ZABBIX SUMMIT 2023

Internal Changes and Improvements in ZABBIX 7.0

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Thread - based Preprocessing

Why Zabbix needs preprocessing

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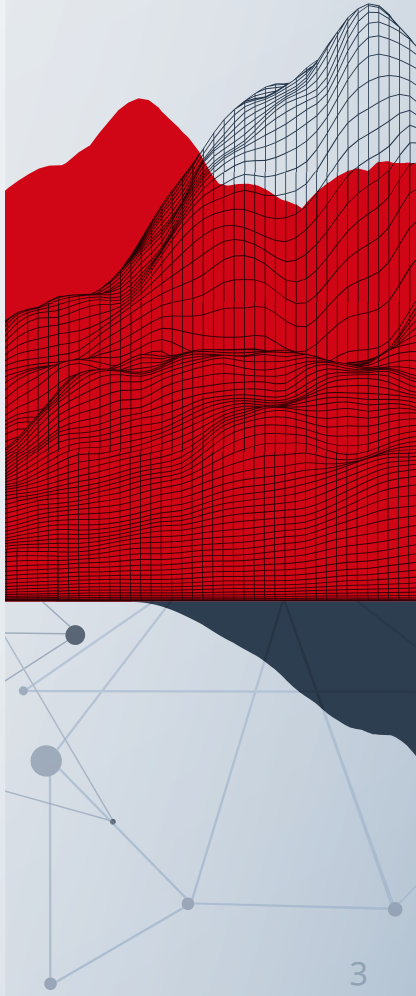
Collected values may need transformation before they can be used in monitoring:

- Convert bytes to bits and vice versa
- Extract values from JSON, XML, CSV or other data structures
- Create dependent items from bulk data collected by master items

Preprocessing is performed by both Zabbix server and proxies:

- Server can be unloaded by moving some hosts to proxies
- Load can be distributed between multiple proxies



Preprocessing basics

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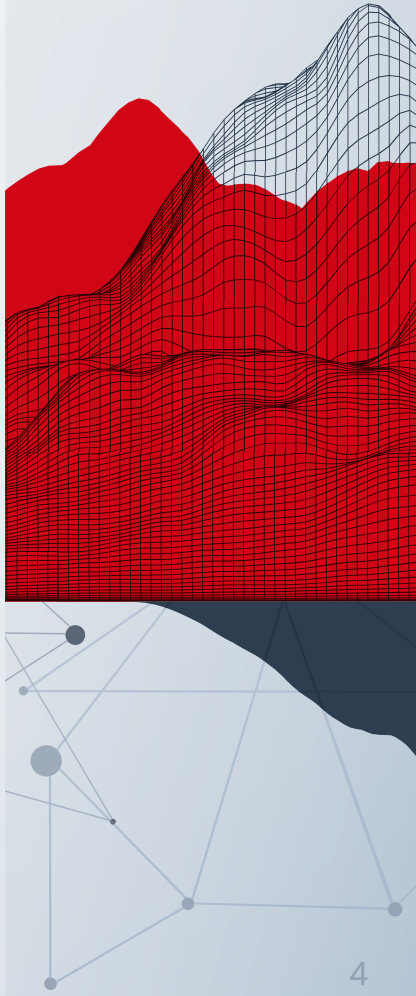
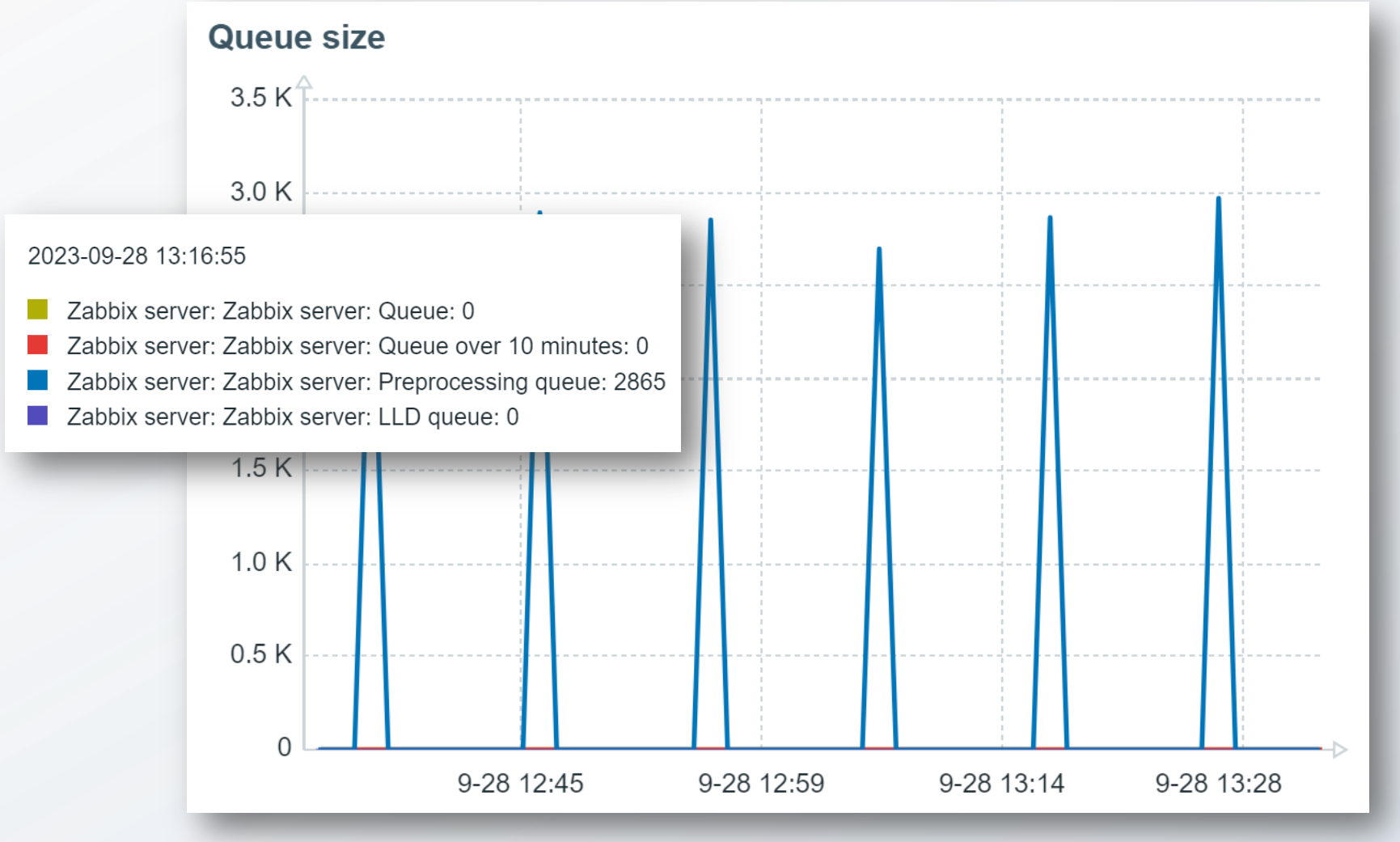
Every value collected by Zabbix goes through preprocessing

- Preprocessing queue is a FIFO stack
- Some items may have complex preprocessing steps
- It may require significant amount to time to preprocess them.
- In previous versions such items could block other items



Performance issues

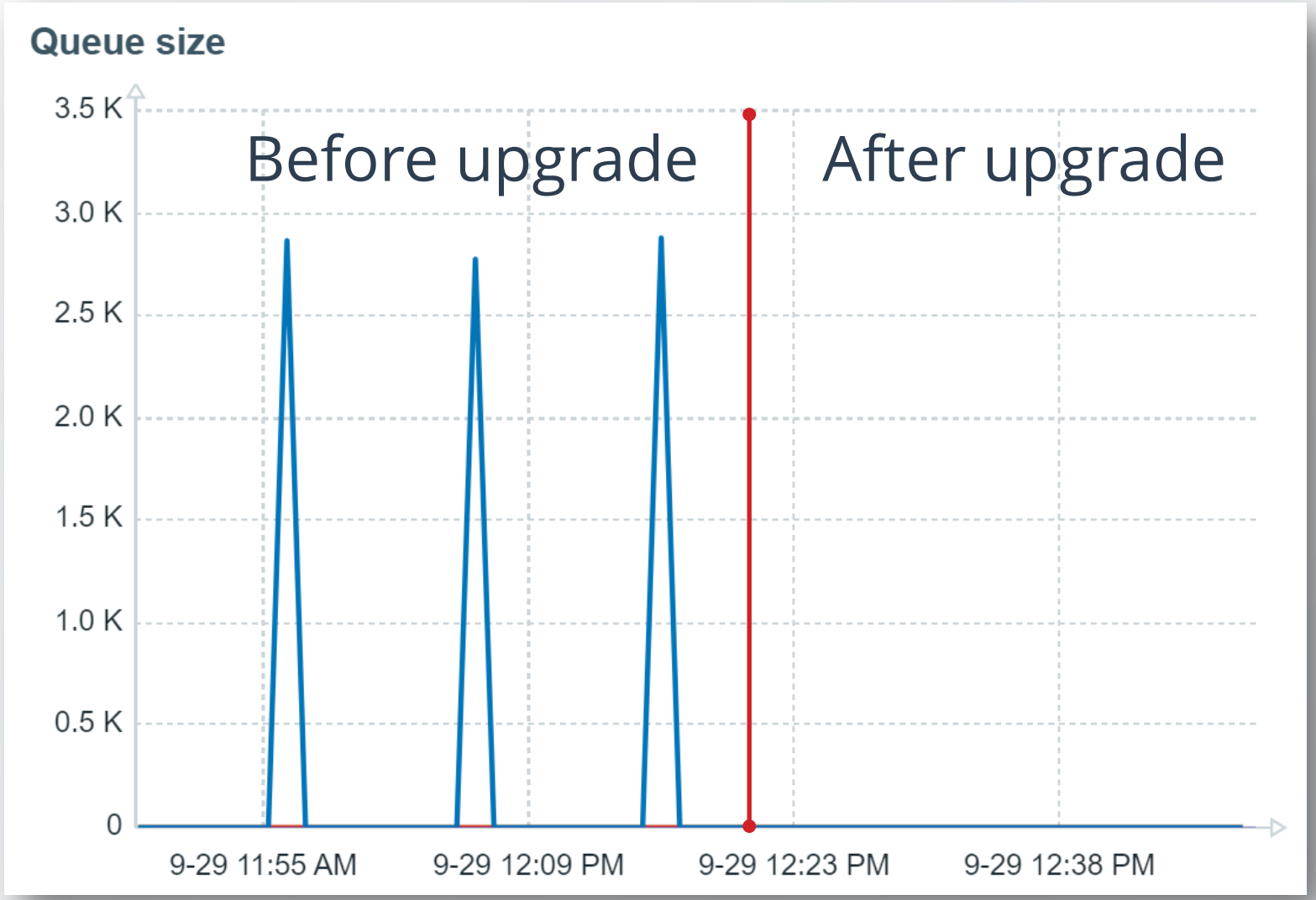


Separate queues

Separate preprocessing queues are introduced since Zabbix 6.4:

- Queue for waiting items
- Queue for processed items

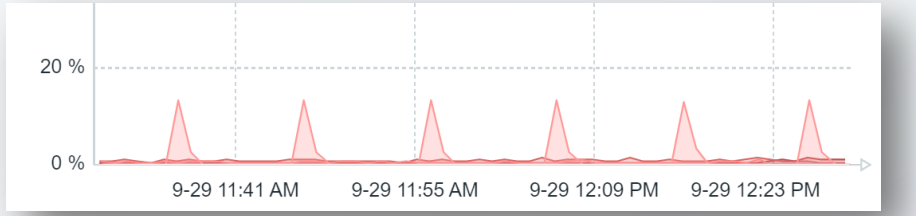
Performance after migration to 7.0



Performance tuning

Make sure you start enough preprocessors:

- The default number if 3
- Start more if required
- All workers work in parallel




```
### Option: StartPreprocessors
# Number of pre-forked instances of preprocessing workers.
# The preprocessing manager process is automatically started when preprocessor
# worker is started.
# Range: 1-1000
# Default: 3

StartPreprocessors=10
```

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Asynchronous data polling

Data collectors

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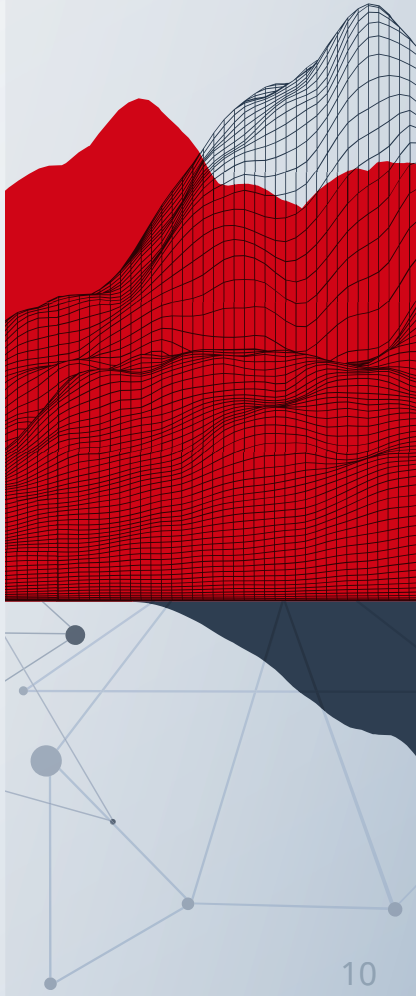
Data in Zabbix are collected by various data collectors:

- Pollers
- Trappers
- Pingers
- etc.

Poller processes can collect only a single metric at once:

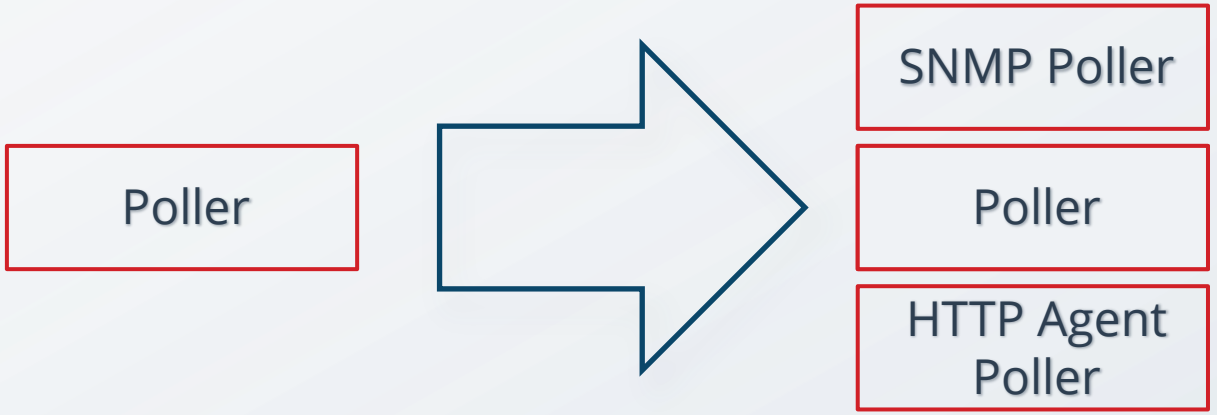
- As a result, hundreds of pollers are required in some scenarios
- Maximum number of pollers is limited to 1000



Specific poller types

In Zabbix 7.0 specific poller types are introduced

- SNMP poller
- Zabbix agent poller
- HTTP check poller



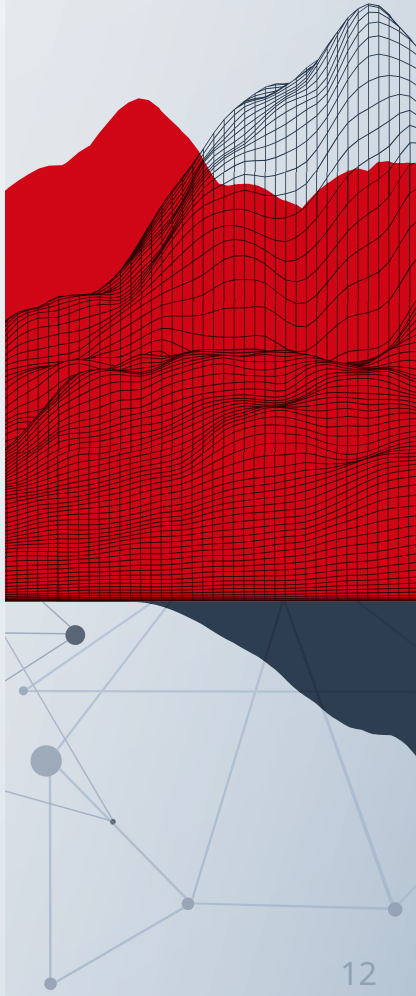
SNMP poller

SNMP poller collects data using the SNMP protocol:

- Uses SNMP protocol over UDP to collect data
- Optimized to work with network devices (SNMPGET, SNMPBULKGET)

```
### Option: StartSNMPPollers
#       Number of pre-forked instances of asynchronous SNMP pollers.
#
# Mandatory: no
# Range: 0-1000
# Default:

StartSNMPPollers=1
```



Zabbix agent poller

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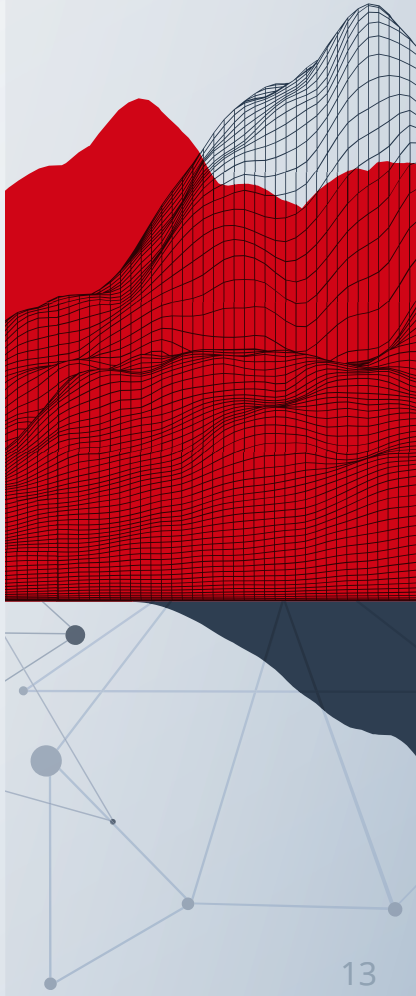
Zabbix agent poller collect data from passive Zabbix agents:

- Uses Zabbix communication protocol
- Optimized to communicate with Zabbix agents in passive mode

```
### Option: StartAgentPollers
#       Number of pre-forked instances of asynchronous Zabbix agent pollers
#
# Mandatory: no
# Range: 0-1000
# Default:

StartAgentPollers=1
```



HTTP agent poller

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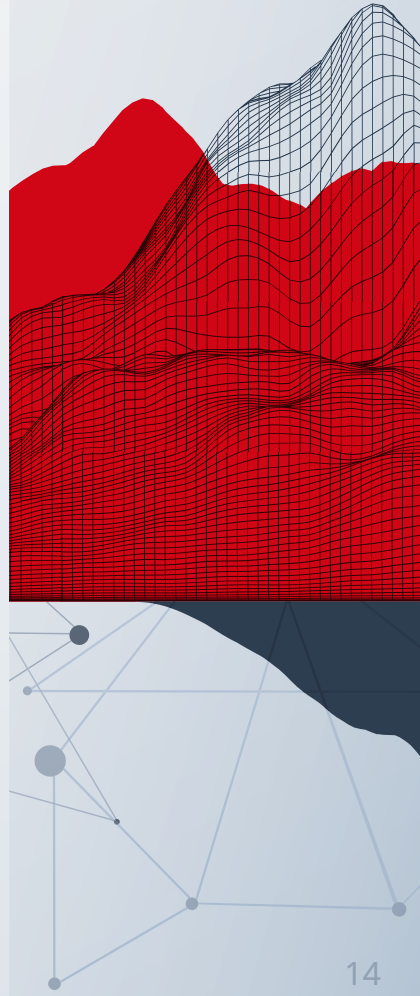
HTTP agent poller collects data from the web pages:

- Uses libcurl for data collection
- Optimized to work with web requests

```
### Option: StartHTTPAgentPollers
#       Number of pre-forked instances of asynchronous HTTP agent pollers
#
# Mandatory: no
# Range: 0-1000
# Default:

StartHTTPAgentPollers=1
```



Number of concurrent checks

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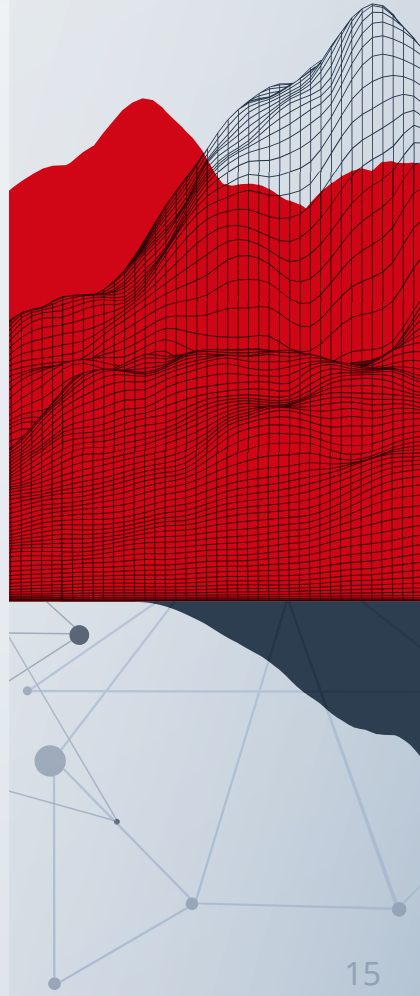
The maximum number of concurrent checks can be specified:

- Specified by the MaxConcurrentChecksPerPoller value
- The default value is 1000

```
### Option: MaxConcurrentChecksPerPoller
#       Maximum number of asynchronous checks that can be executed at once
#
# Mandatory: no
# Range: 1-1000
# Default:

MaxConcurrentChecksPerPoller=1000
```



Asynchronous polling

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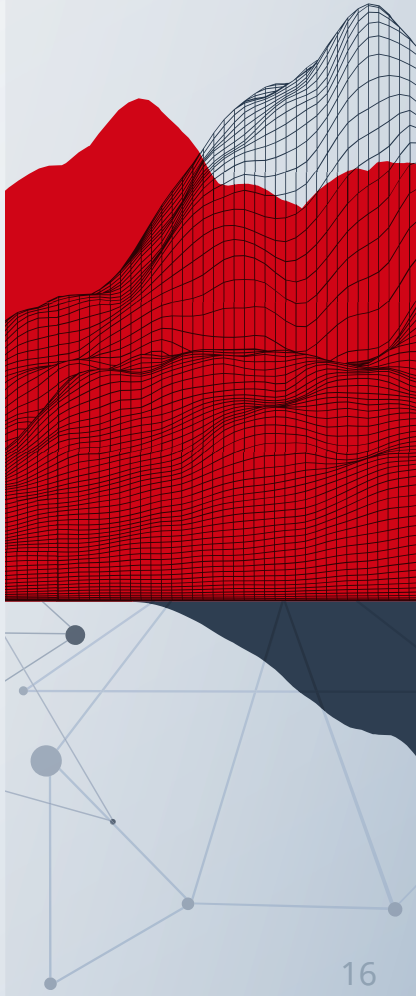
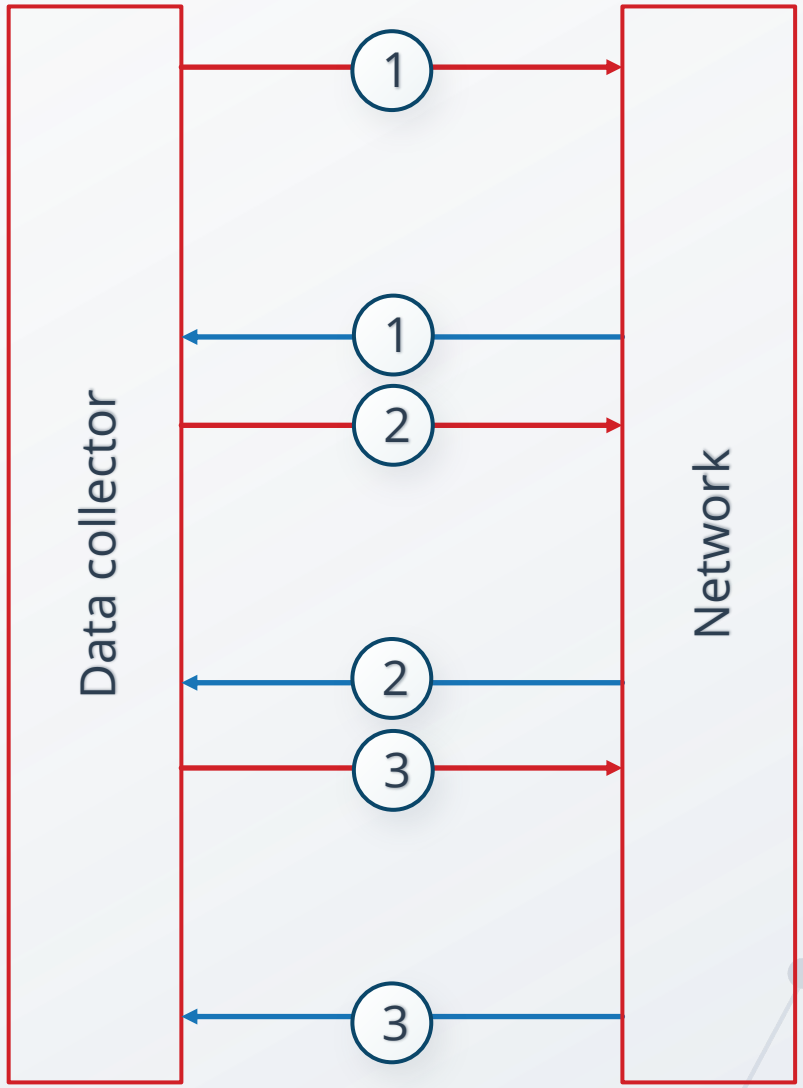
Each poller type now is an asynchronous process:

- Up to 1000 values can be collected by each process in a single cycle
- Separate thread is started to synchronize with configuration cache

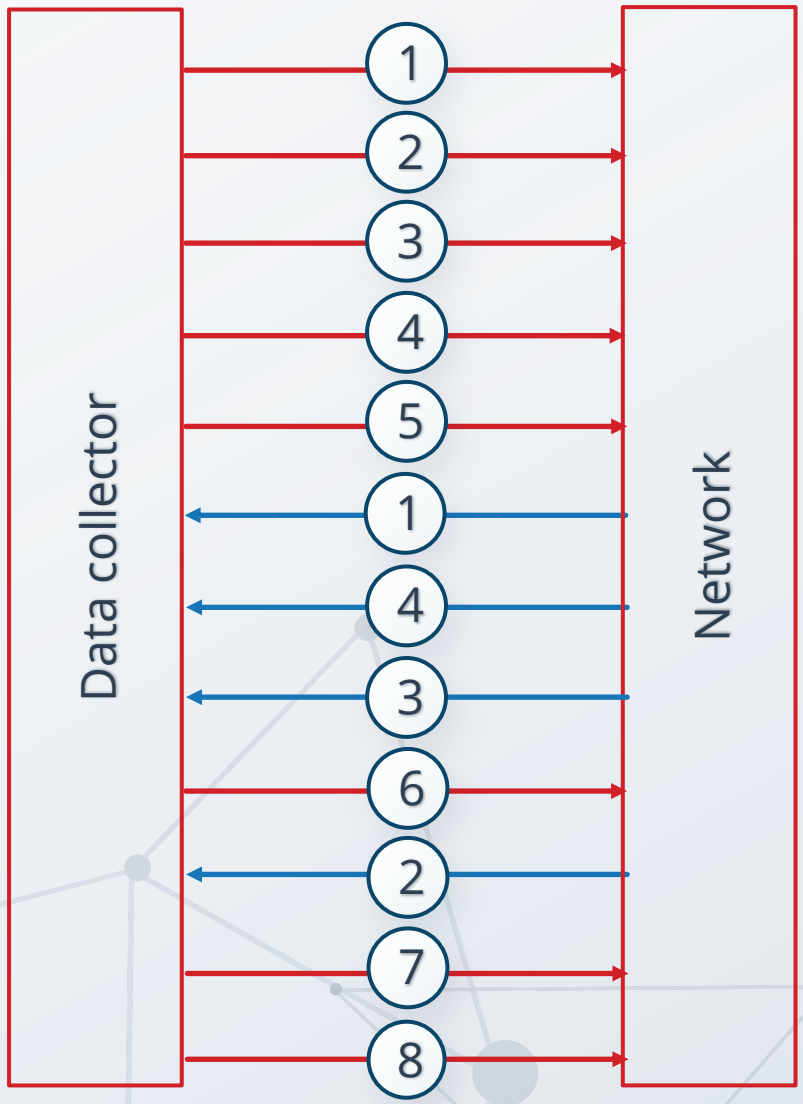
Asynchronous processes are a programming concept that allows tasks to be executed independently of each other and without blocking the main program's execution.



Synchronous data collection

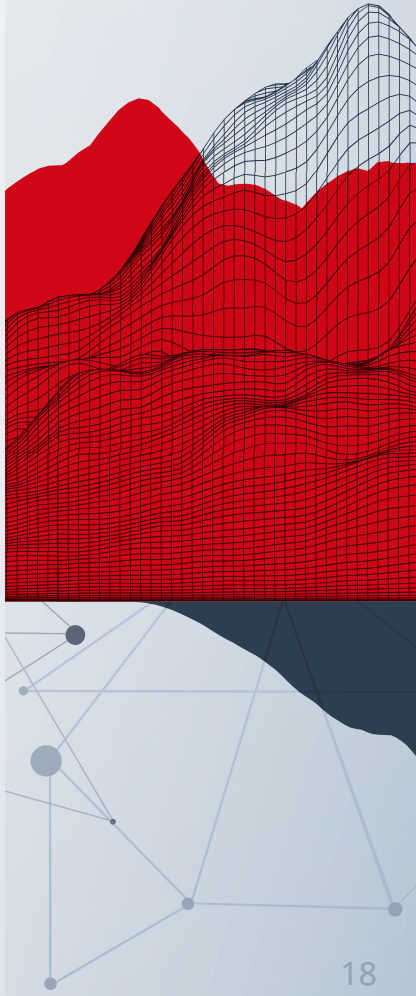


Asynchronous data collection



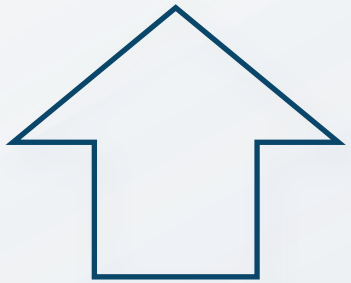
Zabbix 6.0 data collection

```
0:01 /usr/sbin/zabbix_server: poller #1 [got 97 values in 0.720154 sec, getting values]
0:01 /usr/sbin/zabbix_server: poller #2 [got 24 values in 0.480796 sec, getting values]
0:01 /usr/sbin/zabbix_server: poller #3 [got 24 values in 0.495460 sec, getting values]
0:01 /usr/sbin/zabbix_server: poller #4 [got 75 values in 0.734219 sec, getting values]
0:01 /usr/sbin/zabbix_server: poller #5 [got 24 values in 0.493454 sec, getting values]
0:01 /usr/sbin/zabbix_server: poller #6 [got 26 values in 0.493191 sec, getting values]
0:01 /usr/sbin/zabbix_server: poller #7 [got 25 values in 0.495608 sec, getting values]
0:01 /usr/sbin/zabbix_server: poller #8 [got 21 values in 0.480812 sec, getting values]
0:01 /usr/sbin/zabbix_server: poller #9 [got 25 values in 0.493319 sec, getting values]
0:01 /usr/sbin/zabbix_server: poller #10 [got 18 values in 0.489254 sec, getting values]
0:01 /usr/sbin/zabbix_server: poller #11 [got 20 values in 0.510633 sec, getting values]
0:01 /usr/sbin/zabbix_server: poller #12 [got 25 values in 0.495553 sec, getting values]
0:01 /usr/sbin/zabbix_server: poller #13 [got 21 values in 0.493304 sec, getting values]
0:01 /usr/sbin/zabbix_server: poller #14 [got 25 values in 0.493086 sec, getting values]
0:01 /usr/sbin/zabbix_server: poller #15 [got 90 values in 0.741500 sec, getting values]
0:01 /usr/sbin/zabbix_server: poller #16 [got 19 values in 0.492912 sec, getting values]
0:01 /usr/sbin/zabbix_server: poller #17 [got 17 values in 0.495651 sec, getting values]
0:01 /usr/sbin/zabbix_server: poller #18 [got 26 values in 0.492523 sec, getting values]
0:01 /usr/sbin/zabbix_server: poller #19 [got 25 values in 0.493129 sec, getting values]
0:01 /usr/sbin/zabbix_server: poller #20 [got 27 values in 0.493284 sec, getting values]
```



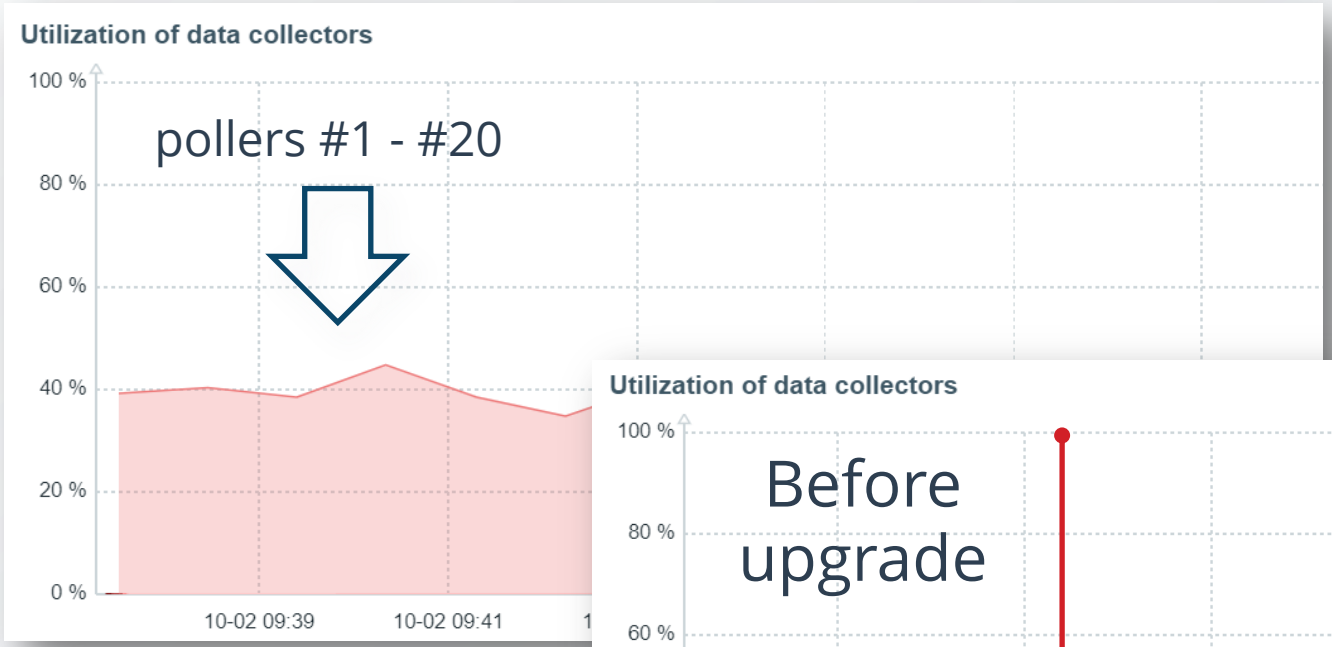
Zabbix 7.0 data collection

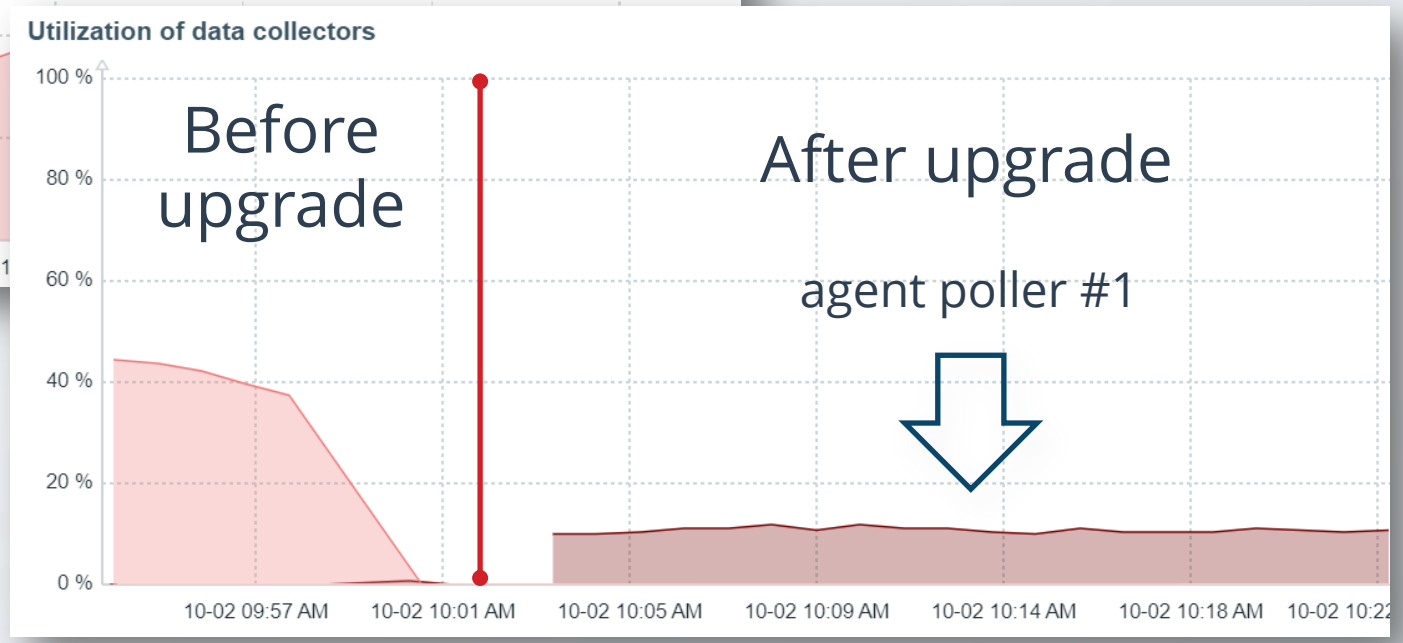
```
0:00 /usr/sbin/zabbix_server: poller #1 [got 0 values in 0.000015 sec, idle 1 sec]
0:00 /usr/sbin/zabbix_server: poller #2 [got 0 values in 0.000018 sec, idle 1 sec]
0:00 /usr/sbin/zabbix_server: poller #3 [got 14 values in 0.000337 sec, idle 1 sec]
0:00 /usr/sbin/zabbix_server: http agent poller #1 [got 0 values, queued 0 in 5 sec]
0:06 /usr/sbin/zabbix_server: agent poller #1 [got 1497 values, queued 1108 in 5 sec]
0:00 /usr/sbin/zabbix_server: snmp poller #1 [got 0 values, queued 0 in 5 sec]
```



Reduce the number of processes

Zabbix 6.0 vs 7.0





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Proxy memory buffer

New proxy buffer modes

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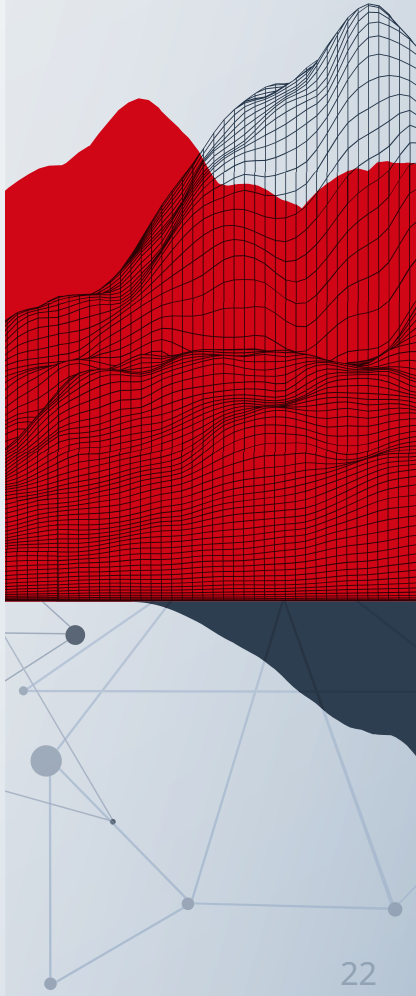
Zabbix 7.0 will introduce new proxy buffer modes:

- Disk — current behavior
- Memory — data stored only in shared memory
- Hybrid — buffer works in memory mode with DB as backup

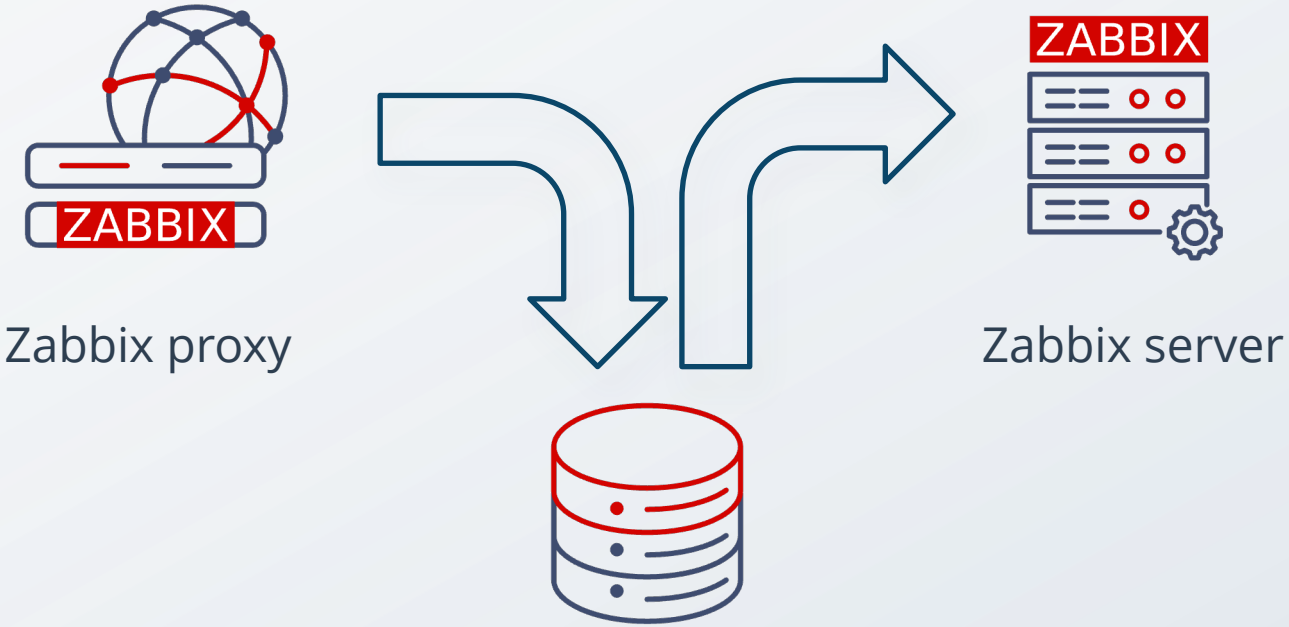
```
### Option: ProxyBufferMode
#     Specifies history, discovery and auto registration data storage mechanism:
#     disk    - data are stored in database and uploaded from database
#     memory  - data are stored in memory and uploaded from memory.
#     hybrid  - the proxy buffer normally works like in memory mode until it
#               runs out of memory or the oldest record exceeds the configured age
# Default:
# ProxyBufferMode=disk

ProxyBufferMode=hybrid
```



Disk mode

Each value collected by Zabbix proxy goes through a database:

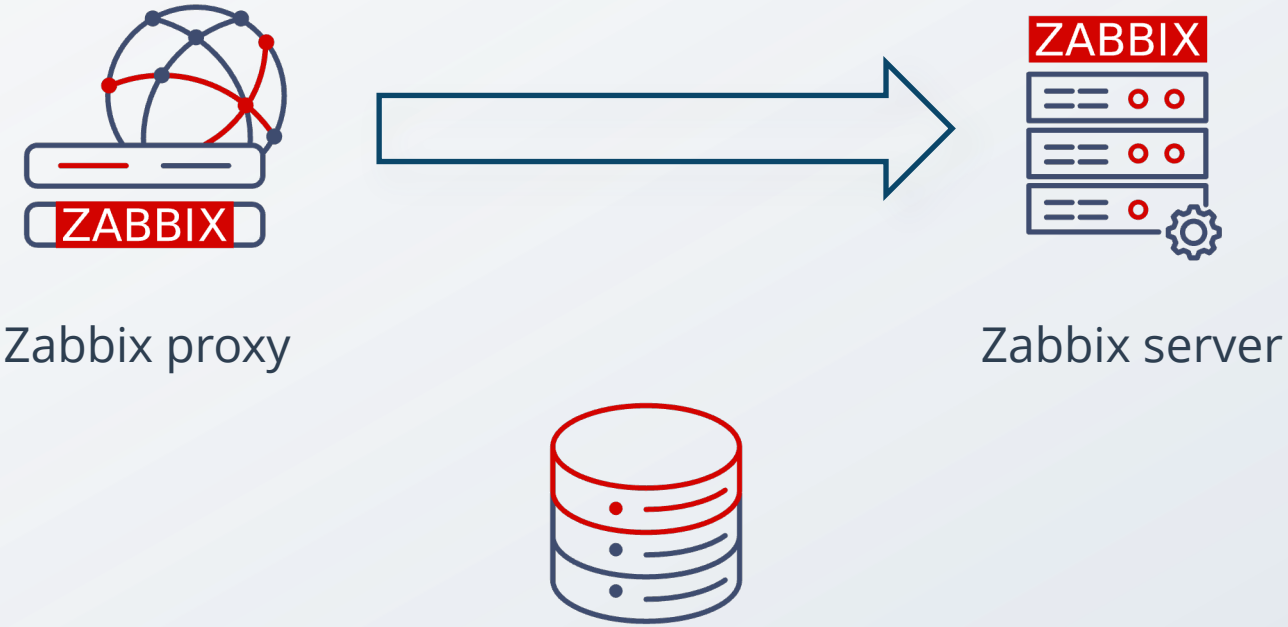
- Database (MySQL, Postgres or SQLITE) required on each proxy
- This may cause a bottleneck on large proxies



Memory mode

Data is sent to Zabbix server directly:

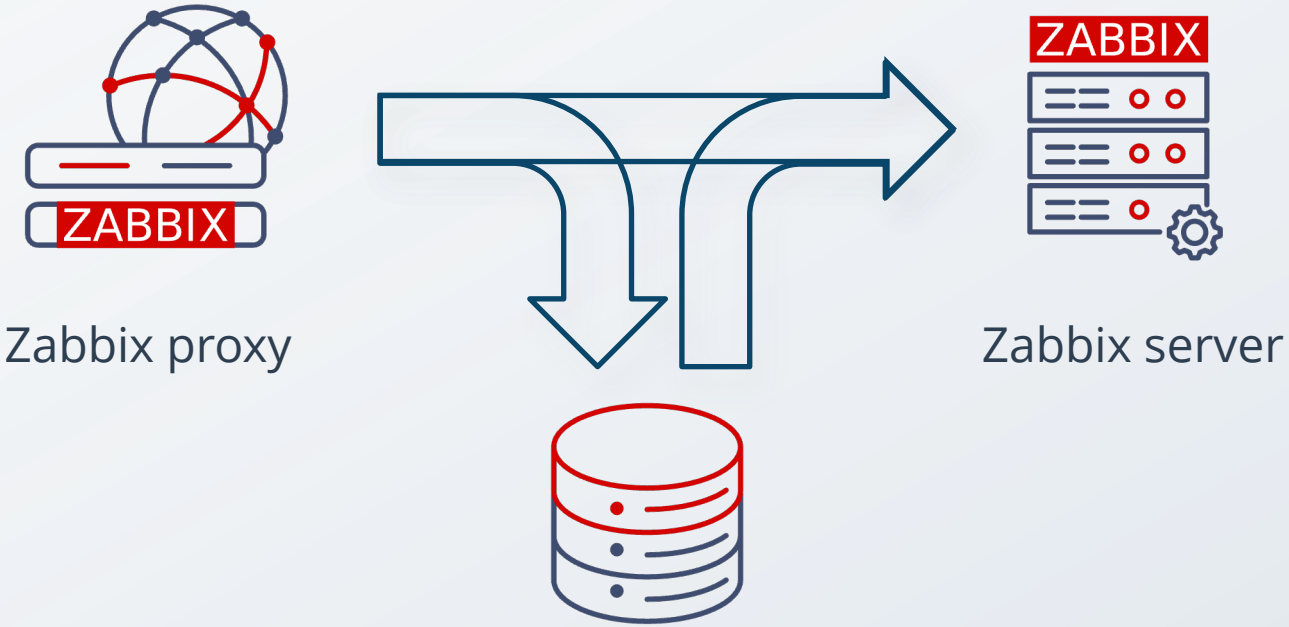
- the history data is being stored in shared memory and uploaded from it
- If buffer runs out of memory the old data will be discarded



Hybrid mode

Data is sent to Zabbix server directly:

- buffer normally works like in the memory mode
- the buffer is flushed in database if buffer does not have enough space



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Item level timeout

Zabbix timeout

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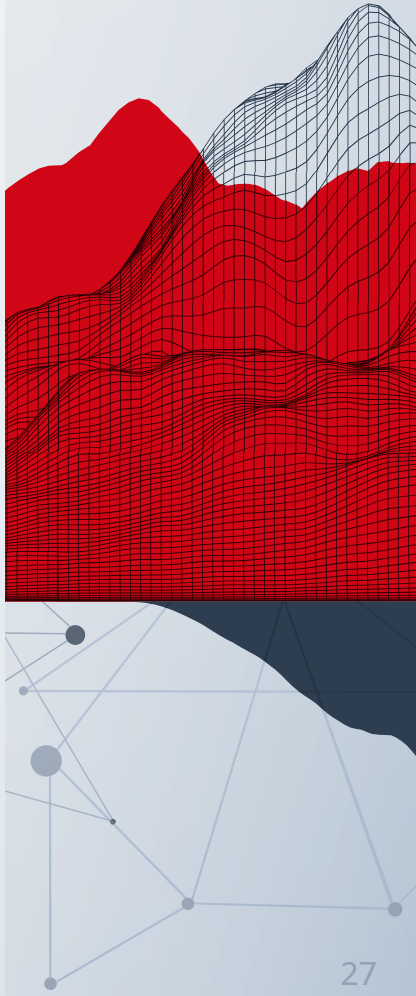
Zabbix has a general timeout specified in the configuration file

- Timeout affects all data collection on Zabbix server or proxy
- Some item types have own timeout (HTTP agent, Script)

```
### Option: Timeout
#       Specifies how long we wait for agent, SNMP device or external check
#
# Mandatory: no
# Range: 1-30
# Default:

Timeout=4
```



Item level timeout

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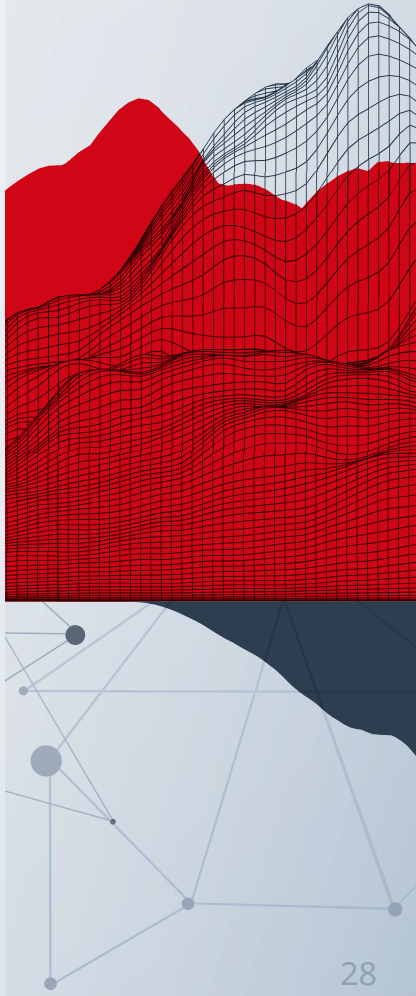
Zabbix 7.0 will introduce item level timeout for most checks:

- Timeout is defined using Zabbix graphical user interface
- Range is from 1 to 600 seconds (10 minutes)

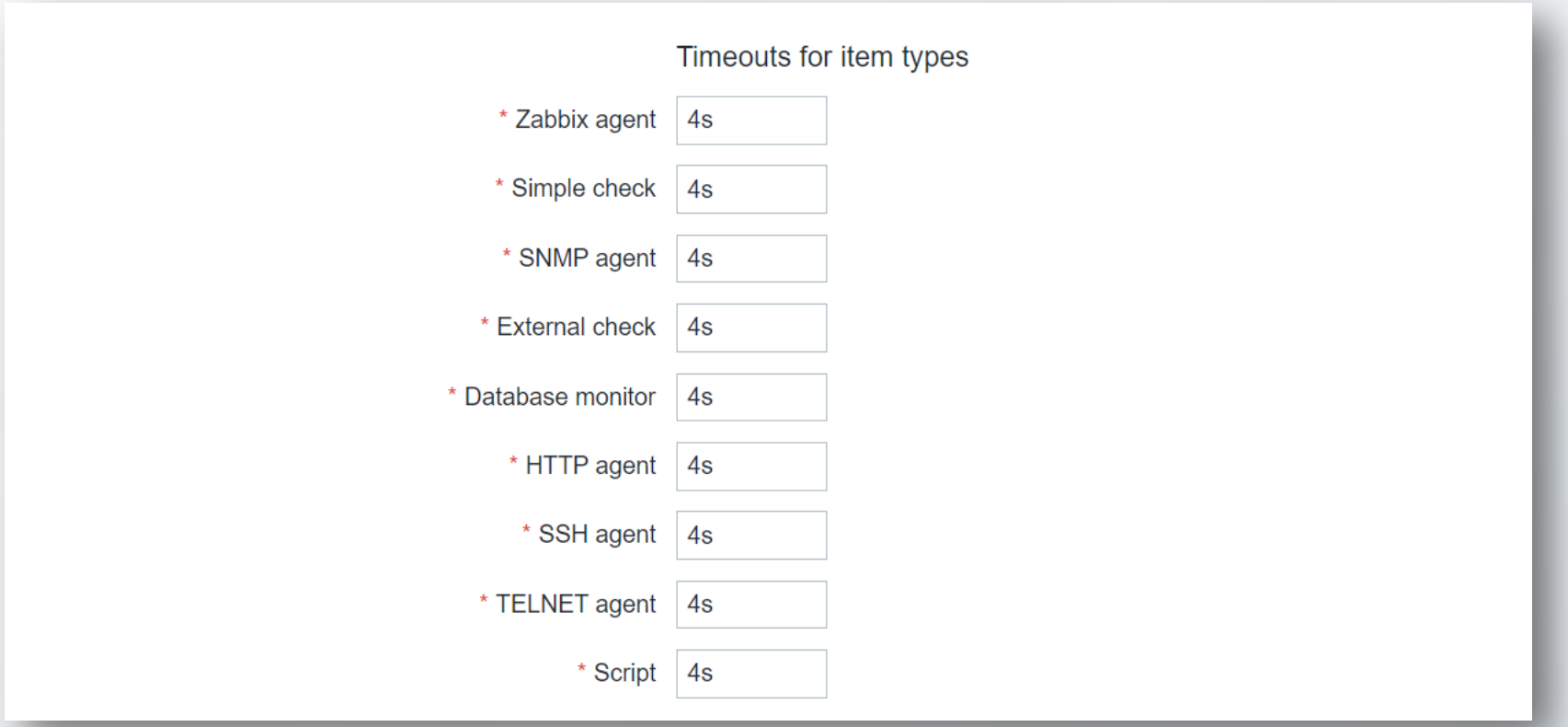
Timeout can be defined on multiple levels:

- On Zabbix server globally for all items
- Per proxy for items monitored by the proxy
- On each item individually



Global timeouts

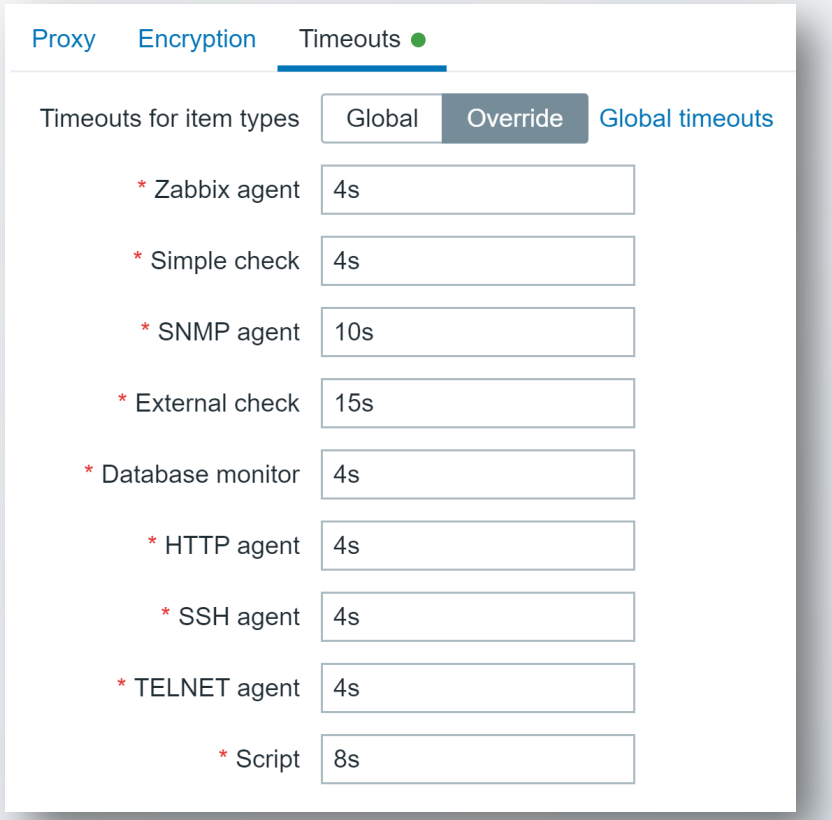
Global timeouts can be defined in Administration > General section



Proxy level timeouts

Proxy level timeout will affect all items collected by proxy

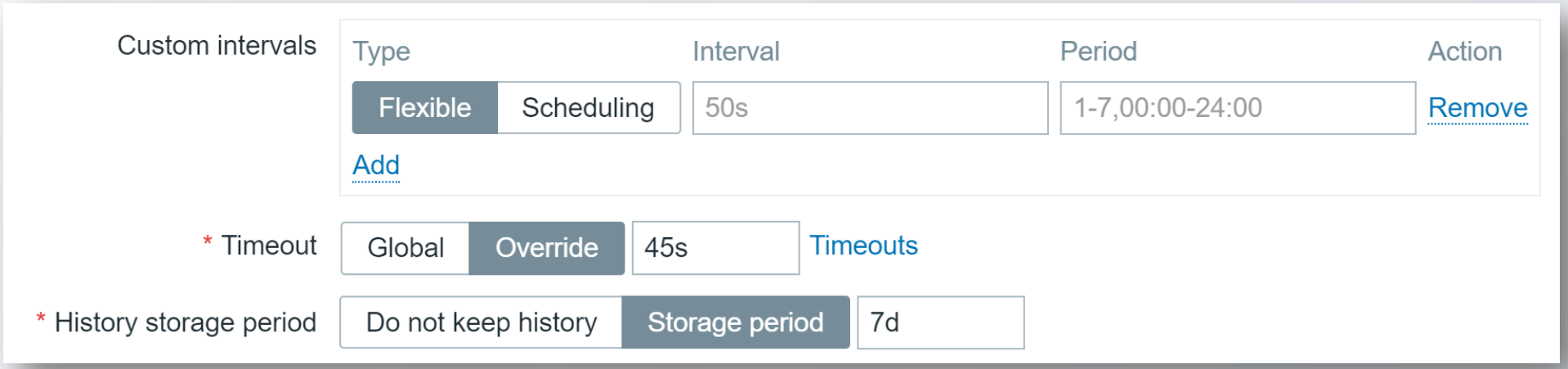
- Each type can be tuned individually
- Timeouts work as default values
- Forced override can be enabled



Individual timeouts

By using item level timeout, it is possible to tune individual items:

- Timeout defined globally or on proxy is used by default
- Can be adjusted if needed for a specific item



Timeout in the configuration file

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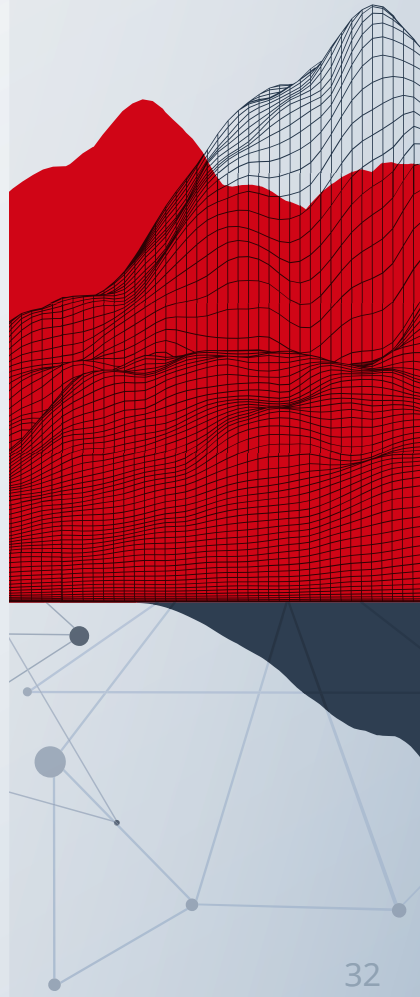
The timeout setting from Zabbix server / proxy configuration file

- Will become a default value for item timeout during the upgrade process
- Will be used as a timeout for communication between server and proxy

```
### Option: Timeout
#       Specifies timeout for communications (in seconds).
#
# Mandatory: no
# Range: 1-30
# Default:

Timeout=4
```



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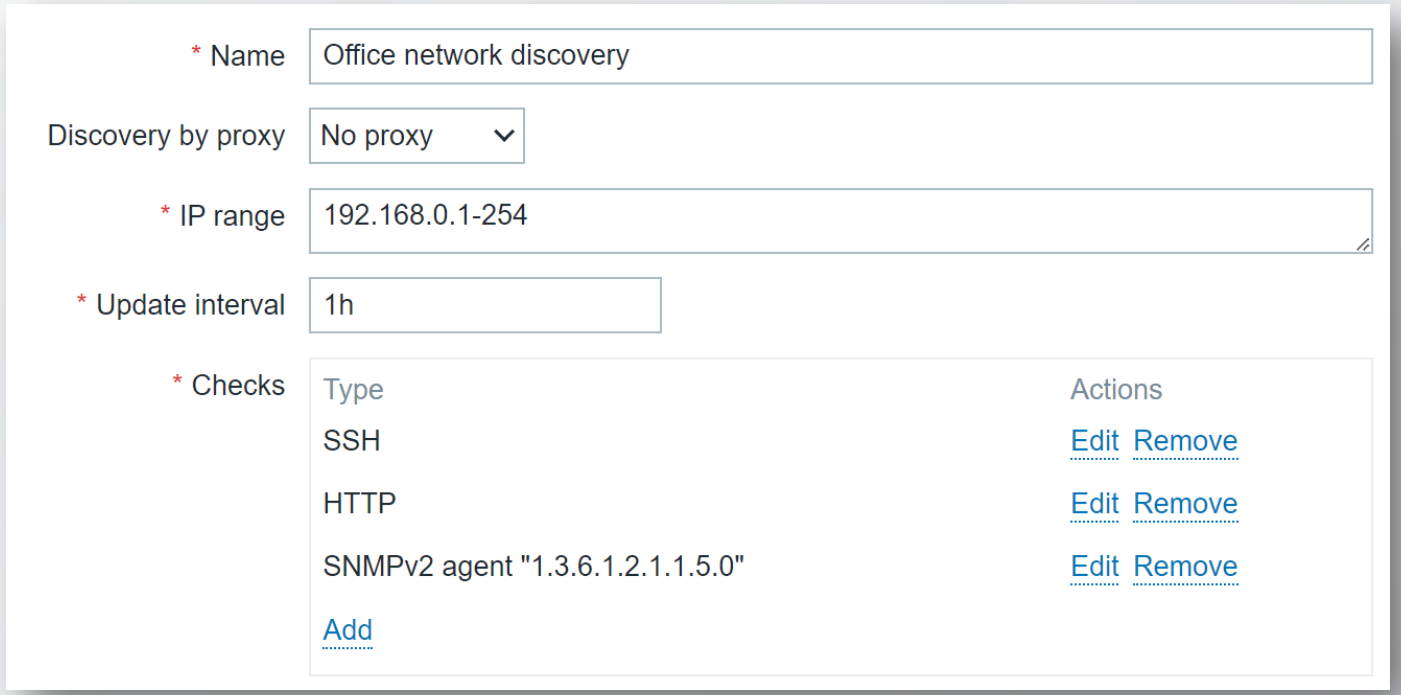
Concurrent network discovery

Network discovery

Network discovery can be quite slow on large segments:

- Each segment is processed by a single discoverer only
- Each IP address and service is processed sequentially



Sequential network discovery

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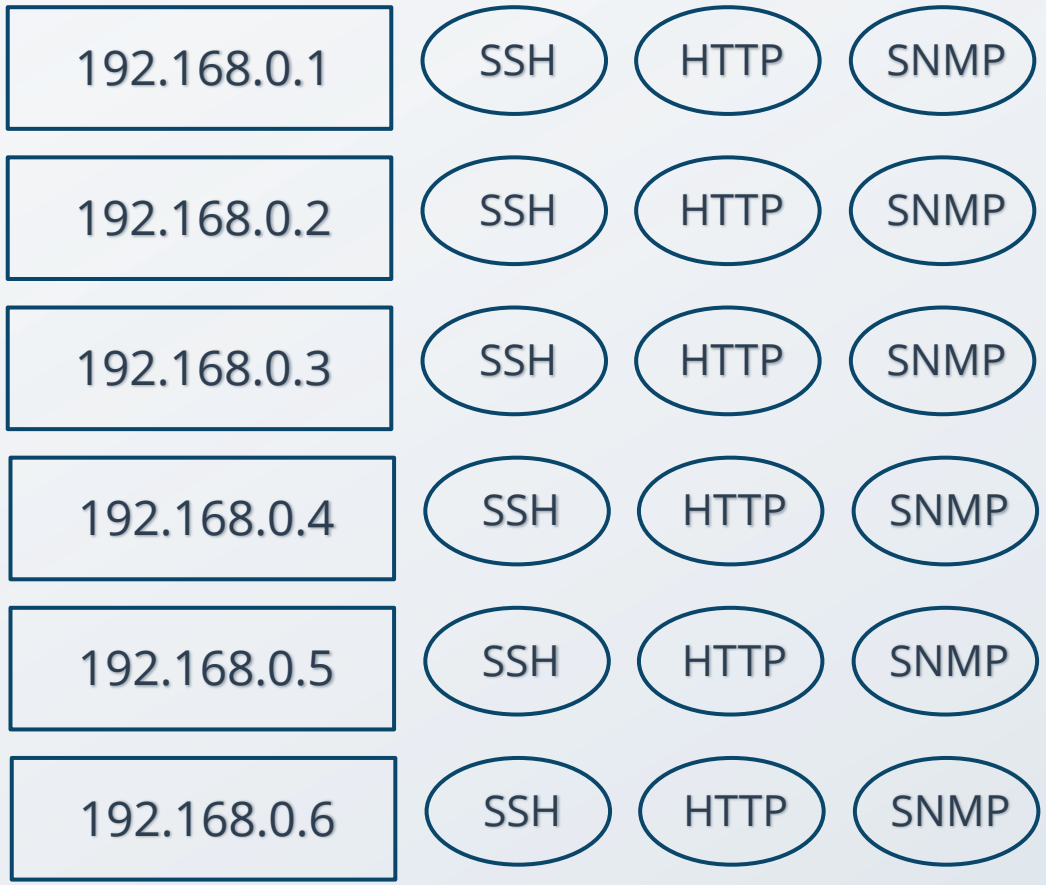
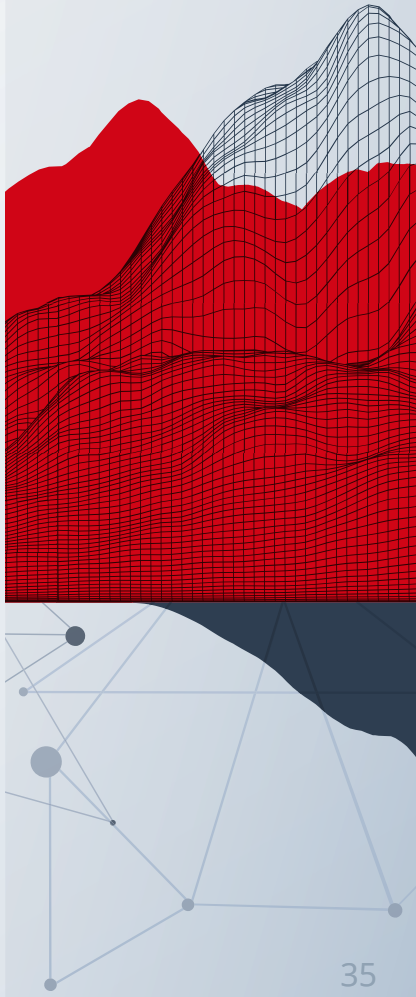
* Name: Office network discovery
Discovery by proxy: No proxy
* IP range: 192.168.0.1-254
* Update interval: 1h
* Checks:
Type
SSH
HTTP
SNMPv2 agent "1.3.6.1.2.1.1.5.0"
Add

```
### Option: Timeout
Timeout=3
```

Single process





New processes

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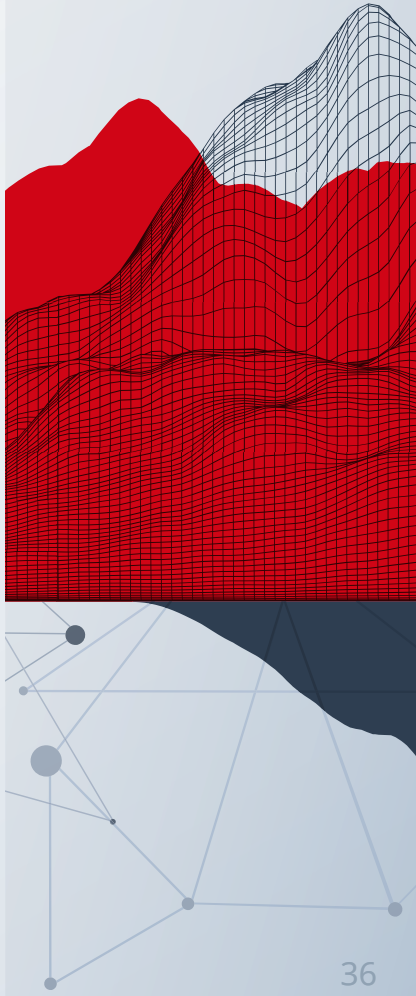
Zabbix 7.0 introduces new processes

- Discovery manager
- Discovery worker (previously known as discoverer process)

```
### Option: StartDiscoverers
#       Number of pre-started instances of discovery workers.
#
# Mandatory: no
# Range: 0-1000
# Default:

StartDiscoverers=5
```



Discovery rule configuration

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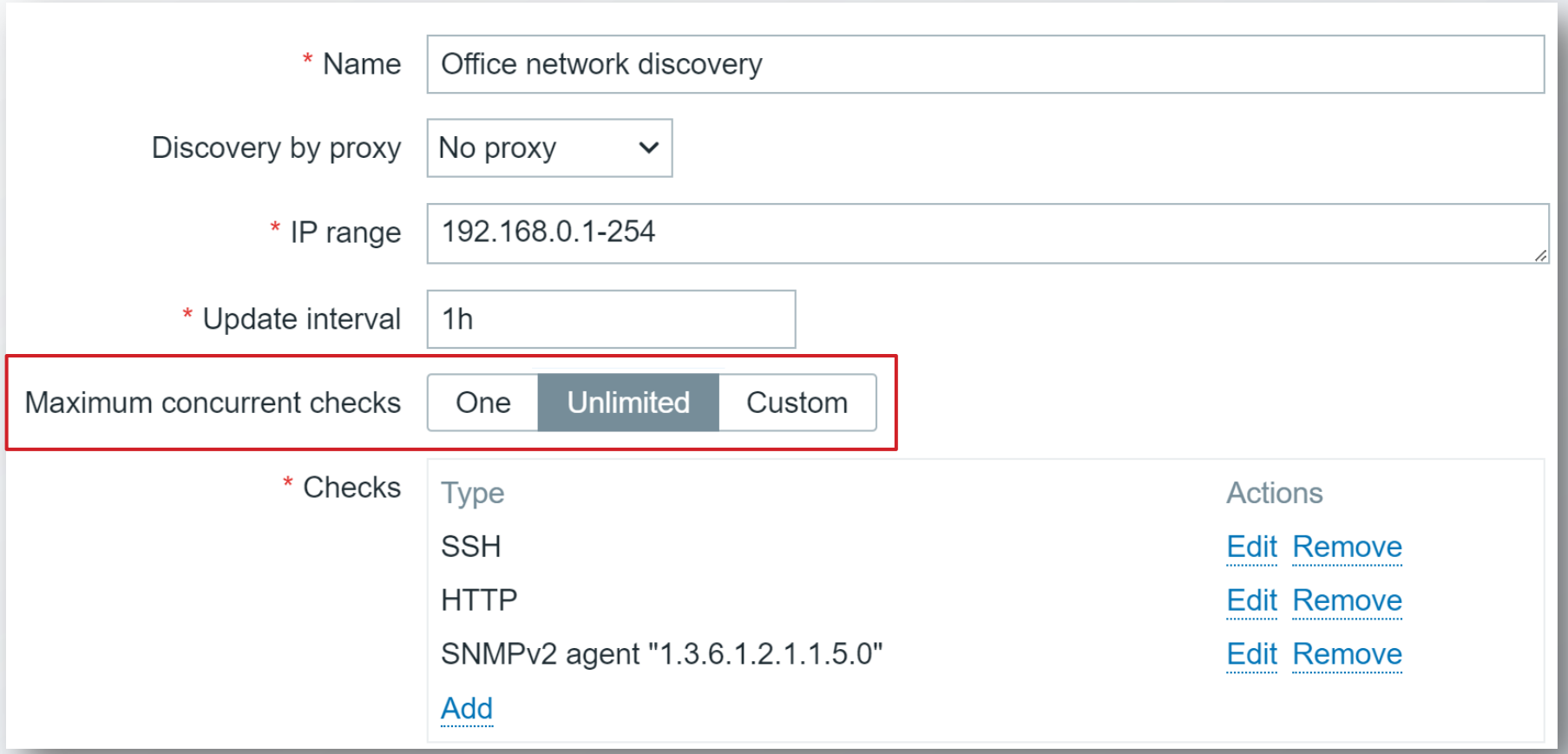
Concurrency is configured on discovery rule level



Concurrent network discovery (in DEV)

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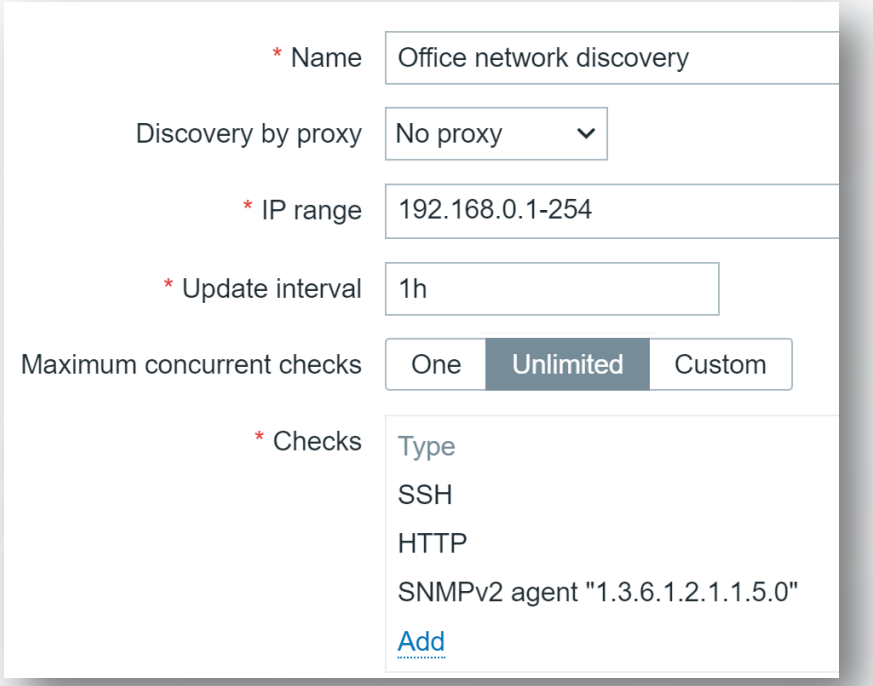

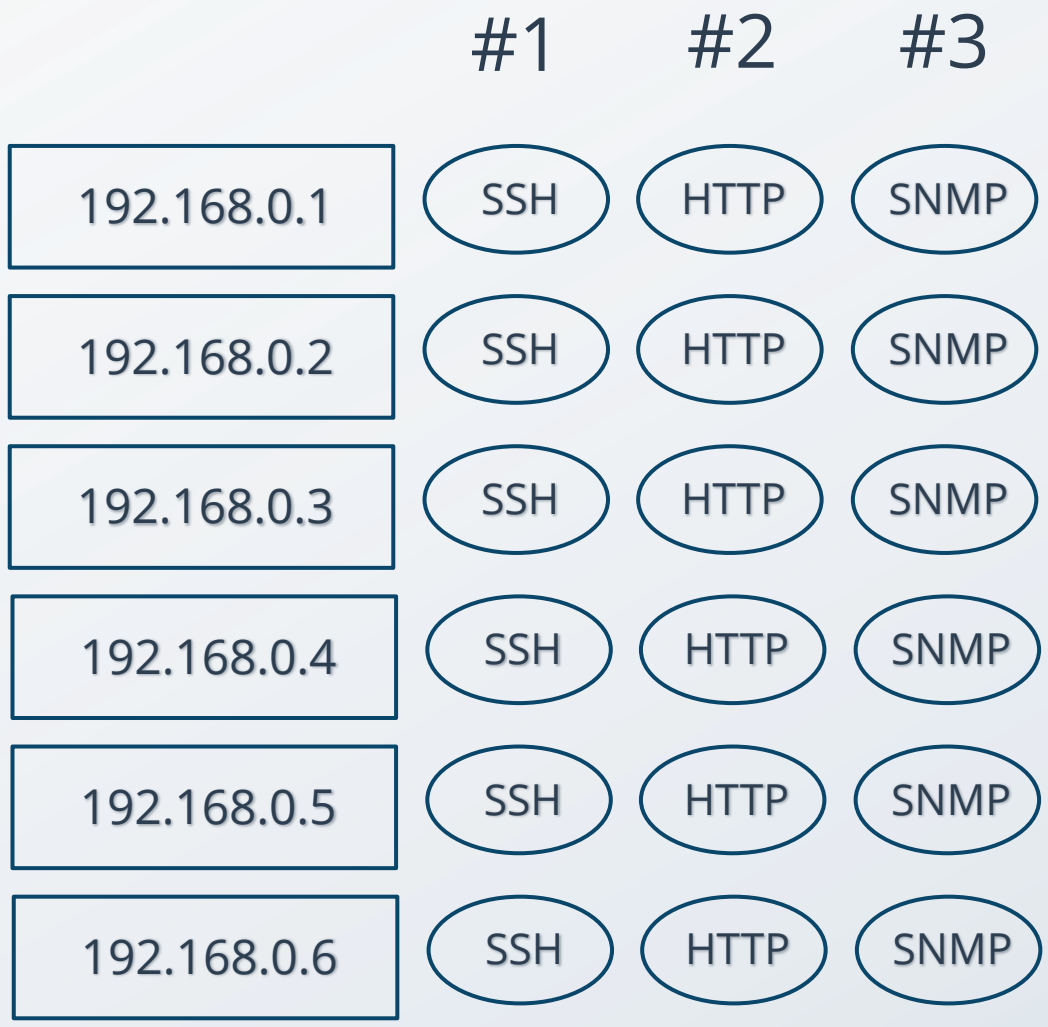

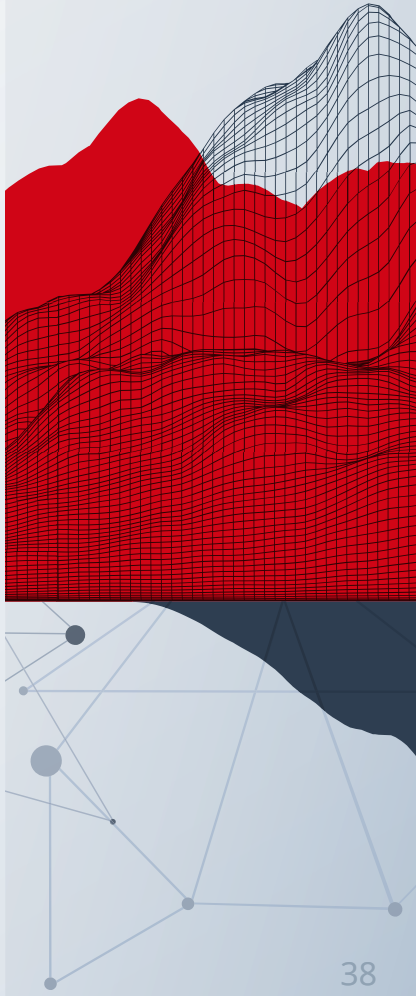

Internal monitoring

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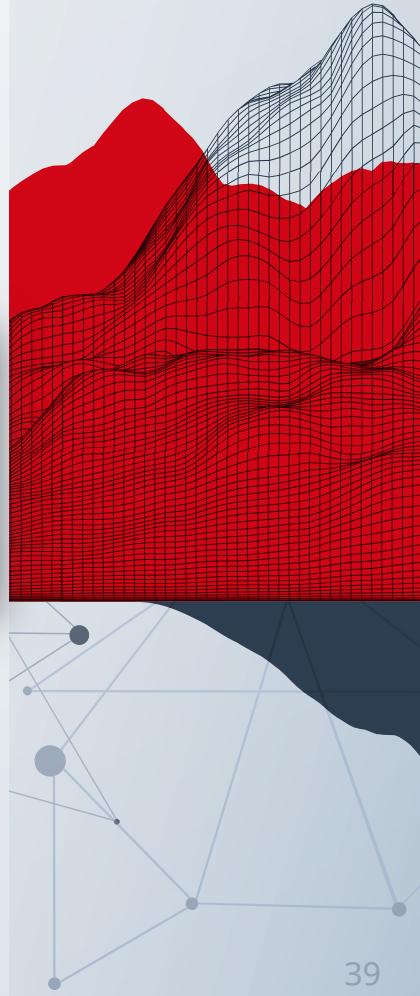
New internal items are introduced:

- The count of network checks enqueued monitored in the discovery queue
- Utilization of discovery manager and workers

Name ▲	Triggers	Key	Interval	History	Trends	Type
Zabbix server: Discovery queue		zabbix[discovery_queue]	1m	1w	365d	Zabbix internal
Zabbix server: Utilization of discovery manager internal processes, in %	Triggers 1	zabbix[process,discovery manager,avg,busy]	1m	1w	365d	Zabbix internal
Zabbix server: Utilization of discovery worker internal processes, in %	Triggers 1	zabbix[process,discovery worker,avg,busy]	1m	1w	365d	Zabbix internal



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Thank You!

Kaspars Mednis

Chief trainer