



Webinar

Zabbix performance tuning

all our microphones are muted

ask your questions in Q&A, not in the Chat

use Chat for discussion, networking or applause

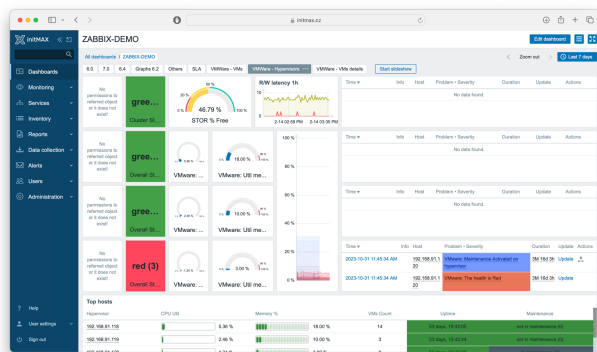


1

Performance tuning

Zabbix performance tuning

Zabbix data flow



Notifications

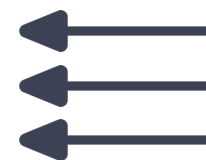
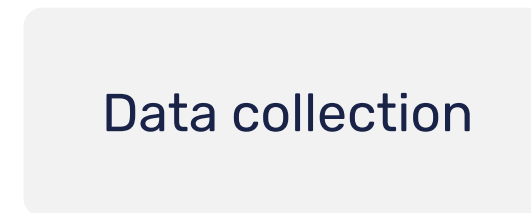
Visualization



History



Analysis

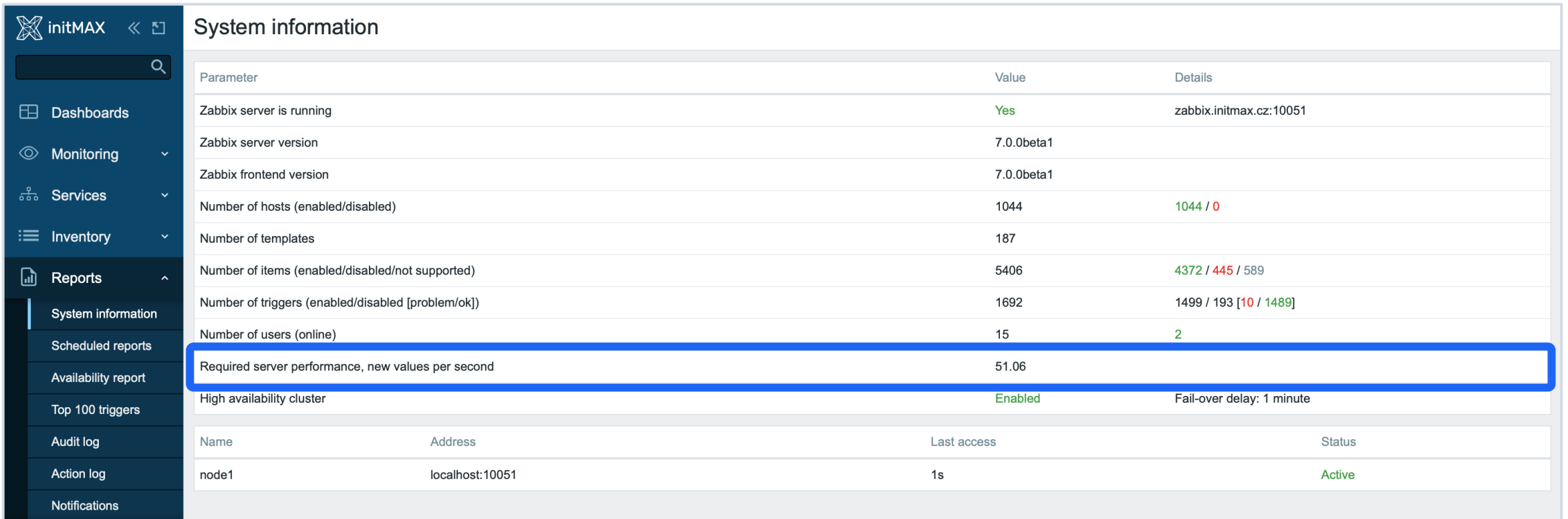


Zabbix performance tuning

How to measure performance

Number of values processed per second (NVPS)

A rough estimate of NVPS is visible in Zabbix



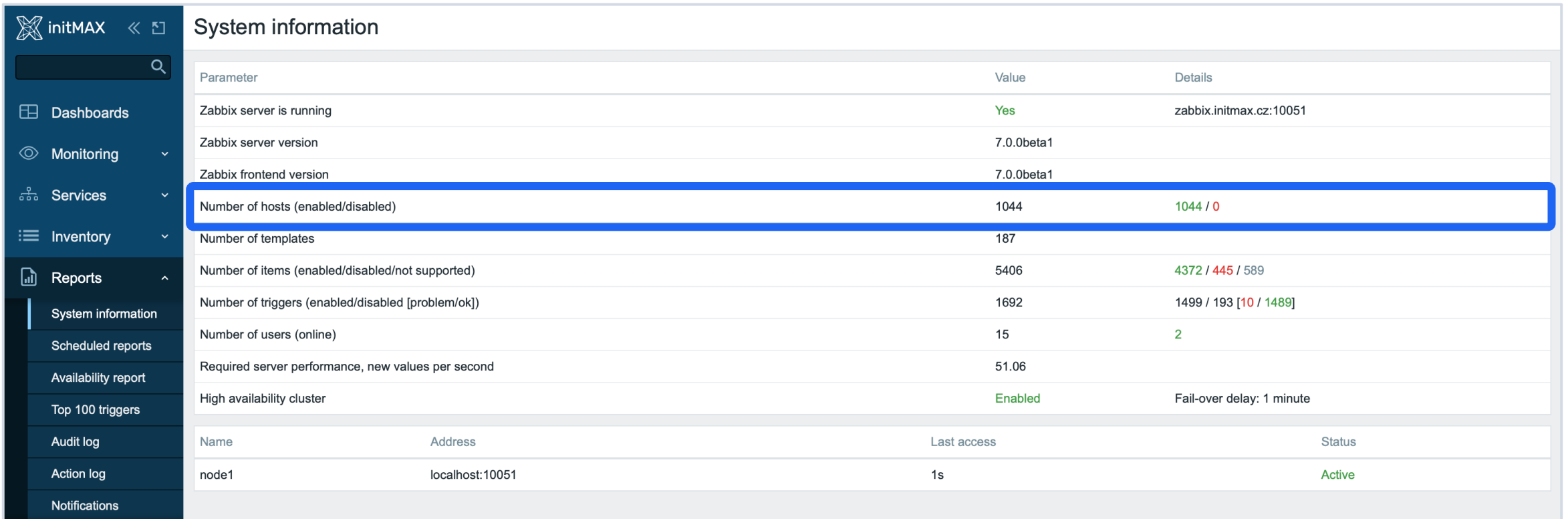
The screenshot shows the Zabbix web interface. On the left is a dark sidebar with navigation options: Dashboards, Monitoring, Services, Inventory, Reports, System information, Scheduled reports, Availability report, Top 100 triggers, Audit log, Action log, and Notifications. The main content area is titled "System information" and contains a table of system parameters. A blue rectangular box highlights the row "Required server performance, new values per second", which has a value of 51.06. Below this is a section for "High availability cluster" which is "Enabled" with a "Fail-over delay: 1 minute". At the bottom, there is a table with columns "Name", "Address", "Last access", and "Status", showing one entry: "node1" at "localhost:10051" with a "Last access" of "1s" and a status of "Active".

Parameter	Value	Details
Zabbix server is running	Yes	zabbix.initmax.cz:10051
Zabbix server version	7.0.0beta1	
Zabbix frontend version	7.0.0beta1	
Number of hosts (enabled/disabled)	1044	1044 / 0
Number of templates	187	
Number of items (enabled/disabled/not supported)	5406	4372 / 445 / 589
Number of triggers (enabled/disabled [problem/ok])	1692	1499 / 193 [10 / 1489]
Number of users (online)	15	2
Required server performance, new values per second	51.06	
High availability cluster	Enabled	Fail-over delay: 1 minute

Name	Address	Last access	Status
node1	localhost:10051	1s	Active

How to measure performance

Why the number of devices is not an indicator?

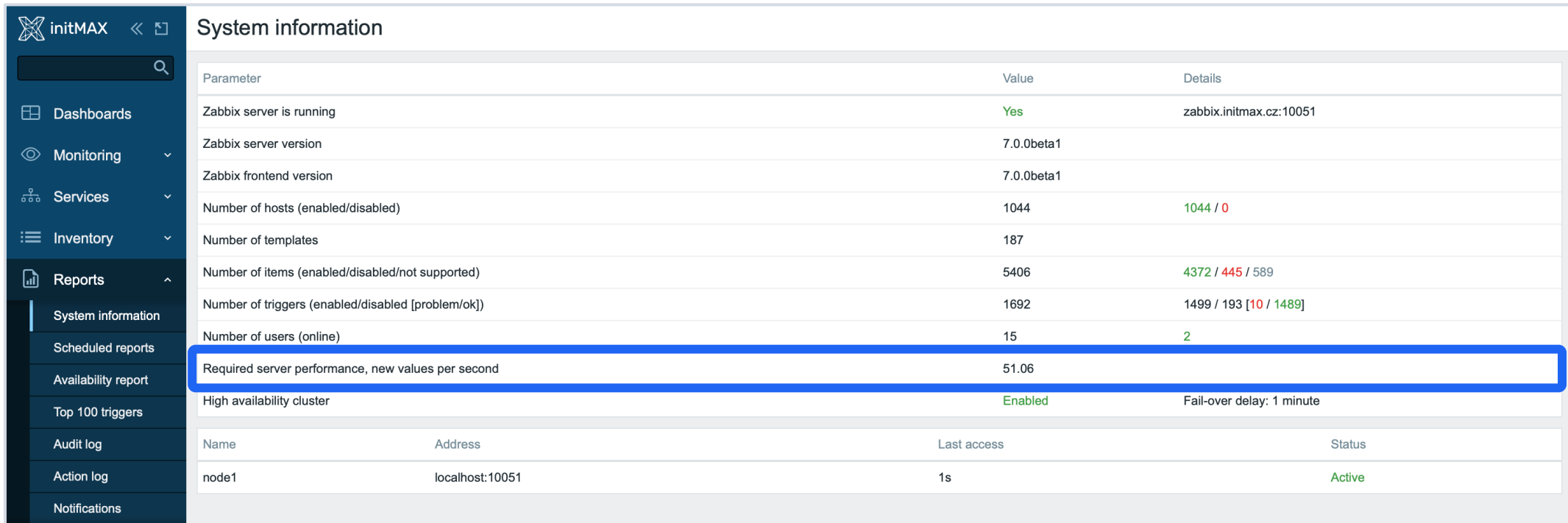


The screenshot shows the Zabbix System Information page. The left sidebar contains navigation options: Dashboards, Monitoring, Services, Inventory, Reports, System information, Scheduled reports, Availability report, Top 100 triggers, Audit log, Action log, and Notifications. The main content area displays system information in a table format.

Parameter	Value	Details
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How to measure performance



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Name	Address	Last access	Status
node1	localhost:10051	1s	Active

- › Update frequency greatly affects NVPS.
- › The calculation takes into account data from the monitored devices.
- › Data types “Zabbix trapper” or “SNMP trap” are not taken into account.

Performance



Hardware: 10 Core CPU, 32GB, RAID10 BBWC
Budget: ~ 4K EUR

- ▶ Zabbix is able to deliver 2,7 million of values per minute or around 45.000 of values per second
- ▶ In real life performance would be worse. Why?!

What affects performance?

- ▶ Type of items, value types, SNMPv3, number of triggers and complexity of triggers.
- ▶ Housekeeper settings and thus size of the database.
- ▶ Number of users working with the WEB interface.

What affects performance?

60 items per host, update frequency once per minute

Number of hosts	➤	Performance - NVPS
100		100
1 000		1 000
10 000		10 000

300 items per host, update frequency once per minute

Number of hosts	➤	Performance - NVPS
100		500
1 000		5 000
10 000		50 000

- ▶ Choose update frequency and duration of storage carefully

Performance

- ▶ History analysis affects performance of Zabbix. But not so much!

	Slow	Fast
Database size	Large	Fits into memory
Low-level detection	Update frequency 30s, 15m, 30m	Update frequency 1h, 1d, 7d
Errors in settings	nodata(5m) and mult. event generation, min(#3600)	nodata(5m), min(3600)
Trigger expressions	min(), max(), avg()	last(), nodata()
Data collection	Polling (SNMP, agent-less, passive agent)	Trapping (active agents)
Data types	Text, string	Numeric

Performance

Different views on performance



“I just added 5 hosts and Zabbix died” :-(
“Zabbix is so sloooooow, I have only 48 hosts” :-)



“Zabbix Milestone achieved - 1000 hosts and growing” :-)
“Our status update: 232623 hosts, 3878565 items, 591121 triggers,
19086 vps” :-)

What's the difference?

Performance

Common problems of initial setup

Default database settings

- ▶ Tune database for the best performance (https://github.com/hermanekt/Zabbix_MYSQL_tunned_for_40k)
- ▶ TimescaleDB tuner **timescaledb-tune** (<https://docs.timescale.com/self-hosted/latest/configuration/timescaledb-tune/>)

Not optimal configuration of Zabbix Server

- ▶ Tune Zabbix Server configuration (Monitoring > Dashboard > Zabbix server health)

Housekeeper settings do not match hardware spec

- ▶ (Use partitions in DB)

Use of default templates

- ▶ Make your own smarter templates

Use of older releases

- ▶ **Always use the latest one!**

Performance

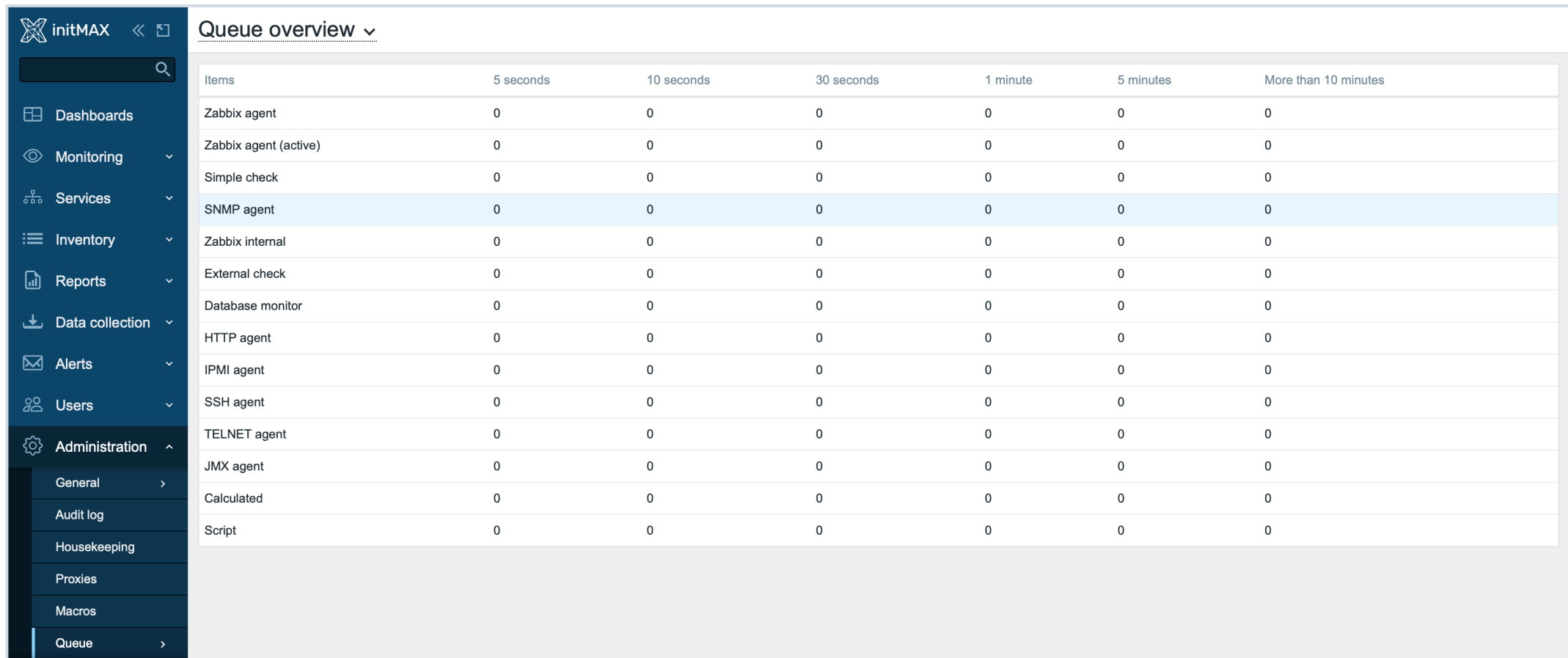
Visible symptoms of bad performance

- › Zabbix queue has too many delayed items Administration->Queue
- › Frequent gaps in graphs, no data for some of the items
- › False positives for triggers having nodata() function
- › Unresponsive WEB interface
- › No alerts or thousands of alerts

Zabbix performance tuning

Performance

Nice view of queue of items



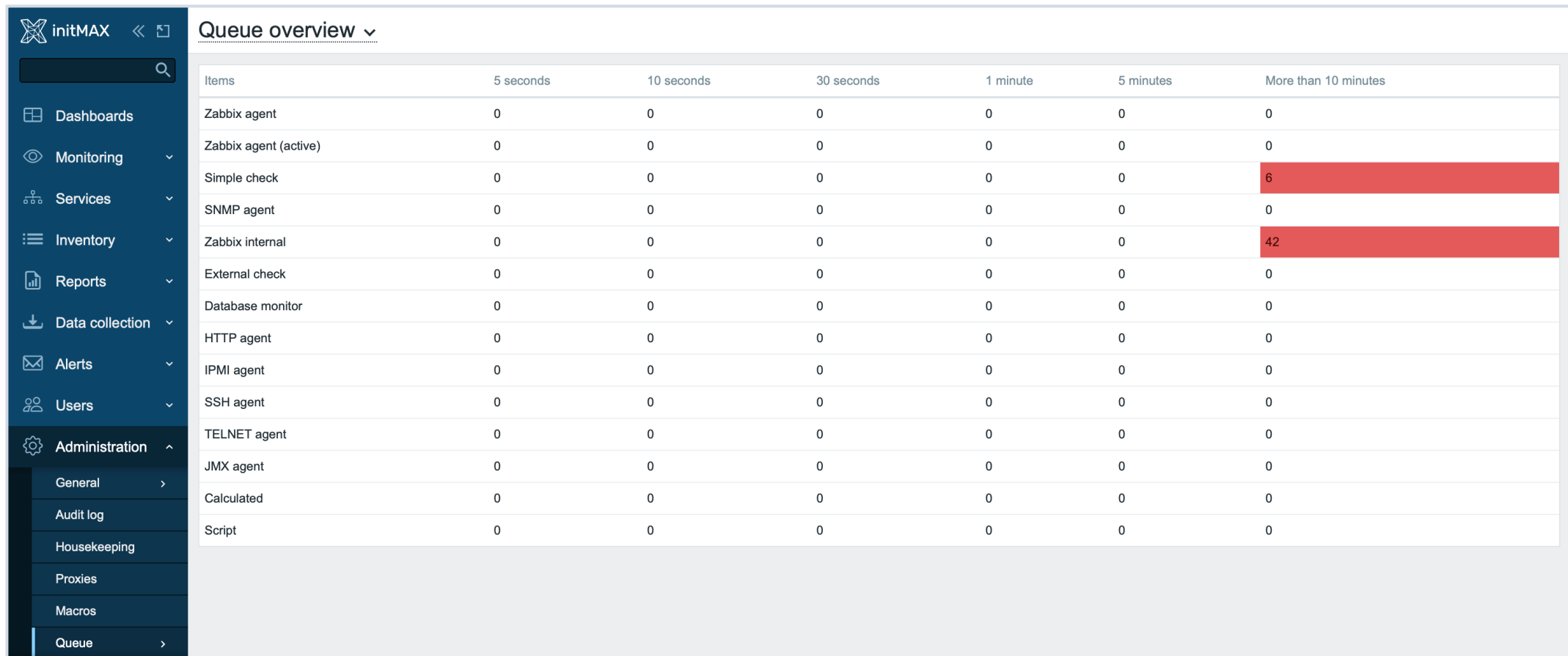
The screenshot shows the 'Queue overview' page in Zabbix. The left sidebar contains navigation menus for Dashboards, Monitoring, Services, Inventory, Reports, Data collection, Alerts, Users, and Administration. The main content area displays a table with columns for item types and time intervals. The 'SNMP agent' row is highlighted in light blue.

Items	5 seconds	10 seconds	30 seconds	1 minute	5 minutes	More than 10 minutes
Zabbix agent	0	0	0	0	0	0
Zabbix agent (active)	0	0	0	0	0	0
Simple check	0	0	0	0	0	0
SNMP agent	0	0	0	0	0	0
Zabbix internal	0	0	0	0	0	0
External check	0	0	0	0	0	0
Database monitor	0	0	0	0	0	0
HTTP agent	0	0	0	0	0	0
IPMI agent	0	0	0	0	0	0
SSH agent	0	0	0	0	0	0
TELNET agent	0	0	0	0	0	0
JMX agent	0	0	0	0	0	0
Calculated	0	0	0	0	0	0
Script	0	0	0	0	0	0

Zabbix performance tuning

Performance

Nice view of queue of items during a problem state



The screenshot shows the Zabbix 'Queue overview' page. The left sidebar contains navigation menus for Dashboards, Monitoring, Services, Inventory, Reports, Data collection, Alerts, Users, and Administration. The main content area displays a table with columns for item types and queue durations. Two rows, 'Simple check' and 'Zabbix internal', are highlighted in red, indicating a high number of items in the 'More than 10 minutes' category (6 and 42 items respectively).

Items	5 seconds	10 seconds	30 seconds	1 minute	5 minutes	More than 10 minutes
Zabbix agent	0	0	0	0	0	0
Zabbix agent (active)	0	0	0	0	0	0
Simple check	0	0	0	0	0	6
SNMP agent	0	0	0	0	0	0
Zabbix internal	0	0	0	0	0	42
External check	0	0	0	0	0	0
Database monitor	0	0	0	0	0	0
HTTP agent	0	0	0	0	0	0
IPMI agent	0	0	0	0	0	0
SSH agent	0	0	0	0	0	0
TELNET agent	0	0	0	0	0	0
JMX agent	0	0	0	0	0	0
Calculated	0	0	0	0	0	0
Script	0	0	0	0	0	0

Performance



Step 1

Identify



Step 2

Tune



Step 3

Improve

2

Identify

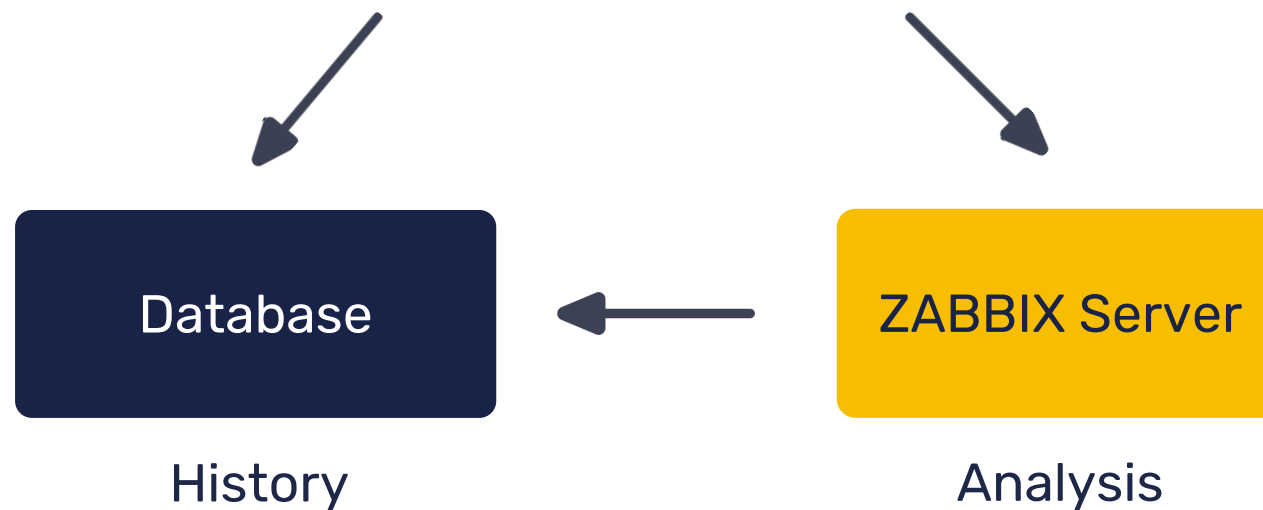
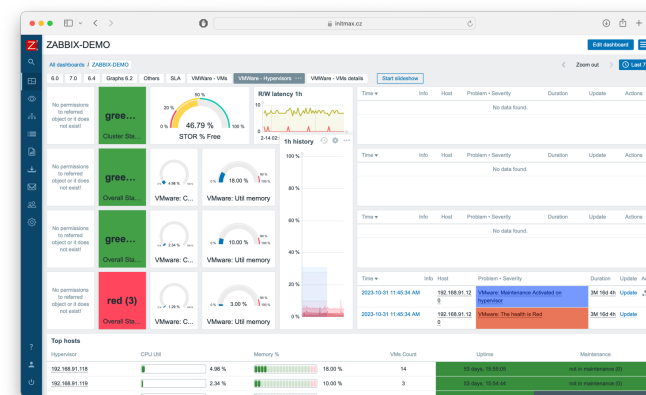


Zabbix performance tuning

Identify

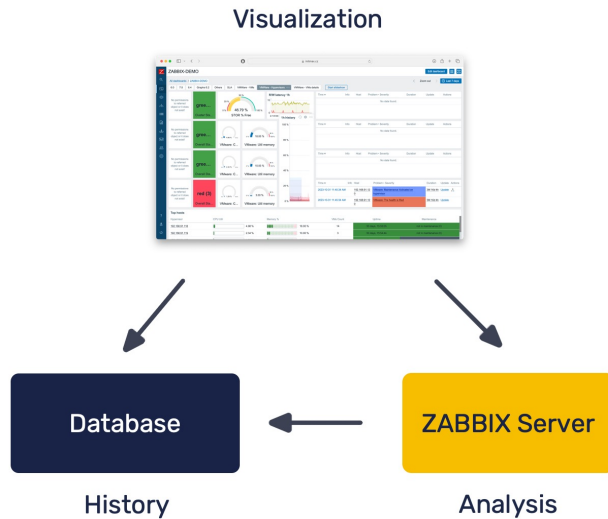
How to understand which one is the root cause of Zabbix slowdown?

Visualization



Zabbix performance tuning

Identify



Main utilities

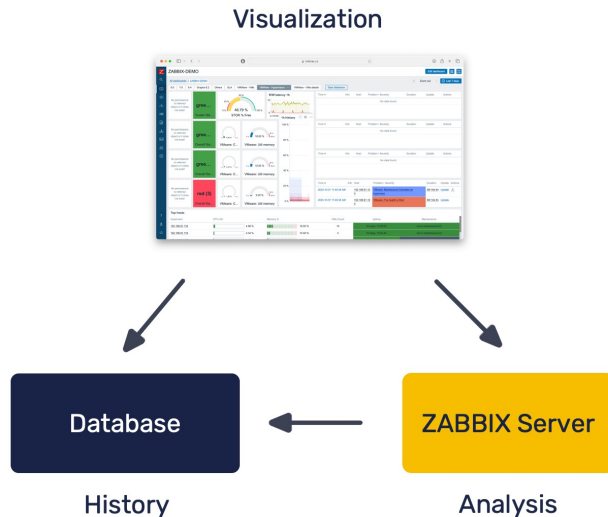
- › top, ntop, iostat, vmstat, sar
- › Zabbix itself
- › strace or log file with debugging mode enabled
- › ps aux | grep zabbix_server

```
# ps ax | grep sync
zabbix_server: history syncer #1 [synced 1845 items in 0.257111 sec, syncing history]
zabbix_server: history syncer #2 [synced 24 items in 0.060314 sec, idle 4 sec]
zabbix_server: history syncer #3 [synced 0 items in 0.000018 sec, idle 4 sec]
zabbix_server: history syncer #4 [synced 0 items in 0.000009 sec, syncing history]
```

Values change?

Zabbix performance tuning

Identify



Main utilities

- › top, ntop, iostat, vmstat, sar
- › Zabbix itself
- › strace or log file with debugging mode enabled
- › ps aux | grep zabbix_server

```
# ps ax | grep sync
history syncer #1 [synced 1020 items in 285.198752 sec, syncing history]
history syncer #2 [synced 915 items in 285.177799 sec, syncing history]
history syncer #3 [synced 3401 items in 284.936376 sec, syncing history]
history syncer #4 [synced 1194 items in 285.280719 sec, syncing history]
```

During the problem?

Zabbix performance tuning

Identify

Get internal statistics

The actual VPS value

- ▶ zabbix[wcache, values, all]
- ▶ zabbix[queue,1m] amount of items with a delay of more than 1 minute

Zabbix server components

- ▶ Alerter, Configuration syncer, DB watchdog, discoverer, escalator, history syncer, http poller, housekeeper, icmp pinger, ipmi poller, poller, trapper, etc.

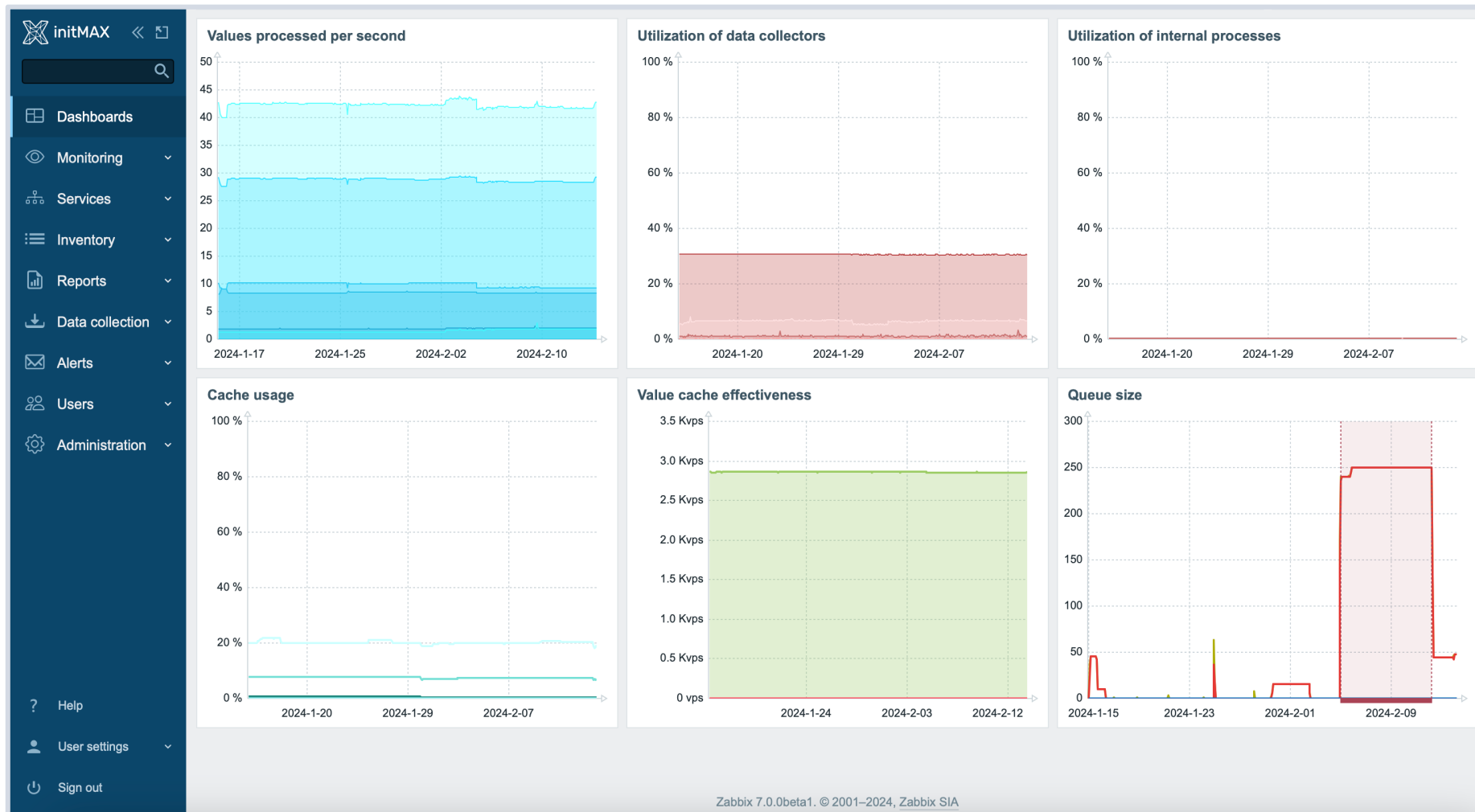
Zabbix server cache

- ▶ history write cache, value cache, trend write cache, vmware cache, etc.

Ready templates:

- ▶ Template App Zabbix Server
- ▶ Template App Zabbix Proxy
- ▶ Template App Zabbix Agent

Identify



Identify

Debug mode

- ▶ There is a problem, but it is not clear what kind of problem?
- ▶ Enable debugging mode for the process:
`# zabbix_server -R log_level_increase=alerter`
- ▶ Search in the log for information about the problem (grep, etc.):
`/var/log/zabbix/zabbix_server.log`

Identify

How to know that the performance of the DB is bad?

- › Zabbix server configuration file, zabbix_server.conf

LogSlowQueries=3000

Zabbix performance tuning

Identify

Main utilities

- › top, ntop, iostat, vmstat, sar
- › DB statistics, innotop, pg_top

```
last pid: 4161158; load av 0.53, 0.27, 0.26; up 102+22:02:42
102 processes: 102 sleeping
CPU states: 2.5% user, 0.0% nice, 1.9% system, 95.6% idle, 0.1% iowait
Memory: 15G used, 140M free, 16K buffers, 10G cached
DB activity: 91 tps, 0 rollbs/s, 27 buffer r/s, 99 hit%, 496 row r/s, 1402 row w/s
DB I/O: 20 reads/s, 1102 KB/s, 25 writes/s, 2866 KB/s
DB disk: 490.3 GB total, 260.6 GB free (46% used)
Swap: 73M used, 7987M free, 2708K cached

PID USERNAME PRI NICE SIZE RES STATE TIME WCPU CPU COMMAND
3581700 postgres 20 0 3363M 31M sleep 43:23 0.25% 0.80% postgres: zabbixdb: zabbix_server zabbix (41916) idle
3581704 postgres 20 0 3363M 31M sleep 42:48 0.25% 0.80% postgres: zabbixdb: zabbix_server zabbix (41946) idle
3581701 postgres 20 0 3363M 34M sleep 42:36 0.19% 0.80% postgres: zabbixdb: zabbix_server zabbix (41912) idle
3581698 postgres 20 0 3363M 31M sleep 42:22 0.24% 0.80% postgres: zabbixdb: zabbix_server zabbix (41904) idle
1860 postgres 20 0 3340M 8436K sleep 343:49 0.14% 0.60% postgres: zabbixdb: checkpointer
4158428 postgres 20 0 3346M 20M sleep 0:02 0.07% 0.40% postgres: zabbixdb: zabbix_web zabbix (41080) idle
3385676 postgres 20 0 3337M 8408K sleep 78:12 0.05% 0.20% postgres: zabbixdb: walsender repl (62544) streaming 110D/2DA0AC98
3400490 postgres 20 0 3337M 8144K sleep 76:03 0.05% 0.20% postgres: zabbixdb: walsender repl (46496) streaming 110D/2DA0AC98
3581719 postgres 20 0 3344M 18M sleep 1:28 0.02% 0.20% postgres: zabbixdb: zabbix_server zabbix (42084) idle
3581729 postgres 20 0 3344M 18M sleep 1:25 0.02% 0.20% postgres: zabbixdb: zabbix_server zabbix (42176) idle
3581718 postgres 20 0 3344M 18M sleep 1:25 0.02% 0.20% postgres: zabbixdb: zabbix_server zabbix (42070) idle
3581654 postgres 20 0 3342M 17M sleep 0:50 0.02% 0.20% postgres: zabbixdb: zabbix_server zabbix (54664) idle
3385664 postgres 20 0 3340M 7680K sleep 0:44 0.02% 0.20% postgres: zabbixdb: pg_cron launcher
3581745 postgres 20 0 3344M 18M sleep 0:44 0.02% 0.20% postgres: zabbixdb: zabbix_server zabbix (42340) idle
3581742 postgres 20 0 3344M 18M sleep 0:43 0.02% 0.20% postgres: zabbixdb: zabbix_server zabbix (42302) idle
3581762 postgres 20 0 3344M 18M sleep 0:43 0.02% 0.20% postgres: zabbixdb: zabbix_server zabbix (42506) idle
4157855 postgres 20 0 3346M 20M sleep 0:02 0.09% 0.20% postgres: zabbixdb: zabbix_web zabbix (55444) idle in transaction
```

Identify

Main utilities

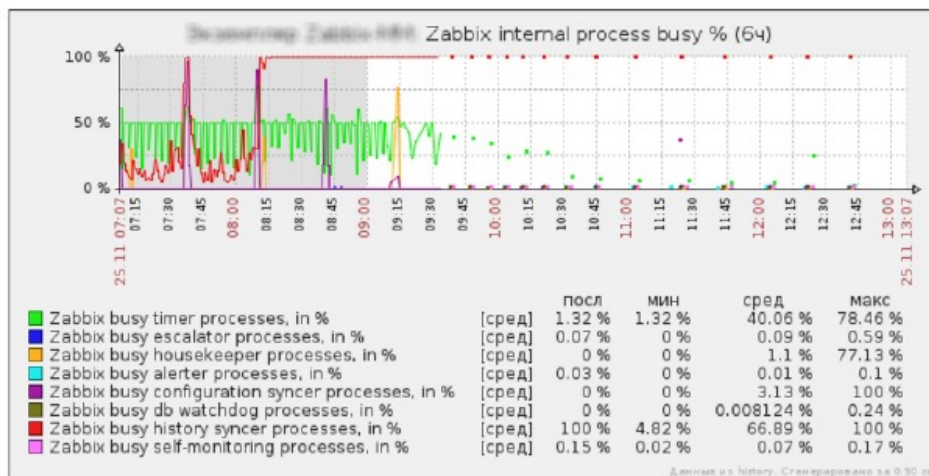
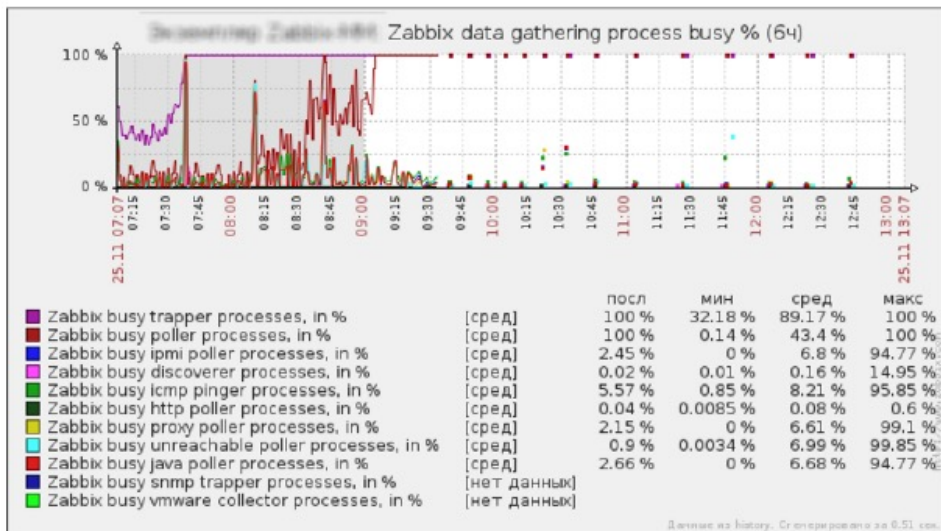
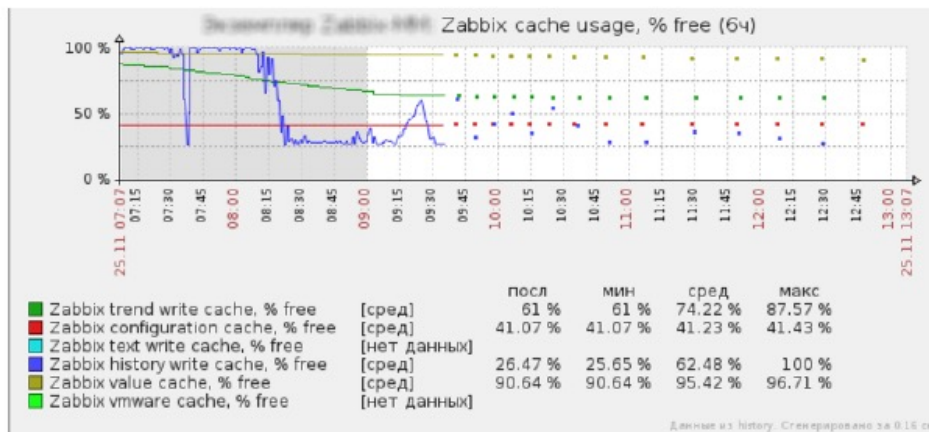
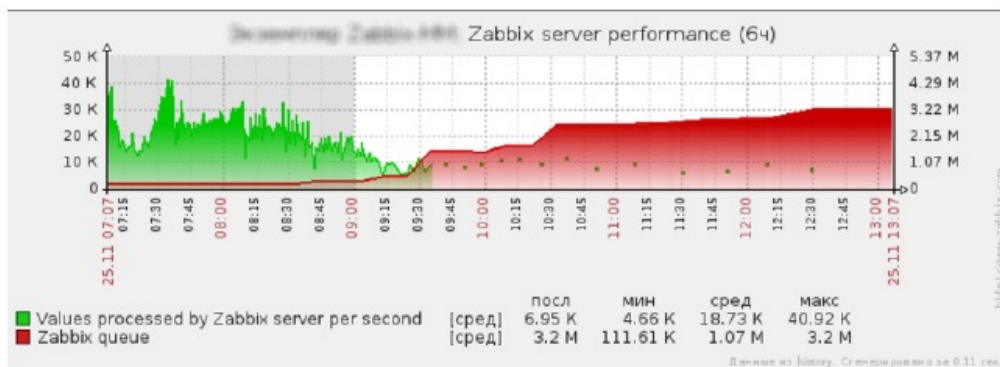
- › top, ntop, iostat, vmstat, sar
- › DB statistics, innotop

```
# grep slow /var/log/zabbix/zabbix_server.log
slow query: 9.054528 sec, "insert into events (eventid, source, object, objectid,
clock...
slow query: 8.501505 sec, "update hosts set lastaccess=1421211815 where hostid...
slow query: 6.754405 sec, "insert into history (itemid,clock,ns,value) values...
slow query: 37.949541 sec, "select i.itemid, i.hostid, h.proxy_hostid, i.type,
i.data_type...
slow query: 70.877295 sec, "select distinct t.triggerid, t.description, t.expression,
t.error..."
```

Zabbix performance tuning

Identify

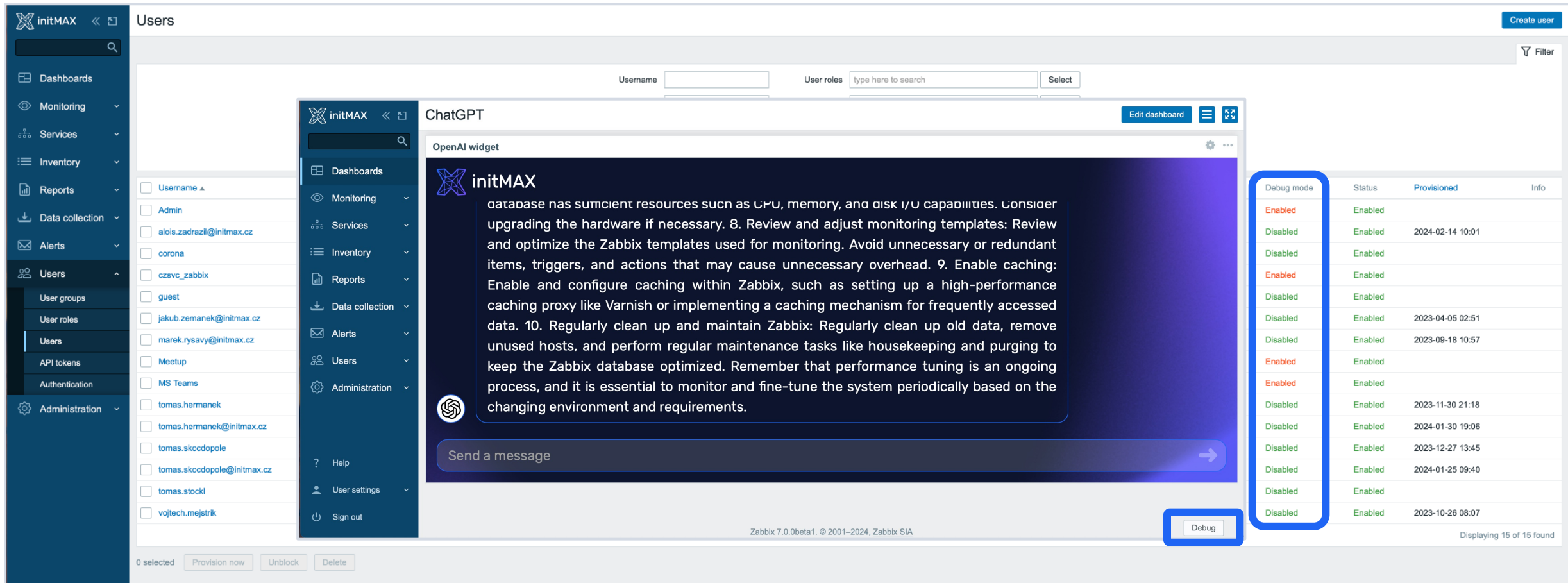
Slow DB?



Zabbix performance tuning

Identify

Debug mode



The screenshot displays the initMAX web interface. On the left is a navigation sidebar with categories like Dashboards, Monitoring, Services, Inventory, Reports, Data collection, Alerts, Users, API tokens, Authentication, and Administration. The main content area is titled 'Users' and contains a list of users with checkboxes for selection. A 'Create user' button is in the top right. A 'ChatGPT' widget is overlaid, showing an 'OpenAI widget' with the initMAX logo and a text box containing performance tuning advice. A 'Debug' button is highlighted in the bottom right. On the right side, a table lists user debug mode settings.

Debug mode	Status	Provisioned	Info
Enabled	Enabled		
Disabled	Enabled	2024-02-14 10:01	
Disabled	Enabled		
Enabled	Enabled		
Disabled	Enabled		
Disabled	Enabled	2023-04-05 02:51	
Disabled	Enabled	2023-09-18 10:57	
Enabled	Enabled		
Enabled	Enabled		
Disabled	Enabled	2023-11-30 21:18	
Disabled	Enabled	2024-01-30 19:06	
Disabled	Enabled	2023-12-27 13:45	
Disabled	Enabled	2024-01-25 09:40	
Disabled	Enabled		
Disabled	Enabled	2023-10-26 08:07	

0 selected Provision now Unblock Delete

Zabbix 7.0.0beta1. © 2001–2024, Zabbix SIA

Displaying 15 of 15 found

Identify

Debug mode

Load speed
less than a
second



```
***** Script profiler *****  
Total time: 0.960905  
Total SQL time: 0.749027  
SQL count: 5636 (selects: 4065 | executes: 1571)  
Peak memory usage: 180.5M  
Memory limit: 2G
```

Identify

Debug mode

Problem
with web
server



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***** Script profiler *****  
Total time: 10.960905  
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Identify

Debug mode

Problem
with DB



```
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```

3

Tune



Tune

Tune number of processes (example)

› Zabbix server configuration file, `zabbix_server.conf`:

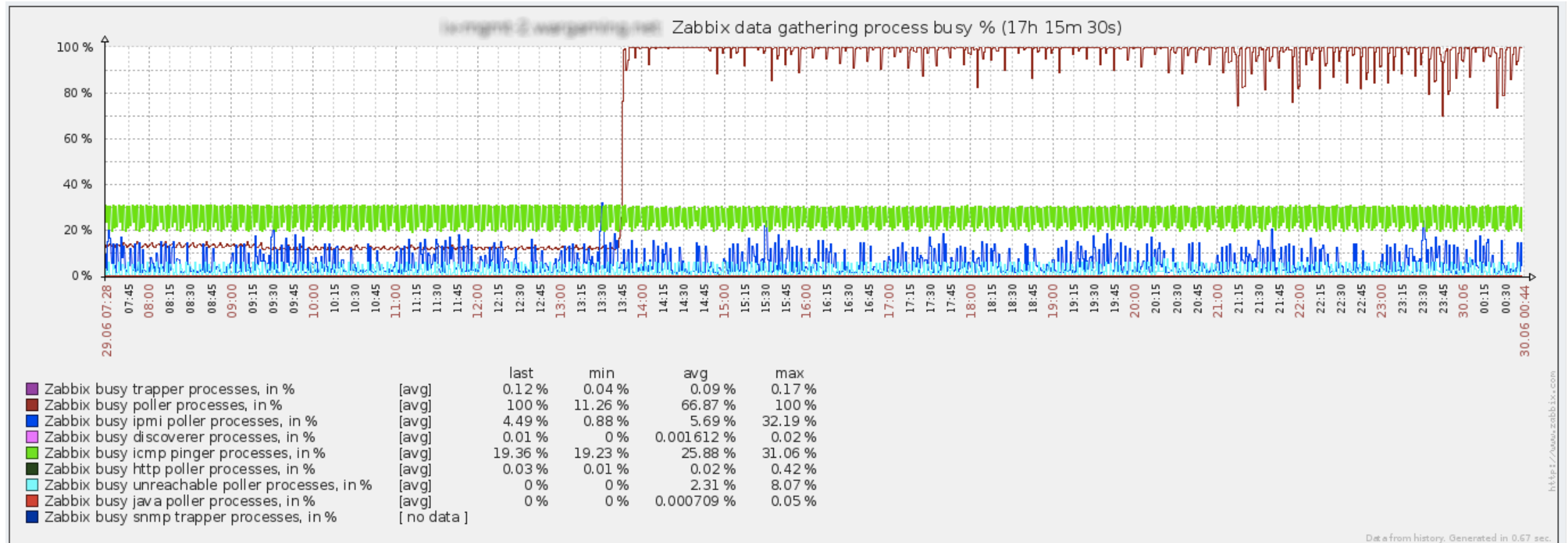
```
StartPollers=80
StartPingers=10
StartPollersUnreachable=80
StartIPMIPollers=10
StartTrappers=20
StartDBSyncers=6
```

Zabbix performance tuning

Tune

How to know when it is time to tune Zabbix configuration?

- ▶ Failures in graphs or 100% load



Zabbix performance tuning

Tune

InnoDB is better than MyISAM

- › Look at the data

mysqladmin status / variables (or innotop)

- › InnoDB

innodb_file_per_table = 1

innodb_buffer_pool_size=<large> (~75% of total RAM)

innodb_buffer_pool_instances = 8

innodb_flush_log_at_trx_commit = 2

innodb_flush_method = O_DIRECT

innodb_log_file_size = 256M

- › Do not use

Query history

Zabbix performance tuning

Tune

Problem with Web server

```
***** Script profiler *****  
Total time: 10.960905  
Total SQL time: 0.749027  
SQL count: 5636 (selects: 4065 | executes: 1571)  
Peak memory usage: 180.5M  
Memory limit: 2G
```



**Problem
with web
server**

- › Optimize configuration
- › Try nginx

Apache	nginx
Total time: 6.47	Total time: 1.02

4

Improve



Zabbix performance tuning

Improve

Table partitioning

- ▶ It is a way to split large tables into smaller partitions.
- ▶ Make sense for historical tables:
 - history_* and trends*
- ▶ Benefits:
 - Easy to remove older data
 - Significantly better performance

Zabbix performance tuning

Improve

No table partitioning



Zabbix
Server
& GUI



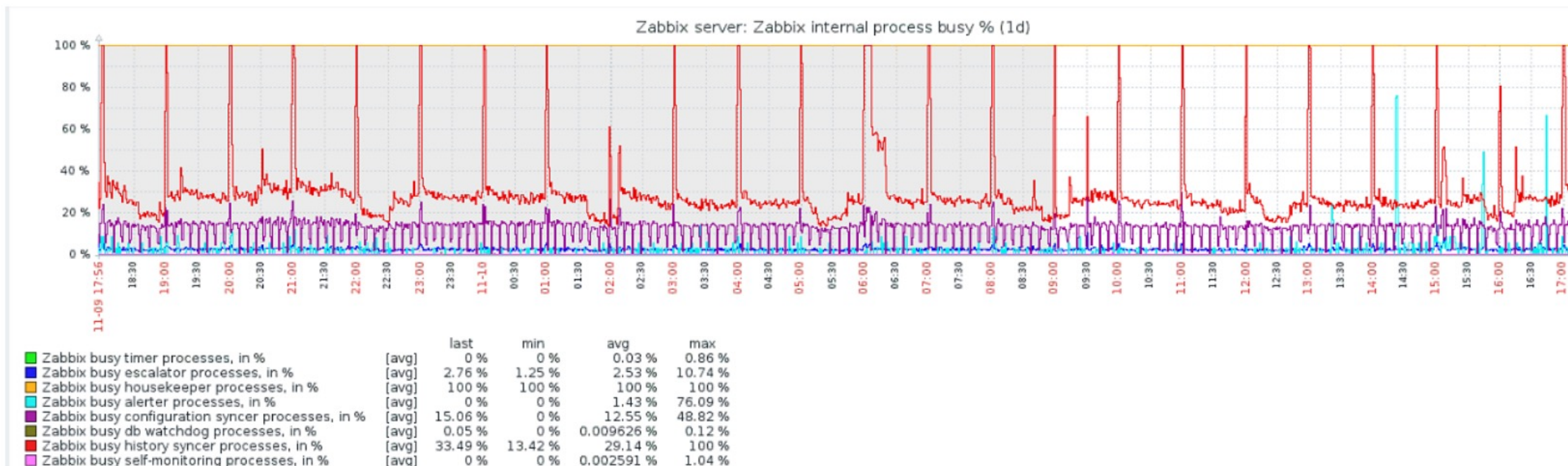
History

Zabbix performance tuning

Improve

How to know when it is time to apply partitioning?

- ▶ Trigger “Zabbix housekeeper processes more than 75% busy” is in problem state for hours or days
- ▶ The performance of housekeeper is dropping



Zabbix performance tuning

Improve

I still need better performance

- ▶ Run Zabbix components on separate servers!

Zabbix server & Web-interface
8 core CPU
8GB RAM



Database
16 core CPU
64GB RAM
Fast repository



Zabbix performance tuning

Improve

I still need better performance

- ▶ Run Zabbix components on separate servers!

Zabbix server
8 core CPU
4GB RAM



Web-interface
2 core CPU
4GB RAM



Database
16 core CPU
64GB RAM
Fast repository



Zabbix performance tuning

Improve

I still need better performance

- › All data collection is done using a proxy



Improve

Why to use proxy?

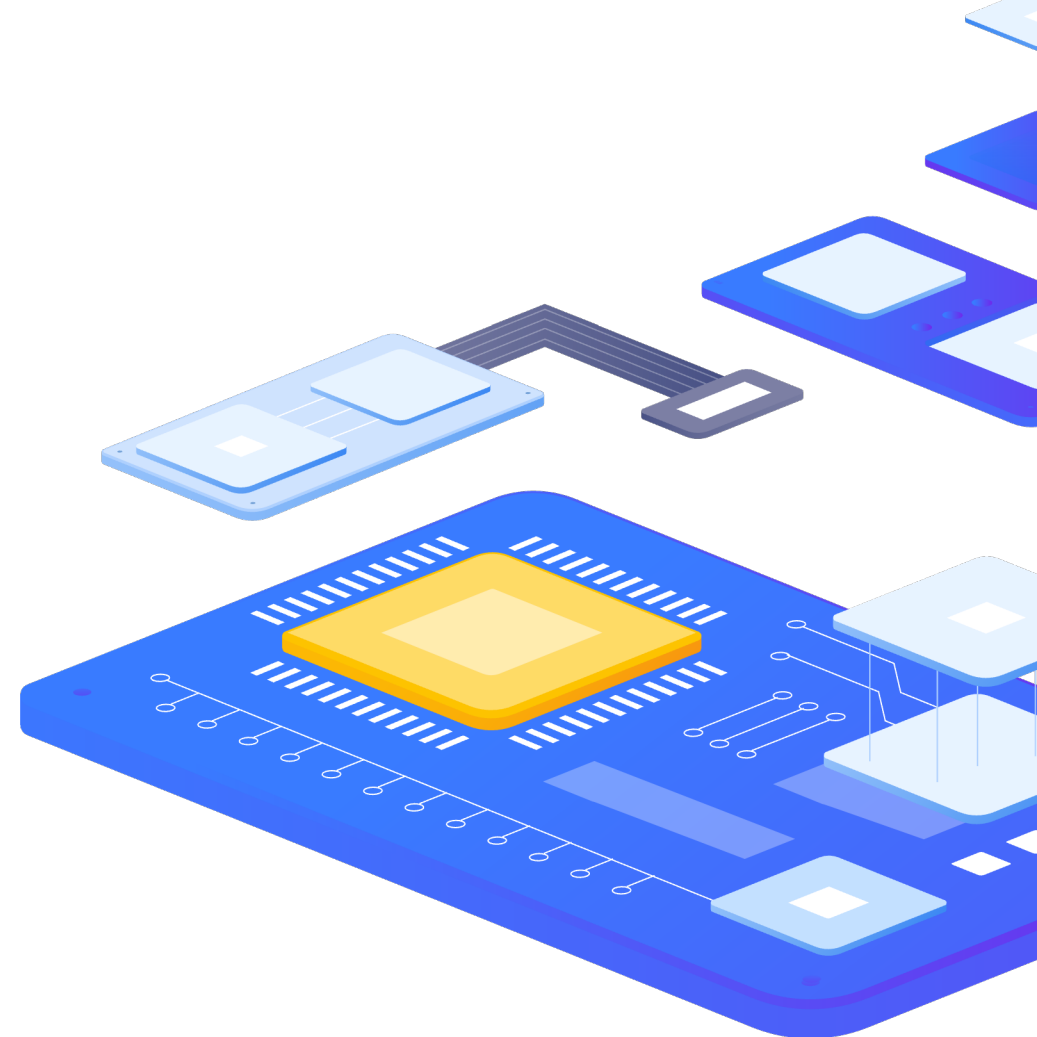
- ▶ Zabbix Proxy "converts" passive checks into active
- ▶ The load is distributed between the proxies
- ▶ If one proxy is overloaded, network nodes can be moved to another proxy
- ▶ Easy maintenance
- ▶ Caching data when Zabbix server is not available

Zabbix performance tuning

Improve

Checklist

- › Zabbix internal checks are done
 - › Otherwise, you don't know anything about Zabbix health!
- › Zabbix configuration is tuned
- › Database performance is tuned
- › Removing history is not used for history tables



Zabbix performance tuning

Improve

Additional reading

Performance Optimization Guide:

- › Mysql: <https://www.percona.com/blog/2014/11/14/optimizing-mysql-zabbix/>
- › PostgreSQL: https://wiki.postgresql.org/wiki/Tuning_Your_PostgreSQL_Server
- › PostgreSQL: <https://pgtune.leopard.in.ua/>

Partitioning tables in Zabbix:

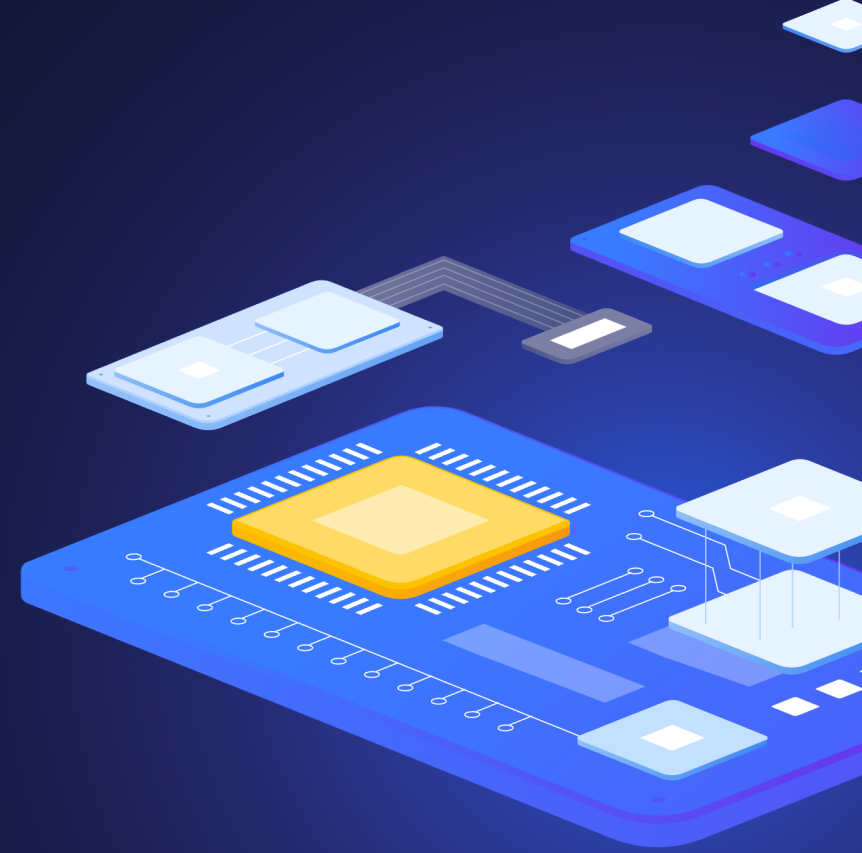
- › MySQL: http://zabbix.org/wiki/Docs/howto/mysql_partitioning
- › PostgreSQL: https://www.zabbix.org/wiki/Docs/howto/zabbix2_postgresql_partitioning (OLD)
- › PostgreSQL: <https://www.zabbix.com/documentation/current/manual/appendix/install/timescaledb>

Zabbix internal checks

- › <http://blog.zabbix.com/monitoring-how-busy-zabbix-processes-are>
- › <https://www.zabbix.com/documentation/current/manual/config/items/itemtypes/internal>

5

Highlighting of latest versions



Zabbix performance tuning

Highlighting of latest versions

Zabbix 6.0

- › High availability cluster for Zabbix server
- › **Primary keys**
- › Bulk processing for Prometheus metrics
- › **Separate processing for ODBC checks**
- › **Drop unsupported versions of DBs**
- › Configuration syncer 6.0.1
- › **DB schema update 6.0.11**
- › **Improved performance of history syncers 6.0.12**
- › Limits for JavaScript objects in preprocessing 6.0.14
- › Proxy history housekeeping 6.0.18
- › **Autoregistration table cleared from orphaned records 6.0.22**
- › **Simplified trend synchronization queries to improve performance 6.0.23**
- › **Improved trend recalculation performance by performing trend updates in own transaction 6.0.27**

Highlighting of latest versions

Zabbix 6.2

- › User macro cache
- › Reload proxy configuration in frontend or in linux console
- › **Optimized server configuration update**
- › Improved performance of history syncers 6.2.6
- › Limits for JavaScript objects in preprocessing 6.2.8

Highlighting of latest versions

Zabbix 6.4

- › Streaming to external systems
- › Value cache optimization
- › **Optimized proxy configuration update**
- › **Thread-based preprocessing workers**
- › Instant refresh of active checks
- › **Optimized SNMP discovery and collection**
- › Zabbix server support for older proxies
- › Automated database upgrade on proxies with SQLite
- › Proxy history housekeeping 6.4.3

Highlighting of latest versions

Zabbix 7.0

- ▶ **Asynchronous pollers**

- agent poller

- http agent poller

- snmp poller (for walk[OID] and get[OID] items)

- ▶ **Proxy memory buffer**

- A memory buffer has been developed for Zabbix proxy. The memory buffer allows to store new data (item values, network discovery, host autoregistration) in the buffer and upload to Zabbix server without accessing the database.

- ▶ **Enhanced item timeout configuration possibilities**

- Timeout configuration is now available for more item types (see supported item types). In addition to setting the timeout values on the item level, it is possible to define global and proxy timeouts for various item types.

Highlighting of latest versions

Zabbix 7.0 (end of Q1/2024)

- › **Faster permission checks**

Permission checks have been made much faster by introducing several intermediary tables for checking non-privileged user permissions.

- › **Auditlog converted to hypertable on TimescaleDB**

- › **Separate database table for proxies**

- › **The default period of storing audit log records before those are deleted by the housekeeper has been changed from 365 days to 31 days.**

- › <https://support.zabbix.com/browse/ZBXNEXT-5878> (Enhance permission checking/handling)

- › <https://support.zabbix.com/browse/ZBX-23064> (select distinct)

- › <https://support.zabbix.com/browse/ZBX-23979> (Trends recalculation)

- › <https://support.zabbix.com/browse/ZBX-23973> (Avoid retrieving trends from database for new items)

6

Tips and tricks



Zabbix performance tuning

Tips and tricks

From time to time check our wiki or social networks

- › Throtling, PosgreSQL tune,...

CZ

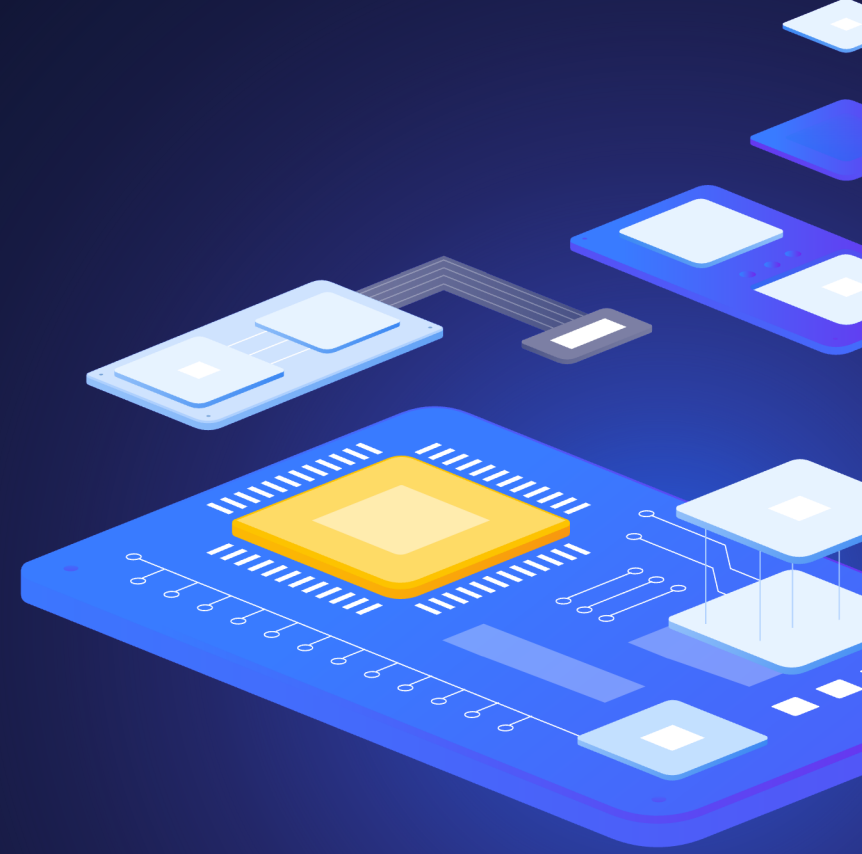
- › <https://www.initmax.cz/wiki/throttling-a-ochrana-pred-falesnymi-alerty-pomoci-min-max-avg/>
- › <https://www.initmax.cz/wiki/zabbix-7-0-instalace-v-5-minutach/>

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- › <https://www.initmax.com/wiki/throttling-and-false-positives-protection-using-min-max-avg/>
- › <https://www.initmax.com/wiki/zabbix-7-0-instructions-for-installation-in-5-minutes/>

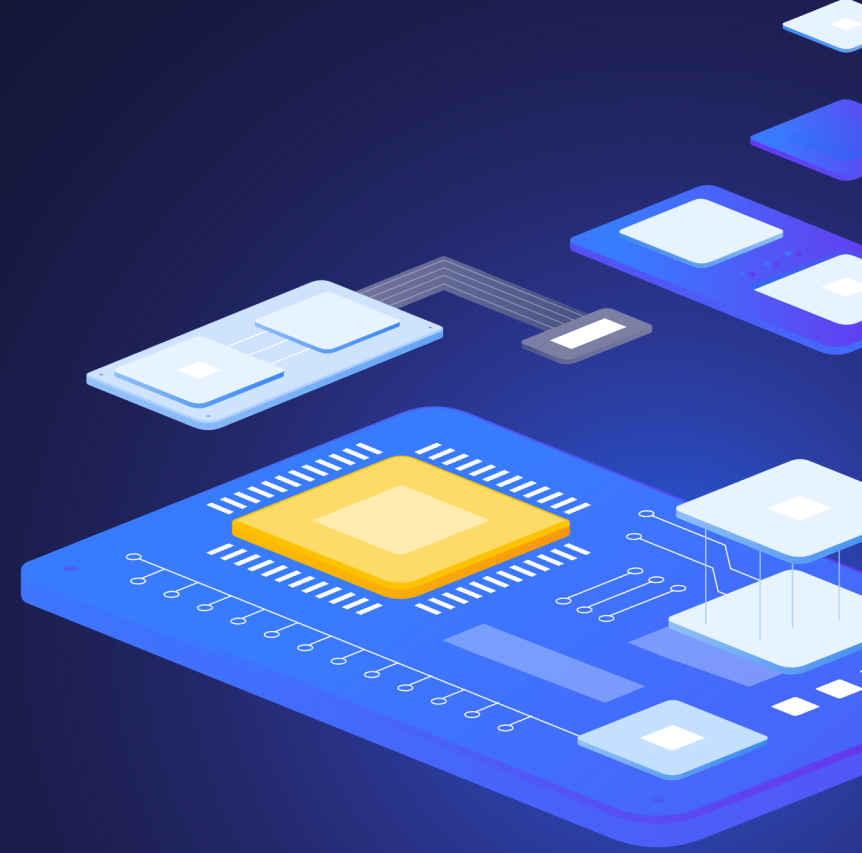
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Demo





Questions?



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