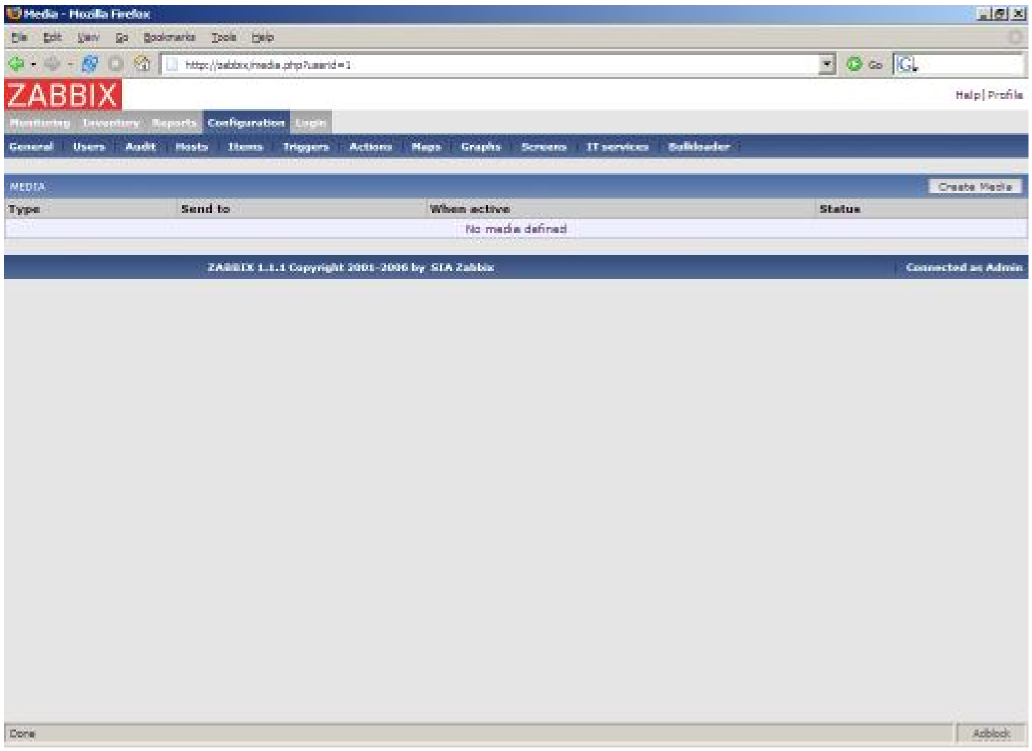
User group "Zabbix administrators"

Group name	Zabbix administrators
Users	☐ Admin ☑ Alexei ☐ guest

ZABBIX 1.1.1 Copyright 2001-2006 by SIA Zabbix

Connected as Admin

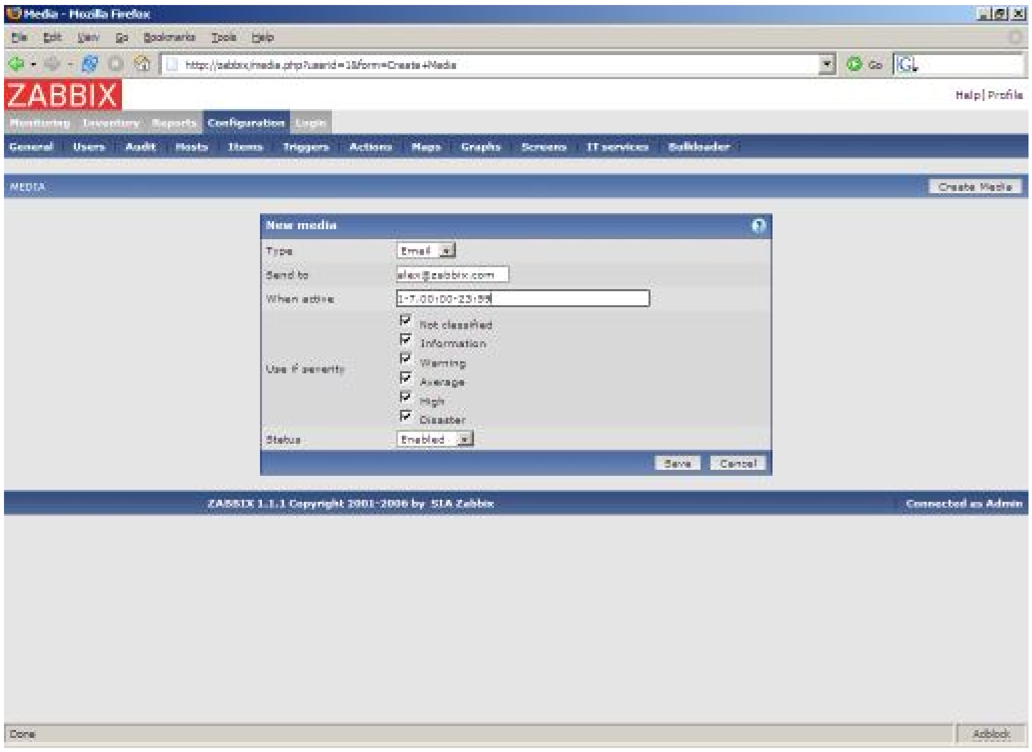
Assign notification methods (medias) to the user. No medias assigned yet.


Media - Mozilla Firefox
File Edit View Go Bookmarks Tools Help
http://zabbix/media.php?userid=1
ZABBIX
Help | Profile
Monitoring Inventory Reports Configuration Login
General Users Audit Hosts Items Triggers Actions Maps Graphs Screens IT services Bulkloader
MEDIA
Create Media
Done
Adblock

Type	Send to	When active	Status
	No media defined		

ZABBIX 1.1.1 Copyright 2001-2006 by SIA Zabbix — Connected as Admin

Configure email address, list of severities for which the media will be active.


Media - Mozilla Firefox
File Edit View Go Bookmarks Tools Help
http://zabbix/media.php?userid=1&form=Create+Media
ZABBIX
Help | Profile
Monitoring Inventory Reports Configuration Login
General Users Audit Hosts Items Triggers Actions Maps Graphs Screens IT services Bulkloader
MEDIA
Create Media
Save
Cancel
Done
Adblock

New media

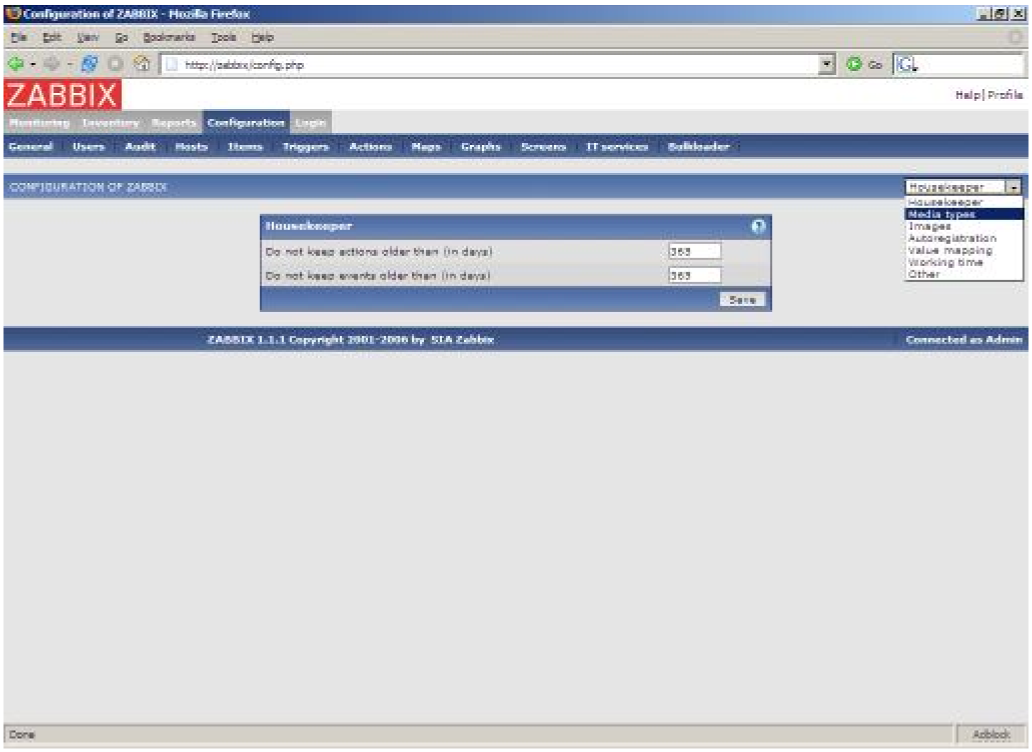
Type	Email
Send to	alex@zabbix.com
When active	1-7,00:00-23:59
Use if severity	✓ Not classified ✓ Information ✓ Warning ✓ Average ✓ High ✓ Disaster
Status	Enabled

ZABBIX 1.1.1 Copyright 2001-2006 by SIA Zabbix — Connected as Admin

Done! You may try to log in.

6.3. Email settings

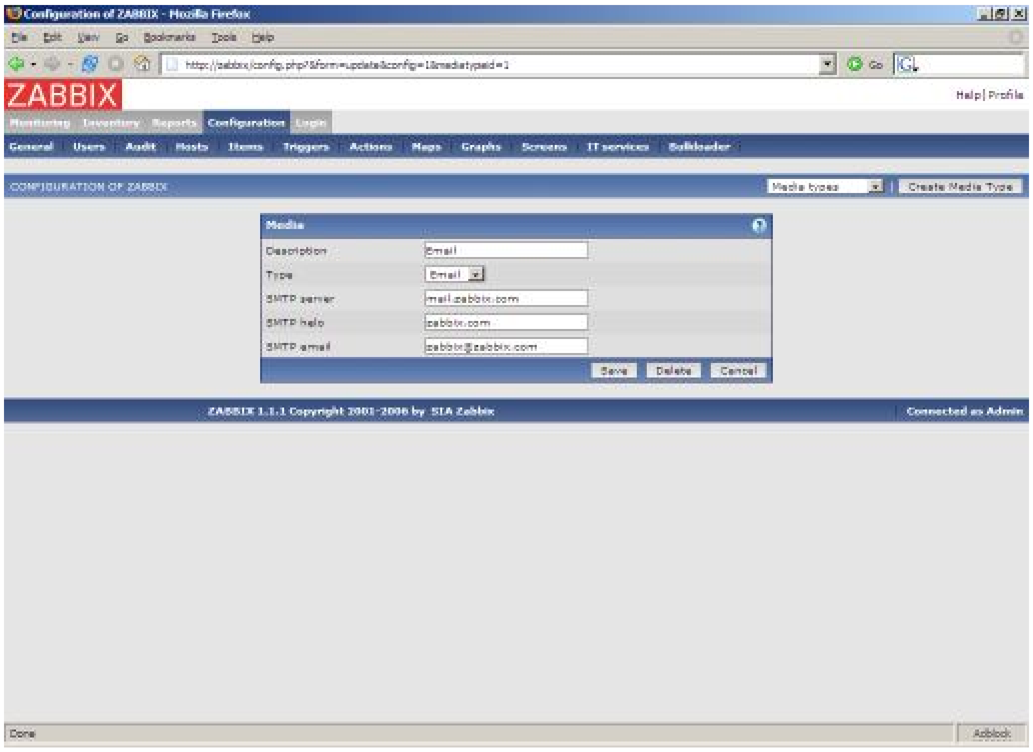
Initially, ZABBIX has only one notification delivery method (media type) defined, Email. Email configuration can be found under Menu->Configuration->Media types.


Configuration of ZABBIX - Mozilla Firefox
File Edit View Go Bookmarks Tools Help
http://zabbix/config.php
ZABBIX
Help | Profile
Monitoring Inventory Reports Configuration Login
General Users Audit Hosts Items Triggers Actions Maps Graphs Screens IT services Bulkloader
CONFIGURATION OF ZABBIX
Housekeeper
Housekeeper
Media types
Images
Autoregistration
Value mapping
Working time
Other
Save
ZABBIX 1.1.1 Copyright 2001-2006 by SIA Zabbix
Connected as Admin
Done
Adblock

Housekeeper

Do not keep actions older than (in days)	365
Do not keep events older than (in days)	365

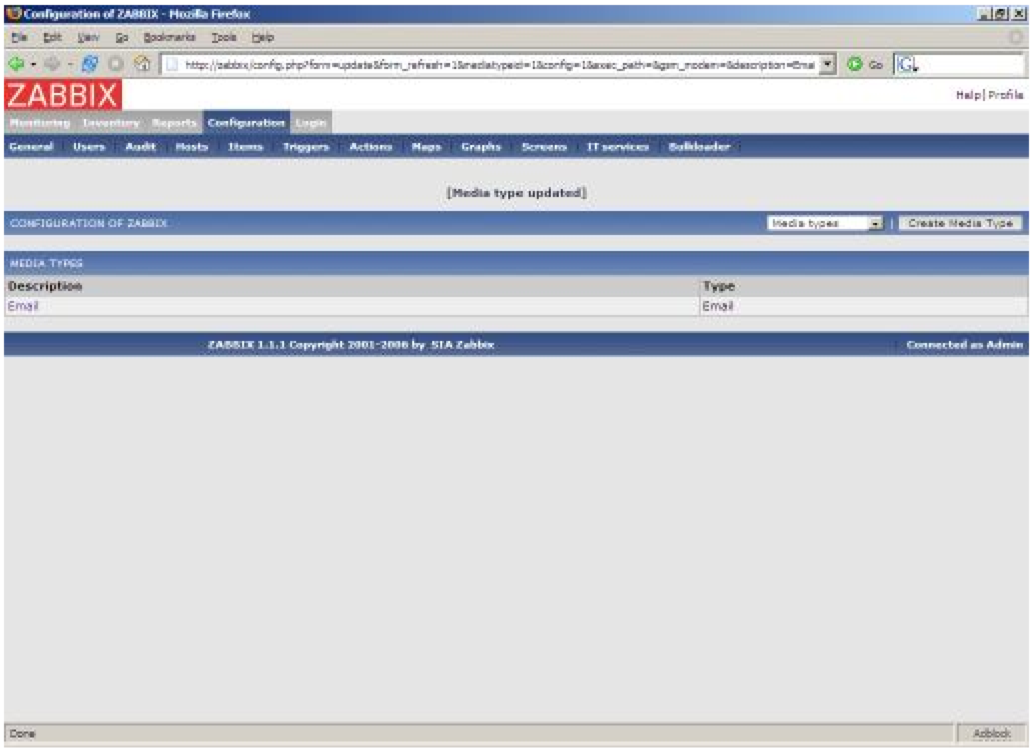
Select "Email" from the list of all available media types.


Configuration of ZABBIX - Mozilla Firefox
File Edit View Go Bookmarks Tools Help
http://zabbix/config.php?&form=update&config=1&mediatypeid=1
Help | Profile
Monitoring Inventory Reports Configuration Login
General Users Audit Hosts Items Triggers Actions Maps Graphs Screens IT services Bulkloader
CONFIGURATION OF ZABBIX
Media types
Create Media Type
Save Delete Cancel
ZABBIX 1.1.1 Copyright 2001-2006 by SIA Zabbix
Connected as Admin
Done
Adblock

Media

Description	Email
Type	Email
SMTP server	mail.zabbix.com
SMTP helo	zabbix.com
SMTP email	zabbix@zabbix.com

Set correct SMTP server, SMTP helo and SMTP email values. Press "Save" when ready.


Configuration of ZABBIX - Mozilla Firefox
File Edit View Go Bookmarks Tools Help
Help | Profile
Monitoring Inventory Reports Configuration Login
General Users Audit Hosts Items Triggers Actions Maps Graphs Screens IT services Bulkloader
CONFIGURATION OF ZABBIX
Media types
Create Media Type
ZABBIX 1.1.1 Copyright 2001-2006 by SIA Zabbix
Connected as Admin
Done
Adblock

[Media type updated]

MEDIA TYPES

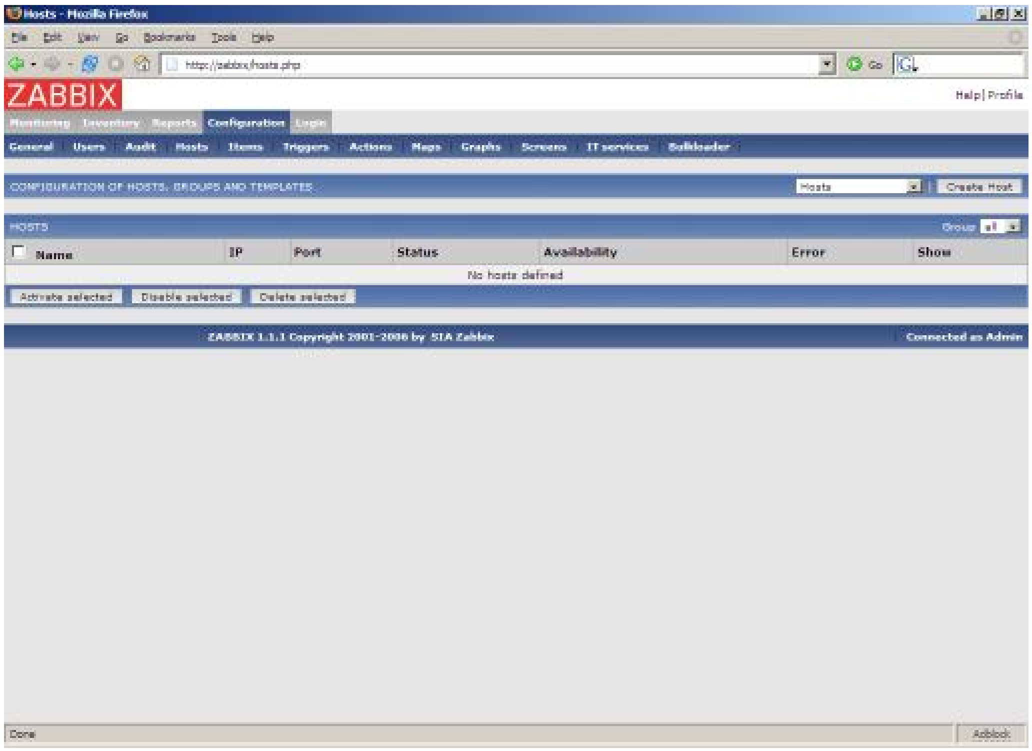
Description	Type
Email	Email

Now you have media type "Email" defined. A media type must be linked with users, otherwise it will not be used.

6.4. Add agent-enabled host

The section provides details about monitoring a host which has ZABBIX agent running. You must have the agent installed and configured properly.

No hosts defined yet.

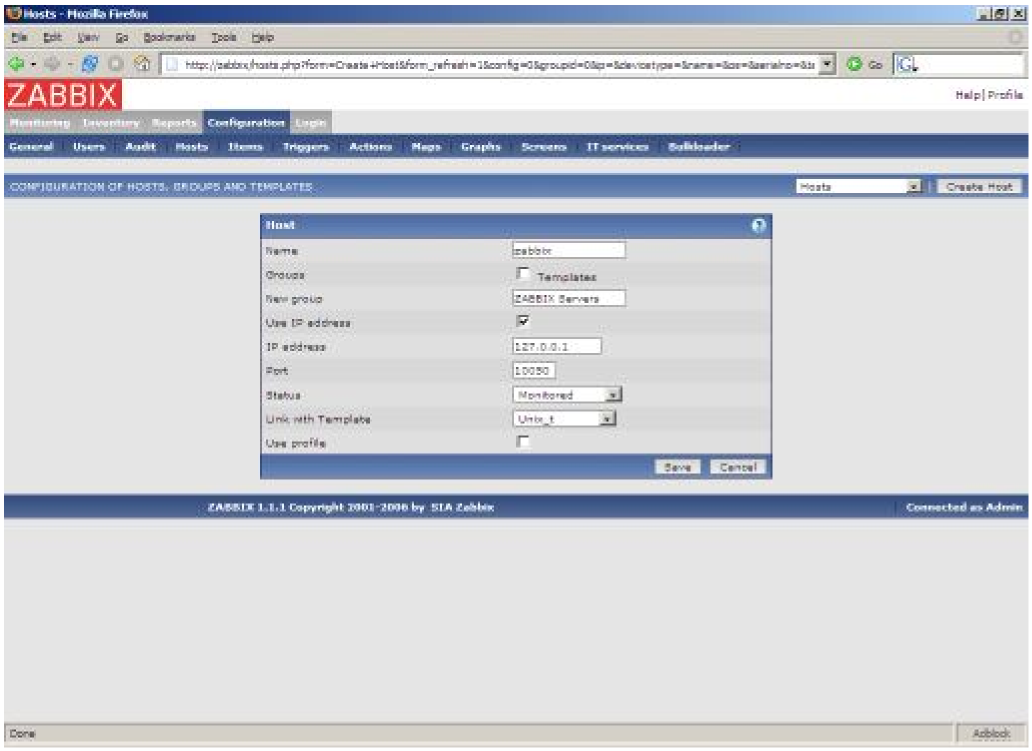

Hosts - Mozilla Firefox
File Edit View Go Bookmarks Tools Help
http://zabbix/hosts.php
ZABBIX
Help | Profile
Monitoring Inventory Reports Configuration Login
General Users Audit Hosts Items Triggers Actions Maps Graphs Screens IT services Bulkloader
CONFIGURATION OF HOSTS, GROUPS AND TEMPLATES
Hosts
Create Host
HOSTS
Group all
Activate selected
Disable selected
Delete selected
ZABBIX 1.1.1 Copyright 2001-2006 by SIA Zabbix
Connected as Admin
Done
Adblock

Name	IP	Port	Status	Availability	Error	Show
No hosts defined						

We have ZABBIX agent running on our ZABBIX server and we want to monitor this server.

Click on "Create host". Enter all required details. We will use standard template Unix_t in order to simplify configuration.

If a template is not used, we should manually add Items and Triggers to the host afterwards.



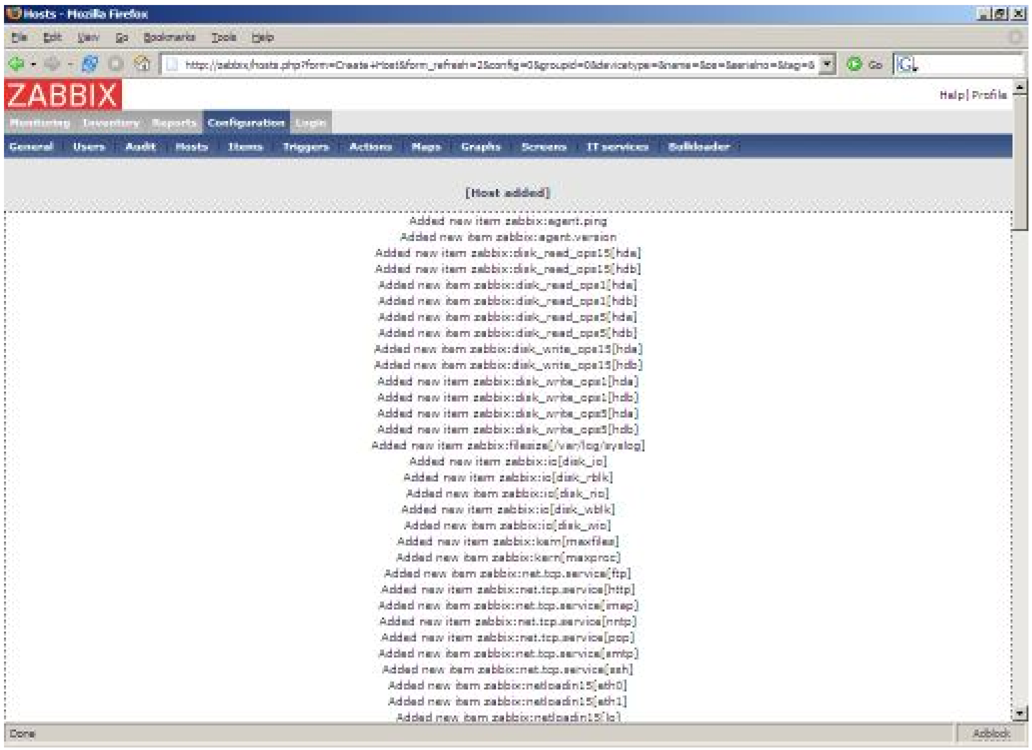
CONFIGURATION OF HOSTS, GROUPS AND TEMPLATES

Host

Name	zabbix
Groups	☐ Templates
New group	ZABBIX Servers
Use IP address	✓
IP address	127.0.0.1
Port	10050
Status	Monitored
Link with Template	Unix_t
Use profile	☐

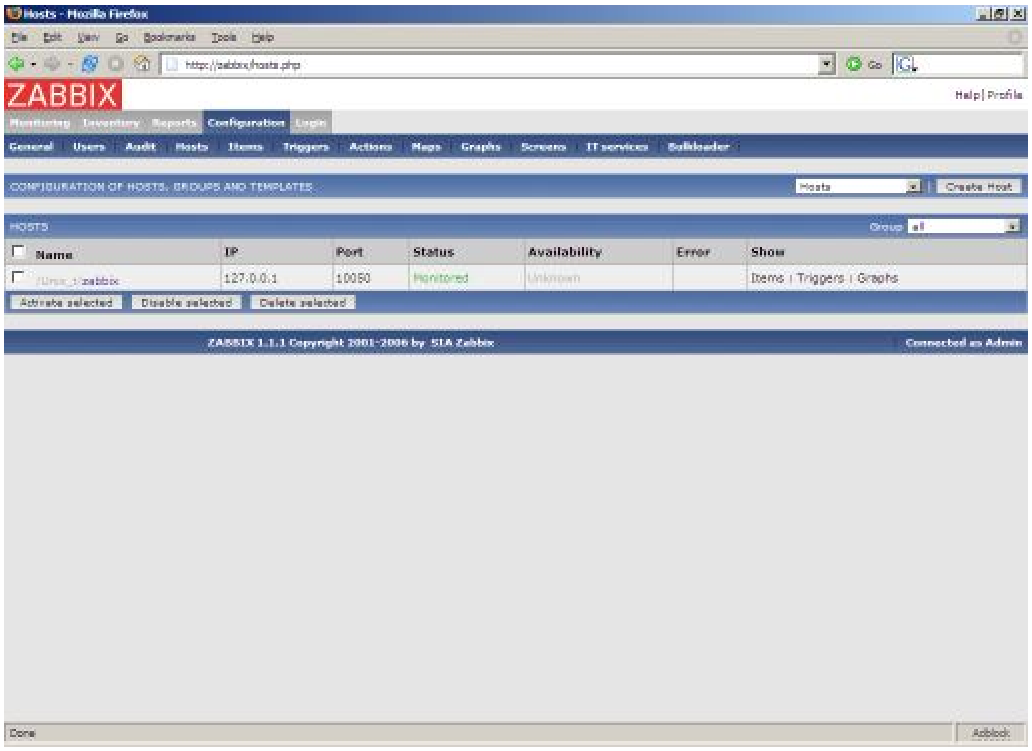
ZABBIX 1.1.1 Copyright 2001-2006 by SIA Zabbix

The host is created and it has exactly the same items and triggers as Unix_t has.



```
[Host added]
Added new item zabbix:agent.ping
Added new item zabbix:agent.version
Added new item zabbix:disk_read_ops15[hda]
Added new item zabbix:disk_read_ops15[hdb]
Added new item zabbix:disk_read_ops1[hda]
Added new item zabbix:disk_read_ops1[hdb]
Added new item zabbix:disk_read_ops5[hda]
Added new item zabbix:disk_read_ops5[hdb]
Added new item zabbix:disk_write_ops15[hda]
Added new item zabbix:disk_write_ops15[hdb]
Added new item zabbix:disk_write_ops1[hda]
Added new item zabbix:disk_write_ops1[hdb]
Added new item zabbix:disk_write_ops5[hda]
Added new item zabbix:disk_write_ops5[hdb]
Added new item zabbix:filesize[/var/log/syslog]
Added new item zabbix:io[disk_io]
Added new item zabbix:io[disk_rblk]
Added new item zabbix:io[disk_rio]
Added new item zabbix:io[disk_wblk]
Added new item zabbix:io[disk_wio]
Added new item zabbix:kern[maxfiles]
Added new item zabbix:kern[maxproc]
Added new item zabbix:net.tcp.service[ftp]
Added new item zabbix:net.tcp.service[http]
Added new item zabbix:net.tcp.service[imap]
Added new item zabbix:net.tcp.service[nntp]
Added new item zabbix:net.tcp.service[pop]
Added new item zabbix:net.tcp.service[smtp]
Added new item zabbix:net.tcp.service[ssh]
Added new item zabbix:netloadin15[eth0]
Added new item zabbix:netloadin15[eth1]
Added new item zabbix:netloadin15[lo]
```

Back to the list of hosts. We see our host in the list.


Hosts - Mozilla Firefox
http://zabbix/hosts.php
Help | Profile
Monitoring Inventory Reports Configuration Login
General Users Audit Hosts Items Triggers Actions Maps Graphs Screens IT services Bulkloader
Create Host
Activate selected
Disable selected
Delete selected
Done
Adblock

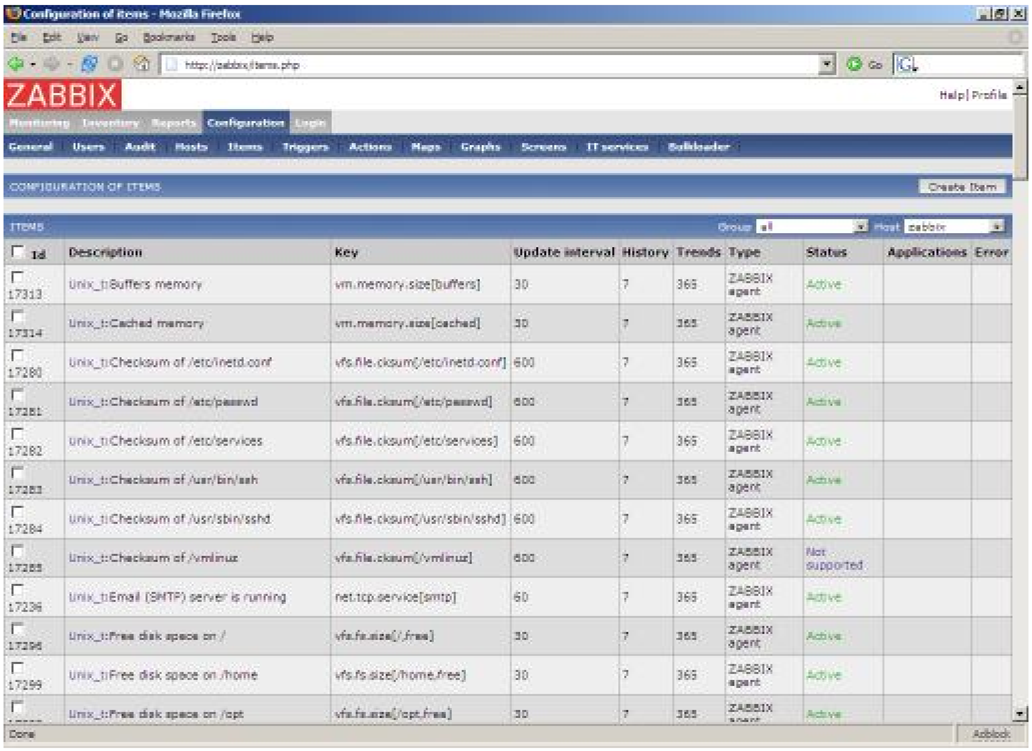
CONFIGURATION OF HOSTS, GROUPS AND TEMPLATES

HOSTS — Group: all

Name	IP	Port	Status	Availability	Error	Show
/Unix_t/:zabbix	127.0.0.1	10050	Monitored	Unknown		Items | Triggers | Graphs

ZABBIX 1.1.1 Copyright 2001-2006 by SIA Zabbix — Connected as Admin

Let check if ithis host has any items to monitor. Menu->Configuration->Items:

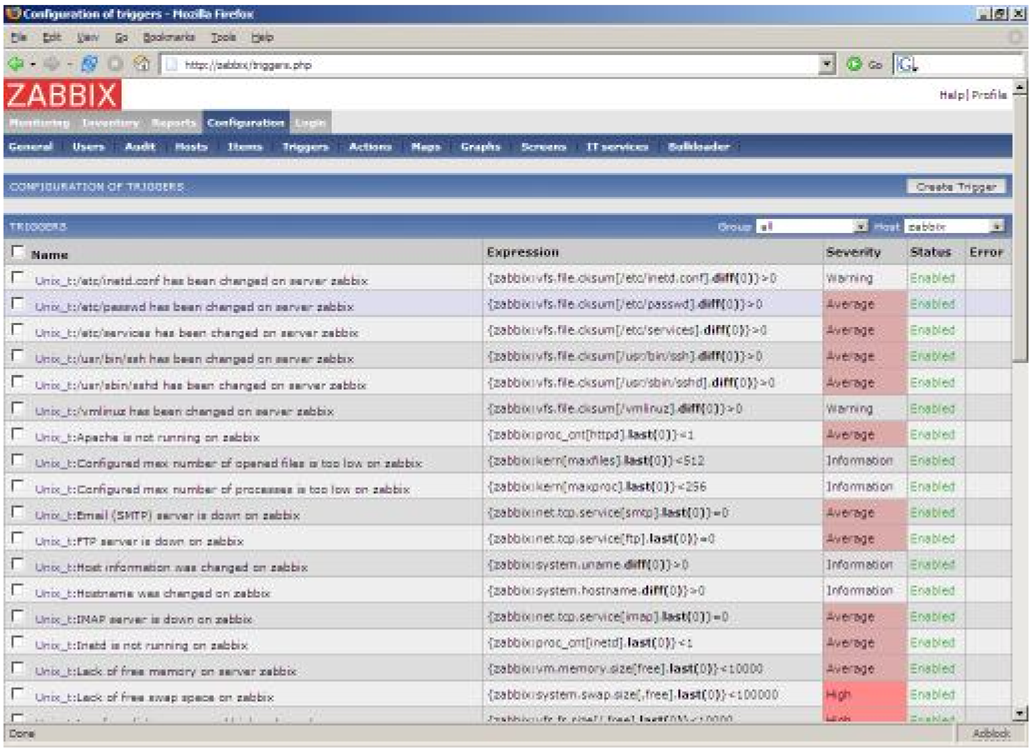

Configuration of items - Mozilla Firefox
http://zabbix/items.php
Help | Profile
Monitoring Inventory Reports Configuration Login
General Users Audit Hosts Items Triggers Actions Maps Graphs Screens IT services Bulkloader
Create Item
Done
Adblock

CONFIGURATION OF ITEMS

ITEMS — Group: all — Host: zabbix

Id	Description	Key	Update interval	History	Trends	Type	Status	Applications	Error
17313	Unix_t:Buffers memory	vm.memory.size[buffers]	30	7	365	ZABBIX agent	Active		
17314	Unix_t:Cached memory	vm.memory.size[cached]	30	7	365	ZABBIX agent	Active		
17280	Unix_t:Checksum of /etc/inetd.conf	vfs.file.cksum[/etc/inetd.conf]	600	7	365	ZABBIX agent	Active		
17281	Unix_t:Checksum of /etc/passwd	vfs.file.cksum[/etc/passwd]	600	7	365	ZABBIX agent	Active		
17282	Unix_t:Checksum of /etc/services	vfs.file.cksum[/etc/services]	600	7	365	ZABBIX agent	Active		
17283	Unix_t:Checksum of /usr/bin/ssh	vfs.file.cksum[/usr/bin/ssh]	600	7	365	ZABBIX agent	Active		
17284	Unix_t:Checksum of /usr/sbin/sshd	vfs.file.cksum[/usr/sbin/sshd]	600	7	365	ZABBIX agent	Active		
17285	Unix_t:Checksum of /vmlinuz	vfs.file.cksum[/vmlinuz]	600	7	365	ZABBIX agent	Not supported		
17236	Unix_t:Email (SMTP) server is running	net.tcp.service[smtp]	60	7	365	ZABBIX agent	Active		
17298	Unix_t:Free disk space on /	vfs.fs.size[/,free]	30	7	365	ZABBIX agent	Active		
17299	Unix_t:Free disk space on /home	vfs.fs.size[/home,free]	30	7	365	ZABBIX agent	Active		
[illegible]	Unix_t:Free disk space on /opt	vfs.fs.size[/opt,free]	30	7	365	ZABBIX agent	Active		

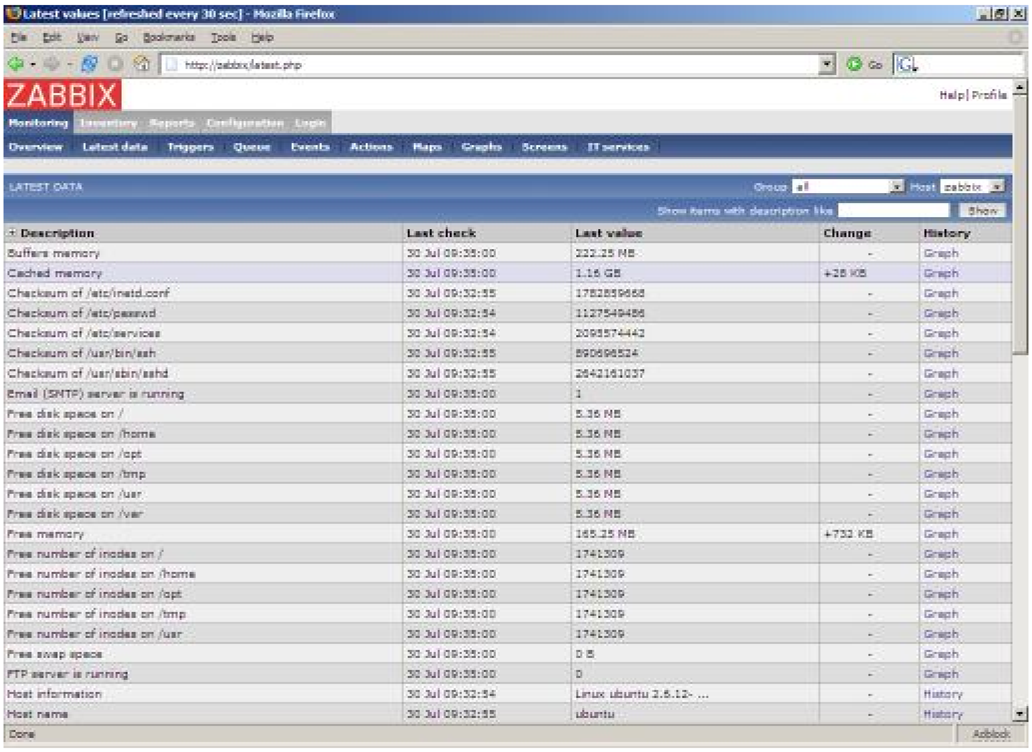
Yes! What about triggers? Menu->Configuration->Triggers:



Configuration of triggers - Mozilla Firefox
http://zabbix/triggers.php
Monitoring | Inventory | Reports | Configuration | Login
General | Users | Audit | Hosts | Items | Triggers | Actions | Maps | Graphs | Screens | IT services | Bulkloader
CONFIGURATION OF TRIGGERS
Create Trigger
TRIGGERS
Group all
Host zabbix
Done
Adblock

Name	Expression	Severity	Status	Error
Unix_t:/etc/inetd.conf has been changed on server zabbix	{zabbix:vfs.file.cksum[/etc/inetd.conf].diff(0)}>0	Warning	Enabled	
Unix_t:/etc/passwd has been changed on server zabbix	{zabbix:vfs.file.cksum[/etc/passwd].diff(0)}>0	Average	Enabled	
Unix_t:/etc/services has been changed on server zabbix	{zabbix:vfs.file.cksum[/etc/services].diff(0)}>0	Average	Enabled	
Unix_t:/usr/bin/ssh has been changed on server zabbix	{zabbix:vfs.file.cksum[/usr/bin/ssh].diff(0)}>0	Average	Enabled	
Unix_t:/usr/sbin/sshd has been changed on server zabbix	{zabbix:vfs.file.cksum[/usr/sbin/sshd].diff(0)}>0	Average	Enabled	
Unix_t:/vmlinuz has been changed on server zabbix	{zabbix:vfs.file.cksum[/vmlinuz].diff(0)}>0	Warning	Enabled	
Unix_t:Apache is not running on zabbix	{zabbix:proc_cnt[httpd].last(0)}<1	Average	Enabled	
Unix_t:Configured max number of opened files is too low on zabbix	{zabbix:kern[maxfiles].last(0)}<512	Information	Enabled	
Unix_t:Configured max number of processes is too low on zabbix	{zabbix:kern[maxproc].last(0)}<256	Information	Enabled	
Unix_t:Email (SMTP) server is down on zabbix	{zabbix:net.tcp.service[smtp].last(0)}=0	Average	Enabled	
Unix_t:FTP server is down on zabbix	{zabbix:net.tcp.service[ftp].last(0)}=0	Average	Enabled	
Unix_t:Host information was changed on zabbix	{zabbix:system.uname.diff(0)}>0	Information	Enabled	
Unix_t:Hostname was changed on zabbix	{zabbix:system.hostname.diff(0)}>0	Information	Enabled	
Unix_t:IMAP server is down on zabbix	{zabbix:net.tcp.service[imap].last(0)}=0	Average	Enabled	
Unix_t:Inetd is not running on zabbix	{zabbix:proc_cnt[inetd].last(0)}<1	Average	Enabled	
Unix_t:Lack of free memory on server zabbix	{zabbix:vm.memory.size[free].last(0)}<10000	Average	Enabled	
Unix_t:Lack of free swap space on zabbix	{zabbix:system.swap.size[,free].last(0)}<100000	High	Enabled	

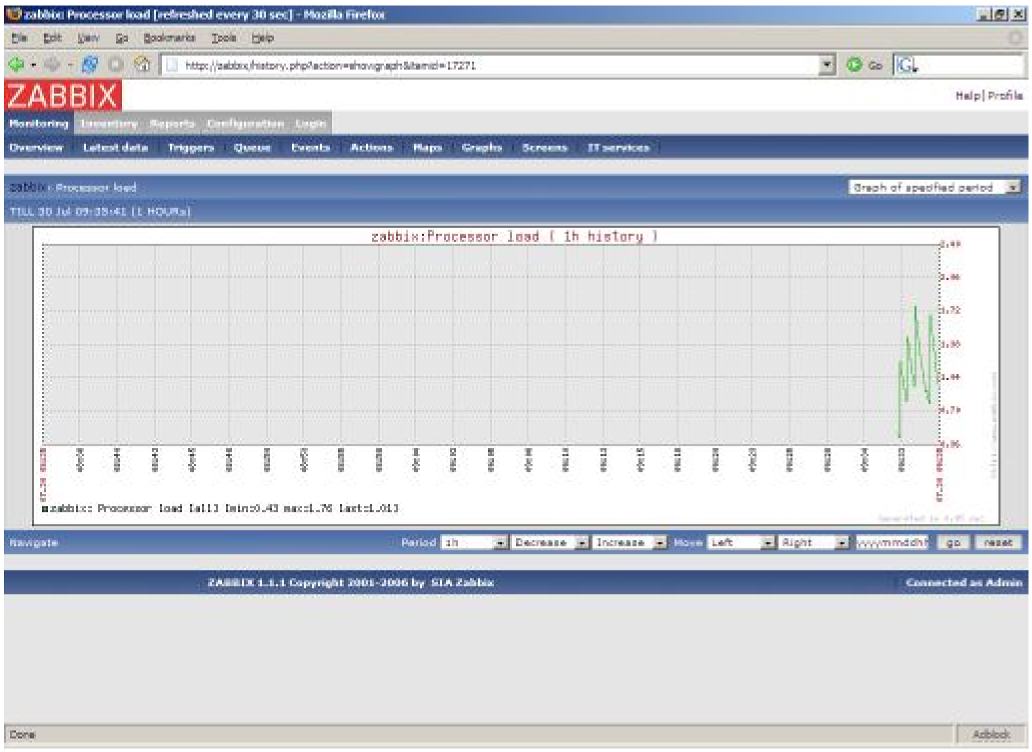
Good. It is time to see what information is available. Go to Menu->Latest data:



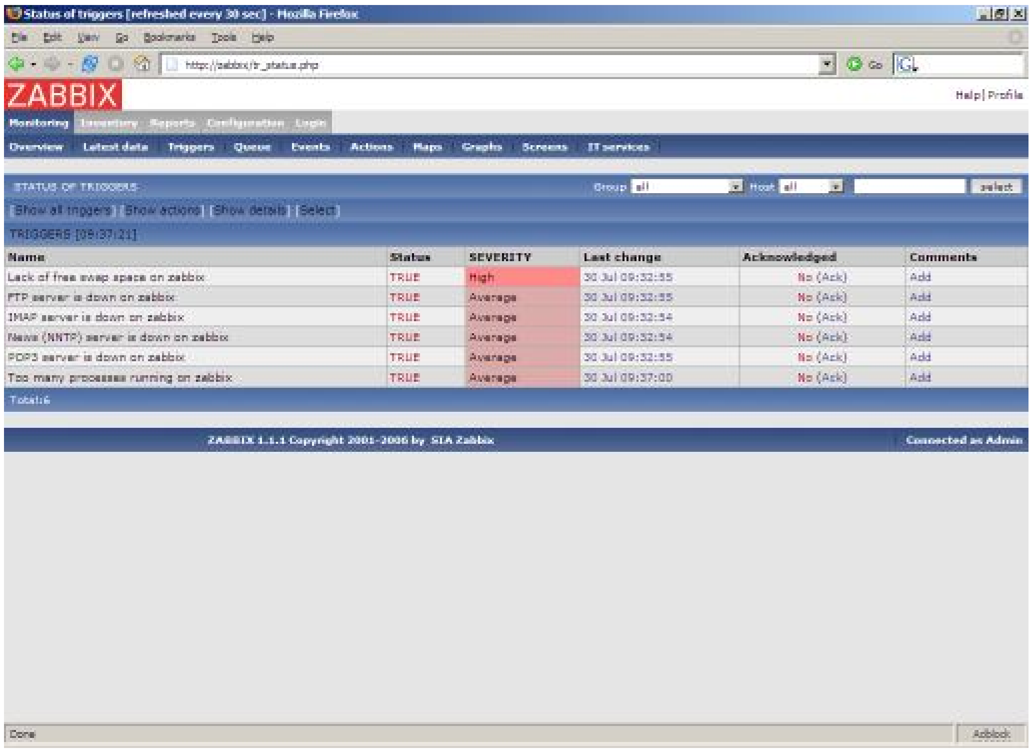
Latest values [refreshed every 30 sec] - Mozilla Firefox
http://zabbix/latest.php
Monitoring | Inventory | Reports | Configuration | Login
Overview | Latest data | Triggers | Queue | Events | Actions | Maps | Graphs | Screens | IT services
LATEST DATA
Group all
Host zabbix
Show items with description like
Show
Done
Adblock

Description	Last check	Last value	Change	History
Buffers memory	30 Jul 09:35:00	222.25 MB	-	Graph
Cached memory	30 Jul 09:35:00	1.16 GB	+28 KB	Graph
Checksum of /etc/inetd.conf	30 Jul 09:32:55	1782859668	-	Graph
Checksum of /etc/passwd	30 Jul 09:32:54	1127549486	-	Graph
Checksum of /etc/services	30 Jul 09:32:54	2093574442	-	Graph
Checksum of /usr/bin/ssh	30 Jul 09:32:55	890696524	-	Graph
Checksum of /usr/sbin/sshd	30 Jul 09:32:55	2642161037	-	Graph
Email (SMTP) server is running	30 Jul 09:35:00	1	-	Graph
Free disk space on /	30 Jul 09:35:00	5.36 MB	-	Graph
Free disk space on /home	30 Jul 09:35:00	5.36 MB	-	Graph
Free disk space on /opt	30 Jul 09:35:00	5.36 MB	-	Graph
Free disk space on /tmp	30 Jul 09:35:00	5.36 MB	-	Graph
Free disk space on /usr	30 Jul 09:35:00	5.36 MB	-	Graph
Free disk space on /var	30 Jul 09:35:00	5.36 MB	-	Graph
Free memory	30 Jul 09:35:00	165.25 MB	+732 KB	Graph
Free number of inodes on /	30 Jul 09:35:00	1741309	-	Graph
Free number of inodes on /home	30 Jul 09:35:00	1741309	-	Graph
Free number of inodes on /opt	30 Jul 09:35:00	1741309	-	Graph
Free number of inodes on /tmp	30 Jul 09:35:00	1741309	-	Graph
Free number of inodes on /usr	30 Jul 09:35:00	1741309	-	Graph
Free swap space	30 Jul 09:35:00	0 B	-	Graph
FTP server is running	30 Jul 09:35:00	0	-	Graph
Host information	30 Jul 09:32:54	Linux ubuntu 2.6.12- ...	-	History
Host name	30 Jul 09:32:55	ubuntu	-	History

It is time to see some graphs. Click on Graph.


zabbix: Processor load [refreshed every 30 sec] - Mozilla Firefox
http://zabbix/history.php?action=showgraph&itemid=17271
Monitoring
Overview | Latest data | Triggers | Queue | Events | Actions | Maps | Graphs | Screens | IT services
zabbix : Processor load
Graph of specified period
TILL 30 Jul 09:35:41 (1 HOURs)
zabbix:Processor load (1h history)
zabbix: Processor load [all] [min:0.43 max:1.76 last:1.01]
Navigate
Period 1h
Decrease
Increase
Move Left
Right
go
reset
ZABBIX 1.1.1 Copyright 2001-2006 by SIA Zabbix
Connected as Admin

.. and finally triggers. Menu->Status of triggers:


Status of triggers [refreshed every 30 sec] - Mozilla Firefox
http://zabbix/tr_status.php
Monitoring
Overview | Latest data | Triggers | Queue | Events | Actions | Maps | Graphs | Screens | IT services
STATUS OF TRIGGERS
Group all
Host all
select
[Show all triggers] [Show actions] [Show details] [Select]
ZABBIX 1.1.1 Copyright 2001-2006 by SIA Zabbix
Connected as Admin

TRIGGERS [09:37:21]

Name	Status	SEVERITY	Last change	Acknowledged	Comments
Lack of free swap space on zabbix	TRUE	High	30 Jul 09:32:55	No (Ack)	Add
FTP server is down on zabbix	TRUE	Average	30 Jul 09:32:55	No (Ack)	Add
IMAP server is down on zabbix	TRUE	Average	30 Jul 09:32:54	No (Ack)	Add
News (NNTP) server is down on zabbix	TRUE	Average	30 Jul 09:32:54	No (Ack)	Add
POP3 server is down on zabbix	TRUE	Average	30 Jul 09:32:55	No (Ack)	Add
Too many processes running on zabbix	TRUE	Average	30 Jul 09:37:00	No (Ack)	Add

Total:6

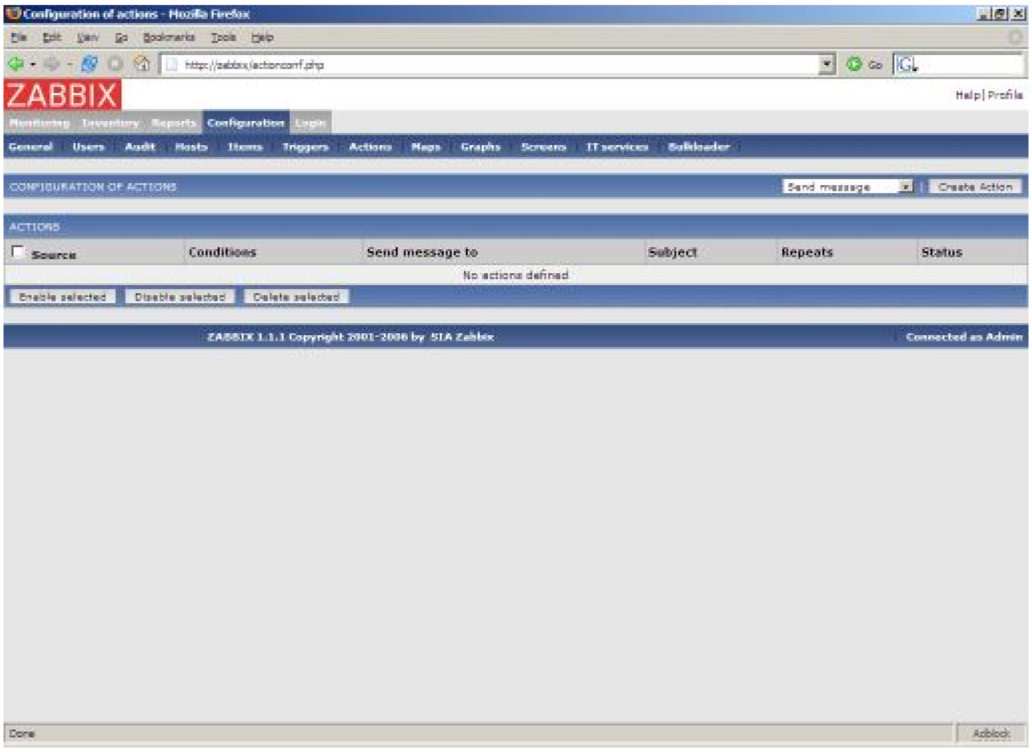
All right, the host is under ZABBIX control. After the host is added, we may be interested in:

- Modifying list of monitored items

- Modifying list of triggers items
- Adjusting refresh rate for items
- Adding user notificationules

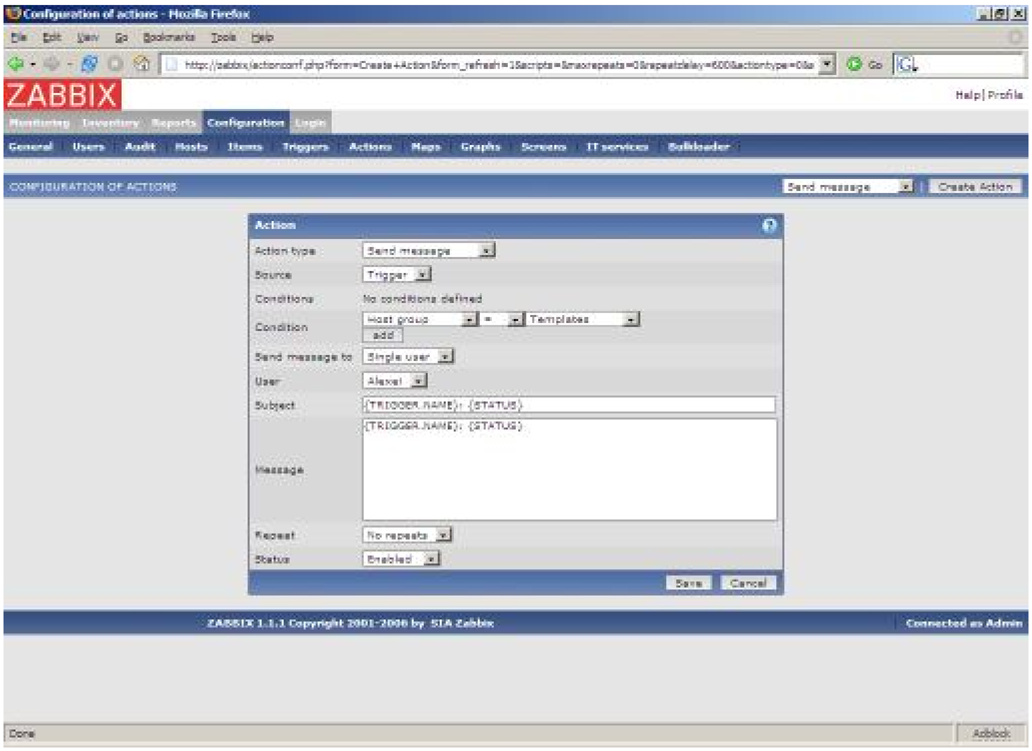
6.5. Setup notifications

We have a host or several hosts monitored. We see graphs and status of the hosts. Now it is time to configure basic email notification. Menu->Configuration->Actions


Configuration of actions - Mozilla Firefox
File Edit View Go Bookmarks Tools Help
http://zabbix/actionconf.php
Help | Profile
Monitoring Inventory Reports Configuration Login
General Users Audit Hosts Items Triggers Actions Maps Graphs Screens IT services Bulkloader
CONFIGURATION OF ACTIONS
Send message
Create Action
ACTIONS
Enable selected
Disable selected
Delete selected
ZABBIX 1.1.1 Copyright 2001-2006 by SIA Zabbix
Connected as Admin
Done
Adblock

Source	Conditions	Send message to	Subject	Repeats	Status
No actions defined					

No actions defined yet. Press "Create Action":



CONFIGURATION OF ACTIONS

Action

Action type	Send message
Source	Trigger
Conditions	No conditions defined
Condition	Host group = Templates
Send message to	Single user
User	Alexei
Subject	{TRIGGER.NAME}: {STATUS}
Message	{TRIGGER.NAME}: {STATUS}
Repeat	No repeats
Status	Enabled

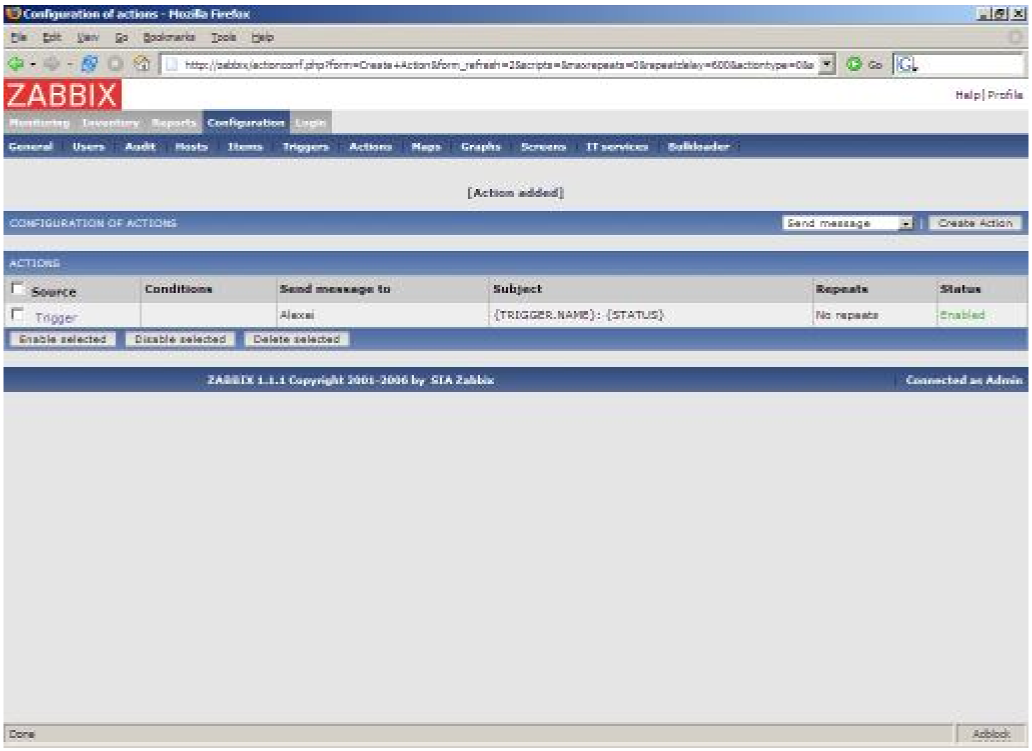
ZABBIX 1.1.1 Copyright 2001-2006 by SIA Zabbix

Connected as Admin

If you do not specify any conditions the action will be triggerred if any trigger change its status.

Macro {TRIGGER.NAME} will be substituted by a trigger name. Macro {STATUS} is either ON or OFF depending on current status of the trigger.

The action will be applied to all medias linked to the selected user or user group.



[Action added]

CONFIGURATION OF ACTIONS

ACTIONS

Source	Conditions	Send message to	Subject	Repeats	Status
Trigger		Alexei	{TRIGGER.NAME}: {STATUS}	No repeats	Enabled

ZABBIX 1.1.1 Copyright 2001-2006 by SIA Zabbix

Connected as Admin

This is very basic setup of notifications. We may be interested in:

- Use conditions to define advanced filters for sending notification
- Repeat notifications
- Execution of remote commands

7. XML Import and Export

7.1. Goals

ZABBIX Import/Export functionality is created to make possible effective exchange of templates, hosts, items, triggers and graphs configuration parameters.

Exported data has XML format which is easy to read and modify.

- Sharing of templates

  ZABBIX users may share configuration parameters.

- Integration with third-party tools

  Universal XML format make possible integration and data import/export with third party tools and applications.

7.2. Overview

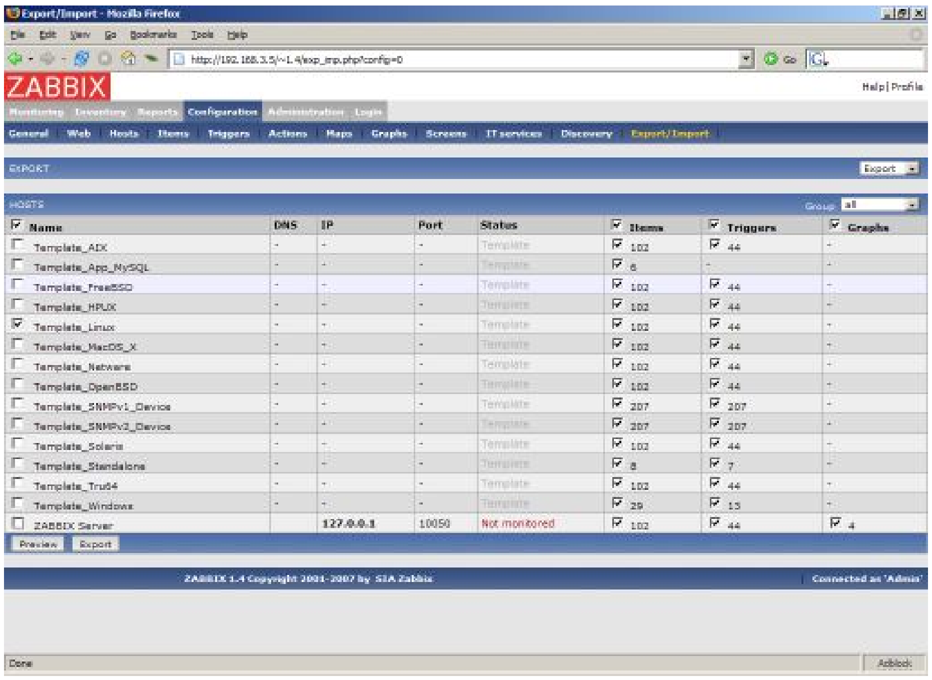
ZABBIX Import/Export processes the following data:

- Hosts
- Applications
- Items
- Triggers
- Custom graphs
- Value mappings

7.3. Data export

Menu->Configuration->Export/Import

Step 1	Select elements for export



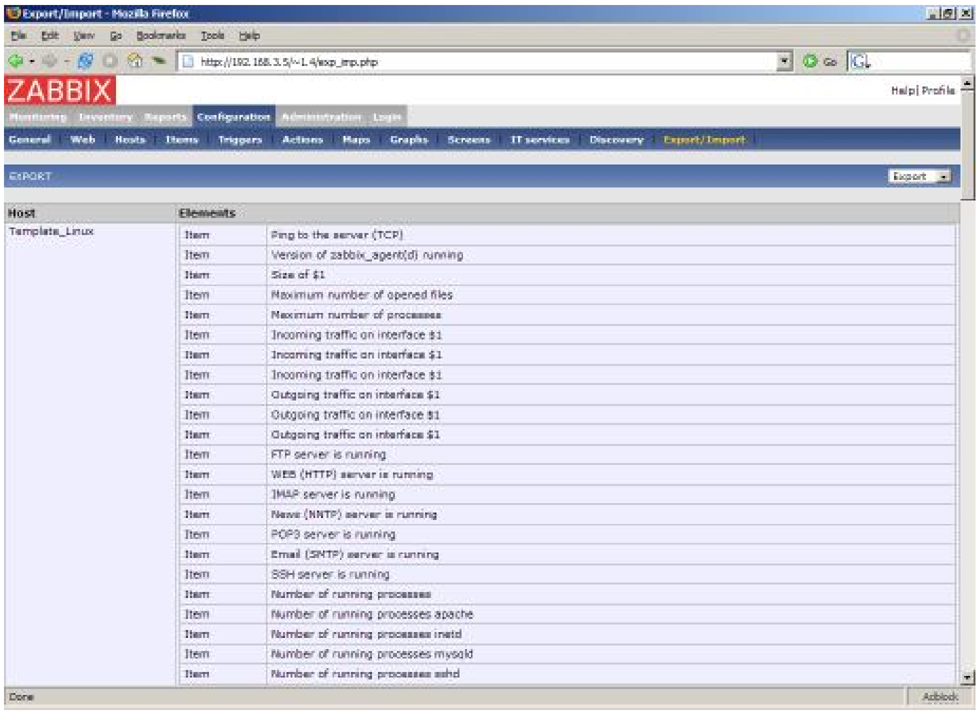
☑ Name	DNS	IP	Port	Status	☑ Items	☑ Triggers	☑ Graphs
☐ Template_AIX	-	-	-	Template	☑ 102	☑ 44	-
☐ Template_App_MySQL	-	-	-	Template	☑ 6	-	-
☐ Template_FreeBSD	-	-	-	Template	☑ 102	☑ 44	-
☐ Template_HPUX	-	-	-	Template	☑ 102	☑ 44	-
☑ Template_Linux	-	-	-	Template	☑ 102	☑ 44	-
☐ Template_MacOS_X	-	-	-	Template	☑ 102	☑ 44	-
☐ Template_Netware	-	-	-	Template	☑ 102	☑ 44	-
☐ Template_OpenBSD	-	-	-	Template	☑ 102	☑ 44	-
☐ Template_SNMPv1_Device	-	-	-	Template	☑ 207	☑ 207	-
☐ Template_SNMPv2_Device	-	-	-	Template	☑ 207	☑ 207	-
☐ Template_Solaris	-	-	-	Template	☑ 102	☑ 44	-
☐ Template_Standalone	-	-	-	Template	☑ 8	☑ 7	-
☐ Template_Tru64	-	-	-	Template	☑ 102	☑ 44	-
☐ Template_Windows	-	-	-	Template	☑ 29	☑ 13	-
☐ ZABBIX Server		127.0.0.1	10050	Not monitored	☑ 102	☑ 44	☑ 4

ZABBIX 1.4 Copyright 2001-2007 by SIA Zabbix

Connected as 'Admin'

We selected host “Template_Linux” all its items and triggers.

Press button “Preview” to see list of elements to be exported:



Host	Elements	
Template_Linux	Item	Ping to the server (TCP)
	Item	Version of zabbix_agent(d) running
	Item	Size of $1
	Item	Maximum number of opened files
	Item	Maximum number of processes
	Item	Incoming traffic on interface $1
	Item	Incoming traffic on interface $1
	Item	Incoming traffic on interface $1
	Item	Outgoing traffic on interface $1
	Item	Outgoing traffic on interface $1
	Item	Outgoing traffic on interface $1
	Item	FTP server is running
	Item	WEB (HTTP) server is running
	Item	IMAP server is running
	Item	News (NNTP) server is running
	Item	POP3 server is running
	Item	Email (SMTP) server is running
	Item	SSH server is running
	Item	Number of running processes
	Item	Number of running processes apache
	Item	Number of running processes inetd
	Item	Number of running processes mysqld
	Item	Number of running processes sshd

Step 2 Export data

Press button “Export” to export selected elements to a local XML file with default name **zabbix_export.xml**.

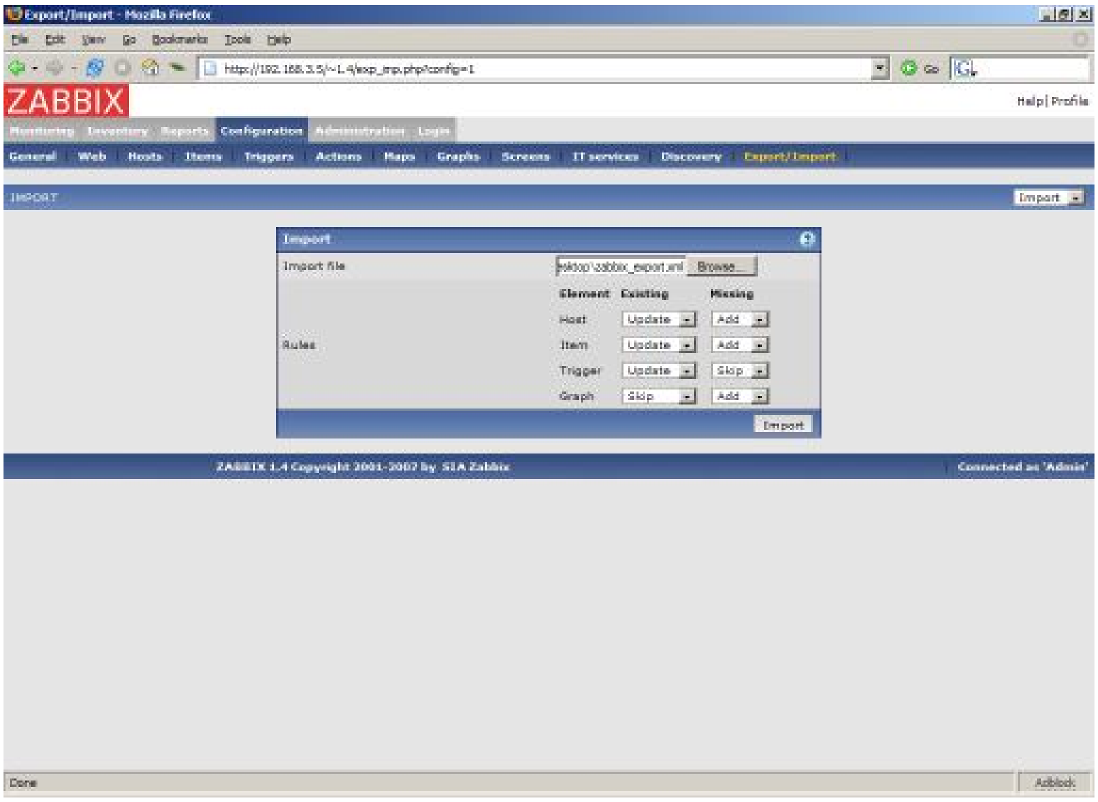
The file has the following format (one element of each type is shown):

```
<?xml version="1.0"?>
<zabbix_export version="1.0" date="11.05.07" time="11.11">
  <hosts>
     <host name="ZABBIX Server">
        <useip>1</useip>
        <ip>127.0.0.1</ip>
        <port>10050</port>
        <status>1</status>
        <groups>
        </groups>
        <items>
           <item type="0" key="agent.ping" value_type="3">
              <description>Ping to the server (TCP)</description>
              <delay>30</delay>
              <history>7</history>
              <trends>365</trends>
              <snmp_port>161</snmp_port>
              <valuemap>Service state</valuemap>
              <applications>
                 <application>General</application>
              </applications>
           </item>
                     ....
        </items>
        <triggers>
           <trigger>
              <description>Version of zabbix_agent(d) was changed on
{HOSTNAME}</description>
              <expression>{{HOSTNAME}:agent.version.diff(0)}&gt;0</expression>
              <priority>3</priority>
           </trigger>
                     ....
        <graphs>
           <graph name="CPU Loads" width="900" height="200">
              <show_work_period>1</show_work_period>
              <show_triggers>1</show_triggers>
              <yaxismin>0.0000</yaxismin>
              <yaxismax>100.0000</yaxismax>
              <graph_elements>
                 <graph_element item="{HOSTNAME}:system.cpu.load[,avg15]">
                    <color>990000</color>
                    <yaxisside>1</yaxisside>
                    <calc_fnc>2</calc_fnc>
                    <periods_cnt>5</periods_cnt>
                 </graph_element>
                 <graph_element item="{HOSTNAME}:system.cpu.load[,avg1]">
                    <color>009900</color>
                    <yaxisside>1</yaxisside>
                    <calc_fnc>2</calc_fnc>
                    <periods_cnt>5</periods_cnt>
                 </graph_element>
                 <graph_element item="{HOSTNAME}:system.cpu.load[,avg5]">
                    <color>999900</color>
                    <yaxisside>1</yaxisside>
                    <calc_fnc>2</calc_fnc>
                    <periods_cnt>5</periods_cnt>
                 </graph_element>
              </graph_elements>
           </graph>
                     ....
        </graphs>
     </host>
                     ....

  </hosts>
</zabbix_export>
```

7.4. Data import

Menu->Configuration->Export/Import

Step 1	Configure settings for data import and press “Import”.


Export/Import - Mozilla Firefox
File Edit View Go Bookmarks Tools Help
http://192.168.3.5/~1.4/exp_imp.php?config=1
ZABBIX
Help | Profile
Monitoring Inventory Reports Configuration Administration Login
General Web Hosts Items Triggers Actions Maps Graphs Screens IT services Discovery Export/Import
IMPORT
Import
Browse...
Import
ZABBIX 1.4 Copyright 2001-2007 by SIA Zabbix
Connected as 'Admin'
Done
Adblock

Import

Import file	esktop\zabbix_export.xml		
Rules	Element	Existing	Missing
	Host	Update	Add
	Item	Update	Add
	Trigger	Update	Skip
	Graph	Skip	Add

Pay attention to the following parameters of the item:

PARAMETER	Description
Import file	File name of XML file.
Rules	**Element** defines element of XML file. If parameter **Update** is set for **Existing** element, then the import will update it with data taken from the file. Otherwise it will not update it. If parameter **Add** is set for **Missing** element, then the import will add new element with data taken from the file. Otherwise it will not add it.

8. Tutorials

The section contains step-by-step instructions for most common tasks.

8.1. Extending ZABBIX Agent

This tutorial provides step-by-step instructions how to extend functionality of ZABBIX agent.

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 this command to agent's configuration file.

Add the command to zabbix_agentd.conf:

```
UserParameter=mysql.questions,mysqladmin -uroot status|cut -f4 -d":"|cut -f1 -d"S"
```

mysql.questions is an unique identifier. It can be any string, for example, queries.

Test this parameter by executing:

```
zabbix_agentd -t mysql.questions
```

Step 3 Restart ZABBIX agent.

Agent will reload configuration file.

Step 4 Add new item for monitoring.

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.

8.2. Monitoring of log files

This tutorial provides step-by-step instructions how to setup monitoring of log files. It is assumed that a host is configured already in ZABBIX frontend.

Step 1 Configure ZABBIX agent.

Follow standard instructions in order to install and configure agent on monitored host. Make sure that parameter `Hostname` matches host name of the host configured in ZABBIX frontend.

Also make sure that parameter `DisableActive` is not set in `zabbix_agentd.conf`

Step 2 Add a new item for monitoring of a log file.

Pay attention to the following parameters of the item:

PARAMETER	Description
Type	Must be set to 'ZABBIX Agent (active)'.
Key	Must be set to 'log[file<,regexp>]'. For example: log[/var/log/syslog], log[/var/log/syslog,error] Make sure that the file has read permissions for user 'zabbix' otherwise the item status will be set to 'unsupported'. ZABBIX agent will filter entries of log file by the regexp if present.
Type of information	Must be set to 'log'.

PARAMETER	Description
Update interval (in sec)	The parameter defines how often ZABBIX Agent will check for any changes in the log file. Normally must be set to 1 second in order to get new records as soon as possible.

8.3. Remote actions

This tutorial provides step-by-step instructions how to setup remote execution of pre-defined commands in case on an event. It is assumed that ZABBIX is configured and operational.

Step 1	Configure new action.

Follow standard instructions in order to configure actions. and configure agent on monitored host.

Pay attention to the following parameters of the action:

PARAMETER	Description
Action type	Must be set to 'Remote command'.
Remote command	Each line must contain an command for remote execution. For example: host:/etc/init.d/apache restart Make sure that corresponding agent has EnableRemoteCommands set to 1 in zabbix_agentd.conf. Remote command can contain macros!

Syntax of remote commands:

REMOTE COMMAND	Description
<host>:<command>	Command 'command' will be executed on hist 'host'.
<group>#<command>	Command 'command' will be executed on all hosts of host group 'group'.

Important notes

Make sure that user 'zabbix' has execute permissions for configured commands. One may be interested in using sudo to give access to priviledged commands.

ZABBIX agent executes commands in background

ZABBIX does not check if a command has been executed successfully

Example 1 Restart of Windows on certain condition.

In order to automatically restart Windows in case of a problem detected by ZABBIX, define the following actions:

PARAMETER	Description
Action type	'Remote command'
Remote command	host:c:\windows\system32\shutdown.exe –r –f Replace 'host' with ZABBIX hostname of Windows server.

8.4. Monitoring of Windows services

This tutorial provides step-by-step instructions how to setup monitoring of Windows services. It is assumed that ZABBIX server and ZABBIX agent are configured and operational.

Step 1 Get service name

You can get that name by going to the services mmc and bring up the properties of the service you want to monitor it's up/down status. In the General tab you should see a field called Service name. The value that follows that you put in the brackets above. For example, if I wanted to monitor the "workstation" service then my service would be **lanmanworkstation.**

Step 2 Add item for monitoring of the service

Add item with a key **service_state[lanmanworkstation]**, value type **Integer**, value mapping **Windows service state**.

9. WEB Monitoring

9.1. Goals

ZABBIX WEB Monitoring is aimed to the following goals:

- Performance monitoring of WEB applications
- Availability monitoring of WEB applications
- Support of HTTP and HTTPS
- Support of complex scenarios consisting of many steps (HTTP requests)

9.2. Overview

ZABBIX provides effective and very flexible WEB monitoring functionality. The module periodically executes WEB scenarios and keeps collected data in the database. The data is automatically used for graphs, triggers and notifications.

The following information is collected per each step of WEB scenario:

- Response time
- Download speed per second
- Reponse code

ZABBIX also checks if a retrieved HTML page contains a pre-defined string.

ZABBIX WEB monitoring supports both HTTP and HTTPS.

9.3. WEB Scenario

Scenario is set of HTTP requests (steps), which will be periodically executed by ZABBIX server. Normally a scenario is defined for one particular part of functionality of a WEB application. Scenarios are very convenient way of monitoring user experience.

WEB Scenario is linked to a host application for grouping.

WEB Scenario is periodically executed and consists of one or more Steps.

All cookies are preserved during execution of a single scenario.

Example 1 Monitoring of ZABBIX GUI

If we want to monitor availability and performance of ZABBIX GUI, we have to login, check how quickly Overview and Status of Triggers screens work and then logout.

The scenario may have the following steps:

1. Login
2. Go to Overview screen
3. Go to Status of Triggers screen
4. Logout

If a step cannot be perfomed, execution of scenario fails.

Parameter	**Description**
Application	WEB scenario will be linked to this application. The application must exist. For example: **ZABBIX Server**
Name	Name of the WEB scenario. The name will appear in Monitoring -> Web For example: **ZABBIX GUI**
Update interval	How often this scenario will be executed, in seconds. For example: **60**
Agent	ZABBIX will predend to be the selected browser. Useful for monitoring of WEB sites which generate different content for different WEB browsers. For example: **Opera 9.02 on Linux**
Status	**Active:** active scenario, it will be executed **Disabled:** disabled scenario, it will NOT be executed
Variables	List of macros to be used in configuration of the steps. **Syntax:** {macro}=value The macro {macro} will be replaced by “variable” in Step’s URL and Post variables. For example: **{user}=guest** **{password}=guest**
Steps	Steps of the scenario.

As soon as a scenario is created, ZABBIX automatically adds the following items for monitoring and links them to the selected application. Actual scenario name will be used instead of “Scenario”.

Item	Description
Download speed for scenario 'Scenario'	This item will collect information about download speed (bytes per second) of the whole scenario, i.e. average for all steps. Item key: **web.test.in[Scenario,,bps]** Type: **float**
Failed step of scenario 'Scenario'	This item keeps number of failed step of the scenario. If all steps are executed successfully, 0 is returned. Item key: **web.test.fail[Scenario]** Type: **integer**

These items can be used to create triggers and define notification conditions.

Example 1 Trigger “WEB scenario failed”

The trigger expression can be defined as {host: web.test.fail[Scenario]}.last(0)#0

Do not forget to replace the Scenario with real name of your scenario.

Example 2 Trigger “WEB application is slow”

The trigger expression can be defined as: {host: web.test.in[Scenario,,bps]}.last(0)<10000

Do not forget to replace the Scenario with real name of your scenario.

9.4. WEB Step

Step is basically a HTTP request. Steps are executed in a pre-defined order.

Parameter	Description
Name	Name of the step. For example: **Login**
URL	URL

Parameter	Description
	For example: **www.zabbix.com**
Post	HTTP POST variables, if any. For example: **id=2345&userid={user}** If {user} is defined as a macro of the WEB scenario, it will be replaced by its value when the step is executed. The information will be sent as is.
Timeout	Do not spend more than **Timeout** seconds for execution of the step. Actually this parameter defines maximum time for making connection to the URL and maximum time for performing an HTTP request. Therefore, ZABBIX will not spend more than **2xTimeout** seconds on the step. For example: **15**
Required	The string (give as Posix regular expression) must exist in retrieved content. Otherwise this step fails. If empty, any content will be accepted. For example: **Homepage of ZABBIX**
Status codes	List of HTTP status codes to be considered as success. If retrieved status code is not in the list, this step fails. If empty, any status code is accepted. For example: **200,210**

As soon as a step is created, ZABBIX automatically adds the following items for monitoring and links them to the selected application. Actual scenario and step names will be used instead of “Scenario” and “Step” respectively.

Item	Description
Download speed for step 'Step' of scenario 'Scenario'	This item will collect information about download speed (bytes per second) of the step. Item key: **web.test.in[Scenario,Step,bps]** Type: **float**
Response time for step 'Step' of scenario 'Scenario’	This item will collect information about response time of the step in seconds. Item key: **web.test.time[Scenario,Step]** Type: **float**
Response code for	This item will collect response codes of the step.

Item	Description
step 'Step' of scenario 'Scenario'	Item key: **web.test.rspcode[Scenario,Step]** Type: **integer**

These items can be used to create triggers and define notification conditions.

Example 1 Trigger “ZABBIX GUI login is too slow”

The trigger expression can be defined as: {zabbix: web.test.time[ZABBIX GUI,Login]}.last(0)>3

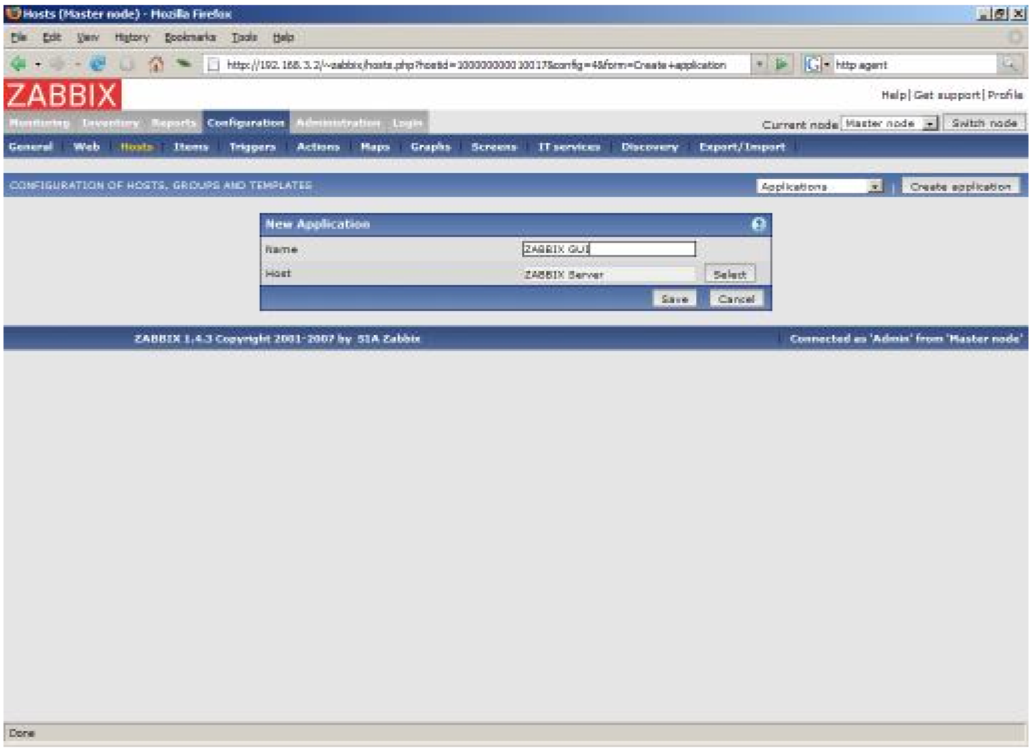
9.5. Real life scenario

Let’s use ZABBIX WEB Monitoring for monitoring of ZABBIX WEB interafce. We want to know if it is available, provides right content and how quickly it works.

So, first we make a login with our user name and password and then we will try to access Configuration->General page.

Step 1 Add new host application.

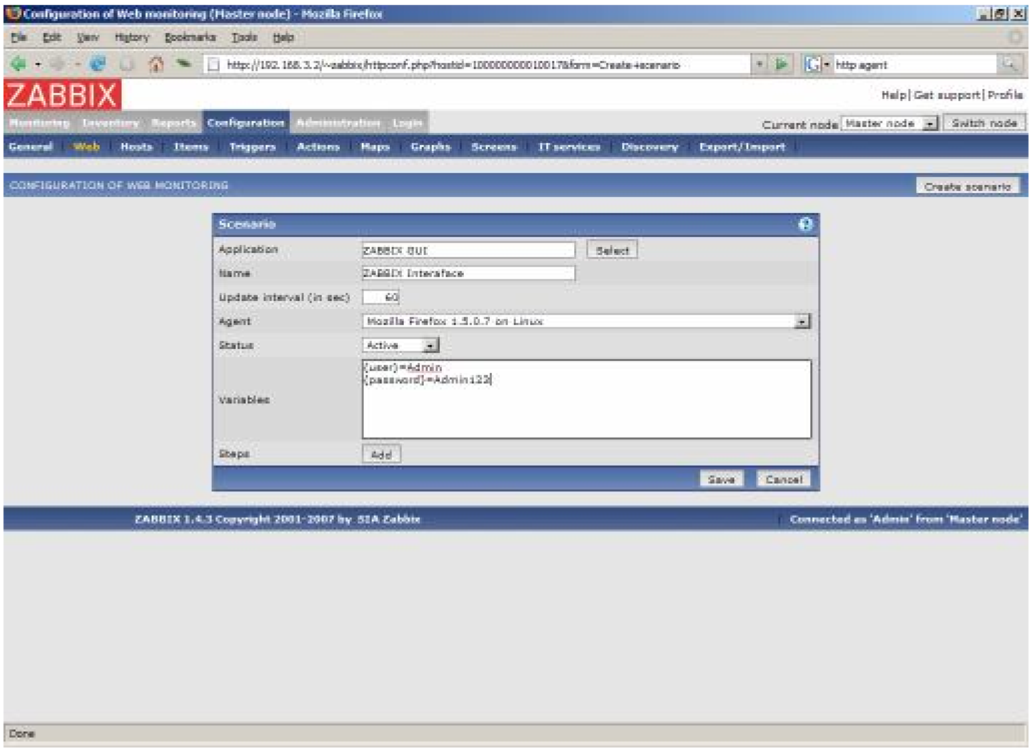
This step is not required if you already have a suitable application. You may also want to create a host if one does not exist.


Hosts (Master node) - Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://192.168.3.2/~zabbix/hosts.php?hostid=10000000000100017&config=4&form=Create+application
http agent
ZABBIX
Help | Get support | Profile
Monitoring Inventory Reports Configuration Administration Login
Current node Master node Switch node
General Web Hosts Items Triggers Actions Maps Graphs Screens IT services Discovery Export/Import
CONFIGURATION OF HOSTS, GROUPS AND TEMPLATES
Applications
Create application
New Application
Select
Save
Cancel
ZABBIX 1.4.3 Copyright 2001-2007 by SIA Zabbix
Connected as 'Admin' from 'Master node'
Done

Name	ZABBIX GUI
Host	ZABBIX Server

Step 2 Add new WEB scenario.

We add a new scenario for monitoring of ZABBIX WEB inetrafce. The scenario will execute number of steps.


Configuration of Web monitoring (Master node) - Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://192.168.3.2/~zabbix/httpconf.php?hostid=100000000100017&form=Create+scenario
Help | Get support | Profile
Monitoring Inventory Reports Configuration Administration Login
Current node Master node Switch node
General Web Hosts Items Triggers Actions Maps Graphs Screens IT services Discovery Export/Import
CONFIGURATION OF WEB MONITORING
Create scenario
Select
Add
Save Cancel
ZABBIX 1.4.3 Copyright 2001-2007 by SIA Zabbix
Connected as 'Admin' from 'Master node'
Done

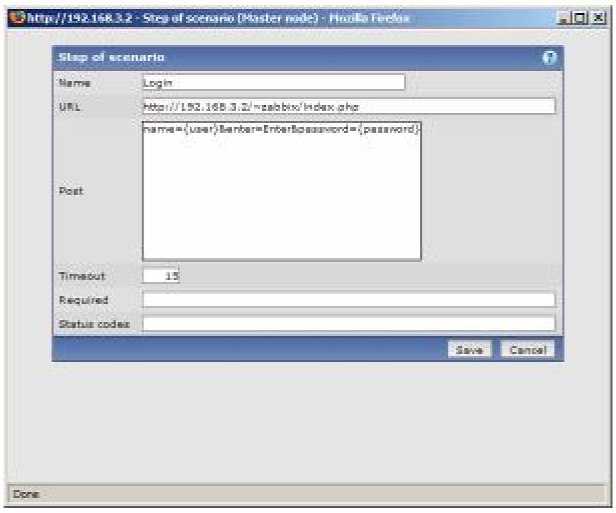
Scenario

Application	ZABBIX GUI
Name	ZABBIX Interface
Update interval (in sec)	60
Agent	Mozilla Firefox 1.5.0.7 on Linux
Status	Active
Variables	{user}=Admin {password}=Admin123
Steps	

Note that we also created two macros, {user} and {password}.

Step 3 Define steps for the scenario.

Add steps for monitoring.

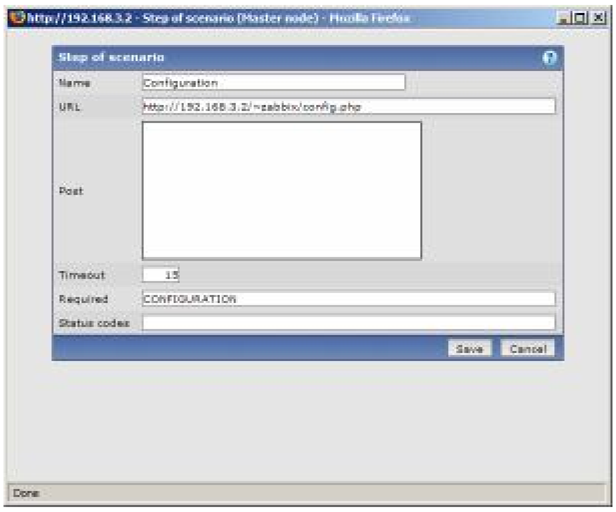


http://192.168.3.2 - Step of scenario (Master node) - Mozilla Firefox

Step of scenario

Name	Login
URL	http://192.168.3.2/~zabbix/index.php
Post	name={user}&enter=Enter&password={password}
Timeout	15
Required	
Status codes	

Scenario step 1. Note use of macros {user} and {password}.



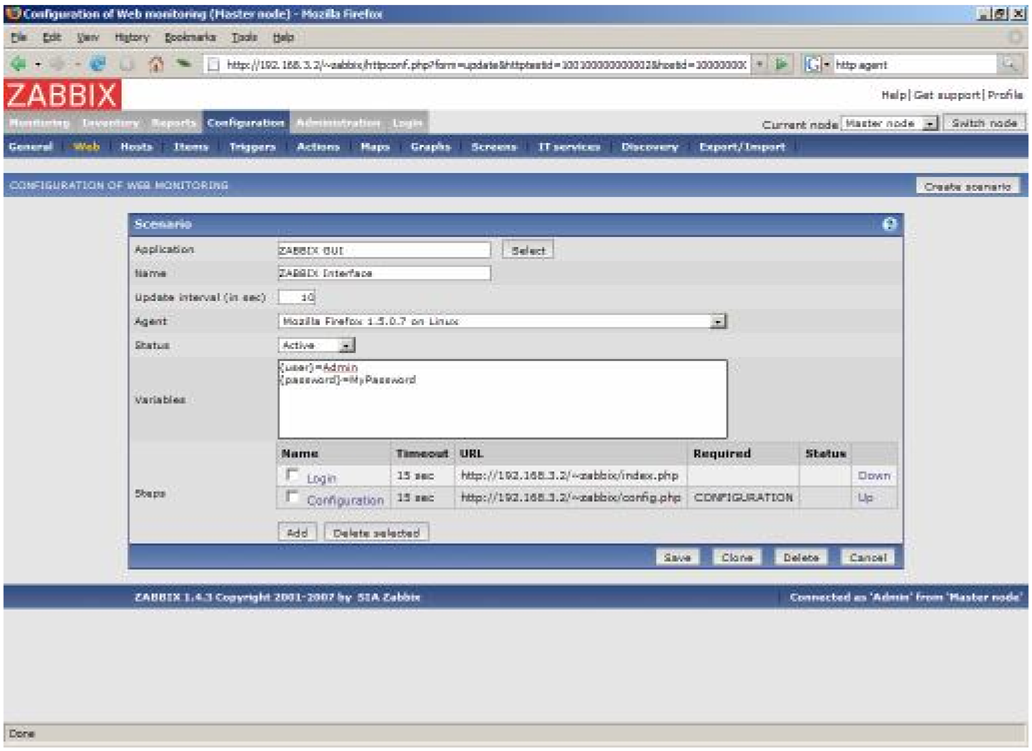
http://192.168.3.2 - Step of scenario (Master node) - Mozilla Firefox

Step of scenario

Name	Configuration
URL	http://192.168.3.2/~zabbix/config.php
Post	
Timeout	15
Required	CONFIGURATION
Status codes	

Scenario step 2.

Step 4	Save Scenario.



CONFIGURATION OF WEB MONITORING

Scenario

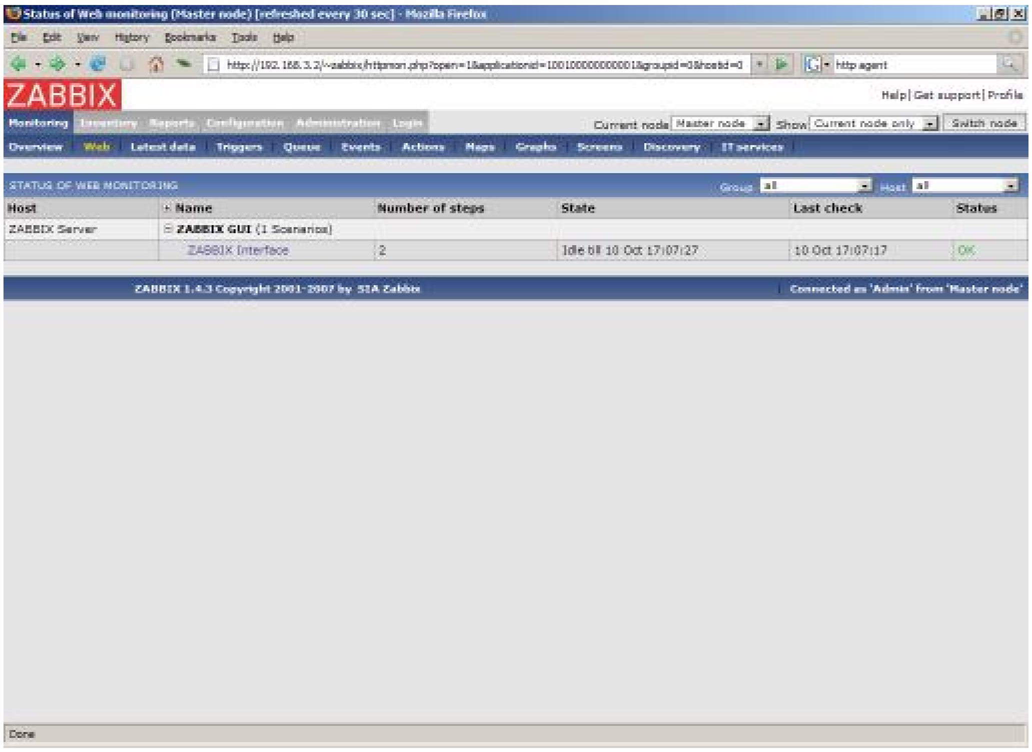
Application	ZABBIX GUI
Name	ZABBIX Interface
Update interval (in sec)	10
Agent	Mozilla Firefox 1.5.0.7 on Linux
Status	Active
Variables	{user}=Admin {password}=MyPassword

Steps

Name	Timeout	URL	Required	Status	
Login	15 sec	http://192.168.3.2/~zabbix/index.php			Down
Configuration	15 sec	http://192.168.3.2/~zabbix/config.php	CONFIGURATION		Up

ZABBIX 1.4.3 Copyright 2001-2007 by SIA Zabbix | Connected as 'Admin' from 'Master node'

The list of applications and linked scenarios will appear in Monitoring->WEB:

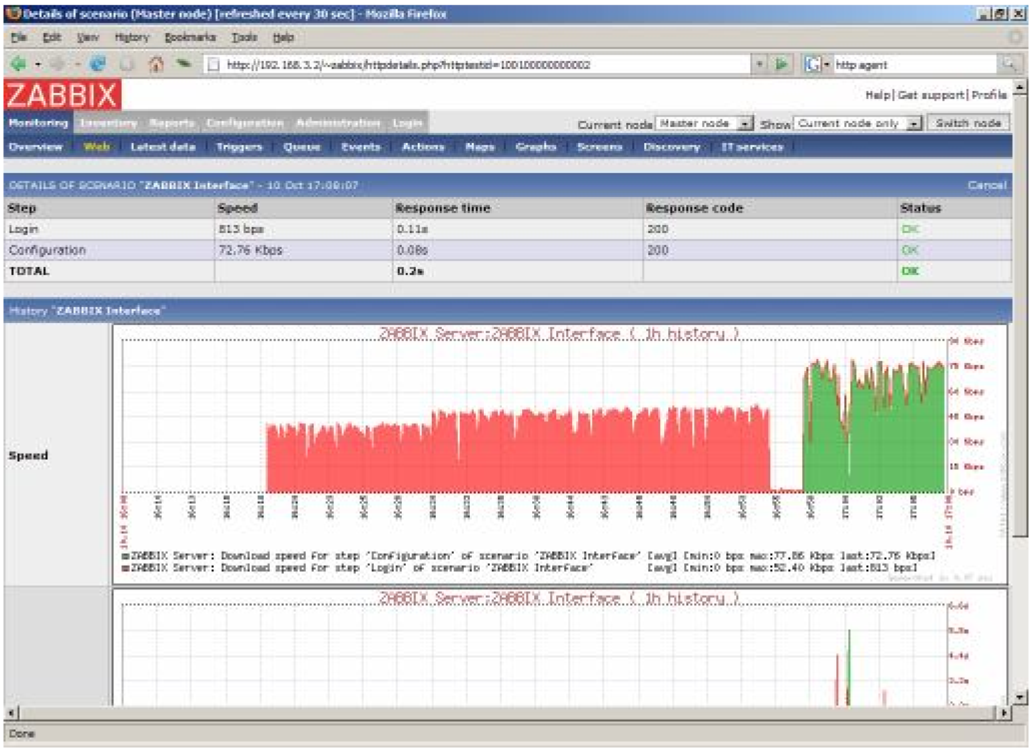


STATUS OF WEB MONITORING

Host	Name	Number of steps	State	Last check	Status
ZABBIX Server	ZABBIX GUI (1 Scenarios)				
	ZABBIX Interface	2	Idle till 10 Oct 17:07:27	10 Oct 17:07:17	OK

ZABBIX 1.4.3 Copyright 2001-2007 by SIA Zabbix | Connected as 'Admin' from 'Master node'

Click on a scenario to see nice statistics:


Details of scenario (Master node) [refreshed every 30 sec] - Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://192.168.3.2/~zabbix/httpdetails.php?httptestid=100100000000002
http agent
ZABBIX
Help | Get support | Profile
Monitoring Inventory Reports Configuration Administration Login
Current node Master node Show Current node only Switch node
Overview Web Latest data Triggers Queue Events Actions Maps Graphs Screens Discovery IT services
Cancel
Speed
ZABBIX Server:ZABBIX Interface (1h history)
Done

DETAILS OF SCENARIO "ZABBIX Interface" - 10 Oct 17:08:07

Step	Speed	Response time	Response code	Status
Login	813 bps	0.11s	200	OK
Configuration	72.76 Kbps	0.08s	200	OK
TOTAL		**0.2s**		**OK**

History "ZABBIX Interface"

```
■ZABBIX Server: Download speed for step 'Configuration' of scenario 'ZABBIX Interface' [avg] [min:0 bps max:77.86 Kbps last:72.76 Kbps]
■ZABBIX Server: Download speed for step 'Login' of scenario 'ZABBIX Interface'         [avg] [min:0 bps max:52.40 Kbps last:813 bps]
```

10. Log File Monitoring

10.1. Overview

ZABBIX can be used for cetralised monitoring and analysis of log fles. Notifications can be used to warn users when a log file contains certain strings or string patterns.

10.2. How it works

Monitoring of log files requires ZABBIX Agent running on a host. An item used for monitoring of a log files must have type **ZABBIX Agent (Active)**, its value type must be **Log** and key set to **log[path to log file<,pattern>]**.

Important notes:

- The server and agent keep a trace of the monitored log's size in a counter.
- The agent starts reading the log file from the point it stopped the previous time.
- The number of bytes already analyzed (the counter) is stored in the ZABBIX database and is sent to the agent, to make sure it starts reading the log file from this point.
- Whenever the log file become smaller than the log counter known by the agent, the counter is reset to zero and the agent starts reading the log file from the beginning.
- ZABBIX Agent processes new records of a log file once per **Refresh period** seconds.
- .ZABBIX Agent won't send more than **10** lines of a log file per second. The limit prevents overloading of network and CPU resources.

11. Auto-discovery

11.1. Goals

There are several goals of ZABBIX auto-discovery module:

- Simplify deployment

  Auto-discovery can be used to significantly simplify and speed up ZABBIX deployment. It also makes possible creation of user friendly appliances.

- Simplify administration

  Properly configured auto-discovery can simplify administration of ZABBIX system very much.

- Support of changing environments

  Auto-discovery makes possible use of ZABBIX in rapidly changing environments with no excessive administration.

11.2. Overview

ZABBIX provides effective and very flexible auto-discovery functionality. ZABBIX auto-discovery is based on the following information:

- IP ranges
- Availability of external services (FTP, SSH, WEB, PO3, IMAP, TCP, etc)
- Information received from ZABBIX agent
- Information received from SNMP agent

It does NOT provide:

- Discovery of network topology

Every service and host (IP) checked by ZABBIX auto-discovery module generates events which may be used to create rules for the following actions:

- Generating user notifications
- Adding and removing hosts
- Adding hosts to a template
- Removing hosts from a template
- Linking hosts to a template
- Unlinking hosts from a template
- Executing remote scripts

The actions can be configured to respect host or service uptime and downtime.

11.3. How it works

Auto-discovery basically consists of two phases: Discovery and Actions.

First, we discover a host or a service, and generate discovery events.

Then we process the events and apply certain actions depending of type of discovered device, IP, its status, up/down time, etc.

11.3.1. Discovery

ZABBIX periodically scans IP ranges defined in auto-discovery rules. Frequency of the check is configurable for each rule individually.

Each rule defines set of service checks to be performed for IP range.

ZABBIX tries to perform a service check:

- if OK, it generated Service UP and Host UP events
- if FAIL, it generates Service Down event

If all service checks failed for a single IP, ZABBIX generates Host Down event.

Events generated by auto-discovery module have Event Source "Discovery".

11.3.2. Actions

For a description of all conditions available for auto-discovery based events see Action conditions.

For a description of all operations available for auto-discovery based events see Operations.

11.4. Auto-discovery rule

Auto-discovery rule is a rule used by ZABBIX to discover hosts and services.

Parameters of auto-discovery rule:

Parameter	Description
Name	Name of the rule. For example, "Local network".
IP range	Range of IP addresses for discovery. It may have the

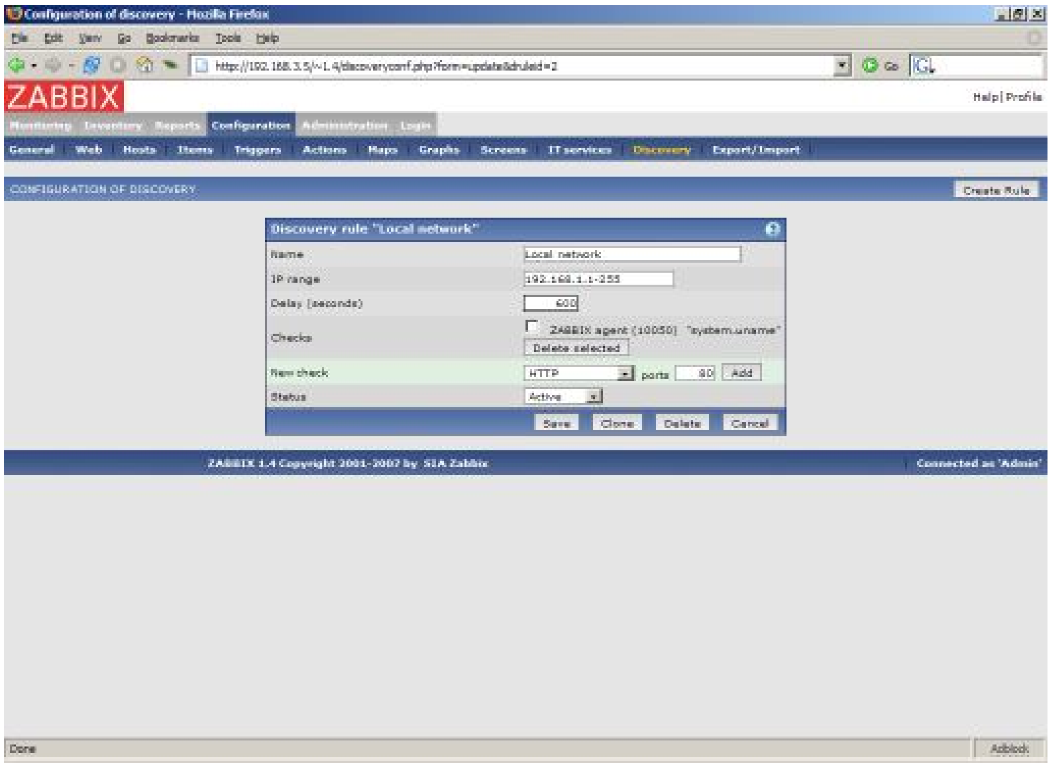
Parameter	Description
	following formats: Single IP: 192.168.1.33 Range of IP addresses: 192.168.1.1-255 List: 192.168.1.1-255,192.168.2.1-100,192.168.2.200
Delay (in sec)	This parameter defines how often ZABBIX should execute this rule.
Checks	ZABBIX will use this list of check for discovery of hosts and services. List of supported checks: SSH, LDAP, SMTP, FTP, HTTP, POP, NNTP, IMAP, TCP, ZABBIX Agent, SNMPv1 Agent, SNMPv2 Agent Parameter Ports may be one of following: Single port: 22 Range of ports: 22-45 List: 22-45,55,60-70
Status	Active – the rule is active and will be execute by ZABBIX server Disable – the rule is not active. It won't be executed.

11.5. Real life scenario

Suppose we would like to setup auto-discovery for local network having IP range of 192.168.1.1-192.168.1.255. In our scenario we want to:

- discover only hosts having ZABBIX Agent running
- run discovery every 10 minutes
- add host for monitoring if host uptime is more than 1 hour
- remove hosts if host downtime is more than 24 hours
- use Template_Windows for Windows hosts
- use Template_Linux for Linux hosts
- add Linux hosts to group "Linux servers"
- add Windows hosts to group "Windows servers"

Step 1	Define auto-discovery rule for our IP range.


Configuration of discovery - Mozilla Firefox
File Edit View Go Bookmarks Tools Help
http://192.168.3.5/~1.4/discoveryconf.php?form=update&druleid=2
ZABBIX
Help | Profile
Monitoring Inventory Reports Configuration Administration Login
General Web Hosts Items Triggers Actions Maps Graphs Screens IT services Discovery Export/Import
CONFIGURATION OF DISCOVERY
Create Rule
Save Clone Delete Cancel
ZABBIX 1.4 Copyright 2001-2007 by SIA Zabbix
Connected as 'Admin'
Done
Adblock

Discovery rule "Local network"

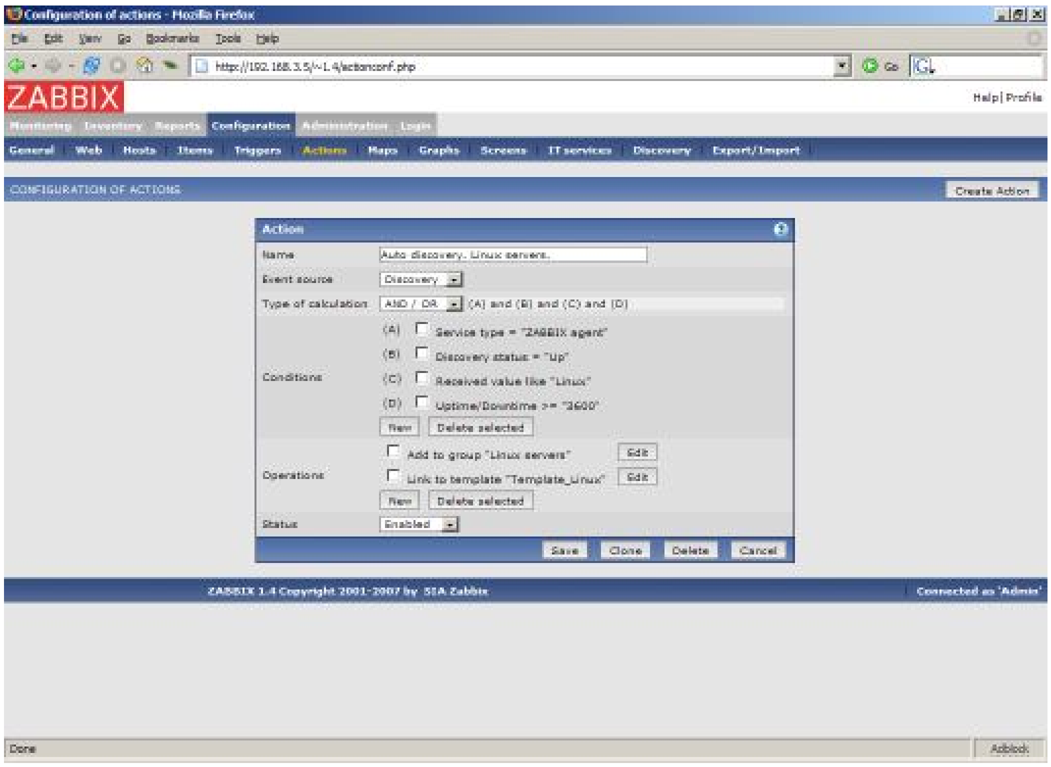
Name	Local network
IP range	192.168.1.1-255
Delay (seconds)	600
Checks	ZABBIX agent (10050) "system.uname"
New check	HTTP ports 80
Status	Active

ZABBIX will try to discover hosts in IP range of 192.168.1.1-192.168.1.255 by connecting to ZABBIX Agents and getting system.uname. A value received from an agent can be used to apply different actions for different operating systems. For example, link Windows boxes to Windows_Template, Linux boxes to Linux_Template.

The rule will be executed every 10 minutes (600 seconds).

When the rule is added, ZABBIX will automatically start discovery and generation of Discovery based events for further processing.

Step 2	Define an action for adding newly discovered Linux servers.



Action

Name	Auto discovery. Linux servers.
Event source	Discovery
Type of calculation	AND / OR (A) and (B) and (C) and (D)
Conditions	(A) Service type = "ZABBIX agent" (B) Discovery status = "Up" (C) Received value like "Linux" (D) Uptime/Downtime >= "3600"
Operations	Add to group "Linux servers" Link to template "Template_Linux"
Status	Enabled

ZABBIX 1.4 Copyright 2001-2007 by SIA Zabbix

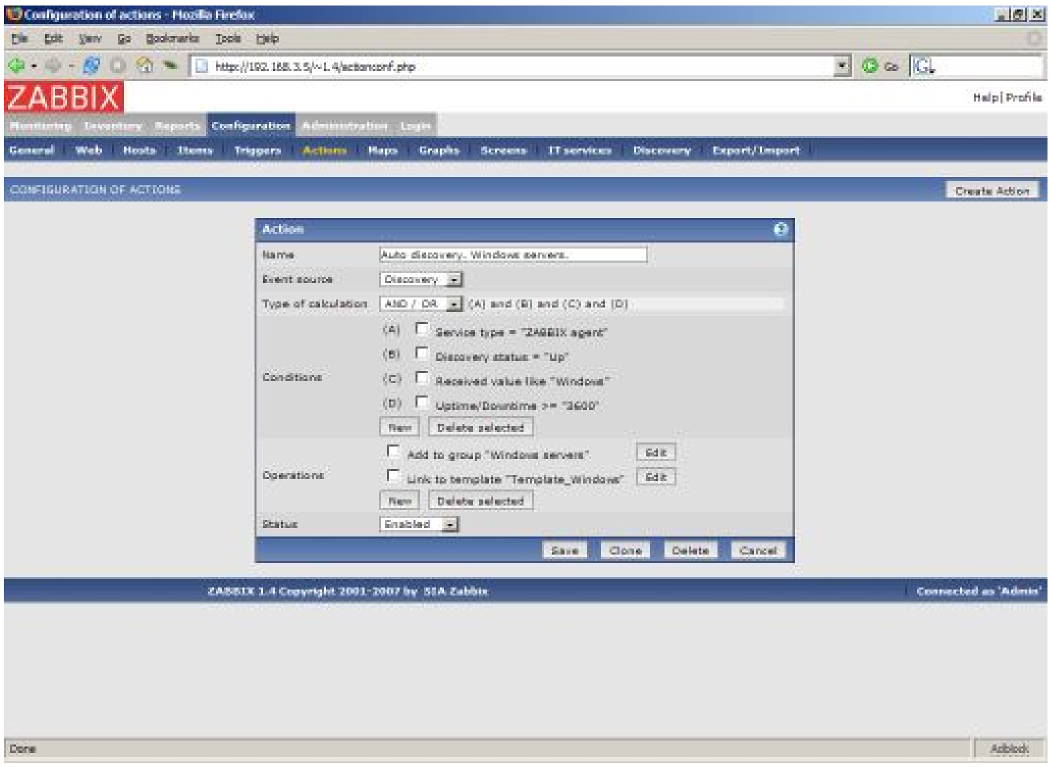
The action will be activated if:

- service "ZABBIX Agent" is Up
- value of system.uname (ZABBIX Agent's key we used in rule definition) contains "Linux"
- Uptime is more than 1 hour (3600 seconds)

The action will execute the following operations:

- adds newly discovered host to group "Linux servers" (also adds host if wasn't added previously)
- links host to template "Template_Linux". ZABBIX will automatically start monitoring of the host using items and triggers from "Template_Linux".

Step 3	Define an action for adding newly discovered Windows servers.

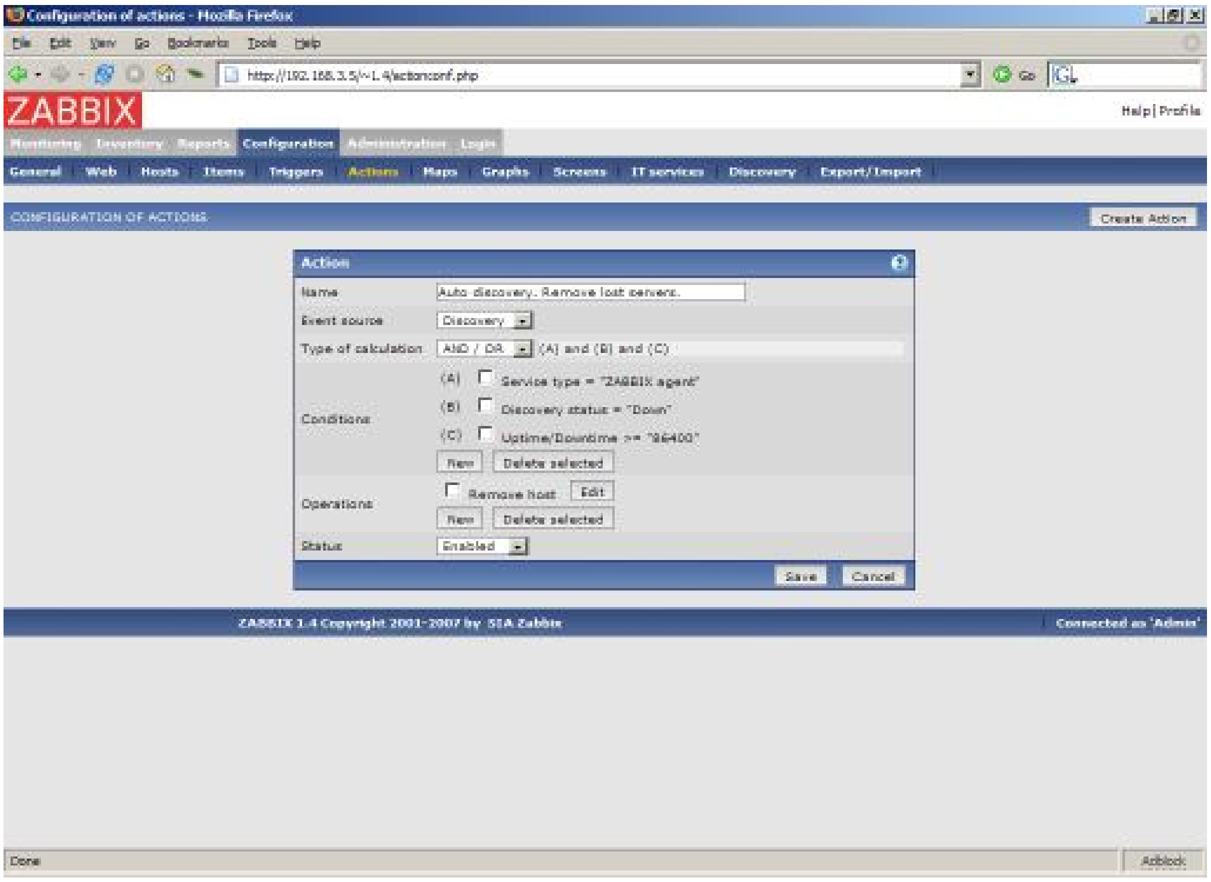

Configuration of actions - Mozilla Firefox
http://192.168.3.5/~1.4/actionconf.php
Help| Profile
Monitoring Inventory Reports Configuration Administration Login
General Web Hosts Items Triggers Actions Maps Graphs Screens IT services Discovery Export/Import
CONFIGURATION OF ACTIONS
Create Action
ZABBIX 1.4 Copyright 2001-2007 by SIA Zabbix
Connected as 'Admin'
Done
Adblock

Action

Name	Auto discovery. Windows servers.
Event source	Discovery
Type of calculation	AND / OR (A) and (B) and (C) and (D)
Conditions	(A) Service type = "ZABBIX agent" (B) Discovery status = "Up" (C) Received value like "Windows" (D) Uptime/Downtime >= "3600" New Delete selected
Operations	Add to group "Windows servers" Edit Link to template "Template_Windows" Edit New Delete selected
Status	Enabled

Save Clone Delete Cancel

Step 4	Define an action for removing lost servers.



Configuration of actions - Mozilla Firefox

http://192.168.3.5/~1.4/actionconf.php

CONFIGURATION OF ACTIONS

Action

Name	Auto discovery. Remove lost servers.
Event source	Discovery
Type of calculation	AND / OR (A) and (B) and (C)
Conditions	(A) Service type = "ZABBIX agent" (B) Discovery status = "Down" (C) Uptime/Downtime >= "86400"
Operations	Remove host
Status	Enabled

ZABBIX 1.4 Copyright 2001-2007 by SIA Zabbix

Connected as 'Admin'

A server will be removed if service “ZABBIX Agent” is Down for more than 24 hours (86400 seconds).

12. Distributed Monitoring

ZABBIX can be configured to support **hierarchical** distributed monitoring.

12.1. Goals

There are several goals of the distributed monitoring:

- Get control of whole monitoring from a single or several locations

  ZABBIX administrator may control configuration of all Nodes from a single ZABBIX WEB front-end.

- Hierarchical monitoring

  This is for monitoring of complex multi-level environments.

- Monitor large complex environments

  This is especially useful when monitoring several geographical locations.

- Offload the overhead from busy ZABBIX server

  Monitoring thousands of hosts using single ZABBIX server? This may be for you!

12.2. Overview

ZABBIX provides effective and reliable way of monitoring distributed IT infrastructure. Configuration of the whole distributed setup can be done from a single location via common WEB interface.

ZABBIX supports up-to **1000** (one thousand) Nodes in a distributed setup. Each Node is responsible for monitoring of its own Location. Node can be configured either locally or by its Master node which has a copy of configuration data of all Child Nodes. Configuration of Child Nodes can be done in offline mode, i.e. when there are no connectivity between Master and Child Node.

Hierarchical distributed monitoring allows having tree-like structure of Nodes. Each Node reports to its Master Node only.

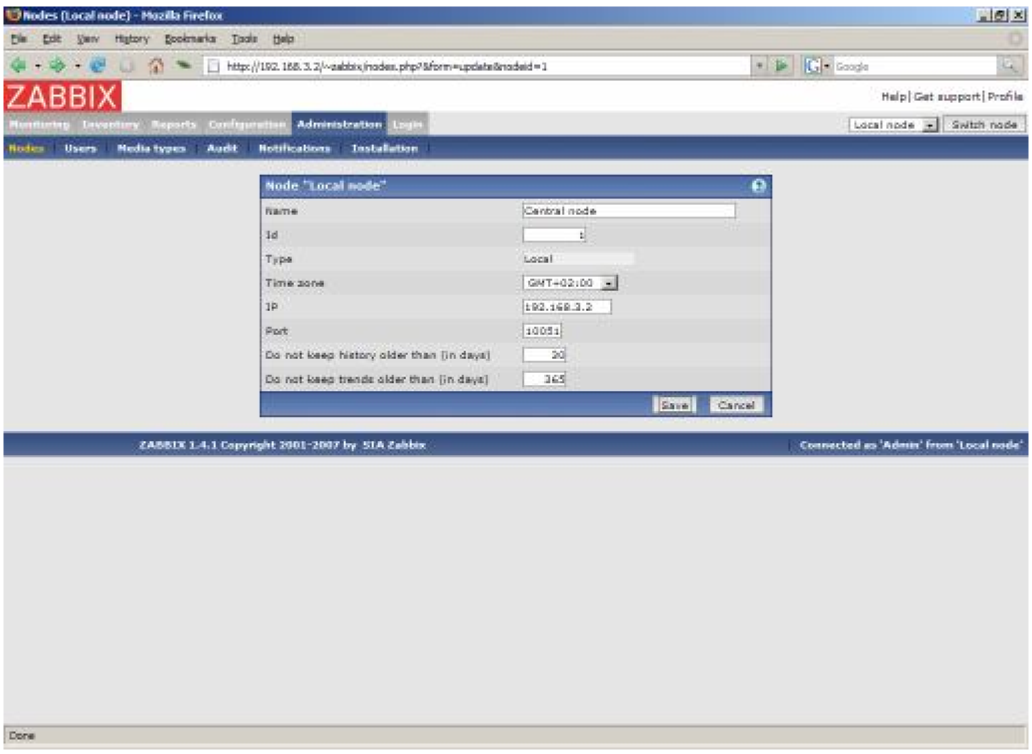
All Nodes may work even in case of communication problems. Historical information and event are stored locally. When communication is back, Child Nodes will optionally send the data to Master Node.

New Nodes can be attached to and detached from the ZABBIX distributed setup without any loss of functionality of the setup. No restart of any Node required.

Each Node has its own configuration and works as a normal ZABBIX Server.

12.3. Configuration

12.3.1. Configuration of Nodes



Node "Local node"

Name	Central node
Id	1
Type	Local
Time zone	GMT+02:00
IP	192.168.3.2
Port	10051
Do not keep history older than (in days)	20
Do not keep trends older than (in days)	365

ZABBIX 1.4.1 Copyright 2001-2007 by SIA Zabbix

Connected as 'Admin' from 'Local node'

Parameters of a Node:

Parameter	Description
Name	Unique node name.
Id	Unique Node ID.
Type	**Local** – Local node **Remote** – Remote node
Time zone	Time zone of the Node. ZABBIX automatically converts time stamps to local timezone when transferring time related data across nodes.
IP	Node IP address. ZABBIX trapper must be listening on this IP address.
Port	Node Port number. ZABBIX trapper must be listening on this port number. Default is 10051.
Do not keep history older than (in sec)	For non local historical data only. ZABBIX won't keep history of the node longer than **N** seconds.
Do not keep trends	For non local trend data only. ZABBIX won't keep

Parameter	Description
older than (in sec)	trends of the node longer than **N** seconds.

12.3.2. Simple configuration

Our simple configuration consists of a Central Node and a Child One.

Central Node will have total control over configuration of Child Node. ChildNode will report to central node events, history and trends.

Central Node will have NodeID=1, while Child Node's NodeID=2.

Central Node IP: 192.168.3.2, Port: 10051

Child Node IP: 192.168.3.5, Port: 15052

For Central Node:

Step 1	Install ZABBIX.

Follow standard installation instructions to create database, install ZABBIX frontend and binaries.

Step 2	Setup NodeID in server configuration file.

In file zabbix_server.conf:

```
NodeID=1
```

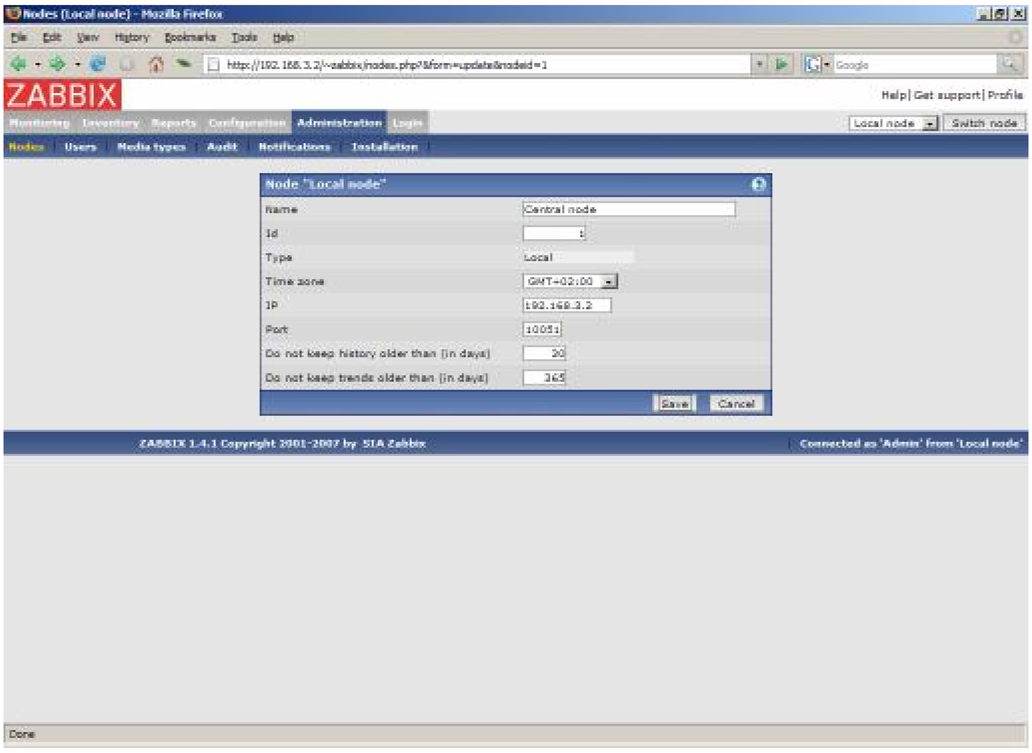
Step 3	Convert database data.

ZABBIX server has to be executed to covert unique IDs for use by first node.

```
cd bin
./zabbix_server -n 1 -c /etc/zabbix/zabbix_server.conf
Converting tables ............................................................. done.

Conversion completed.
```

Note: This should be executed only once. This option is not required to start ZABBIX server!

Step 4 Configure Node parameters.

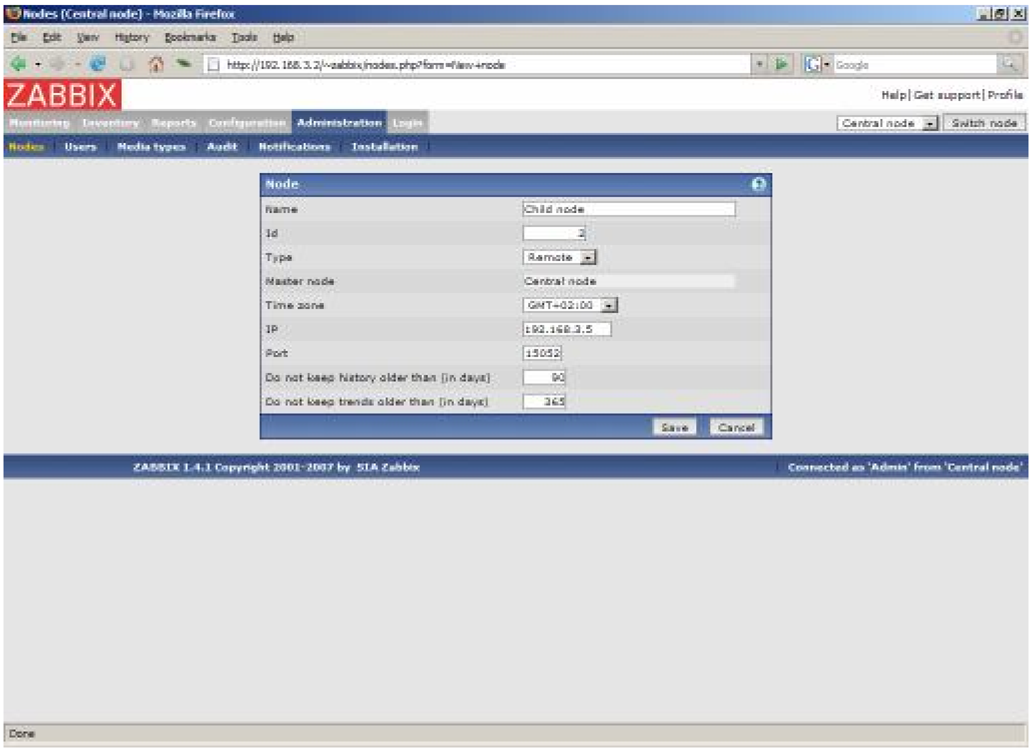

Nodes (Local node) - Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://192.168.3.2/~zabbix/nodes.php?&form=update&nodeid=1
Google
ZABBIX
Help | Get support | Profile
Monitoring Inventory Reports Configuration Administration Login
Local node
Switch node
Nodes | Users | Media types | Audit | Notifications | Installation
Save
Cancel
Done

Node "Local node"

Name	Central node
Id	1
Type	Local
Time zone	GMT+02:00
IP	192.168.3.2
Port	10051
Do not keep history older than (in days)	20
Do not keep trends older than (in days)	365

ZABBIX 1.4.1 Copyright 2001-2007 by SIA Zabbix | Connected as 'Admin' from 'Local node'

Step 5 Add child node.



Node	
Name	Child node
Id	2
Type	Remote
Master node	Central node
Time zone	GMT+02:00
IP	192.168.3.5
Port	10052
Do not keep history older than (in days)	90
Do not keep trends older than (in days)	365

Nodes (Central node) - Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://192.168.3.2/~zabbix/nodes.php?form=New+node
Help | Get support | Profile
Monitoring Inventory Reports Configuration Administration Login
Central node
Switch node
Nodes Users Media types Audit Notifications Installation
Save
Cancel
ZABBIX 1.4.1 Copyright 2001-2007 by SIA Zabbix
Connected as 'Admin' from 'Central node'
Done

Step 6	Start Master Node.

We should see NodeID in stratup messages of server log file:

```
31754:20070629:150342 server #16 started [Node watcher. Node ID:1]
```

For Child Node:

Step 1	Install ZABBIX.

Follow standard installation instructions to create database, install ZABBIX frontend and binaries.

Step 2	Setup NodeID in server configuration file.

In file zabbix_server.conf:

```
NodeID=2
```

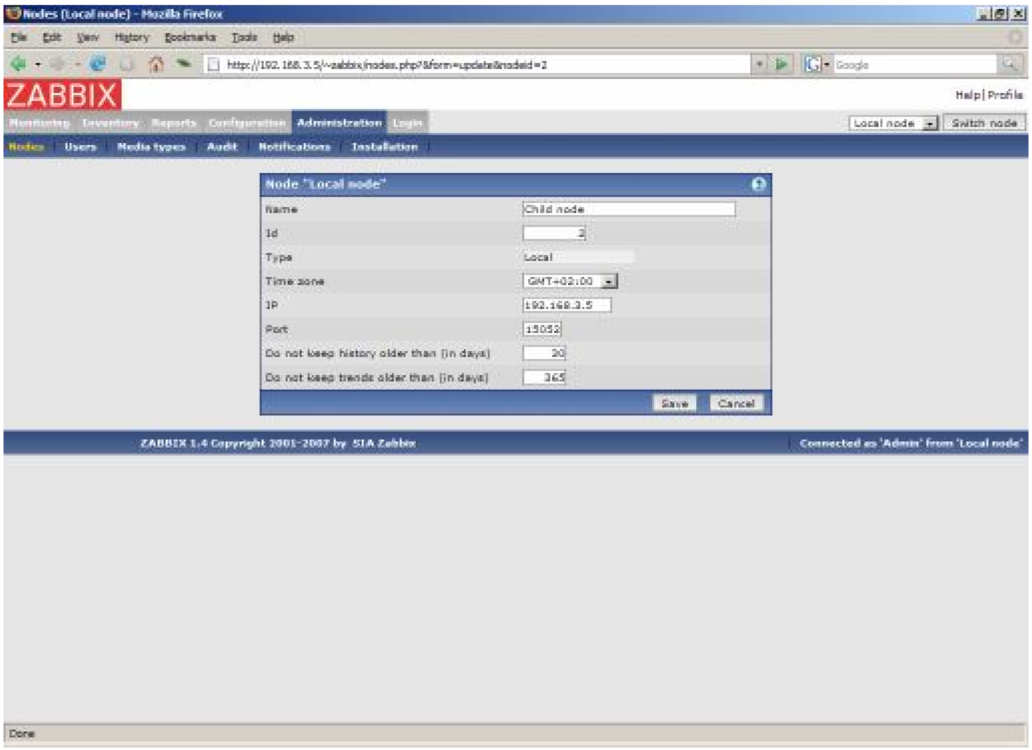
Step 3 Convert database data.

ZABBIX server has to be executed to covert unique IDs for use by first node.

```
cd bin
./zabbix_server -n 2 -c /etc/zabbix/zabbix_server.conf
Converting tables ............................................................ done.

Conversion completed.
```

Note: This should be executed only once. This option is not required to start ZABBIX server!

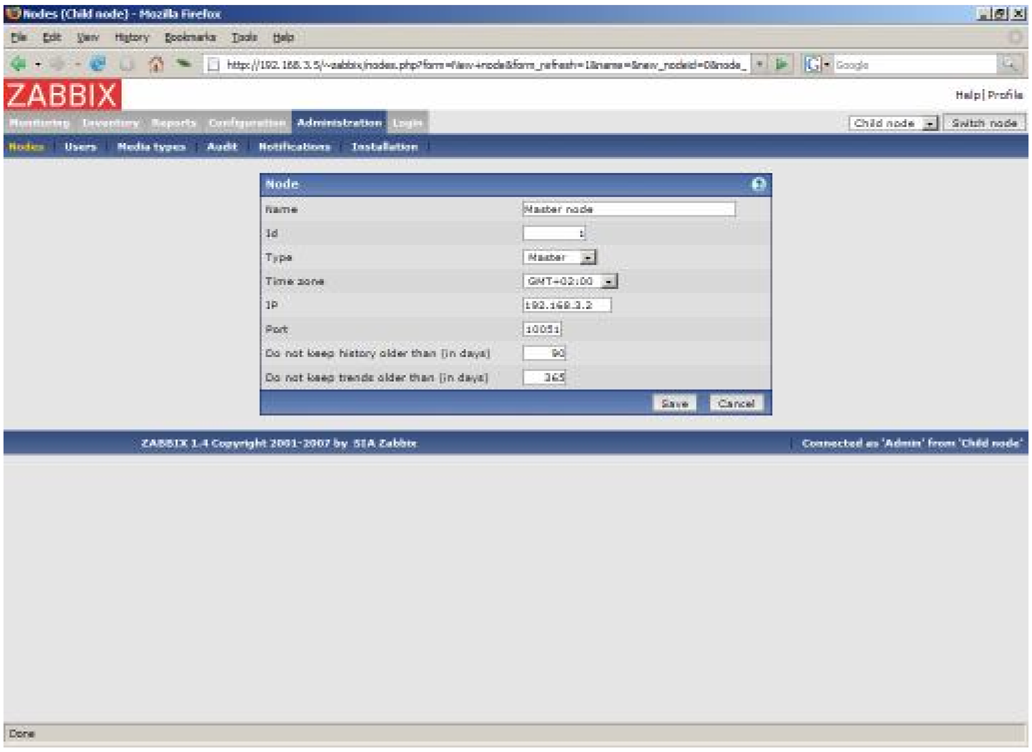
Step 4 Configure Node parameters.


Nodes (Local node) - Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://192.168.3.5/~zabbix/nodes.php?&form=update&nodeid=2
ZABBIX
Help | Profile
Monitoring Inventory Reports Configuration Administration Login
Local node
Switch node
Nodes | Users | Media types | Audit | Notifications | Installation
Save
Cancel
ZABBIX 1.4 Copyright 2001-2007 by SIA Zabbix
Connected as 'Admin' from 'Local node'
Done

Node "Local node"

Name	Child node
Id	2
Type	Local
Time zone	GMT+02:00
IP	192.168.3.5
Port	15052
Do not keep history older than (in days)	30
Do not keep trends older than (in days)	365

Step 5 Add master node.


Nodes (Child node) - Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://192.168.3.5/~zabbix/nodes.php?form=New+node&form_refresh=1&name=&new_nodeid=0&node_
ZABBIX
Help | Profile
Monitoring Inventory Reports Configuration Administration Login
Child node
Switch node
Nodes Users Media types Audit Notifications Installation
Save
Cancel
ZABBIX 1.4 Copyright 2001-2007 by SIA Zabbix
Connected as 'Admin' from 'Child node'
Done

Node	
Name	Master node
Id	1
Type	Master
Time zone	GMT+02:00
IP	192.168.3.2
Port	10051
Do not keep history older than (in days)	90
Do not keep trends older than (in days)	365

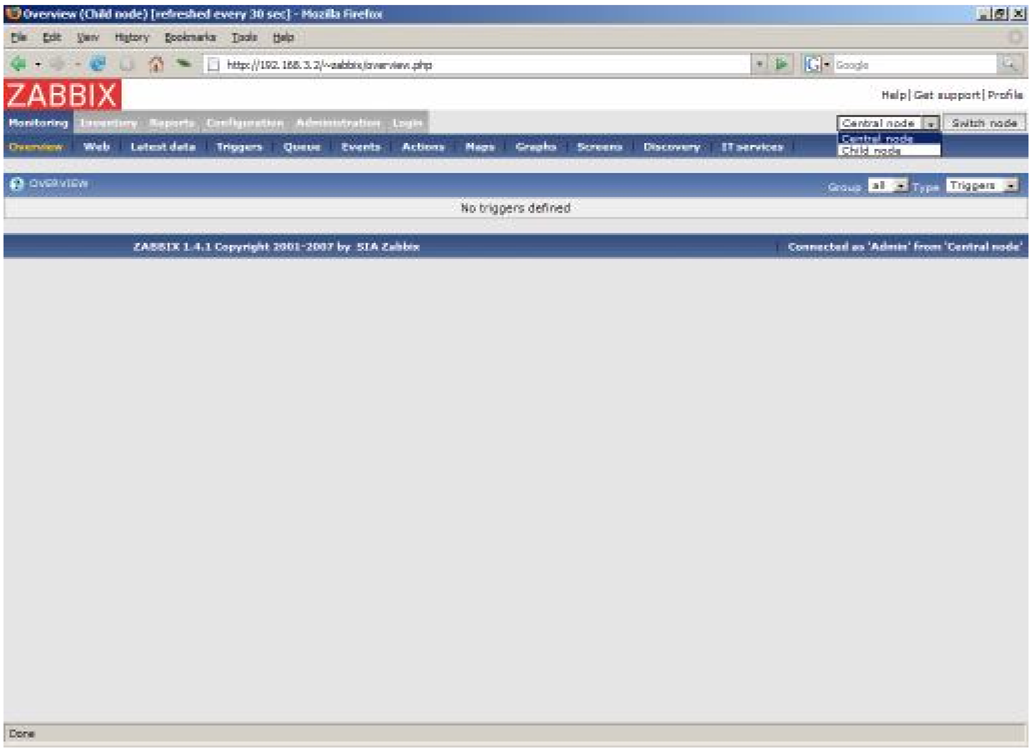
Step 6	Start Child Node.

We should see NodeID in stratup messages of server log file:

```
27524:20070629:150622 server #9 started [Node watcher. Node ID:2]
```

Does it work?

Selection of active nodes will appear automatically after nodes are defined:



Overview (Child node) [refreshed every 30 sec] - Mozilla Firefox

http://192.168.3.2/~zabbix/overview.php

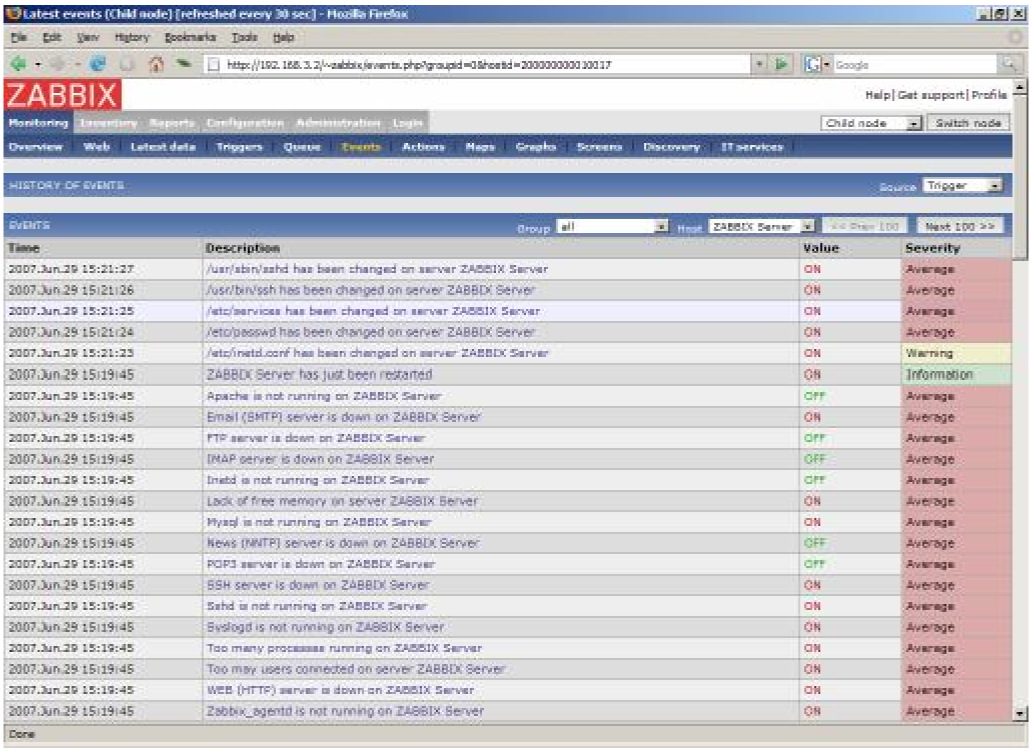
OVERVIEW — Group: all — Type: Triggers

No triggers defined

ZABBIX 1.4.1 Copyright 2001-2007 by SIA Zabbix — Connected as 'Admin' from 'Central node'

Help | Get support | Profile
Monitoring Inventory Reports Configuration Administration Login
Central node
Child node
Switch node
Overview Web Latest data Triggers Queue Events Actions Maps Graphs Screens Discovery IT services
Done

Add host for monitoring for Child Node node and see events coming to Master Node:



Latest events (Child node) [refreshed every 30 sec] - Mozilla Firefox

http://192.168.3.2/~zabbix/events.php?groupid=0&hostid=200000000010017

HISTORY OF EVENTS — Source: Trigger

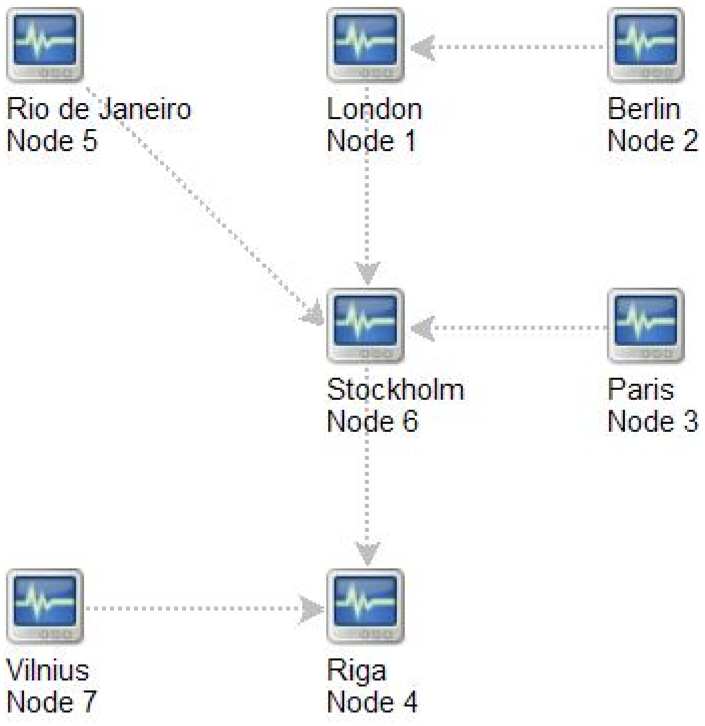
EVENTS — Group: all — Host: ZABBIX Server

Time	Description	Value	Severity
2007.Jun.29 15:21:27	/usr/sbin/sshd has been changed on server ZABBIX Server	ON	Average
2007.Jun.29 15:21:26	/usr/bin/ssh has been changed on server ZABBIX Server	ON	Average
2007.Jun.29 15:21:25	/etc/services has been changed on server ZABBIX Server	ON	Average
2007.Jun.29 15:21:24	/etc/passwd has been changed on server ZABBIX Server	ON	Average
2007.Jun.29 15:21:23	/etc/inetd.conf has been changed on server ZABBIX Server	ON	Warning
2007.Jun.29 15:19:45	ZABBIX Server has just been restarted	ON	Information
2007.Jun.29 15:19:45	Apache is not running on ZABBIX Server	OFF	Average
2007.Jun.29 15:19:45	Email (SMTP) server is down on ZABBIX Server	ON	Average
2007.Jun.29 15:19:45	FTP server is down on ZABBIX Server	OFF	Average
2007.Jun.29 15:19:45	IMAP server is down on ZABBIX Server	OFF	Average
2007.Jun.29 15:19:45	Inetd is not running on ZABBIX Server	OFF	Average
2007.Jun.29 15:19:45	Lack of free memory on server ZABBIX Server	ON	Average
2007.Jun.29 15:19:45	Mysql is not running on ZABBIX Server	ON	Average
2007.Jun.29 15:19:45	News (NNTP) server is down on ZABBIX Server	OFF	Average
2007.Jun.29 15:19:45	POP3 server is down on ZABBIX Server	OFF	Average
2007.Jun.29 15:19:45	SSH server is down on ZABBIX Server	ON	Average
2007.Jun.29 15:19:45	Sshd is not running on ZABBIX Server	ON	Average
2007.Jun.29 15:19:45	Syslogd is not running on ZABBIX Server	ON	Average
2007.Jun.29 15:19:45	Too many processes running on ZABBIX Server	ON	Average
2007.Jun.29 15:19:45	Too may users connected on server ZABBIX Server	ON	Average
2007.Jun.29 15:19:45	WEB (HTTP) server is down on ZABBIX Server	ON	Average
2007.Jun.29 15:19:45	Zabbix_agentd is not running on ZABBIX Server	ON	Average

Help | Get support | Profile
Monitoring Inventory Reports Configuration Administration Login
Child node
Switch node
Overview Web Latest data Triggers Queue Events Actions Maps Graphs Screens Discovery IT services
<< Prev 100
Next 100 >>
Done

12.3.3. More complex setup

The setup consists of seven Nodes. Each Node may be configured either locally (using local WEB interface) or from one of its Master Nodes.



In this example, Riga (node 4) will collect events from all child nodes. It may also optionally collect historical information as well.

12.4. Platform independence

A node may use its own platfom (OS, hardware) and database engine independently of other nodes. Also child nodes can be installed without ZABBIX frontend.

It may be practical to use less powerful hardware with ZABBIX Server running SQLite or MySQL MyISAM while nodes of higher levels may use combination of a better hardware with MySQL InnoDB, Oracle or PostgreSQL backend.

12.5. Configuration of a single Node

Every Node in distributed environment must be properly configured to have a unique Node ID.

Additional steps

Step 1	Follow standard installation procedure.

Follow standard installation procedure but do not start ZABBIX Server. ZABBIX front end must be installed and configured. ZABBIX database must be created and populated with data from data.sql.

Step 2 Configure zabbix_server.conf.

Add `NodeID` to ZABBIX Server configuration file. `NodeID` must be a unique Node ID.

Step 3 Configure Master and Child Nodes.

Use ZABBIX Frontend to configure details of Nodes having direct communication with the Node. Make sure that all IP addresses and port numbers are correct.

Step 4 Start ZABBIX Node.

Start ZABBIX Server:

```
shell> ./zabbix_server
```

If everything was configured properly, ZABBIX node will automatically start configuration and data exchange with all nodes in distributed setup. You may see the following messages in server log file:

```
...
11656:20061129:171614 NODE 2: Sending data of node 2 to node 1
datalen 3522738
11656:20061129:171614 NODE 2: Sending data of node 2 to node 1
datalen 20624
...
```

12.6. Switching between nodes

When connecting to a node in distributed setup, a list of available child nodes is accessible in right-upper corner of the GUI. It displays current node.

All information available in the GUI belongs to the selected node.

12.7. Data flow

12.7.1. Child to Master

Each Child Node periodically sends configuration changes, historical data and events to its Master Node.

Data	Frequency
Configuration changes	Every 120 seconds.
Events	Every 10 seconds.
History	Every 10 seconds.

Child Node will resend data in case of communication problems.

Trend are calculated locally based on received historical data.

ZABBIX does not send operational data across the nodes. For example, item-related information (last check, last value, etc) exists only locally.

Note: Sending of Events and History can be controlled by configuration parameters **NodeNoEvents** and **NodeNoHistory.**

12.7.2. Master to Child

Each Master Node (a node with at least one child) periodically sends configuration changes to Child Nodes either directly or via other Child Nodes directly connected to the Master Node.

Data	Frequency
Configuration changes	Every 120 seconds.

ZABBIX does not send configuration of a Master Node to Childs.

12.7.3. Firewall settings

Inter-node communications use TCP protocol only.

Data flow	Source port	Destination port
Child to Master	Any	10051
Master to Child	Any	10051

This is default port used by ZABBIX trapper process.

12.8. Performance considerations

Any node requires more processing resources in a distributed setup. Master Node must be powerful enough to process and store not only local data but also data received from its all Child Nodes. Network communications must be also fast enough for timely transfer of new data.

13. WEB Interface

14. Performance Tuning

14.1. Real world configuration

Server with ZABBIX 1.0 installed (RedHat Linux 8.0, kernel 24.18-14, MySQL/MyISAM 3.23.54a-4, Pentium IV 1.5Ghz, 256Mb, IDE) is able to collect more than 200 parameters per second from servers being monitored (assuming no network delays).

How many servers can be monitored by ZABBIX on the hardware, one may ask? It depends on number of monitored parameters and how often ZABBIX should acquire these parameters. Suppose, each server you monitor has ten parameters to watch for. You want to update these parameters once in 30 seconds. Doing simple calculation, we see that ZABBIX is able to handle 600 servers (or 6000 checks). In case if these parameters need to be updated once in a minute, the hardware configuration will be able to handle 600x2=1200 servers. These calculations made in assumption that all monitored values are retrieved as soon as required (latency is 0). If this is not a requirement, then number of monitored servers can be increased even up to 5x-10x times.

14.2. Performance tuning

14.2.1. Hardware

General advices on hardware:

- Use fastest processor available
- SCSI or SAT 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
- User fast RAID storage
- Use fast Ethernet adapter
- Having more memory is always better

14.2.2. 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].

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.

14.2.3. Database Engine

This is probably most important part of ZABBIX tuning. ZABBIX heavily depends on availability and performance of database engine.

- use fastest database engine, i.e. MySQL
- 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.
- keep database tables on differend hard disks
- 'history', 'history_str, 'items' 'functions', triggers', and 'trends' are most heavily used tables.

14.2.4. General advices

- monitor required parameters only
- tune ‘Update interval’ for all items. Keeping small update interval may be good for nice graphs, however, this may over load ZABBIX
- tune parameters for default templates
- tune housekeeping parameters
- do not monitor parameters wich return same information.

Example: why use system[procload],system[procload5] andsystem[procload15] if system[procload] contains all.

- avoid use of triggers with long period given as function argument. For example, max(3600) will be calculated significantly slower than max(60).

15. Troubleshooting

15.1. General advices

16. Cookbook

16.1. GENERAL RECIPES

16.1.1. Monitoring of server's availability

At least three methods (or combination of both methods) may be used in order to monitor availability of a server.

- ICMP ping (Key "icmpping")
- Key "status"
- Trigger function nodata() for monitoring availability of hosts using only active checks

16.1.2. 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 https://sourceforge.net/forum/message.php?msg_id=2721722.

16.2. MONITORING OF SPECIFIC APPLICATIONS

16.2.1. AS/400

IBM AS/400 platform can be monitored using SNMP. More information is available at http://publi b.boulder.ibm.com/Redbooks.nsf/RedbookAbstracts/sg244504.html?Open.

16.2.2. MySQL

Configuration file misc/conf/zabbix_agentd.conf contains list of parameters that can be used for monitoring of MySQL.

```
### Set of parameter 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 -f1 -d”T”
#UserParameter=mysql[threads],mysqladmin -uroot status|cut f3 -d”:”|cut -f1 -d”Q”
#UserParameter=mysql[questions],mysqladmin -uroot status|cut f4 -d”:”|cut -f1 -d”S”
#UserParameter=mysql[slowqueries],mysqladmin -uroot status|cut f5 -d”:”|cut -f1 -d”O”
#UserParameter=mysql[qps],mysqladmin -uroot status|cut -f9 d”:”
#UserParameter=version[mysql],mysql -V
```

mysql[ping]

Check, if 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

  Example: mysql Ver 11.16 Distrib 3.23.49, for pc-linux-gnu (i686)

16.2.3. Mikrotik routers

Use SNMP agent provided by Mikrotik. See http://www.mikrotik.com for more information.

16.2.4. WIN32

Use ZABBIX W32 agent included (pre-compiled) into ZABBIX distribution.

16.2.5. Novell

Use MRTG Extension Program for NetWare Server (MRTGEXT.NLM) agent for Novell. The agent is compatible with protocol used by ZABBIX. It is available from http://forge.novell.com/modules/xfmod/project/?mrtgext.

Items have to be configured of type ZABBIX Agent and must have keys according to the MRTGEXT documentation.

For example:

* UTIL1

  1 minute average CPU utilization

* CONNMAX

Max licensed connections used

* VFKSys

bytes free on volume Sys:

Full list of parameter supported by the agent can be found in readme.txt, which is part of the software.

16.2.6. 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.

16.2.7. 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.

16.2.8. JMX

First of all, you need to configure your jvm to allow jmx monitoring. How do you know if you can do this? You can use the sun jconsole utility that comes with the jdk and point it at your machine running the jvm. If you can connect, you are good.

In my tomcat environment, I enable it by setting the following options for the jvm:

```
-Dcom.sun.management.jmxremote \
-Dcom.sun.management.jmxremote.port=xxxxx \
-Dcom.sun.management.jmxremote.ssl=false \
-Dcom.sun.management.jmxremote.authenticate=true \
```

-
Dcom.sun.management.jmxremote.password.file=/path/java/jre/lib/management/jmxremote. password"

This tells the jmx server to run on port XXXXX, to use password authentication, and to refer to the passwords stored in the jmxremote.password file. See the sun docs on jconsole for details. (You might consider enabling ssl to make the connection more secure.)

Once that is done, I can then run jconsole and see everything that is currently exposed (and to verify that I can connect properly). jconsole will also provide you the information you need to query specific jmx attributes from the information tab.

Now, since I use Tomcat, there are two ways that I can grab the jmx attribute values (or effect a jmx operation). The first way is I can use the servlet provided by Tomcat. (Don't know what jboss has). The second way is I can send well formatted requests via a jmx command line tool.

Let's say I am interested in peak threads used by the system. I browse down through the jmx objects via jconsole, find it under java.lang, Threading. After selecting Threading, I click on the info tab, and I can see the name of the mbean is "java.lang:type=Threading"

With tomcat, I can do the following:

curl -s -u<jmxusername>:<jmxpassword> 'http://<tomcat_hostname>/manager/jmxproxy/?qry=java.lang:type=Threading'

where the jmx username and password are the ones defined in the file defined in the jvm options above, the qry string is the one obtained from jconsole.

The output from this will be all the metrics from this jmx key. Parse the output and grab the number of your choice.

If you don't have a servlet that will allow you to make a http request to the jmx interface, you can use the command line tool like this

```
/<pathTo>/java -jar /<pathTo>/cmdline-jmxclient.jar <jmxusername>:<jmxpassword> <jvmhostname>:<jmxport> java.lang:type=Threading PeakThreadCount
```

The difference with the command line client is you need to specify the attribute you are interested in specifically. Leaving it out will give you a list of all the attributes available under Threading.

Again, parse the output for the data of your choice.

Once you can reliably grab the data you are interested in, you can then turn that command into a zabbix userparm.

e.g.

```
UserParameter=jvm.maxthreads, /usr/bin/curl -s -u<jmxusername>:<jmxpassword> 'http://<tomcat_hostname>/manager/jmxproxy/?qry=java.lang:type=Threading' | /bin/awk '/^PeakThreadCount\:/ { gsub( /[^0123456789]/, "" ); print $1 }'
```

or

```
UserParameter=jvm.maxthreads, /<pathTo>/java -jar /<pathTo>/cmdline-jmxclient.jar <jmxusername>:<jmxhostname> <jvmhostname>:<jmxport> java.lang:type=Threading PeakThreadCount | <some filter to grab just the number you need - left as an exercise to the reader>
```

That's it.

I prefer getting my stats from the servlet via http rather than using the java command line client as it is much "lighter" to start up and grab the information.

Need a command line jmx client? I use the one from here:

http://crawler.archive.org/cmdline-jmxclient/

Information on setting up jmx monitoring for your jvms

http://java.sun.com/j2se/1.5.0/docs...ment/agent.html

General Information on JMX

http://java.sun.com/j2se/1.5.0/docs...verviewTOC.html

PS: apparently the 1.5 jvm also supports snmp which provides another option.

16.3. INTEGRATION

16.3.1. 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.

17. Licence

all the rights that you have. You must make sure that they, too, receive or can get the source code. And you must show them these terms so they know their rights.

We protect your rights with two steps: (1) copyright the software, and (2) offer you this license which gives you legal permission to copy, distribute and/or modify the software.

Also, for each author's protection and ours, we want to make certain that everyone understands that there is no warranty for this free software. If the software is modified by someone else and passed on, we want its recipients to know that what they have is not the original, so that any problems introduced by others will not reflect on the original authors' reputations.

Finally, any free program is threatened constantly by software patents. We wish to avoid the danger that redistributors of a free program will individually obtain patent licenses, in effect making the program proprietary. To prevent this, we have made it clear that any patent must be licensed for everyone's free use or not licensed at all.

The precise terms and conditions for copying, distribution and modification follow.

TERMS AND CONDITIONS FOR COPYING, DISTRIBUTION AND MODIFICATION

0. This License applies to any program or other work which contains a notice placed by the copyright holder saying it may be distributed under the terms of this General Public License. The "Program", below, refers to any such program or work, and a "work based on the Program" means either the Program or any derivative work under copyright law: that is to say, a work containing the Program or a portion of it, either verbatim or with modifications and/or translated into another language. (Hereinafter, translation is included without limitation in the term "modification".) Each licensee is addressed as "you".

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running the Program is not restricted, and the output from the Program is covered only if its contents constitute a work based on the Program (independent of having been made by running the Program). Whether that is true depends on what the Program does.

the same sections as part of a whole which is a work based on the Program, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Program.

In addition, mere aggregation of another work not based on the Program with the Program (or with a work based on the Program) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

3. You may copy and distribute the Program (or a work based on it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you also do one of the following:

* a) Accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange; or,

* b) Accompany it with a written offer, valid for at least three years, to give any third party, for a charge no more than your cost of physically performing source distribution, a complete machine-readable copy of the corresponding source code, to be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange; or,

* c) Accompany it with the information you received as to the offer to distribute corresponding source code. (This alternative is allowed only for noncommercial distribution and only if you received the program in object code or executable form with such an offer, in accord with Subsection b above.)

The source code for a work means the preferred form of the work for making modifications to it. For an executable work, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the executable. However, as a special exception, the source code distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

If distribution of executable or object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place counts as distribution of the source code, even though third parties are not compelled to copy the source along with the object code.

4. You may not copy, modify, sublicense, or distribute the Program except as expressly provided under this License. Any attempt otherwise to copy, modify, sublicense or distribute the Program is void, and will automatically terminate your rights under this License. However, parties who have received copies, or rights, from you under this License will not have their licenses terminated so long as such parties remain in full compliance.

5. You are not required to accept this License, since you have not signed it. However, nothing else grants you permission to modify or distribute the Program or its derivative works. These actions are prohibited by law if you do not accept this License. Therefore, by modifying or distributing the Program (or any work based on the Program), you indicate your acceptance of this License to do so, and all its terms and conditions for copying, distributing or modifying the Program or works based on it.

6. Each time you redistribute the Program (or any work based on the Program), the recipient automatically receives a license from the original licensor to copy, distribute or modify the Program subject to these terms and conditions. You may not impose any further restrictions on the recipients' exercise of the rights granted herein. You are not responsible for enforcing compliance by third parties to this License.

7. If, as a consequence of a court judgment or allegation of patent infringement or for any other reason (not limited to patent issues), conditions are imposed on you (whether by court order, agreement or otherwise) that contradict the conditions of this License, they do not excuse you from the conditions of this License. If you cannot distribute so as to satisfy simultaneously your obligations under this

License and any other pertinent obligations, then as a consequence you may not distribute the Program at all. For example, if a patent license would not permit royalty-free redistribution of the Program by all those who receive copies directly or indirectly through you, then the only way you could satisfy both it and this License would be to refrain entirely from distribution of the Program.

If any portion of this section is held invalid or unenforceable under any particular circumstance, the balance of the section is intended to apply and the section as a whole is intended to apply in other circumstances.

It is not the purpose of this section to induce you to infringe any patents or other property right claims or to contest validity of any such claims; this section has the sole purpose of protecting the integrity of the free software distribution system, which is implemented by public license practices. Many people have made generous contributions to the wide range of software distributed through that system in reliance on consistent application of that system; it is up to the author/donor to decide if he or she is willing to distribute software through any other system and a licensee cannot impose that choice.

This section is intended to make thoroughly clear what is believed to be a consequence of the rest of this License.

8. If the distribution and/or use of the Program is restricted in certain countries either by patents or by copyrighted interfaces, the original copyright holder who places the Program under this License may add an explicit geographical distribution limitation excluding those countries, so that distribution is permitted only in or among countries not thus excluded. In such case, this License incorporates the limitation as if written in the body of this License.

9. The Free Software Foundation may publish revised and/or new versions of the General Public License from time to time. Such new versions will be similar in spirit to the present version, but may differ in detail to address new problems or concerns.

Each version is given a distinguishing version number. If the Program specifies a version number of this License which applies to it and "any later version", you have the option of following the terms and conditions either of that version or of any later version published by the Free

Software Foundation. If the Program does not specify a version number of this License, you may choose any version ever published by the Free Software Foundation.

10. If you wish to incorporate parts of the Program into other free programs whose distribution conditions are different, write to the author to ask for permission. For software which is copyrighted by the Free Software Foundation, write to the Free Software Foundation; we sometimes make exceptions for this. Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally.

NO WARRANTY

11. BECAUSE THE PROGRAM IS LICENSED FREE OF CHARGE, THERE IS NO WARRANTY FOR THE PROGRAM, TO THE EXTENT PERMITTED BY APPLICABLE LAW. EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND/OR OTHER PARTIES PROVIDE THE PROGRAM "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE PROGRAM IS WITH YOU. SHOULD THE PROGRAM PROVE DEFECTIVE, YOU ASSUME THE COST OF ALL NECESSARY SERVICING, REPAIR OR CORRECTION.

12. IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT HOLDER, OR ANY OTHER PARTY WHO MAY MODIFY AND/OR REDISTRIBUTE THE PROGRAM AS PERMITTED ABOVE, BE LIABLE TO YOU FOR DAMAGES, INCLUDING ANY GENERAL, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE PROGRAM (INCLUDING BUT NOT LIMITED TO LOSS OF DATA OR DATA BEING RENDERED INACCURATE OR LOSSES SUSTAINED BY YOU OR THIRD PARTIES OR A FAILURE OF THE PROGRAM TO OPERATE WITH ANY OTHER PROGRAMS), EVEN IF SUCH HOLDER OR OTHER PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

END OF TERMS AND CONDITIONS

18. Contribute

There are several ways to contribute to the project:

- Share your experience

We are extremely interested in your experience of using ZABBIX. It gives very useful information that allows us make the software better. It also helps justify priorities for the feature requests.

- Write review

ZABBIX is relatively new software and many people are not aware of its existence. It would be very beneficial for the project to be mentioned in popular tech media. Comparison to existing Open Source and commercial competitive products is especially welcome. My assistance is guaranteed!

- Report bugs

Please, report any bugs or inefficiencies of the software. It is not necessary to send patches or workarounds.

- Write code

Before sending a patch or a piece of code, please, make sure that:

- new code is in sync with ZABBIX coding conventions
- new code is tested and works under all supported platforms. Report any compatibility issues.
- new functionality is clearly described
- no copyright issues associated with your work

Please, consider discussing your ideas with ZABBIX developers before writing actual code.

I believe this policy guarantees high quality of the software and makes support more efficient.

My wish list at Amazon.com

If ZABBIX just saved you from a disaster or if you want to be nice to me, you can purchase something from my wish list at Amazon.com available at

http://www.amazon.com/exec/obidos/wishlist/2MXT84ZA4ZNNA

Thanks to all who sent me something from Amazon!

- Charlie Collins, USA
- Henrik Huhtinen, Finland
- Jaroslaw Pioro, Poland
- Julian Pawlowski, Virtual-Planet Group GmbH, Germany
- Ken Smith, USA
- Plushosting B.V., Netherlands
- Abdourahmane SECK, Senegal

Contributors

Please, see ZABBIX Manual for a complete list of contributors.

WEB Hosting

WEB Hosting is freely provided by Clearcut Networks. Check it out if you want an affordable hosting in Netherlands.

19. Credits

ZABBIX team wants to thank the guys from http://sourceforge.net for providing hosting for the project. Our team also wants to thank all the ZABBIX users who have sent corrections and suggestions. This sort of feedback helps us make the software better.

19.1. Developers of ZABBIX

- ALEXEI VLADISHEV

Author of ZABBIX, has written most of ZABBIX code including PHP front-end.

- EUGENY GRIGORJEV

Many significant improvements mostly related to PHP front-end and ZABBIX agents.

19.2. Contributors to ZABBIX

I am sorry for not mentioning all who contributed to ZABBIX/

In alphabetical order:

- ALEXANDER KALIMULIN

Help with various issues related to C, C functions, etc

- ALEXANDER KIRHENSTEIN

Suggested fixes to make ZABBIX work under SCO.

- ARTURS ABOLTINS

Patch to allow connection to MySQL using UNIX socket. Support for graceful shutdown in case MySQL server goes down (not implemented yet). Idea and initial code for ZABBIX screens.

- CHARLIE COLLINS

Start-up scripts. Significant improvements of the Manual. Thanks Charlie!

- DENIS USTIMENKO

Support for querying SNMP parameters by IP address.

- DANIEL ESTER

Support for SNMP values of type timetick.

- DANIEL HIGGINS

Improvements for email sending routines. Other changes.

- ERIK CARLSEEN

Many excellent ideas.

- EUGENY BACULA

Many suggestions for improvements.

- FRANKY VAN LIEDEKERKE

Support of system[uptime] under Solaris. Fixes and suggestions.

- HARALD HOLZER

RPMs and zabbix.spec.

- IGOR MICKO

Plenty of interesting ideas based on real use of ZABBIX in large monitoring environment.

- JAEN-BAPTISTE MARIOTTE

Help with testing

- JEFF REDDING

Support for non-GCC compilers

- JOHN CRUNK

Start-up scripts for RedHat 8.0

- JOSH KONKOL

Help with testing

- JURGEN SCHMITZ

Idea and implementation of check_service_perf[*]

- KASPARS CIKMACS

Lots of new ideas based on real experience of using ZABBIX.

- LAURIS STIGLICS

Select criteria in for “Status of Triggers”

- LUKAS MACURA

Many ideas.

- MARC LEDENT

Original implementation of proc_cnt[*] for Solaris.

- MARIUSZ ...

Support for system[procload] on Solaris 2.6. Improvements for graphs. Improvements for system maps.

- MICHAL SUSZYCKI

Help with autoconf and automake issues.

- MIKE HOOLEHAN

Help with making the ZABBIX Manual correct and understandable.

- OLIVER SIEGMAR

Fixes in SQL statements of WEB frontend.

- RICKARD PLARS

Help with fixing coredump for zabbix_suckerd.

- SEBASTIEN “SLIX” LIENARD

Fixed selection of hosts and icons in sysmap.php. Other fixes.

- SHAWN MARRIOTT

Proofreading of the Manual.

- VICTOR KIRHENSTEIN

Native ZABBIX agent for WIN32 platforms.

ZABBIX

ZABBIX SIA

Neretas 2/1-109,

LV-1004,

Riga, Latvia

Tel +371 7473943

Fax +371 7473944

Email **sales@zabbix.com**

Web www.zabbix.com