ZABBIX

Zabbix 7.0 Performance Tuning Best Practices

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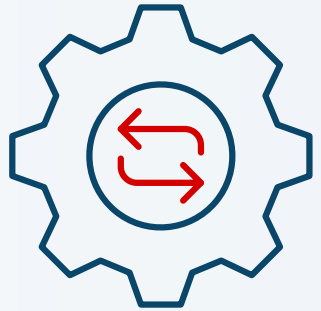
New things in Zabbix 7.0

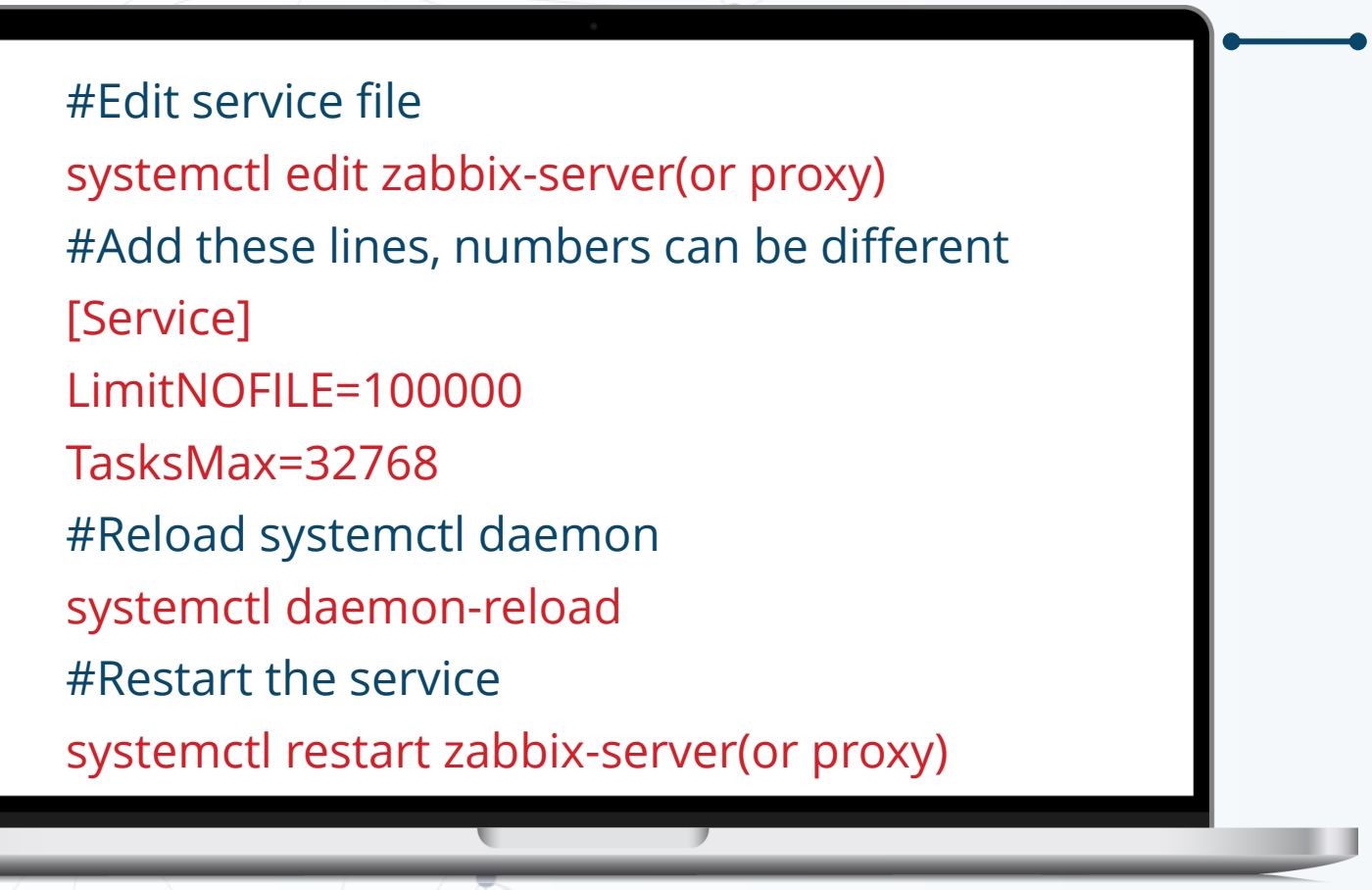
- New processes
- Adjusted health monitoring
- Performance improvements
- Proxy load balancing

New processes

- Asynchronous processes
  - SNMPAgentPoller
  - AgentPoller
  - HTTPAgentPoller
  - Discoverer*
- MaxConcurrentChecksPerPoller
  - Maximum 1000 threads per worker
  - OS configuration required



*Discoverer process is changed, however, network discovery is still performed



Increasing file descriptor amount

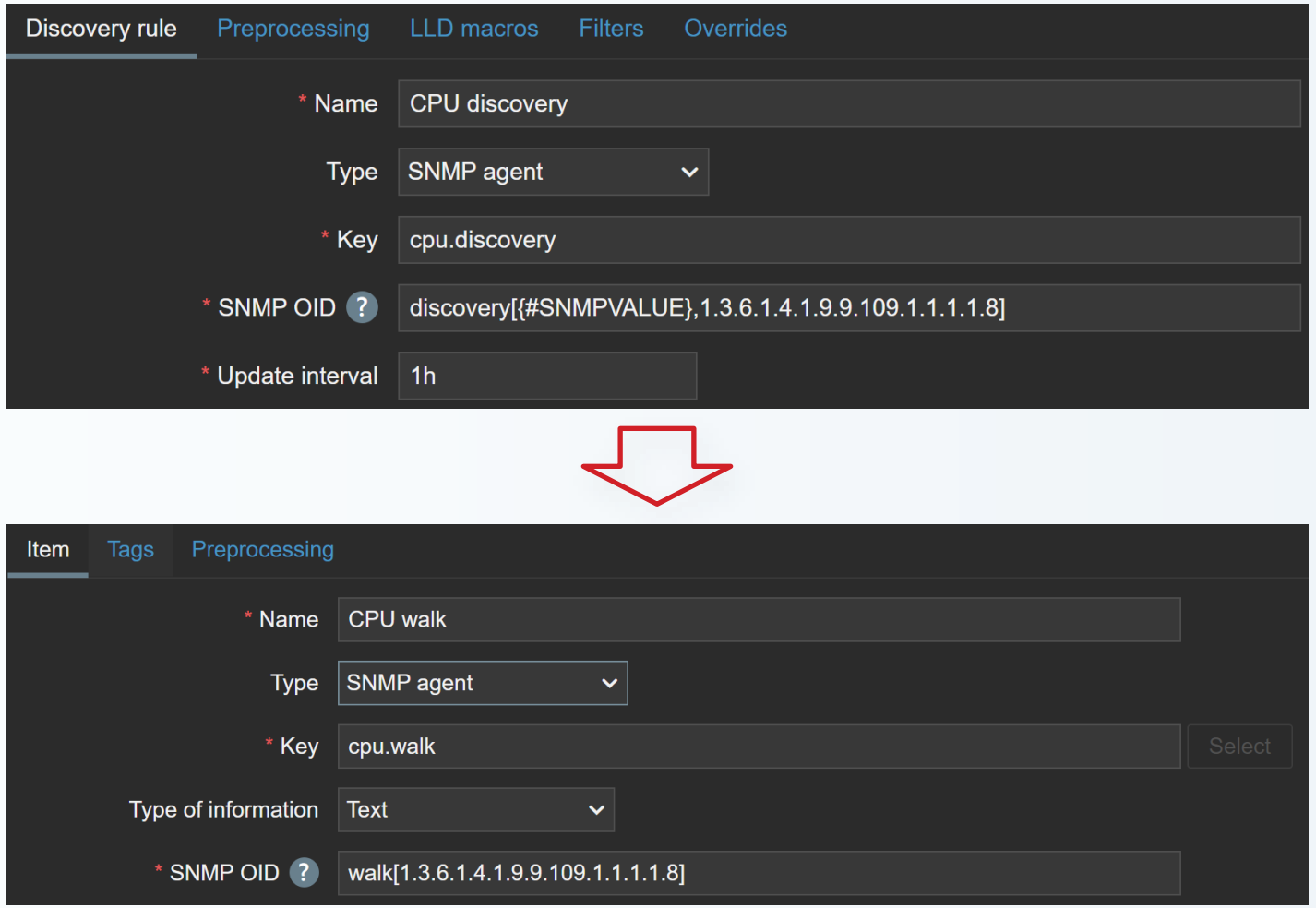
- Modification of service files is required
  - Zabbix server
  - Zabbix proxy

SMNPAgentPoller

- Allows asynchronous monitoring of SNMP devices
- Most default templates have been converted to use SNMPAgentPoller
- Custom templates need to be adjusted
- Works only with certain OID syntax
  - walk[oid,oid,oid...]
  - get[oid]

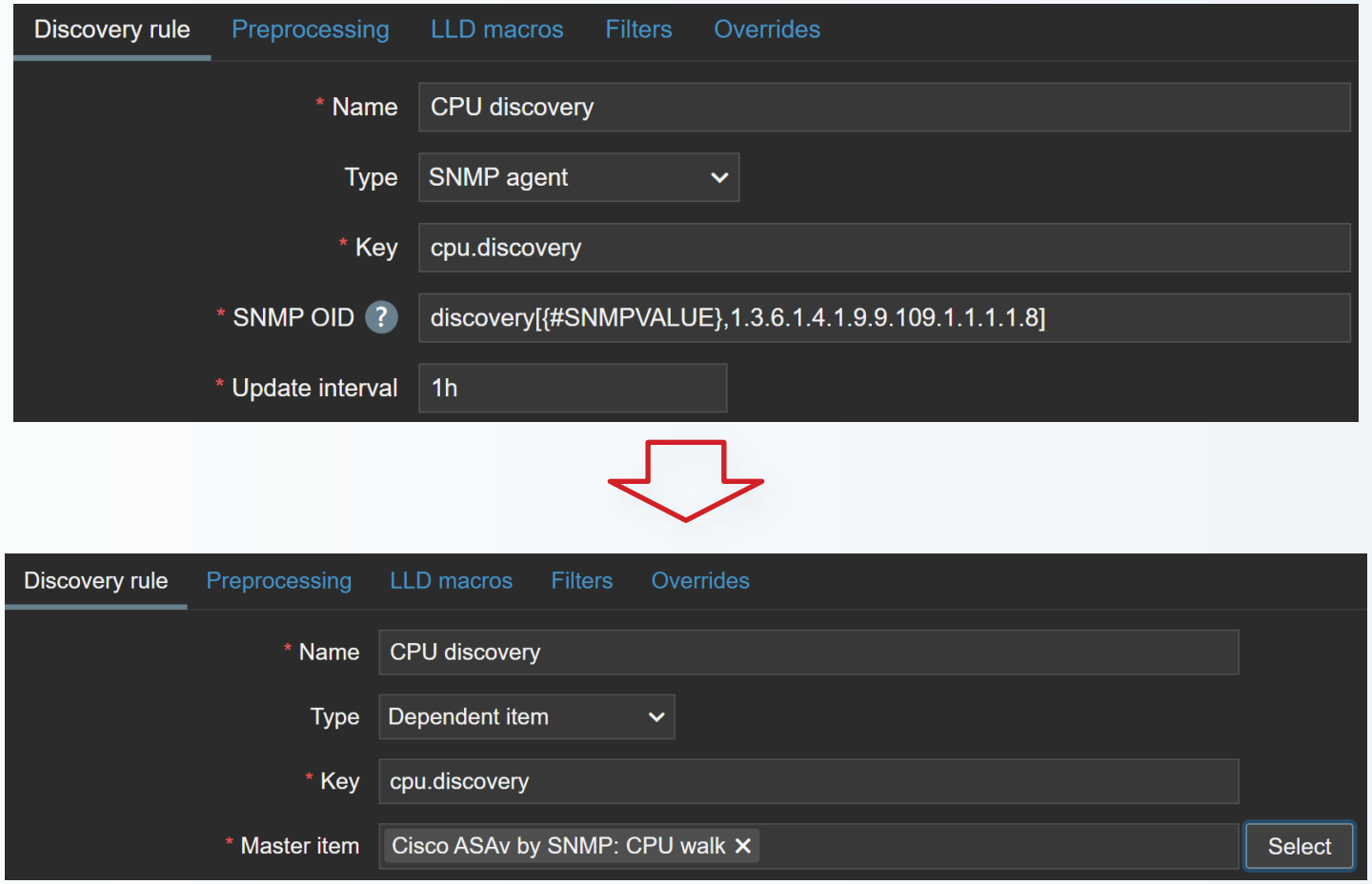
Converting a custom template

- Instead of discovery rule, a new walk item needs to be created



Converting a custom template

- Discovery rule needs to be converted to dependent discovery rule



Converting a custom template

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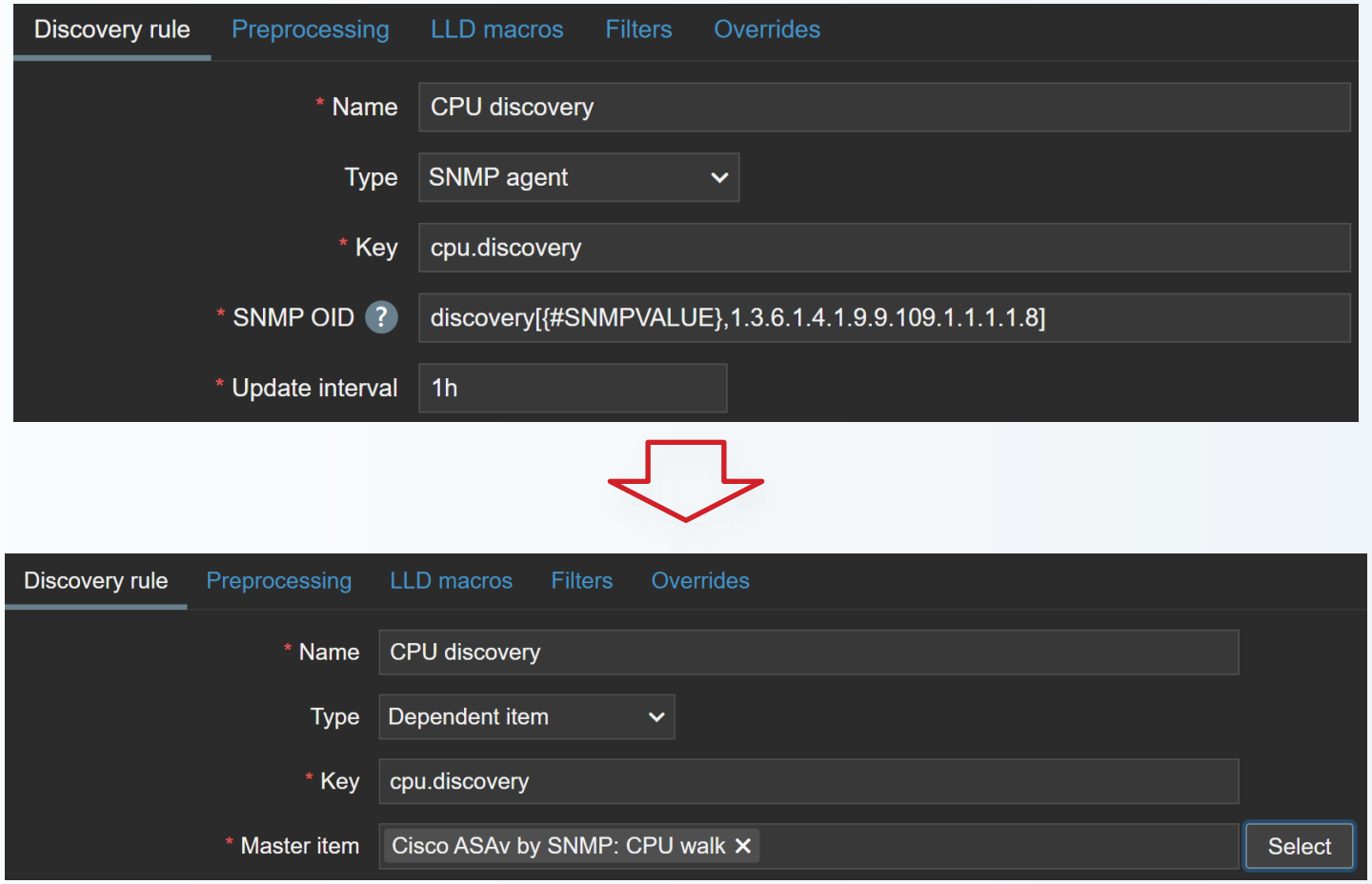
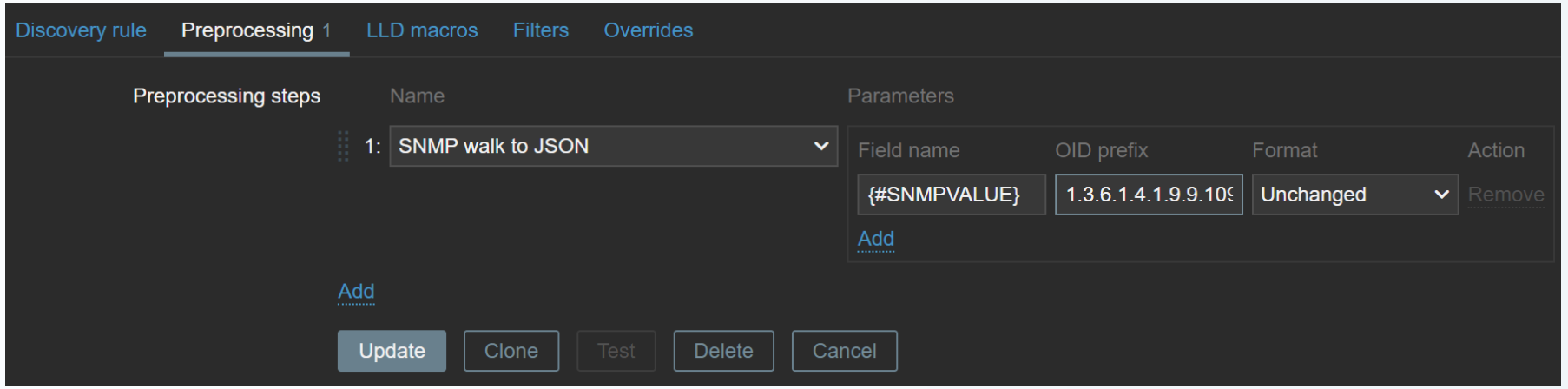


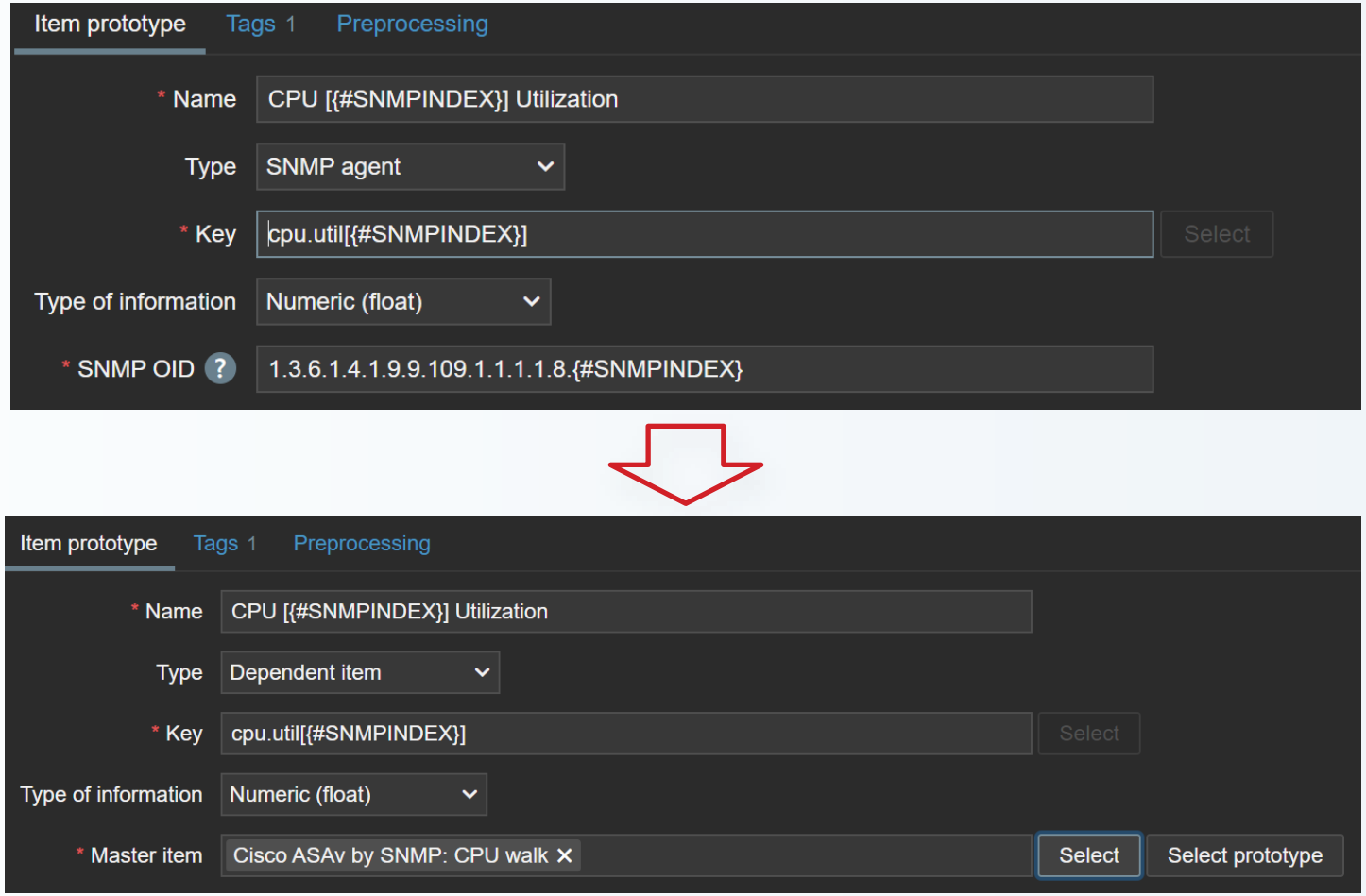
Converting a custom template

- Use preprocessing to convert walk output to JSON on LLD rule



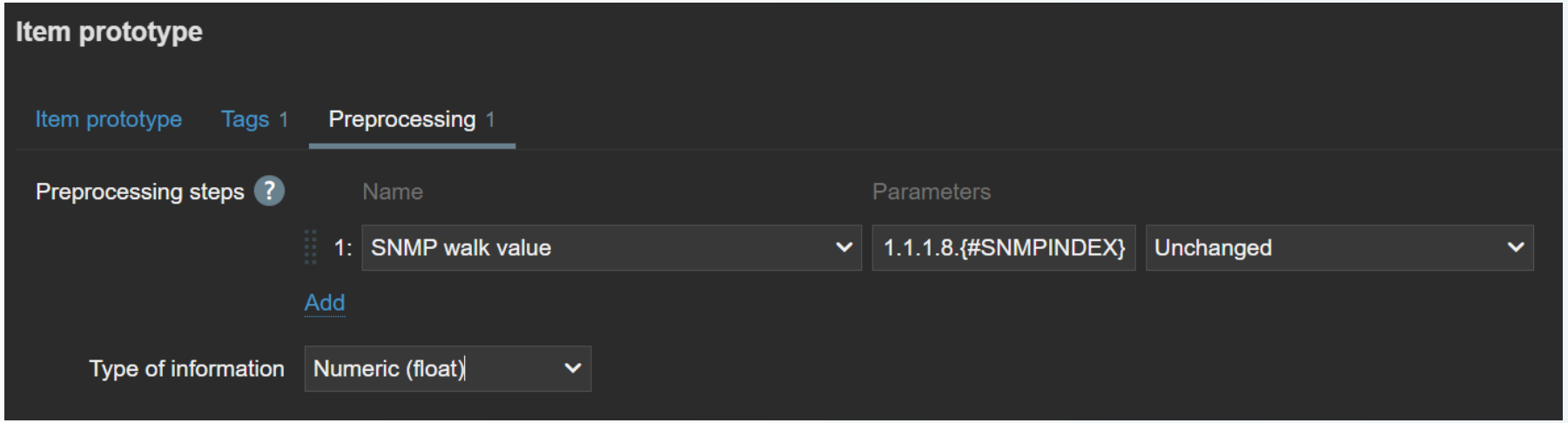
Converting a custom template

- Convert item prototypes to dependent items which will take values from walk item



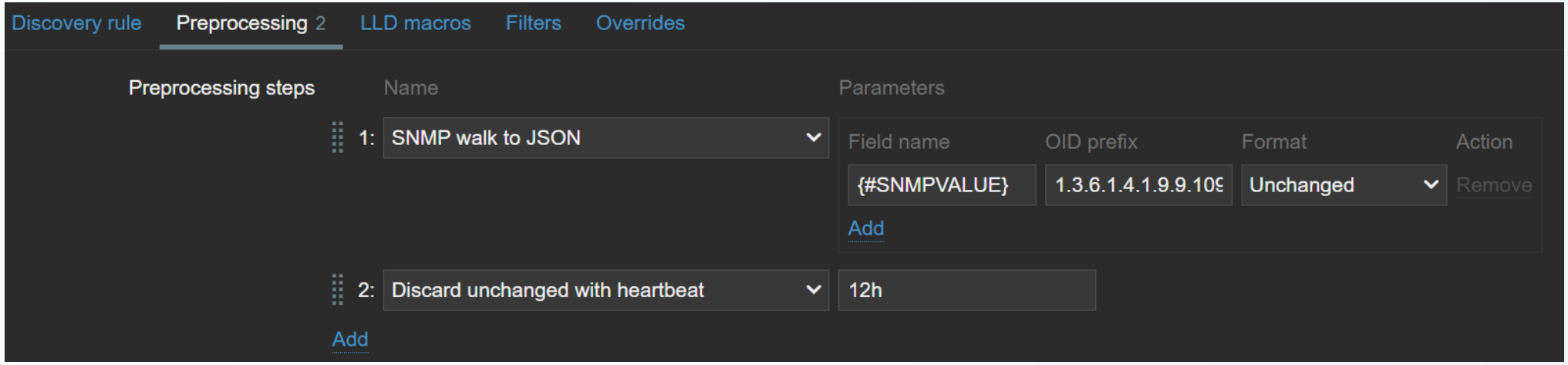
Converting a custom template

- Use preprocessing to extract specific values from the master item on the item prototype



Converting a custom template

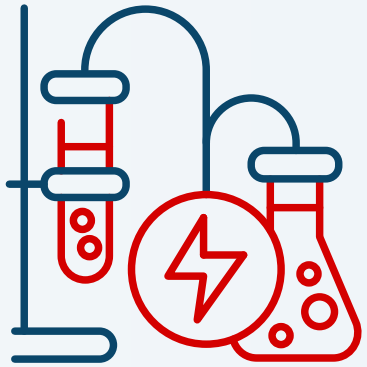
- Use preprocessing to limit LLD rule execution time



Proxy memory buffer

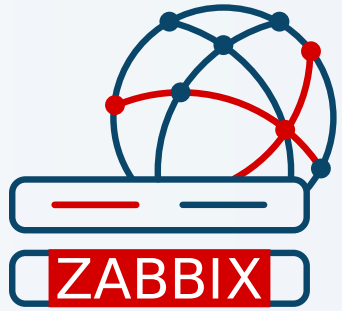
Available proxy memory buffer methods (ProxyBufferMode):

- «disk»
  - All data gets stored in DB
  - Default for old environments after upgrade
- «memory»
  - All data gets stored in memory (RAM)
  - No protection against data loss
- «hybrid»
  - Recommended
  - Uses memory in most cases
  - Data loss protection using DB
  - Default for new installations



Proxy load balancing

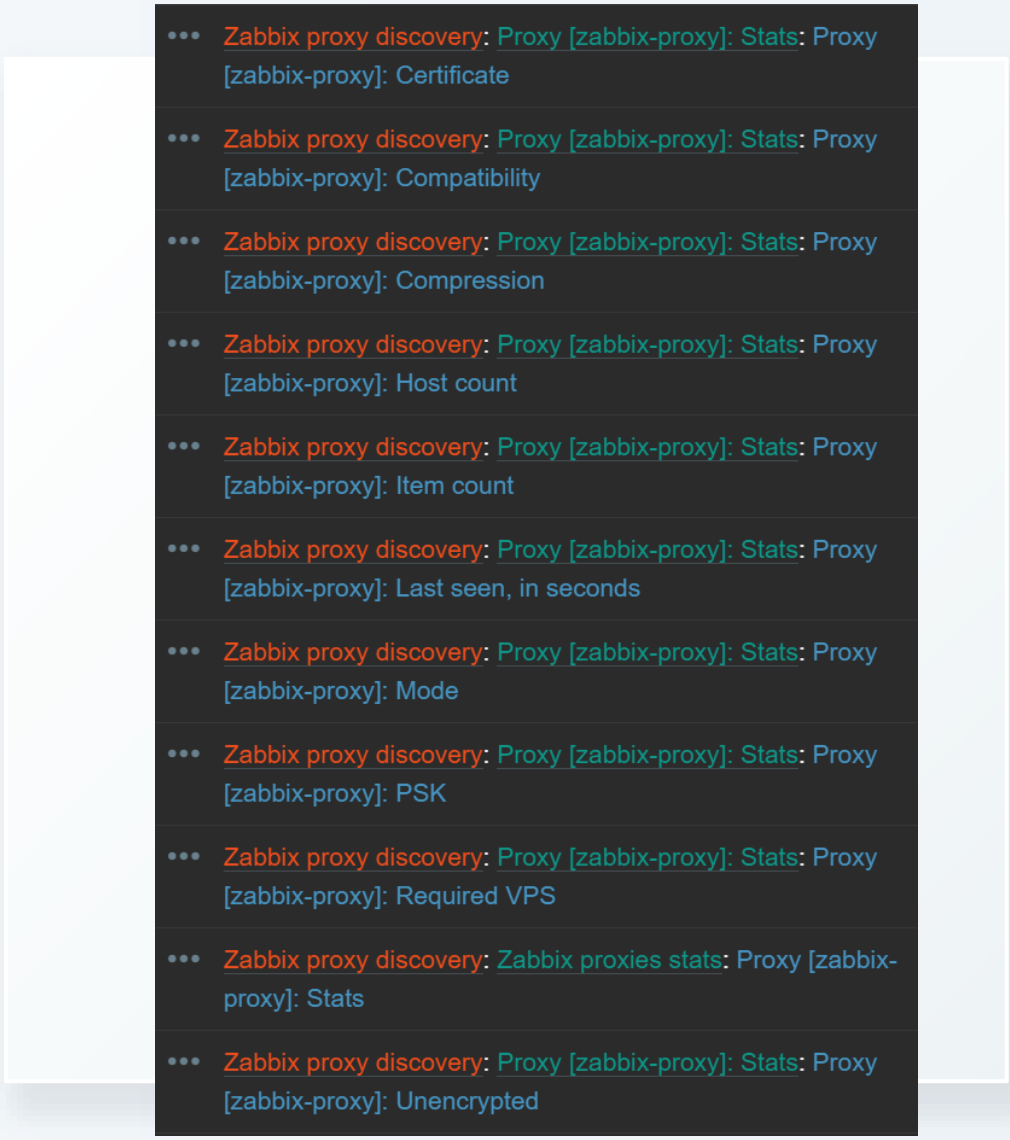
- Proxy groups managed by Zabbix server
- Auto rebalancing of hosts
- In case of issues, host gets automatically assigned to a working proxy



Proxy LLD by Zabbix server

Zabbix server health template:

- Does LLD of proxies that are connected to the server
- Creates basic items and triggers
- Shows various statistics from proxies



*Remember to retrieve the latest health templates after upgrading to a new major Zabbix version!

Configuration updates

- Configuration updates are now incremental
- Zabbix server reloads configuration every 10s
- Zabbix proxy reloads configuration every 10s
- Active agent reloads configuration every 5s

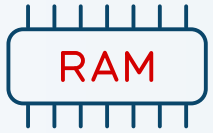
Version/Component	Zabbix server	Zabbix proxy	Active agent
6.0	1 minute	1 hour	2 minutes
7.0	10 seconds	10 seconds	5 seconds

Performance improvements

- Faster frontend permission checks
- Immediate maintenance
- Faster trigger execution
- Logging of SNMP v3 duplicate engine ID
- Configuration file validation
- Item timeouts

Zabbix internal process tuning

- Workers
- Caches
- Managers



Tuning workers

- Most worker usage needs to be between 40-60%
- Zabbix server and proxy have almost the same set of workers

Alerter

Escalator

HTTP poller

History syncer

History poller

Timer

Text

Text

Text

LLD worker

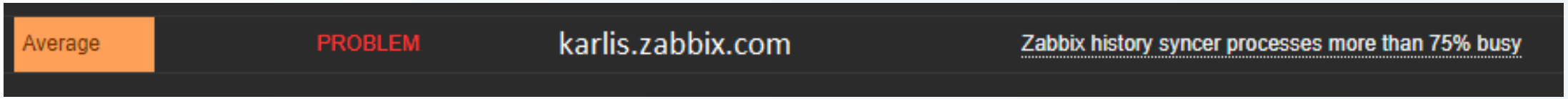
Java poller

Poller

History syncers

- Writes data into the database
- Calculates triggers
- 1 History syncer can deal with ~1000 NVPS

History syncers



Causes:

- Data cannot be written in the DB fast enough
- Lots of triggers to be calculated
- Most often DB related

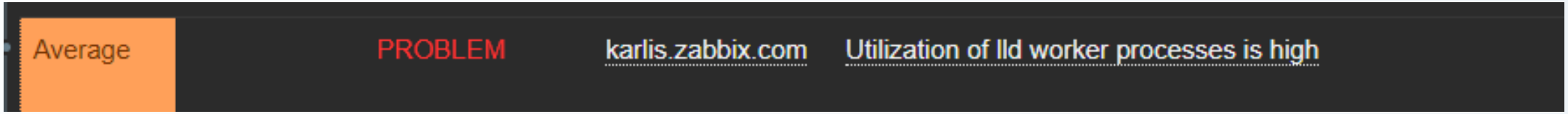
Fixes:

- Tune and check DB performance
- Check triggers
- Improve hardware
- Increase history syncer amount (1 history syncer = 1000 NVPS!)

LLD workers

- Performs low-level discovery
- High impact on DB performance
- Only on Zabbix server
- Usually, best not to increase above the default amount

LLD workers



Causes:

- Frequent execution of low-level discovery rules
- Most often DB related

Fixes:

- Tune and check DB performance
- Increase update interval for low-level discovery rules
- Increase “Discard unchanged with heartbeat” period for dependent low-level discovery rules
- Increase LLD workers (Every LLD worker causes huge load on DB!)

Tuning caches

- Most cache usage should be between 40% and 60%
- Zabbix server and proxy have almost the same set of caches

Value cache

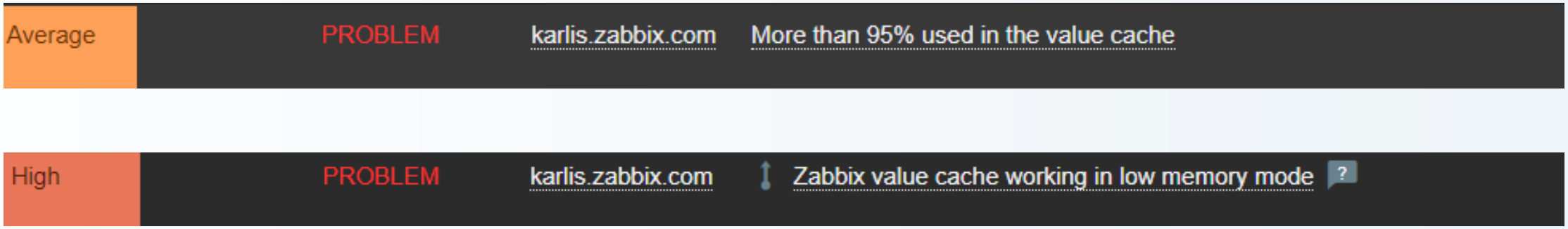
Configuration cache

Trend cache

Value cache

- Stores values for easier accessibility
- Is used for trigger calculation
- Is used for calculated items
- Almost limitless
- Never should be full!

Value cache



Causes:

- Lots of triggers
- Lots of functions that use forecasting
- Lots of calculated items

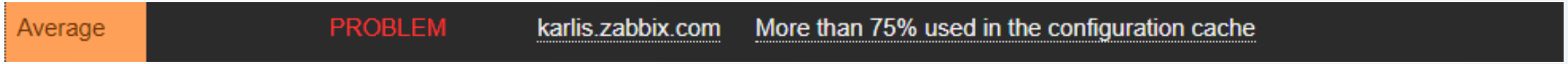
Fixes:

- Increase ValueCacheSize (Make sure there is enough RAM on the server!)
- Adjust forecast/trigger periods

Configuration cache

- Stores configuration
- Almost limitless
- Never should be full, if it gets full, Zabbix server/proxy crashes!

Configuration cache



Causes:

- Lots of hosts, items, triggers

Fixes:

- Increase CacheSize (Make sure there is enough RAM on the server!)

History and history index cache

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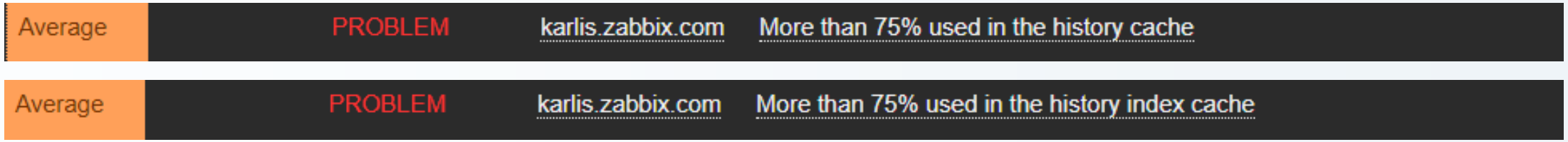
History cache

- Stores values after they are preprocessed
- History syncer takes the values from this cache and writes them to the database
- 2 GB limit
- Never should be full and should be as empty as possible!

History index cache

- Indexes history cache
- ¼ size of history cache

History and history index cache



Causes:

- Data cannot be written in the DB fast enough
- Most of the time issues arise together with history syncer

Fixes:

- Tune and check DB performance
- Increase HistoryCacheSize and HistoryIndexCacheSize(Make sure there is enough RAM on the server - this only applies if your DB is big)

Tuning other processes and caches

- Most process worker and cache usage should be maintained between 40% and 60%
- If the default settings are being used, it's acceptable for the usage to be lower
- There is no “best” configuration, every Zabbix environment needs to be tuned individually

Tuning managers

- Manager processes cannot be tuned!
- High manager usage typically happens when worker usage grows
- Needs to be checked what is causing the issues – diaginfo, reading log files, etc.

Queue

- Values that have not yet arrived
- Fixable
- Many different reasons why it appears

5 seconds	10 seconds	30 seconds	1 minute	5 minutes	More than 10 minutes
0	1	0	1	0	24663
0	0	0	0	0	22919
0	0	0	1	0	28858
0	1	0	7	11	8998
0	0	0	3	7	113535
0	0	0	0	0	108601
0	0	0	2	8	137555
0	0	0	1	0	103860
0	0	0	0	0	14893
0	1	0	0	0	1024

How to

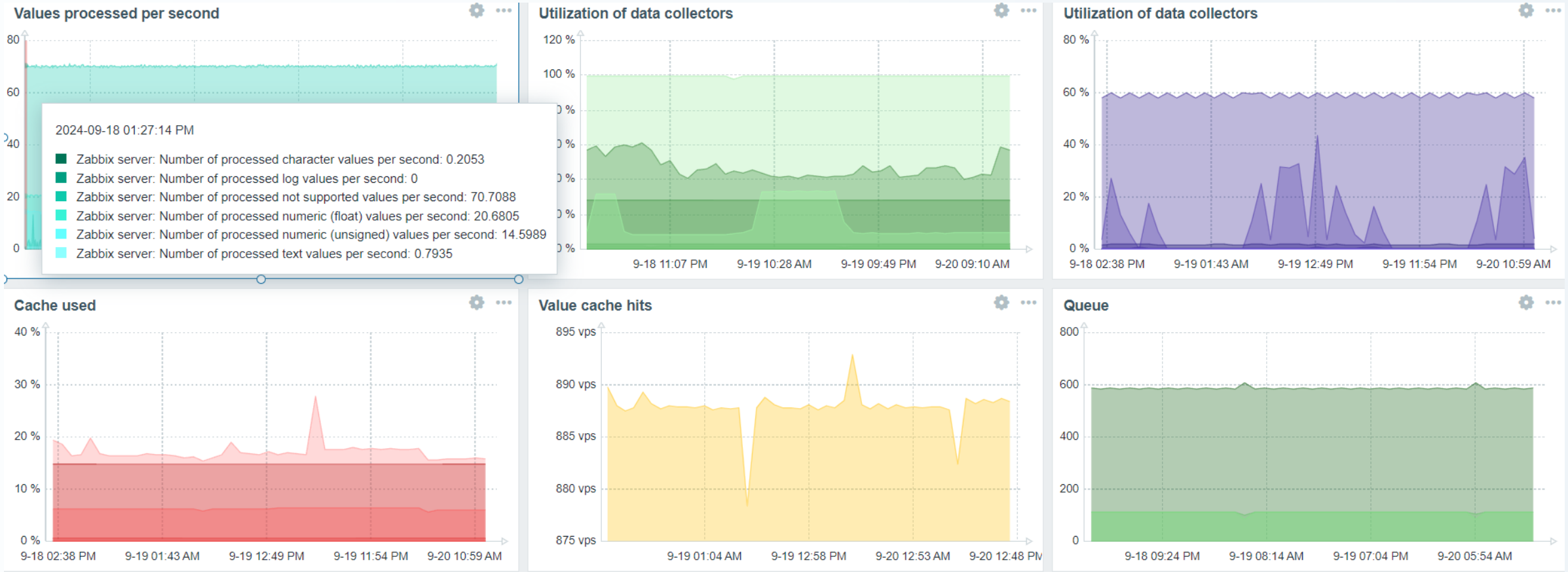
- Use built-in health templates
- Dashboards of server/proxy performance
- Monitor OS metrics of server/proxy using Zabbix agent
- Remember to update the templates when upgrading to next major release

Name ▲	Hosts	Items	Triggers	Graphs	Dashboards	Discovery	Web	Vendor
Remote Zabbix proxy health	Hosts	Items 48	Triggers 35	Graphs 5	Dashboards 1	Discovery	Web	Zabbix
Remote Zabbix server health	Hosts	Items 67	Triggers 49	Graphs 11	Dashboards 2	Discovery 2	Web	Zabbix
Zabbix proxy health	Hosts 2	Items 48	Triggers 34	Graphs 5	Dashboards 1	Discovery	Web	Zabbix
Zabbix server health	Hosts 1	Items 67	Triggers 48	Graphs 11	Dashboards 2	Discovery 2	Web	Zabbix

Set up proxy monitoring

1. Set up the proxy
2. Create a host on the frontend
3. Set up the host to be monitored by itself
4. Link template «Zabbix proxy health»
5. Link Zabbix agent template (optional)

Health monitoring



Problems

Time ▾	Recovery time	Status	Info	Host	Problem • Severity	Duration	Update	Actions
01:10:27 PM		PROBLEM		Zabbix server	Utilization of housekeeper processes over 75%	7m 31s	Update	
01:07:35 PM		PROBLEM		Zabbix server	Load average is too high (per CPU load over 0.15 for 5m) (Load averages(1m 5m 15m): (1.17 1.22 0.89), # of CPUs: 4)	10m 23s	Update	

Tuning frontend

- Frontend can become slow and unresponsive over time
- Lots of improvements in Zabbix 7.0
- Issues can be caused by web server or the DB

Tuning frontend

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- Enable debug mode!
- Debug can be done for the whole page or individual widgets

```
Total time: 15.06485
Total SQL time: 0.010517
SQL count: 36 (selects: 35 | executes: 16)
Peak memory usage: 4M
Memory limit: 256M
```

Web server issue

```
Total time: 15.06485
Total SQL time: 15.010517
SQL count: 36 (selects: 35 | executes: 16)
Peak memory usage: 4M
Memory limit: 256M
```

Database issue

Tuning frontend

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- Web server configuration can be changed
- /etc/php-fpm.d/zabbix.conf

```
pm = dynamic
pm.max_children = 50
pm.start_servers = 5
pm.min_spare_servers = 5
pm.max_spare_servers = 35
pm.max_requests = 200

php_value[session.save_handler] = files
php_value[session.save_path]    = /var/lib/php/session

php_value[max_execution_time] = 300

php_value[memory_limit] = 256M
php_value[post_max_size] = 16M
php_value[upload_max_filesize] = 20M
php_value[max_input_time] = 300
php_value[max_input_vars] = 10000
```

Tuning databases

- MySQL tunable parameters
  - innodb_flush_log_at_trx_commit = 0
  - innodb_flush_method = O_DIRECT
  - optimizer_switch=index_condition_pushdown=off
  - innodb_buffer_pool_size=(75-80% of RAM if standalone DB or 60% if shared with the proxy)
- PostgreSQL tunable parameters
  - Use PGTune (https://pgtune.leopard.in.ua/)

Tuning triggers

- Huge amount of trigger changes in a short time period creates lots of events
- Lots of events = load on DB
- Regularly observe Reports > Top 100 triggers or dashboard widget

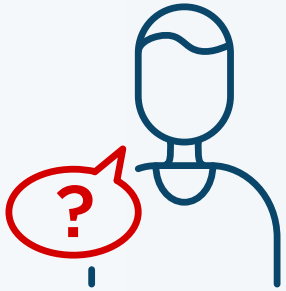
Host	Trigger	Severity	Number of problems
Karlis server	High CPU Load	Average	2465
Karlis laptop	Memory usage is too high	Average	1256
Karlis laptop	Windows requires new updates	Warning	657

Tuning triggers

- Use proper functions
- Adjust time intervals
- Alert fatigue
- LLD overrides allow to not discover triggers based on regexp
- Recovery expression
- Limit nodata() usage

Tuning templates

- Default templates are good, however, require attention
- Switch old SNMP templates to use asynchronous checks
- Think about update interval



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