

# IT Infrastructure Administration

## Day X: Infrastructure Monitoring

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# Infrastructure Monitoring

Day 14  
Training Outline

Observability and Monitoring

Zabbix

Basic Architecture

Data collection

Problem Detection

Visualization

- Latest data

- Graphs

- Problems

- Maps

- Dashboard

Alert and Notification

Auto-discovery

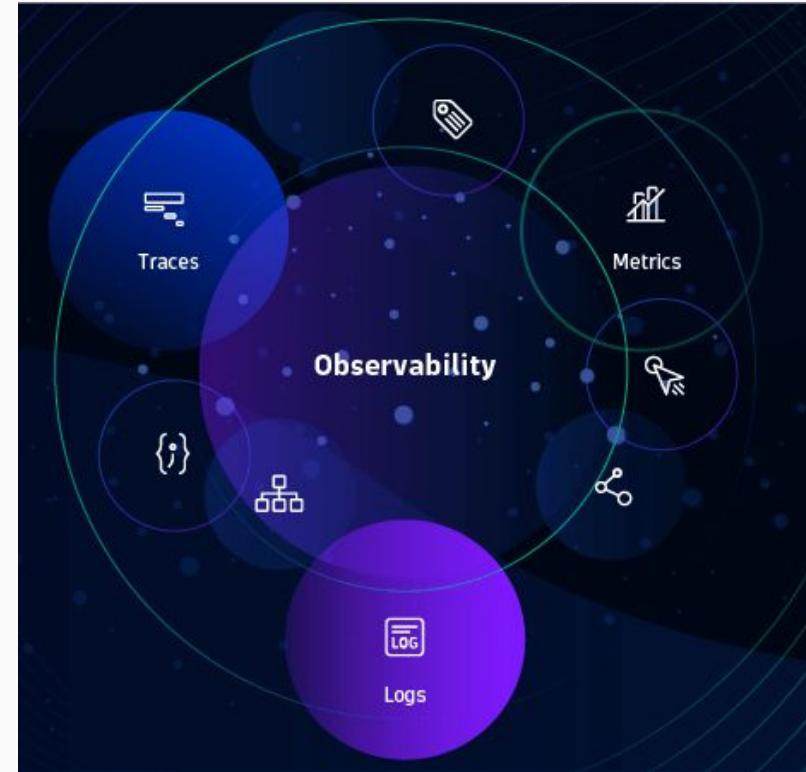
Installation and Deployment

# Observability and Monitoring

In virtualized infrastructure **observability** and **monitoring** are two distinct data-based processes.

We use them to successfully **maintain and manage the health and performance** of distributed micro service architecture and their infrastructure.

Monitoring the process of collecting data and generating reports on different metrics that define system health is an important task



# Observability and Monitoring

## The need for Observability and Monitoring

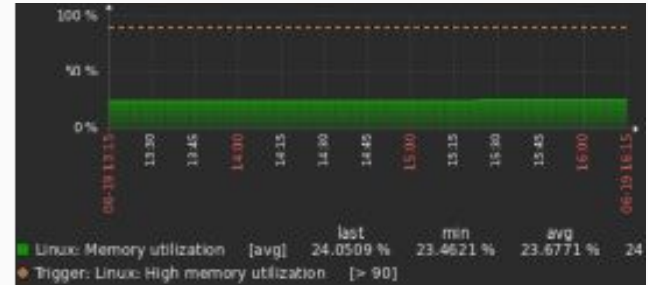
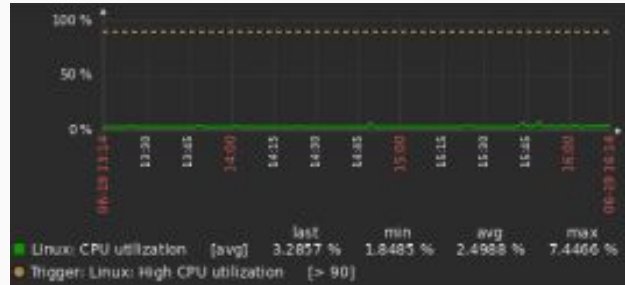
- **Real-time** monitoring of various metrics
- Performance **analytics**
- Speed up **troubleshooting**
- Improve cross-team collaboration by providing **alerting and notifications**



# Observability and Monitoring

## Important Metrics to collect when Monitoring a cloud instance

- CPU utilization
- Memory utilization
- Disk Utilization
- System Up-time
- Password Hash
- System Load



ZABBIX is an **enterprise-level** monitoring system designed to monitor millions of metrics in real time, collected from tens of thousands of servers, virtual machines, network devices and applications.

## Why Zabbix?

- **Open Source** – Zabbix is purely open source and comes at no cost.
- **Active Monitoring** – You can easily monitor servers, applications and network devices, gathering accurate statistics and performance data
- **Enterprise ready** – Zabbix has been designed to scale from small environments to large environments
- **Capacity Planning** – With the data collected by Zabbix, you will be easy to analyze your infrastructure and plan the capacity accordingly.

# Basic architecture

## Host

Anything you wish to monitor:

Server

Switch

UPS

Application

Database

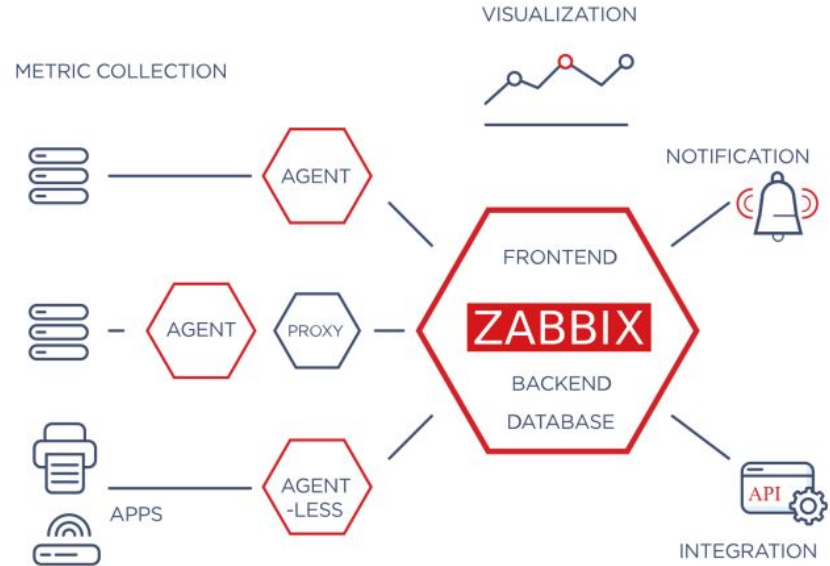
Website

## Agent

Monitoring of devices, resources and applications.

## Proxy

Monitoring of distributed locations.



# Basic architecture

## Server

Data collection

Calculating Triggers

Creating Events

Notification

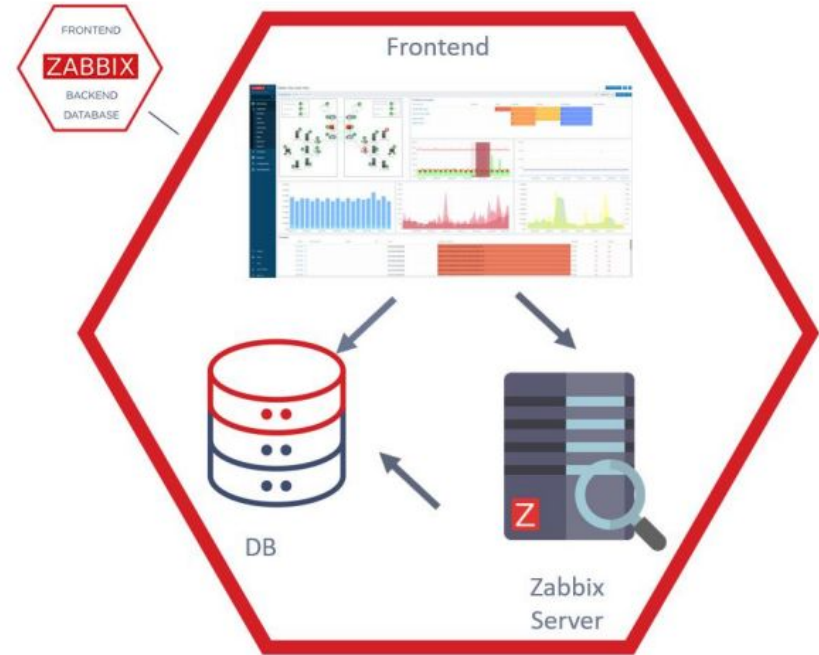
## Frontend

Visualization

Configuration management

## Database

Data storage





# Data collection

## WHAT KIND OF DATA CAN BE COLLECTED

**Services:** availability and the responsiveness of e-mail or web servers.

**Network devices:** network utilization, CPU, memory and port status.

**Virtual machines:** VMware vCenter and vSphere installations for various VMware hypervisor and virtual machine properties and statistics.

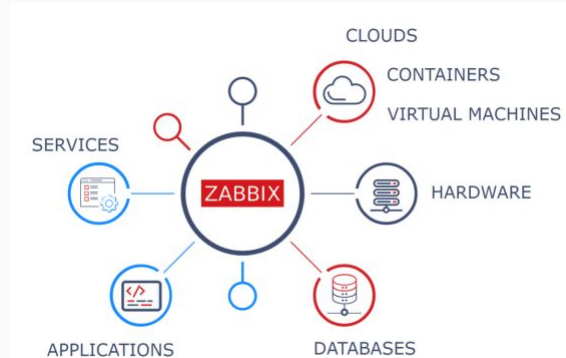
**Databases:** monitor in great detail any database, including MySQL, PostgreSQL, Oracle and Microsoft SQL Server.

**Java Application Server:** monitor JBoss, Tomcat, Oracle Application Server or any other application with the efficient Zabbix Java gateway.

**Web services:** easily monitor availability, response time and download speed of your external website, e-commerce portal or internal wiki and service desk system.

**Hardware:** gather statistics such as temperature, fan speed voltage, and disk state.

**Customized monitoring:** integrate ZABBIX in any environment and gather data from financial systems, environment control systems or even sophisticated research devices.



# Data collection

**Zabbix Agent** can work on different platforms and collect metrics from any device or application on performance and availability.

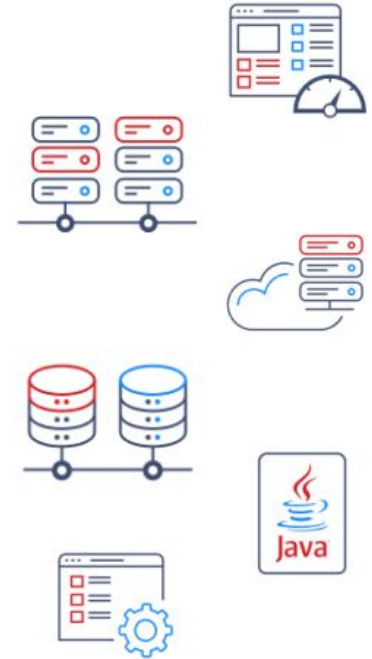
Zabbix Agent supports active/passive checks, is highly efficient



# Data collection

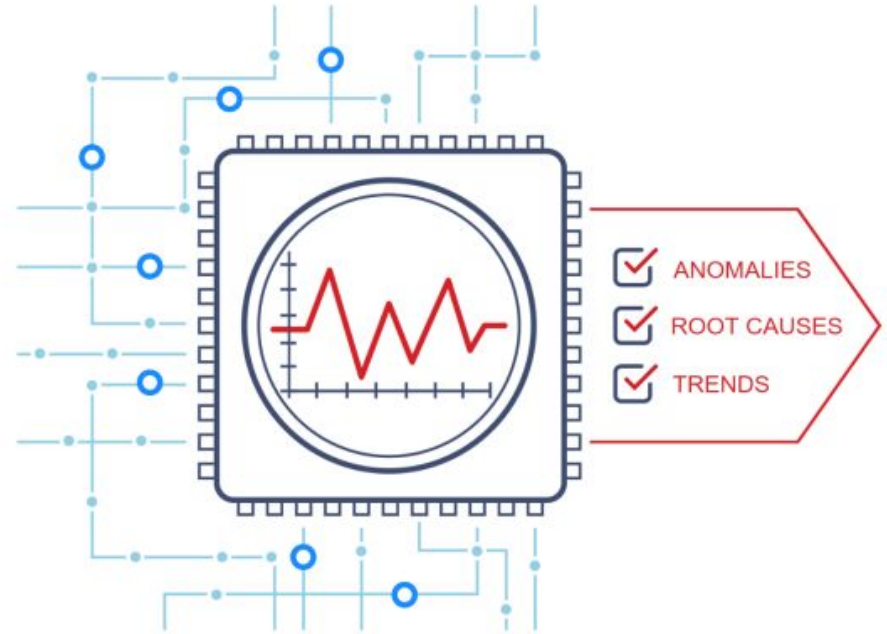
What if **agent** is not an option?

- SNMP, HTTP, IPMI
- Agentless monitoring
- Databases and Java applications
- monitoring
- Custom metrics/scripts
- Aggregation and calculated checks
- VMware monitoring
- Web monitoring



# Problem detection

- Detect problems from the incoming data flow automatically
- Flexible definitions
- Multiple severity levels
- Correlation/root cause analysis
- Anomaly detection
- Trend prediction



# Visualization

Present your IT environment on Web interface using:

- Widget-based dashboards
- Graphs
- Network maps
- Geographical maps
- Slideshows
- Drill-down reports



# Visualization: Latest data

All values in the database are stored as raw and averaged data.

The refresh interval and the storage time is set for each data item separately (or automated through a template).

Automatic database cleaning from old data.

Latest data

Subfilter affects only filtered data

HOSTS  
Certificate Monitoring 13

TAGS  
component 13

TAG VALUES  
component: cert 12 raw 1

DATA  
[With data](#) [Without data](#)

<input type="checkbox"/>	Host	Name ▲	Last check	Last value	Change	Tags	Info
<input type="checkbox"/>	Certificate Monitoring	Expires on	39m 2s	2026-01-15 11:5...		component: cert	Graph
<input type="checkbox"/>	Certificate Monitoring	Fingerprint	39m 2s	310db7af4b2bc...		component: cert	History
<input type="checkbox"/>	Certificate Monitoring	Get				component: raw	
<input type="checkbox"/>	Certificate Monitoring	Issuer	39m 2s	CN=DigiCert GI...		component: cert	History
<input type="checkbox"/>	Certificate Monitoring	Last validation status	39m 2s	certificate verifi...		component: cert	History
<input type="checkbox"/>	Certificate Monitoring	Public key algorithm	39m 2s	ECDSA		component: cert	History
<input type="checkbox"/>	Certificate Monitoring	Serial number	39m 2s	0ad893bafa68b...		component: cert	History
<input type="checkbox"/>	Certificate Monitoring	Signature algorithm	39m 2s	ECDSA-SHA384		component: cert	History
<input type="checkbox"/>	Certificate Monitoring	Subject	39m 2s	CN=*.example.c...		component: cert	History
<input type="checkbox"/>	Certificate Monitoring	Subject alternative name	39m 2s	[*].example.com...		component: cert	History
<input type="checkbox"/>	Certificate Monitoring	Validation result	39m 2s	valid		component: cert	History
<input type="checkbox"/>	Certificate Monitoring	Valid from	39m 2s	2025-01-15 12:...		component: cert	Graph
<input type="checkbox"/>	Certificate Monitoring	Version	39m 2s	3		component: cert	History

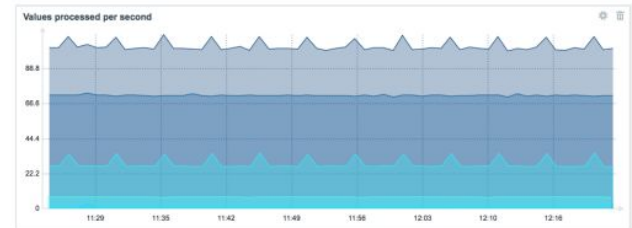
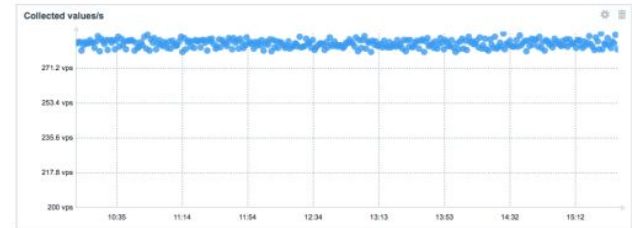
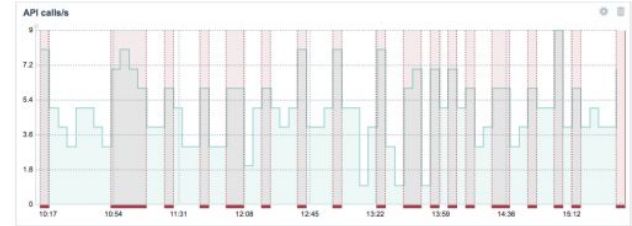
Displaying 13 of 13 found

# Visualization: Graphs

A **standard graph** for a numeric item is available without any configuration at all - these graphs are generated on runtime. In a **custom graph** data of several items can be compared and you can specify the graph style, or the way lines are displayed.

**Ad-hoc graphs** - create a comparison graph for multiple items with little effort and no maintenance.

**Graph** - dashboard widget allows to add data sets and define their visual representation.



# Visualization: Problems

ZABBIX << 3 Problems <span>Export to CSV</span>									
Zabbix production env									
Filter									
Time	Severity	Info	Host	Problem	Duration	Ack	Actions	Tags	
03:38:06 PM	Average		net.mikrotik.450g	Interface ether5 (sfp-sfp+1) Link down	6m 56s	No		Environment: Production Teams: Networking	
03:38:06 PM	Average		net.mikrotik.450g	Interface ether3(1) Link down	6m 56s	No		Environment: Production Teams: Networking	
03:08:32 PM	High		server.hp.proliant-g8	Ambient: Temperature is above critical threshold: >35	36m 30s	No			
03:08:31 PM	High		server.hp.g8	Ambient: Temperature is above critical threshold: >35	36m 31s	No			
03:06:07 PM	Warning		net.mikrotik.91100ah	Device: Temperature is above warning threshold: >50	38m 55s	No			
15:00									
03:54:06 AM	High		net.mikrotik.450g	Device: Temperature is above critical threshold: >60	11h 50m 56s	No		Cloud: No Services: Network	
Today									
04/03/2020 09:49:23 AM	Average		demo1.zabbix.lan	High memory utilization (>90% for 5m)	6d 5h 56m	No			
04/03/2020 09:49:23 AM	Average		Zabbix server	High memory utilization (>90% for 5m)	6d 5h 56m	No			
04/03/2020 09:48:42 AM	Average		DatabaseX	High memory utilization (>90% for 5m)	6d 5h 56m	No			
04/03/2020 07:56:11 AM	Warning		DatabaseX	Disk space is low (used > 80%)	6d 7h 48m	No			
04/03/2020 07:56:07 AM	Warning		Zabbix server	Disk space is low (used > 80%)	6d 7h 48m	No			
04/03/2020 07:56:52 AM	Warning		demo1.zabbix.lan	Disk space is low (used > 80%)	6d 7h 48m	No			
04/03/2020 07:55:24 AM	Warning		Windows2008	Free disk space is less than 20% on volume /	6d 7h 48m	No		Class: Storage Monitoring: Discovery	

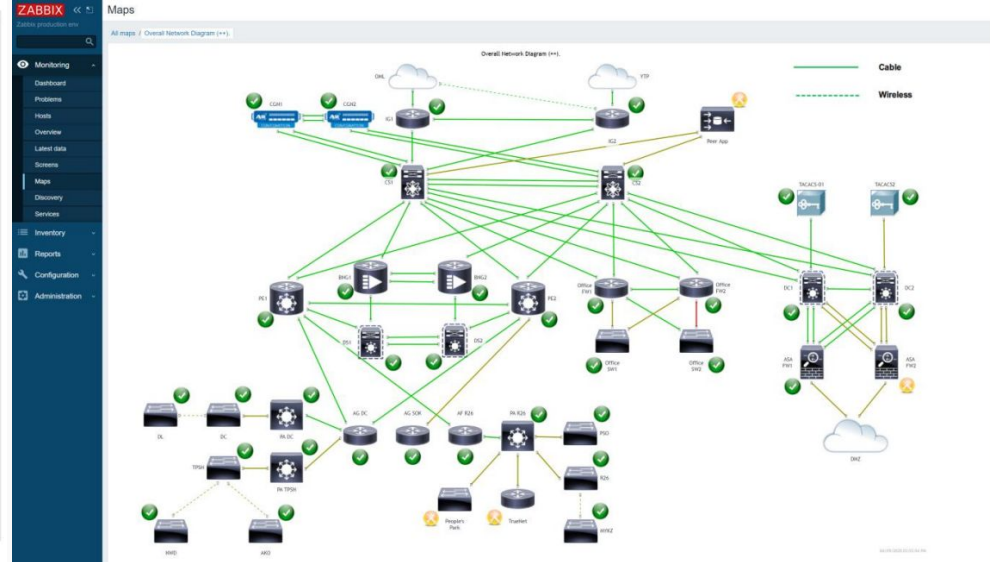
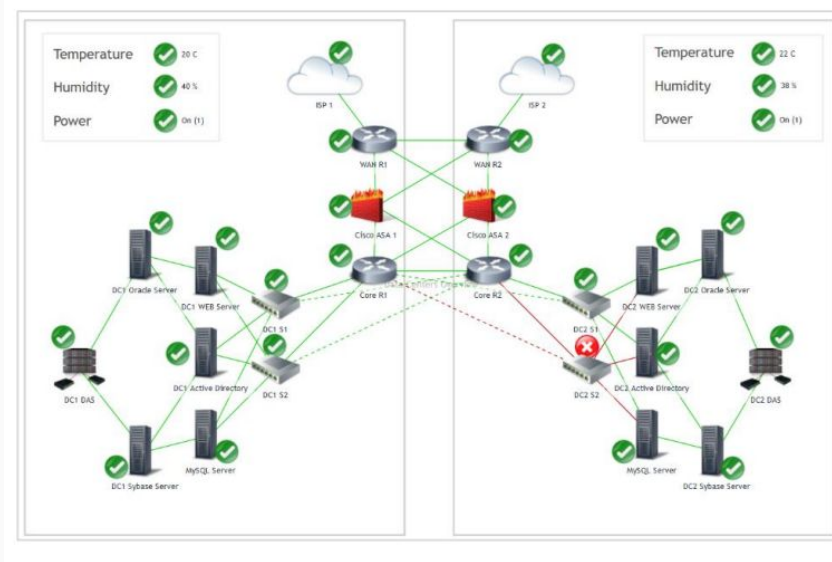
  

ZABBIX << 3 Problems <span>Export to CSV</span>									
Zabbix production env									
Filter									
Time	Severity	Info	Host	Problem	Duration	Ack	Actions	Tags	
03:38:06 PM	Average		net.mikrotik.450g	Interface ether5 (sfp-sfp+1) Link down	9m 34s	No		Environment: Production Teams: Networking	
03:38:06 PM	Average		net.mikrotik.450g	Interface ether3(1) Link down	9m 34s	No		Environment: Production Teams: Networking	
03:06:07 PM	Warning		net.mikrotik.91100ah	Device: Temperature is above warning threshold: >50	47m 33s	No			
03:54:06 AM	High		net.mikrotik.450g	Device: Temperature is above critical threshold: >60	11h 52m 36s	No		Cloud: No Services: Network	
04/03/2020 09:49:23 AM	Average		demo1.zabbix.lan	High memory utilization (>90% for 5m)	6d 5h 52m	No			
04/03/2020 09:49:23 AM	Average		Zabbix server	High memory utilization (>90% for 5m)	6d 5h 52m	No			
04/03/2020 09:48:42 AM	Average		DatabaseX	High memory utilization (>90% for 5m)	6d 5h 52m	No			
04/03/2020 07:56:11 AM	Warning		Zabbix server	Disk space is low (used > 80%)	6d 7h 51m	No			
04/03/2020 07:56:07 AM	Warning		Zabbix server	Disk space is low (used > 80%)	6d 7h 51m	No			
04/03/2020 07:55:52 AM	Warning		demo1.zabbix.lan	Disk space is low (used > 80%)	6d 7h 51m	No			
04/03/2020 07:55:24 AM	Warning		Windows2008	Free disk space is less than 20% on volume /	6d 7h 52m	No		Class: Storage Monitoring: Discovery	
04/03/2020 07:42:23 AM	Information		DatabaseX	Operating system description has changed	6d 8h 5m	No			
04/03/2020 07:31:23 AM	Information		Zabbix server	Operating system description has changed	6d 8h 16m	No			
04/03/2020 07:12:23 AM	Average		net.mikrotik.941-2nD	Interface ether2(1) Link down	6d 8h 34m	No		Environment: Production Teams: Networking	
04/03/2020 07:12:23 AM	Average		net.ZTE	Interface eth0(1) Link down	6d 8h 30m	No		Environment: Production Teams: Networking	
04/03/2020 07:11:42 AM	Information		net.mikrotik.912AG-5nPhG	Interface eth0(1) Ethernet base changed to lower speed than it was before	6d 8h 36m	No		Environment: DEV	
04/03/2020 07:11:32 AM	Average		net.mikrotik.981G-2nD	Interface eth0(1) Link down	6d 8h 36m	No		Environment: Production Teams: Networking	
04/03/2020 06:08:23 AM	High		net.mikrotik.450g	Device: Temperature is above critical threshold: >60	6d 11h 47m	No		Cloud: No Services: Network	
04/03/2020 03:59:23 AM	Average		Testing_JMX_Template	70% mp Survivor Space used on Testing_JMX_Template	6d 11h 47m	No			
04/03/2020 08:21:23 AM	High		net.mikrotik.450g	Device: Temperature is above critical threshold: >60	6d 10h 36m	No		Cloud: No Services: Network	
04/03/2020 03:31:23 AM	Average		Testing_JMX_Template	70% mp Survivor Space used on Testing_JMX_Template	7d 15m	No			



# Visualization: Maps

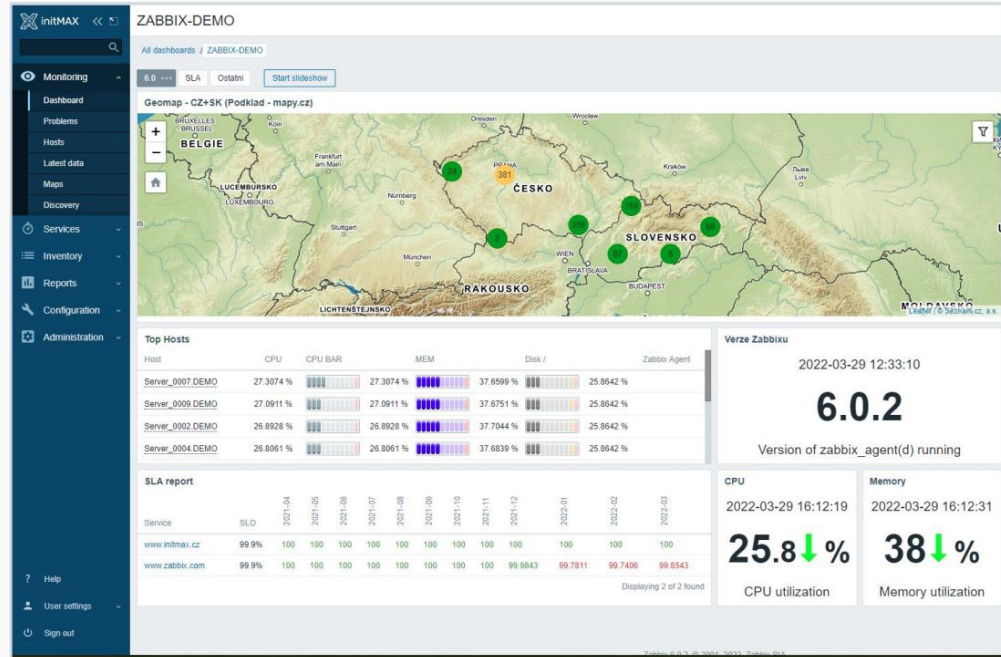
Zabbix network maps offer a possibility of laying out the monitored environment over an optional background image for a user-friendly overview. Each element on the map may represent a host, host group, single trigger, an image or another map.



# Visualization: Dashboards

Zabbix Dashboard is a central place in the web frontend that provides personalized details about the monitored environment:

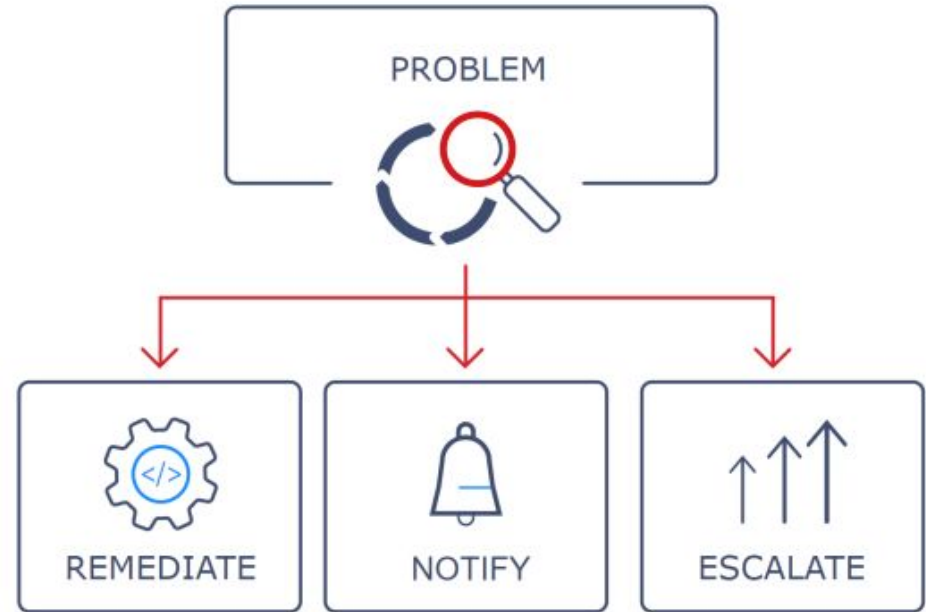
- Drill-down reports
- Maps
- Graphs
- Screens
- Problems
- System status
- Host status
- Status of Zabbix server
- Discovery status
- Web



# Alerting & notifications

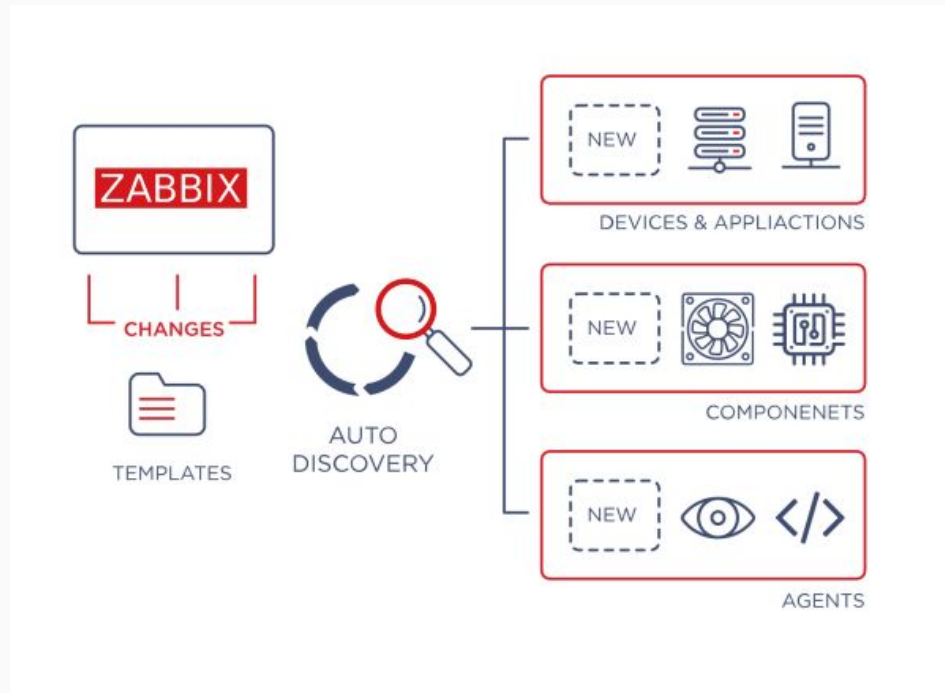
Be notified in case of any issues using different channels:

- Send messages
- Let Zabbix fix issues automatically
- Escalate problems according to flexible user defined Service Levels
- Customize messages based on recipient's role
- Customize messages with runtime and inventory information



# Auto-discovery

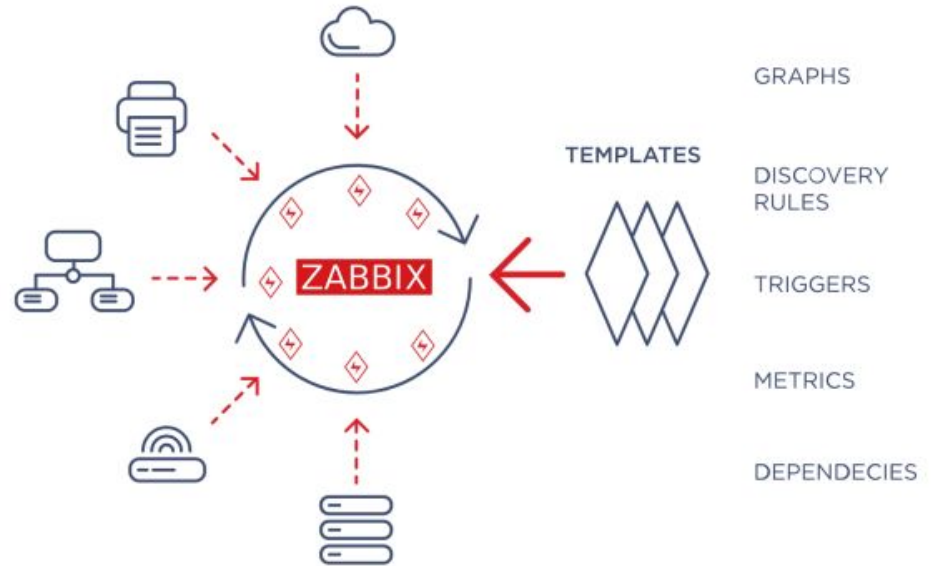
Monitoring of large, dynamic environments with minimal effort.



# Effortless deployment

## Save your time

- Install Zabbix in minutes
- Use out-of-the-box templates for most of popular platforms
- Build custom templates
- Use hundreds of templates built by Zabbix community
- Apply for Template building service from Zabbix team
- Monitor thousands of similar devices by using configuration templates



# Installation

Install Zabbix repository

```
wget
```

```
https://repo.zabbix.com/zabbix/7.4/release/ubuntu/pool/main/z/zabbix-release/zabbix-release\_latest\_7.4+ubuntu24.04\_all.deb
```

```
dpkg -i zabbix-release_latest_7.4+ubuntu24.04_all.deb
```

```
apt update
```

Install Zabbix server, frontend, agent2

```
apt install zabbix-server-mysql zabbix-frontend-php zabbix-apache-conf zabbix-sql-scripts zabbix-agent2
```

Install Zabbix agent 2 plugins

You may want to install Zabbix agent 2 plugins.

```
apt install zabbix-agent2-plugin-mongodb zabbix-agent2-plugin-mssql zabbix-agent2-plugin-postgresql
```

# Installation

Create initial database

Make sure you have database server up and running.

Run the following on your database host.

```
mysql -uroot -p
```

Password

```
mysql> create database zabbix character set utf8mb4 collate utf8mb4_bin;
```

```
mysql> create user zabbix@localhost identified by 'password';
```

```
mysql> grant all privileges on zabbix.* to zabbix@localhost;
```

```
mysql> set global log_bin_trust_function_creators = 1;
```

```
mysql> quit;
```

On Zabbix server host import initial schema and data. You will be prompted to enter your newly created password.

```
zcat /usr/share/zabbix/sql-scripts/mysql/server.sql.gz | mysql --default-character-set=utf8mb4 -uzabbix -p zabbix
```

# Installation

Disable log\_bin\_trust\_function\_creators option after importing database schema.

```
mysql -uroot -p
password
mysql> set global log_bin_trust_function_creators = 0;
mysql> quit;
```

Edit file /etc/zabbix/zabbix\_server.conf

```
DBPassword=password
```

Start Zabbix server and agent processes and make it start at system boot.

```
systemctl restart zabbix-server zabbix-agent2 apache2
systemctl enable zabbix-server zabbix-agent2 apache2
```

Open Zabbix UI web page

The default URL for Zabbix UI when using Apache web server is <http://host/zabbix>

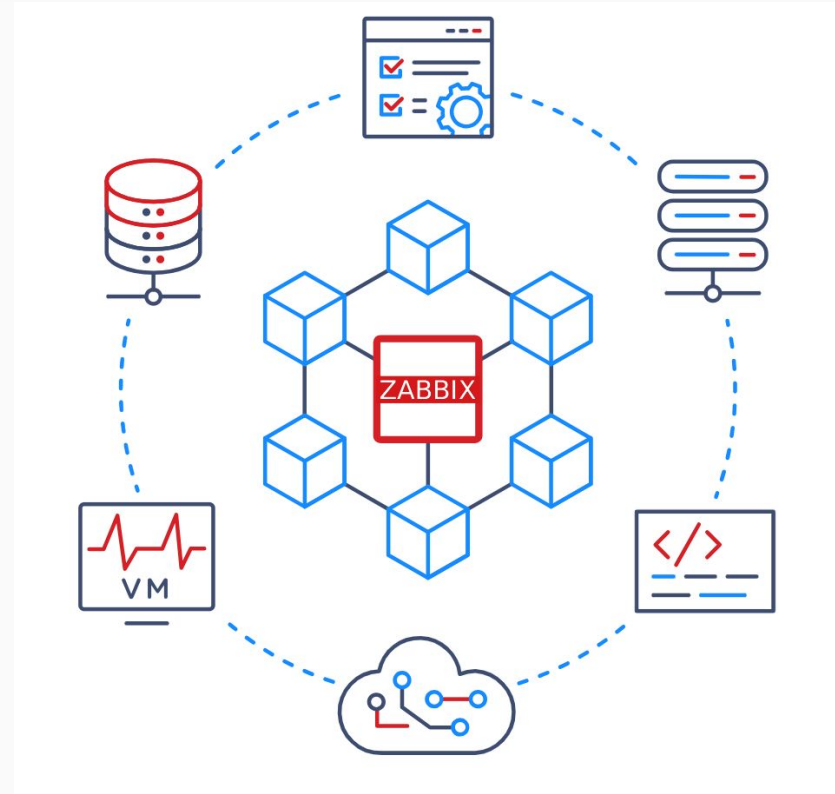


# Setting up monitoring for different services

Servers

OOB

Websites



# Knowledge Check

**Which component in Zabbix is responsible for managing the configuration and collecting data from monitored devices?**

- A. Zabbix Agent
- B. Zabbix Proxy
- C. Zabbix Dashboard
- D. Zabbix Server

**What is the role of the Zabbix Proxy in the monitoring architecture?**

- A. Replaces the Zabbix Server
- B. Only handles user interface operations
- C. Collects and forwards data to the Zabbix Server from remote locations
- D. Acts as a database engine

**What service is responsible for displaying Zabbix data through a web browser?**

- A. Zabbix Agent
- B. Zabbix Server
- C. Apache/Nginx with Zabbix Frontend
- D. Zabbix Trap Listener

# Knowledge Check

**Which method is not used by Zabbix for data collection?**

- A. SNMP
- B. IPMI
- C. FTP
- D. Zabbix Agent

**What is the purpose of Zabbix “items”?**

- A. Define server hardware limits
- B. Display host IP addresses
- C. Collect specific monitoring metrics from hosts
- D. Store backup files

**What is a “trigger” in Zabbix?**

- A. A tool for creating dashboards
- B. A way to define a problem condition based on item data
- C. A notification channel
- D. A method of encrypting agent communication

# Knowledge Check

**What happens when a trigger condition evaluates to true?**

- A. Zabbix stops monitoring the item
- B. A maintenance window is created
- C. A problem is recorded and potentially an alert is generated
- D. Data is erased

**Which Zabbix feature shows the most recent values collected from items?**

- A. Maps
- B. Problems
- C. Graphs
- D. Latest Data

**Which component is used to visualize time-series performance of a host?**

- A. Maintenance View
- B. Network Map
- C. Graphs
- D. Auto-discovery

# Knowledge Check

## **What is the purpose of the Zabbix Dashboard?**

- A. Setting up SNMP community strings
- B. Performing data backups
- C. Providing a customizable overview of monitored resources and alerts
- D. Editing proxy configuration

## **What are Zabbix Maps used for?**

- A. Encrypting network traffic
- B. Mapping items to SNMP OIDs
- C. Showing network topology and device status visually
- D. Exporting database tables

## **How does Zabbix send alerts to administrators?**

- A. Through RSS feeds
- B. Using DNS lookups
- C. Via media types like email, SMS, or scripts
- D. Through agent logs

# Knowledge Check

## **What is a "media type" in Zabbix?**

- A. A category of log files
- B. A file format for exporting reports
- C. A method for sending notifications
- D. A way to group host types

## **What does the auto-discovery feature in Zabbix do?**

- A. Updates system firmware
- B. Automatically discovers new hosts and services on the network
- C. Creates firewall rules
- D. Applies patches

## **What is a "discovery rule" in Zabbix?**

- A. A condition to format graphs
- B. A password policy rule
- C. A template for SNMP polling
- D. A set of criteria to detect new network entities

# Thank You

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