ZABBIX

Case study: Performance improvements with the new SNMP bulk monitoring

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Technical support engineer

Deployment

Turn-key project by Zabbix:

- Planned load ~10k NVPS
- SNMP checks almost exclusively.
- Zabbix version 5.0
- ~10 proxies (HA)

Instance overview

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System information

Parameter	Value	Details
Zabbix server is running	Yes	zabbix.example.com:10051
Number of hosts (enabled/disabled)	14306	13867 / 439
Number of templates	342	
Number of items (enabled/disabled/not supported)	10779688	9953290 / 251426 / 574972
Number of triggers (enabled/disabled [problem/ok])	980662	639466/ 341196 [5914 / 633552]
Number of users (online)	322	30
Required server performance, new values per second	12548	

Deployment

Hoping for ZBXNEXT-6872

Deployment

Some hosts deployed:

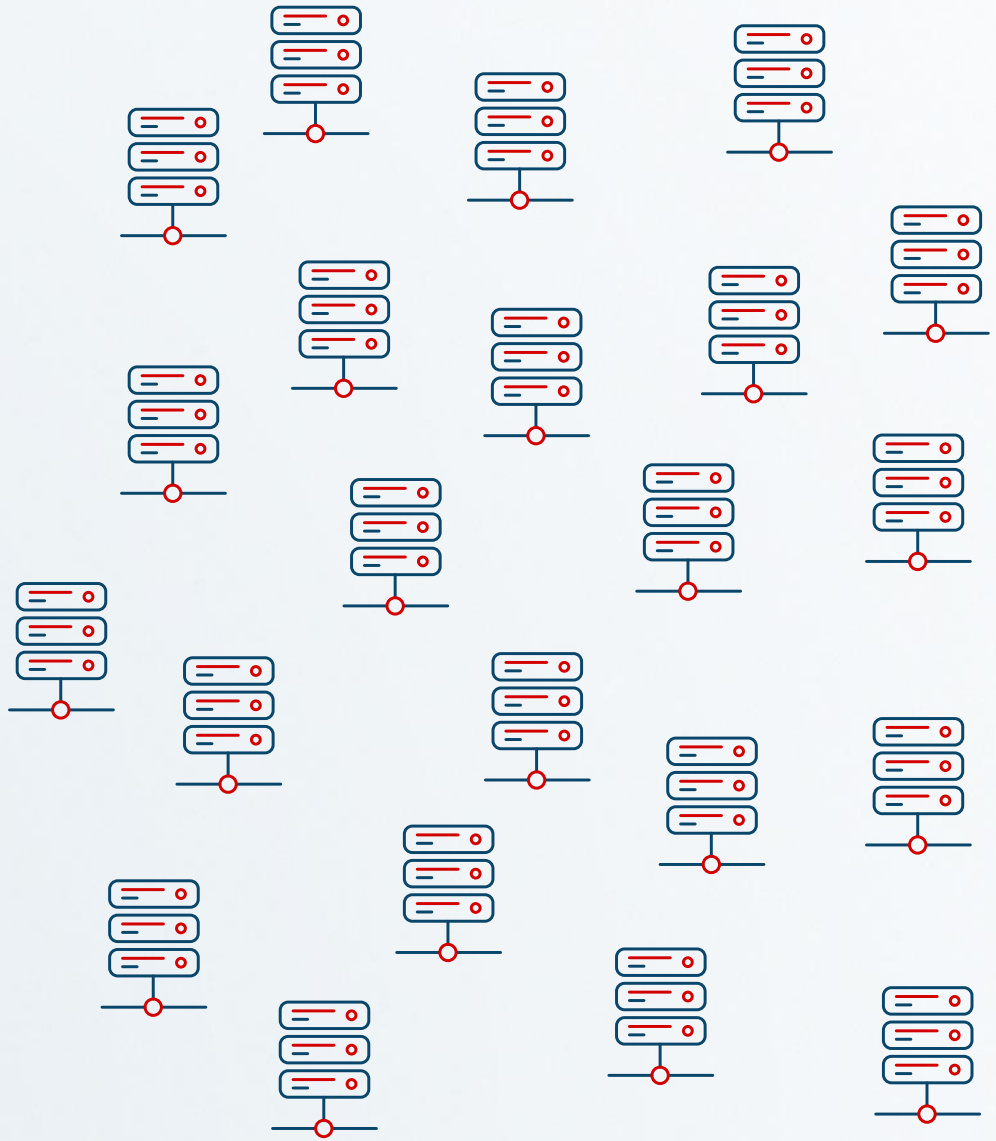
- Pollers quickly hit 100% busy
- StartPollers=100 -> 200

More hosts added:

- StartPollers=200 -> 500

Even more hosts added:

- Pollers 100% busy again
- StartPollers=500->1000



Deployment

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But what is the problem?

Many hosts timed-out, so timeout was increased

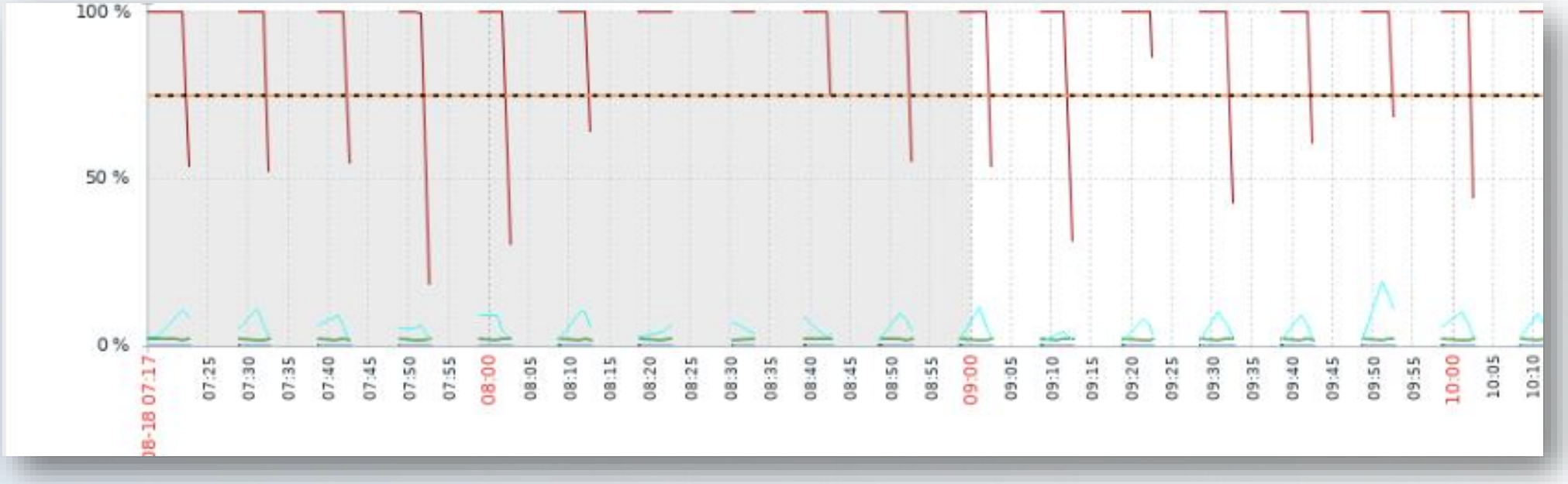
```
### Option: Timeout
#       Specifies how long we wait for agent, SNMP device or external check
# Range: 1-30
# Default: 4
Timeout=20
```

1 Poller collects less than 1 value per second

```
zabbix_server: poller #1 [got 5 values in 20.00465 sec, getting values]
zabbix_server: poller #2 [got 16 values in 20.00328 sec, getting values]
```

Deployment

Pollers are still a too busy (the red line ———)

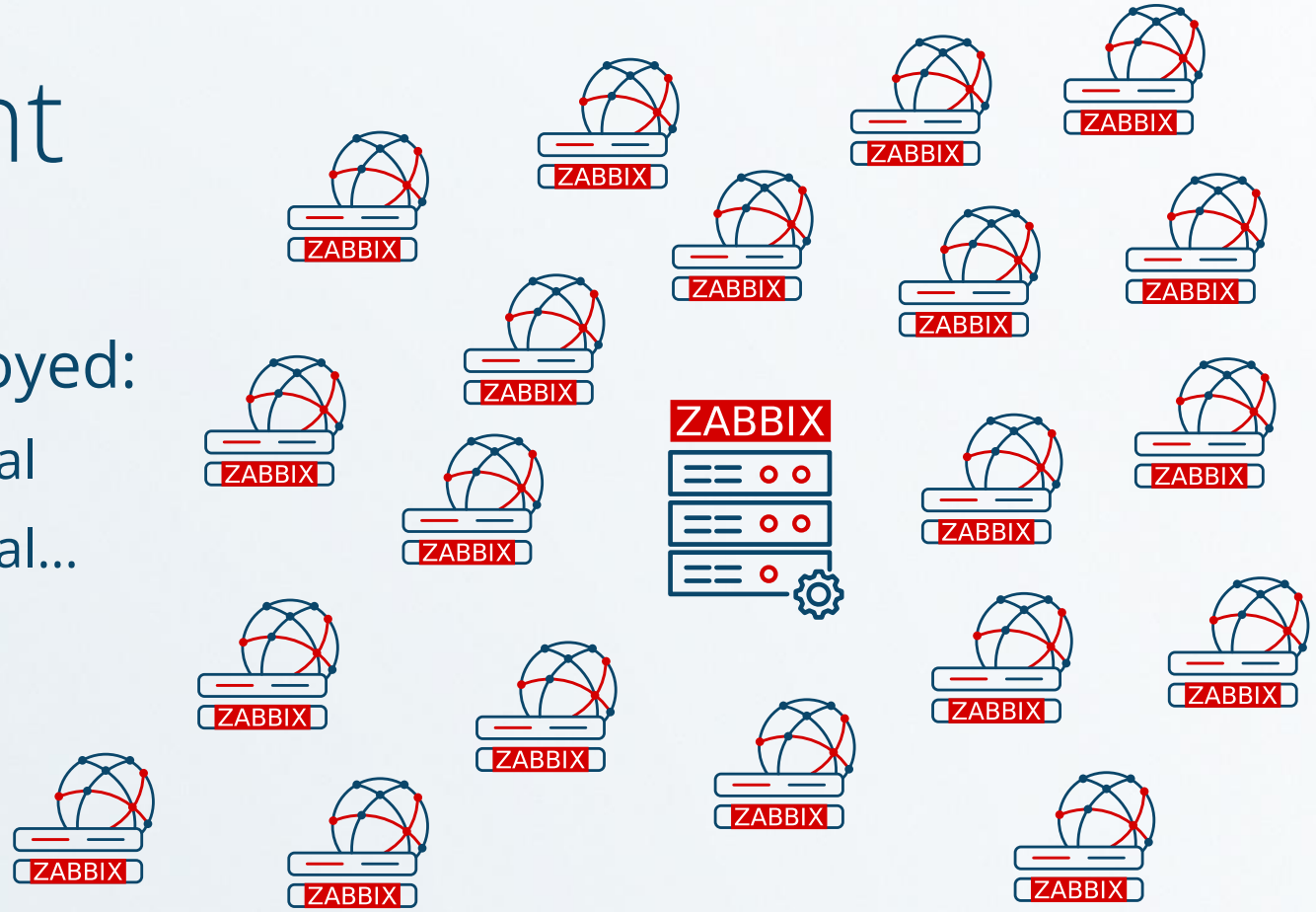


Solution? Add more proxies!

Deployment

More proxies deployed:

- 10 proxies in total
- 20 proxies in total...
- Still not enough



Customer doesn't want to devote more hardware resources ☹

Containers? Run multiple binaries with custom conf files?

Deployment

Break up the HA on proxies!

- 40 proxies now
- Situation somewhat stable
- 12k NVPS

Some devices are slower than others

Constant need to balance them equally between proxies

Solution?

Zabbix 6.4 was released - ZBXNEXT-4428

ZABBIX FEATURE REQUESTS / ZBXNEXT-4428

internal logic of SNMP bulk processing

Closed

Details

Type:	Change Request	Resolution:	Fixed
Priority:	Major	Fix Version/s:	6.4.0beta5, ... (1)
Affects Version/s:	3.4.7		
Component/s:	Proxy (P), ... (1)		

Big hopes

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Upgrade Zabbix:

- Upgrade backend DB (internal requirement)
- Upgrade Zabbix server to 6.4

Nothing changed ☹

Why nothing changed?

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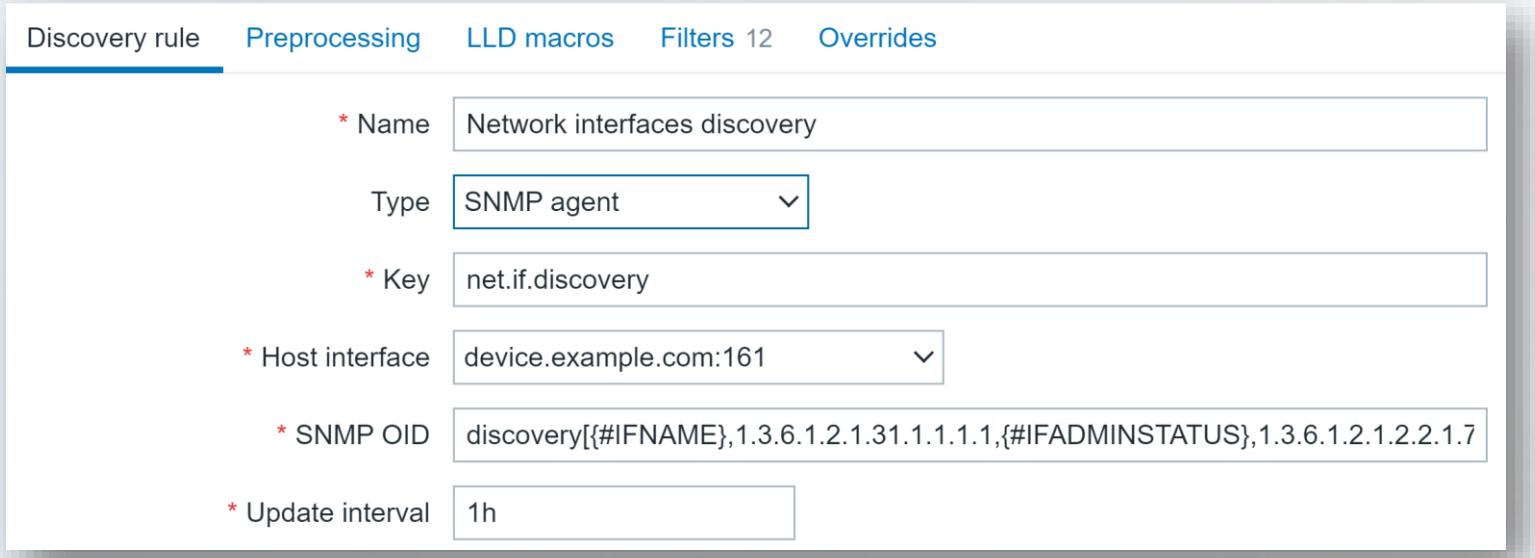
SNMP discovery in previous Zabbix versions:

- LLD rule performs snmpwalk (v1) or snmpgetbulk (v2c, v3) over specified OID in the tree
- Separate items are created from item prototypes for each discovered OID index



Why nothing changed?

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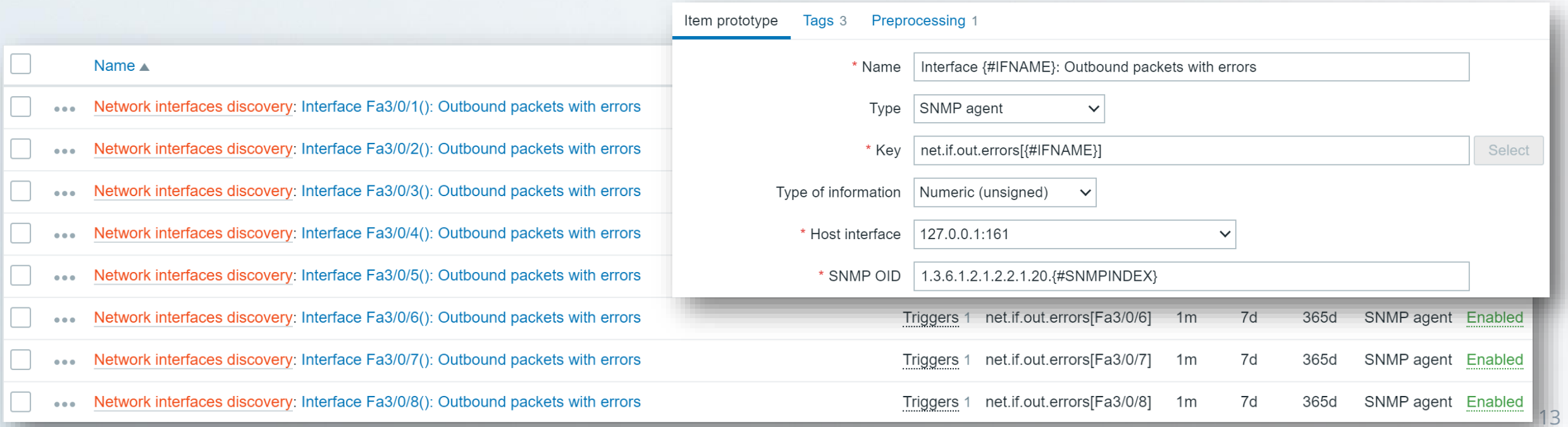
SNMP discovery in previous Zabbix versions:

- Each item created from classic SNMP LLD becomes part of a combined request
- Average sized devices can benefit from that that approach.
- Others either respond with an error or do not respond at all once the potential response is over a certain limit, making pollers busy.



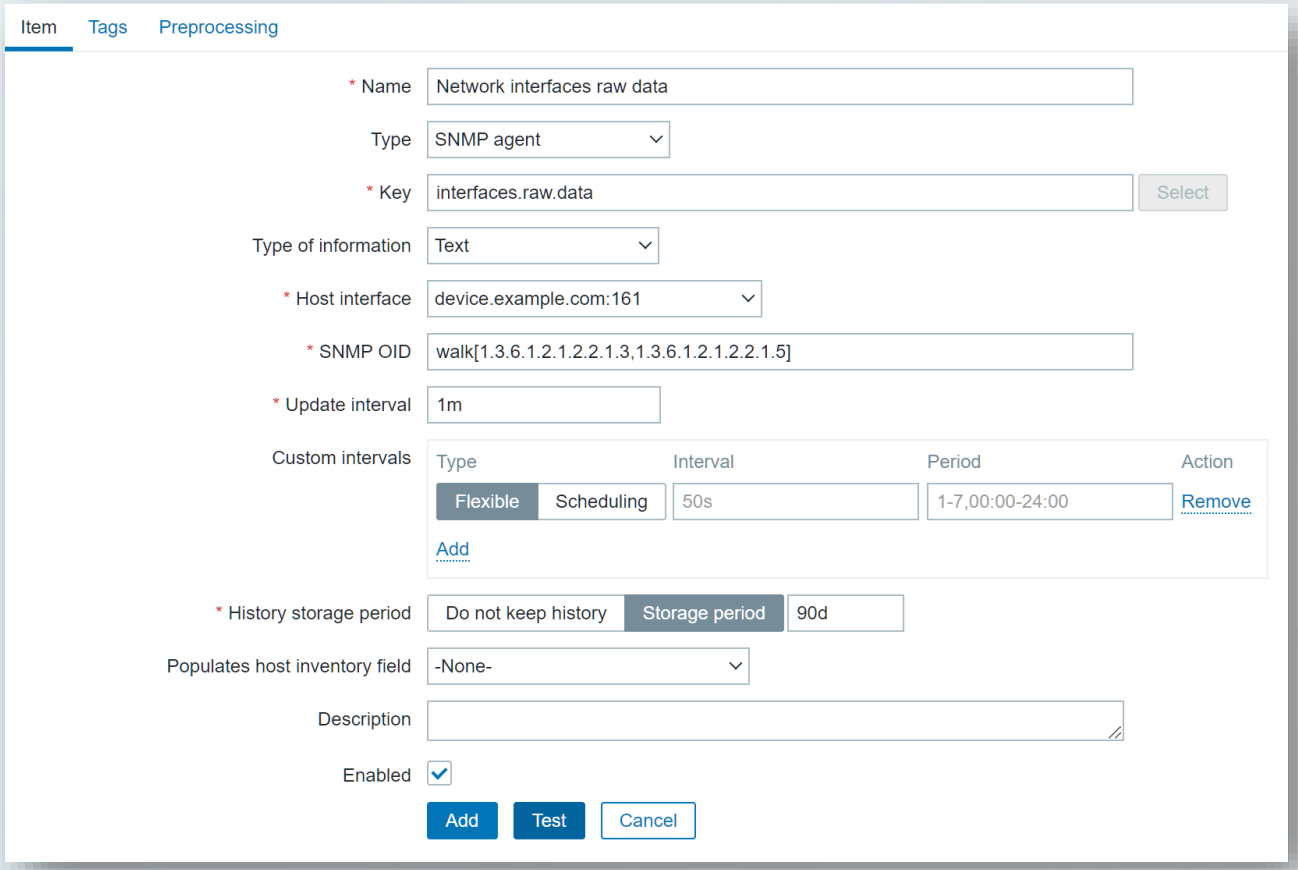
New walk[oid1,oid2,..] item

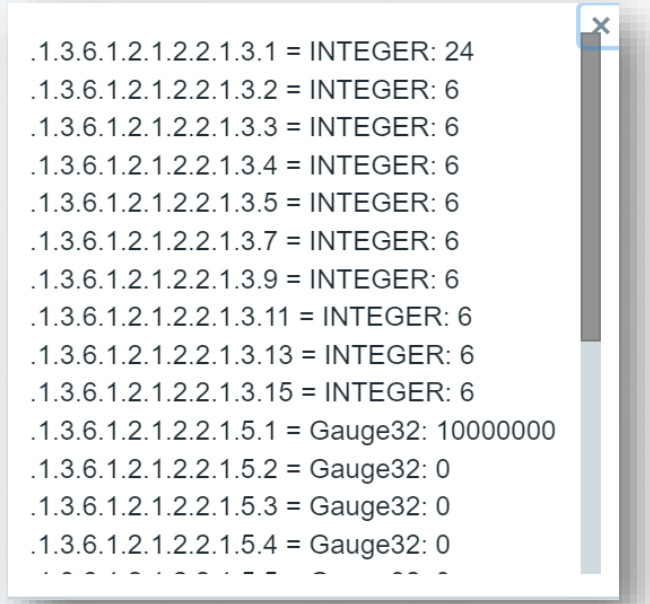
- Is used for data collection and low-level discovery at the same time
- Uses SNMP GetBulk command for data collection (SNMP Walk in v1)
- Multiple OIDs can be specified in the walk[*] item
- The output will feature a concatenated text string from all OID trees

```
.1.3.6.1.2.1.2.2.1.2.1 = STRING: eth1
.1.3.6.1.2.1.2.2.1.2.2 = STRING: eth2
.1.3.6.1.2.1.2.2.1.2.3 = STRING: eth3
.1.3.6.1.2.1.2.2.1.2.4 = STRING: eth4
.1.3.6.1.2.1.2.2.1.10.1 = Counter32: 19716
.1.3.6.1.2.1.2.2.1.10.2 = Counter32: 3520452
.1.3.6.1.2.1.2.2.1.10.3 = Counter32: 1476
.1.3.6.1.2.1.2.2.1.10.4 = Counter32: 75380
```

New walk[oid1,oid2,..] item

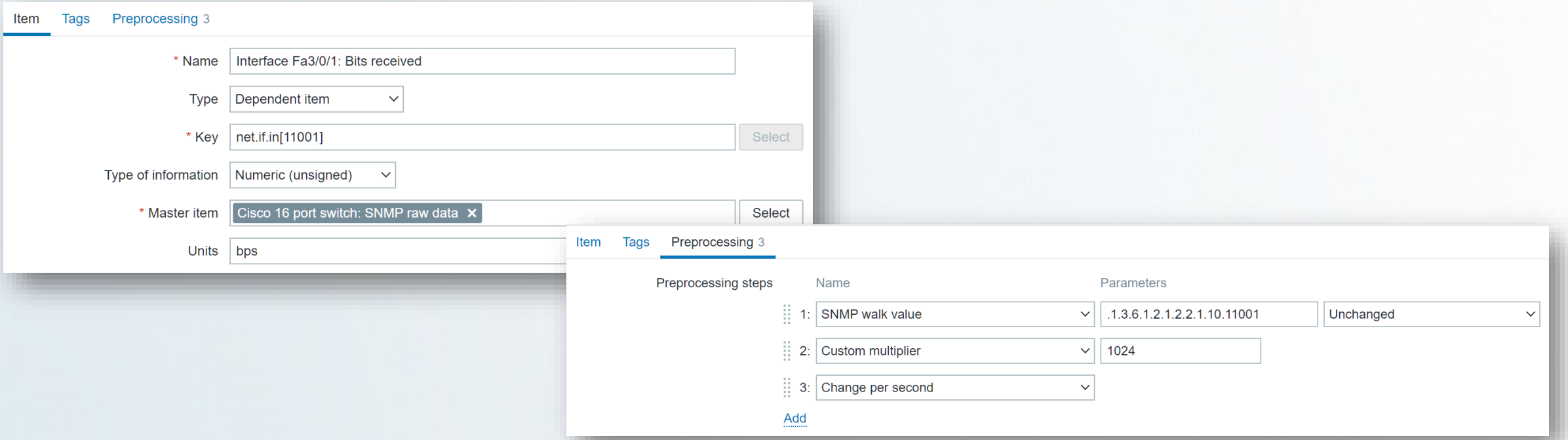
- Is used for data collection and low-level discovery at the same time
- Uses SNMP GetBulk command for data collection (SNMP Walk in v1)
- Multiple OIDs can be specified in the walk[*] item



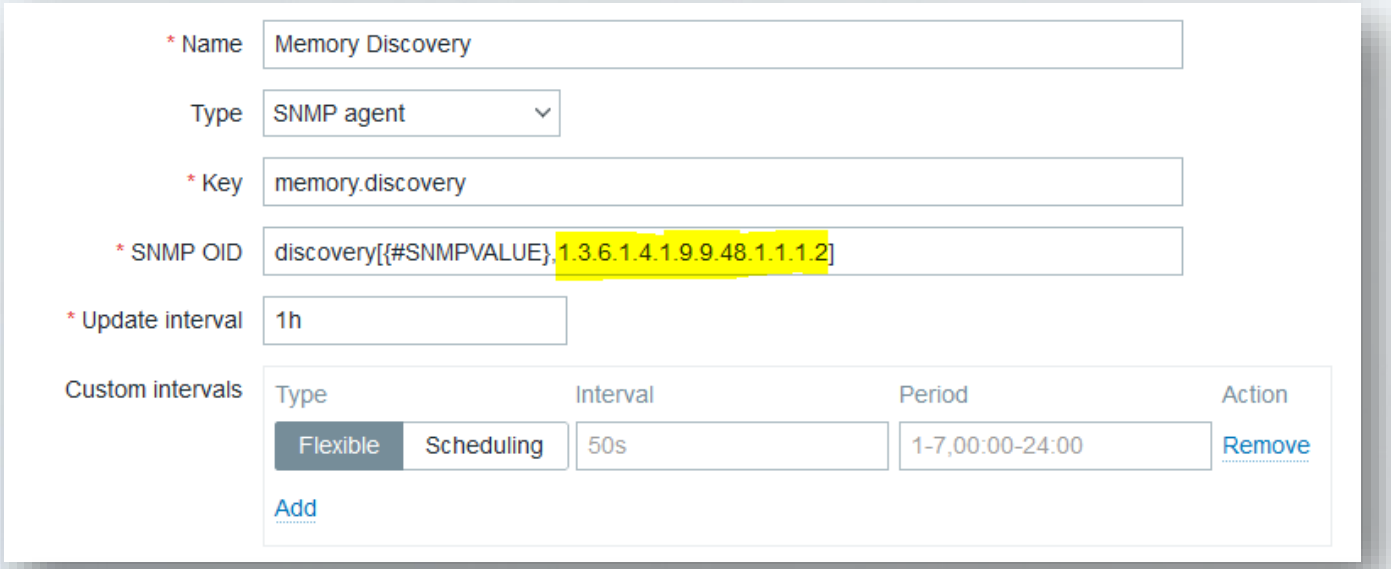


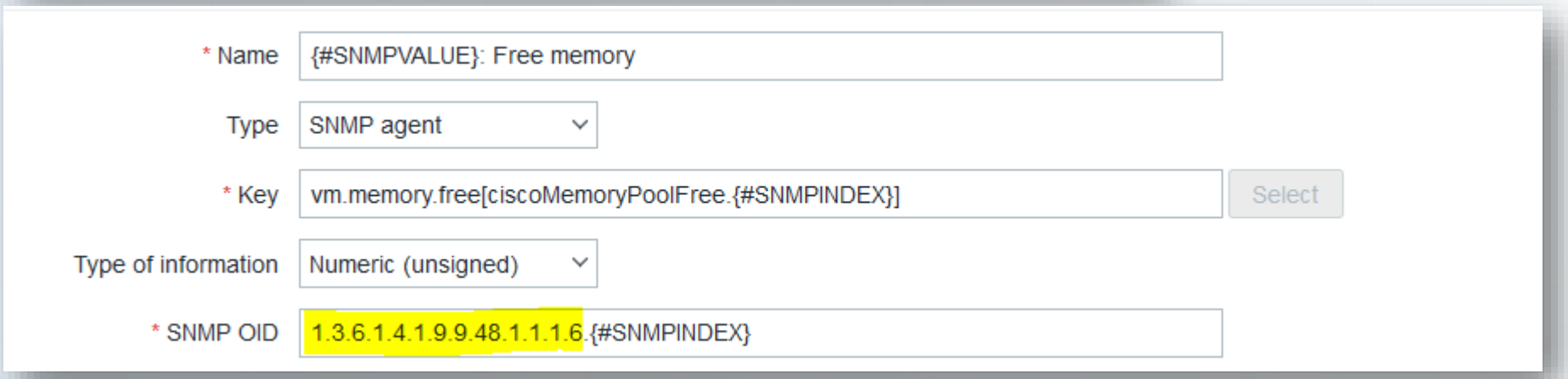
New walk[oid1,oid2,..] item benefits

- The master item collects all SNMP data at once
- Fewer connections to the monitored hosts are made
- Metrics are collected in bulk and are used in several related items at once
- Less load on Zabbix and device at the same time, since dependent items are extracting data from the master using SNMP walk value preprocessing step



Migration


* Name
Memory Discovery
Type
SNMP agent
* Key
memory.discovery
* SNMP OID
discovery[{#SNMPVALUE},1.3.6.1.4.1.9.9.48.1.1.1.2]
* Update interval
1h
Custom intervals
Type
Interval
Period
Action
Flexible
Scheduling
50s
1-7,00:00-24:00
Remove
Add


* Name
{#SNMPVALUE}: Free memory
Type
SNMP agent
* Key
vm.memory.free[ciscoMemoryPoolFree.{#SNMPINDEX}]
Select
Type of information
Numeric (unsigned)
* SNMP OID
1.3.6.1.4.1.9.9.48.1.1.1.6.{#SNMPINDEX}

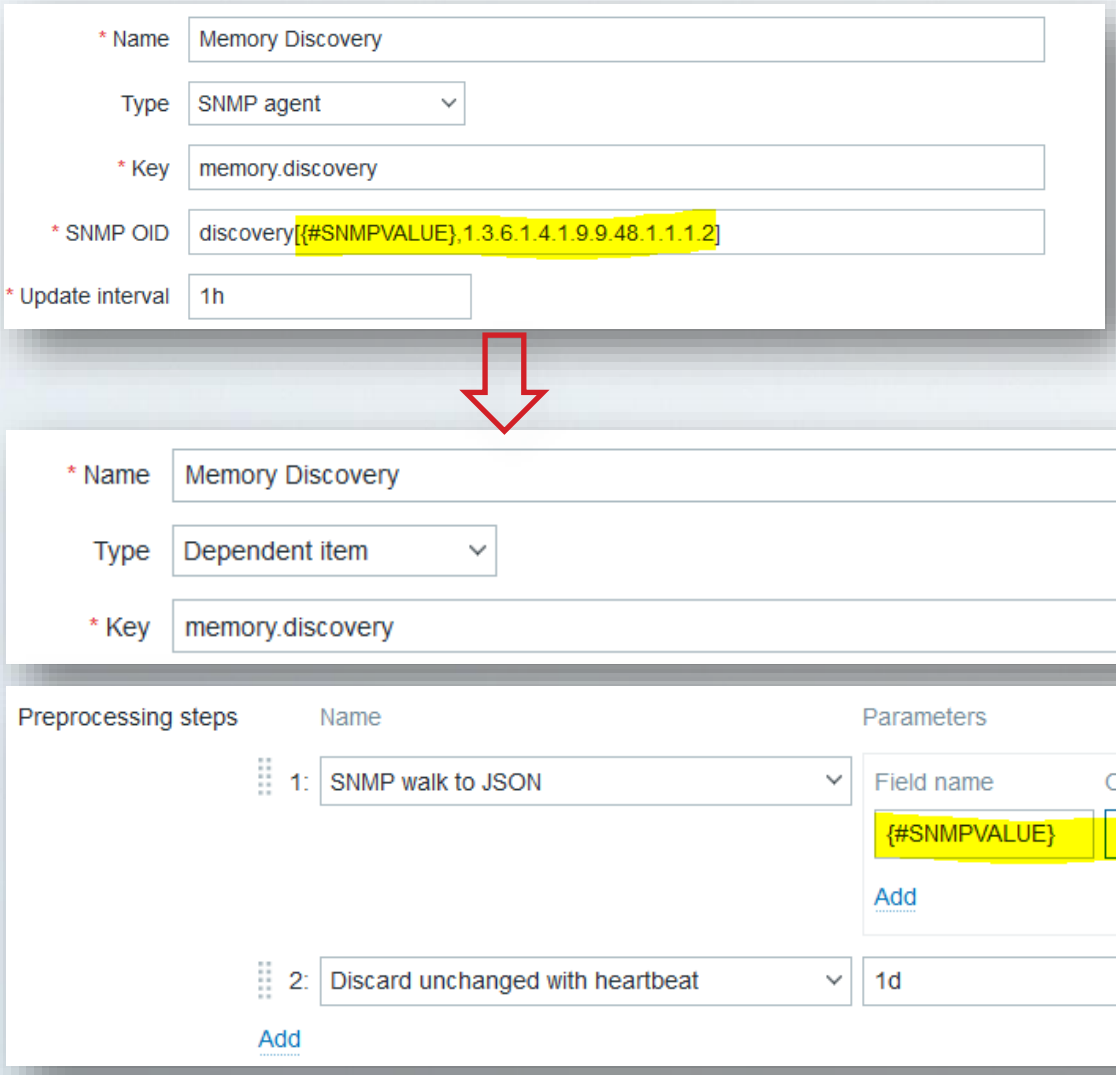
Migration – Master item

```
1.3.6.1.4.1.9.9.48.1.1.1.2
1.3.6.1.4.1.9.9.48.1.1.1.6
1.3.6.1.4.1.9.9.48.1.1.1.5

1.3.6.1.4.1.9.9.48.1.1.1
```

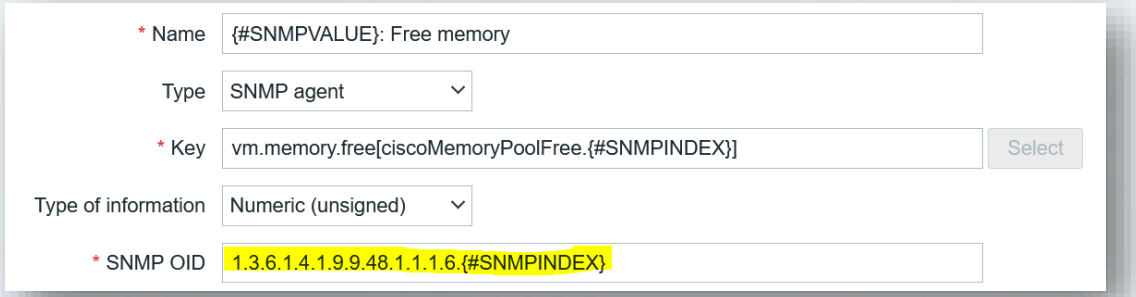
Full clone template – «My Template name – WALK»

Migration – LLD rule

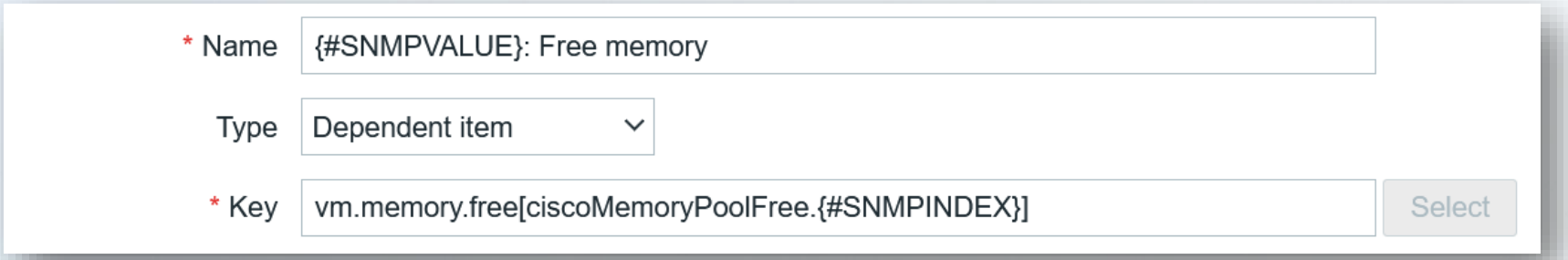


Master item
SNMP data collector

Migration – Items

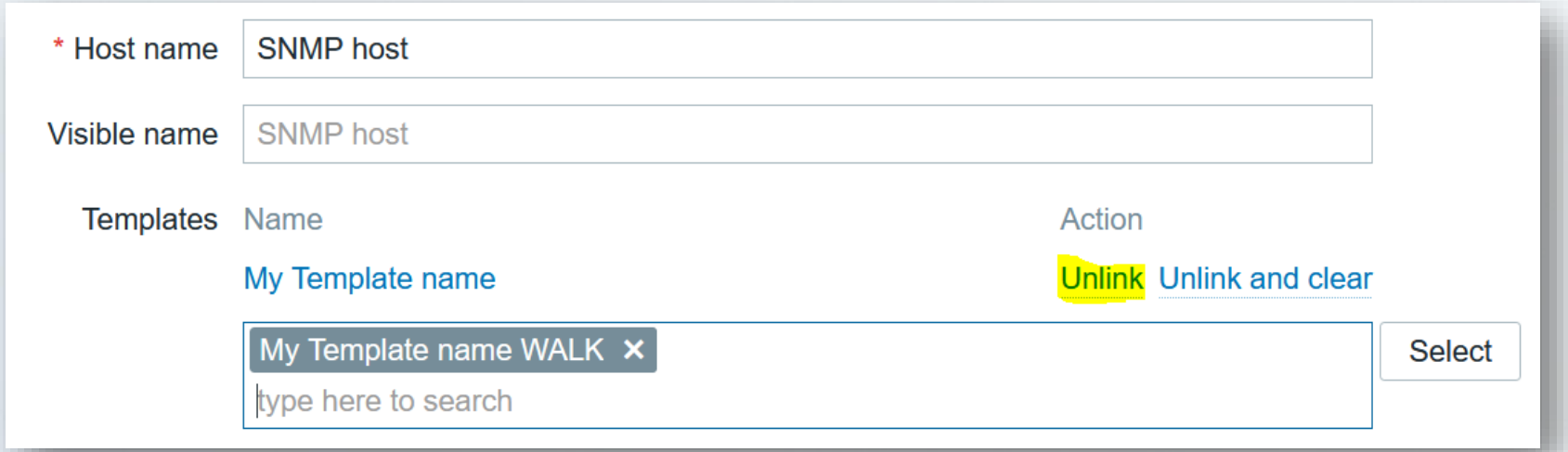


Master item
SNMP data collector

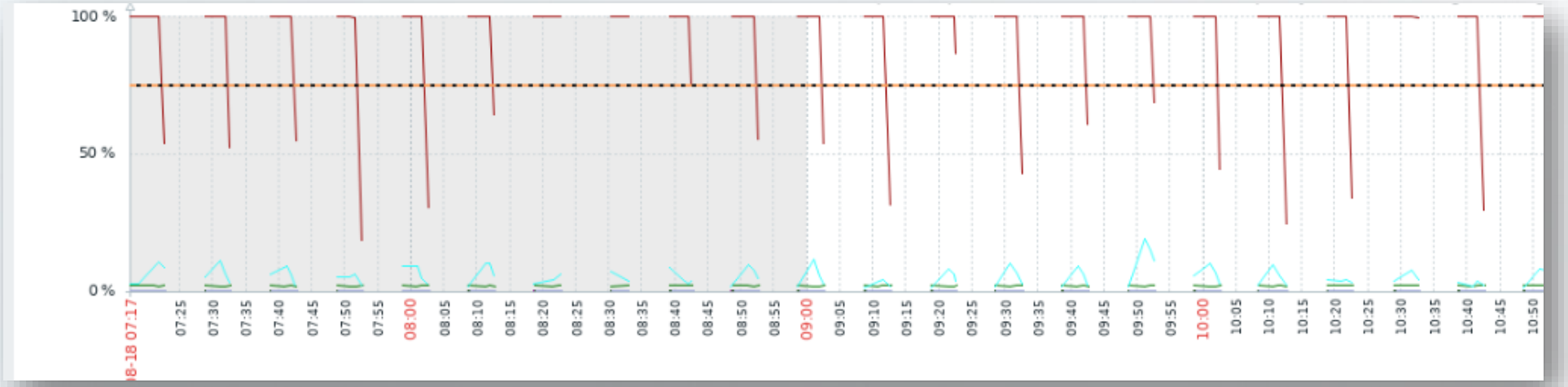


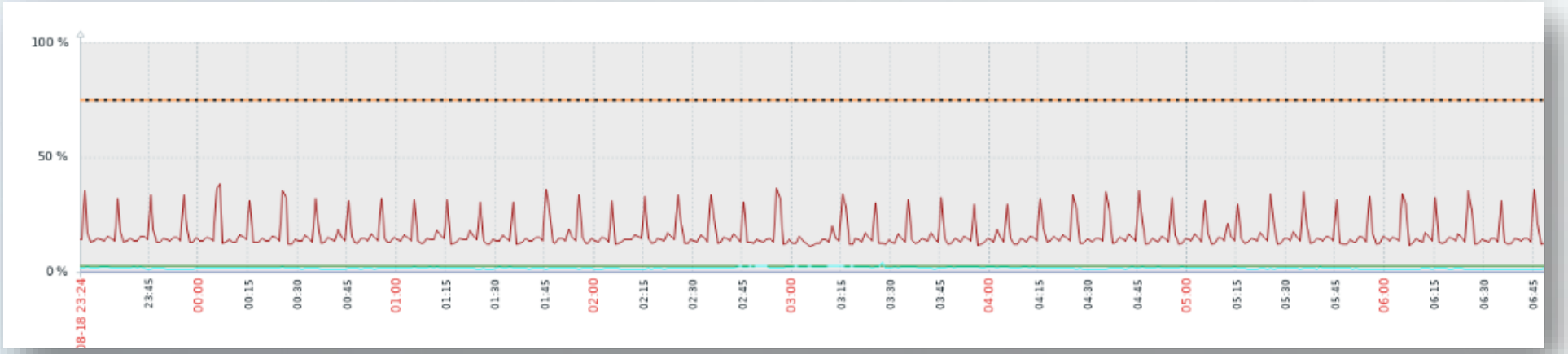
Migration

Apply to hosts



And hope for the best


100 %
50 %
0 %
08-18 07:17
07:25
07:30
07:35
07:40
07:45
07:50
07:55
08:00
08:05
08:10
08:15
08:20
08:25
08:30
08:35
08:40
08:45
08:50
08:55
09:00
09:05
09:10
09:15
09:20
09:25
09:30
09:35
09:40
09:45
09:50
09:55
10:00
10:05
10:10
10:15
10:20
10:25
10:30
10:35
10:40
10:45
10:50

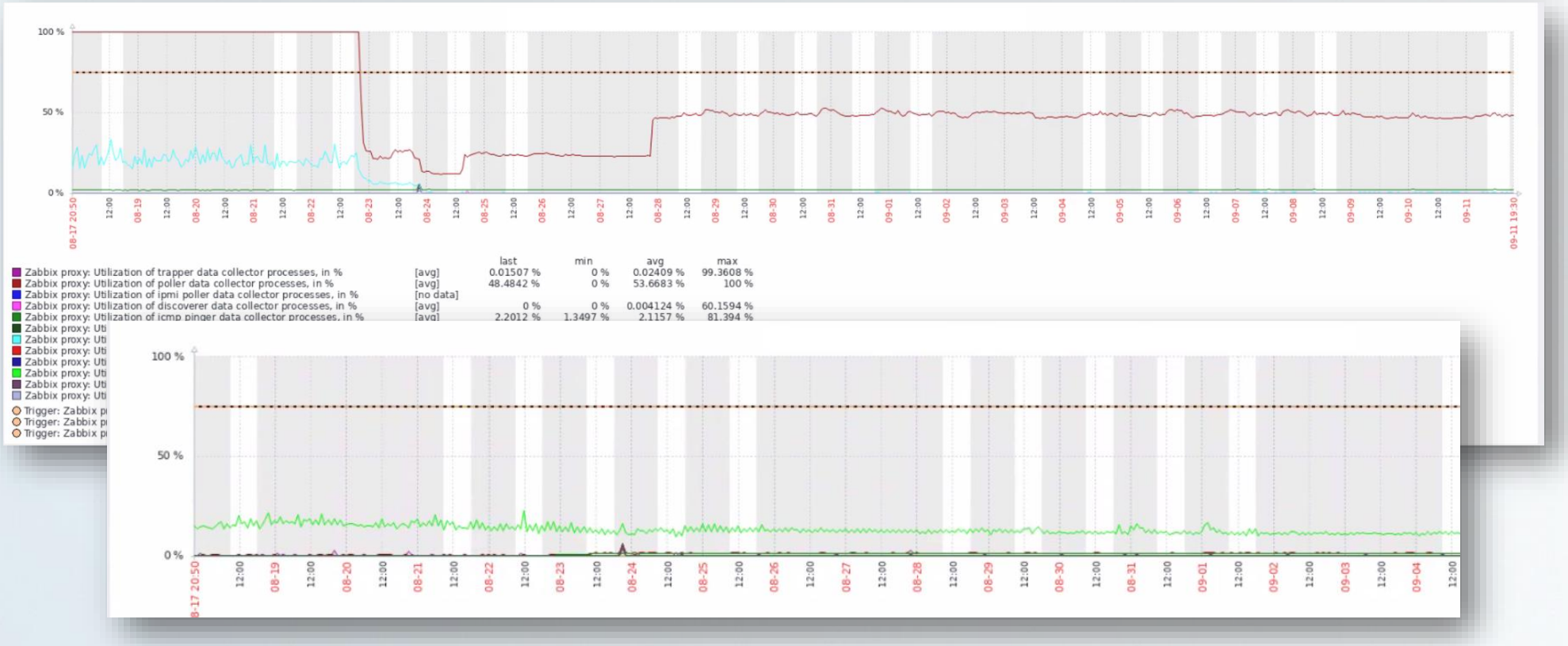

100 %
50 %
0 %
08-18 23:24
23:45
00:00
00:15
00:30
00:45
01:00
01:15
01:30
01:45
02:00
02:15
02:30
02:45
03:00
03:15
03:30
03:45
04:00
04:15
04:30
04:45
05:00
05:15
05:30
05:45
06:00
06:15
06:30
06:45

Results

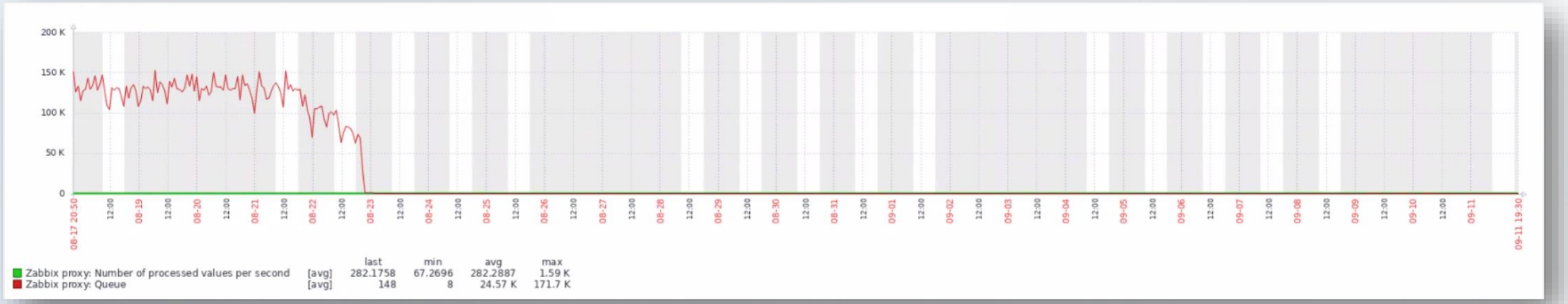
Pollers

Unreachable pollers

Data sender



Results

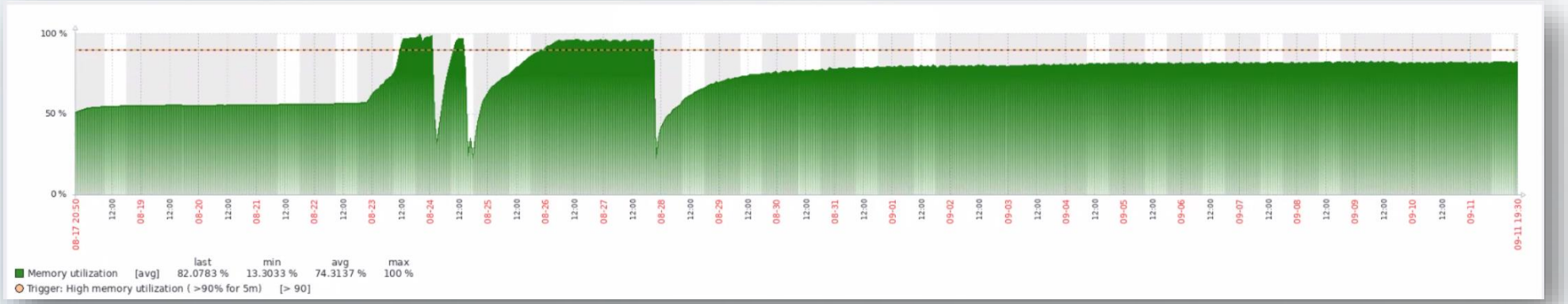

200 K
150 K
100 K
50 K
0
08-17 20:50
08-19
08-20
08-21
08-22
08-23
08-24
08-25
08-26
08-27
08-28
08-29
08-30
08-31
09-01
09-02
09-03
09-04
09-05
09-06
09-07
09-08
09-09
09-10
09-11
09-11 19:30
last min avg max
Zabbix proxy: Number of processed values per second [avg] 282.1758 67.2696 282.2887 1.59 K
Zabbix proxy: Queue [avg] 148 8 24.57 K 171.7 K

Results

Poller process utilization by proxies

Results

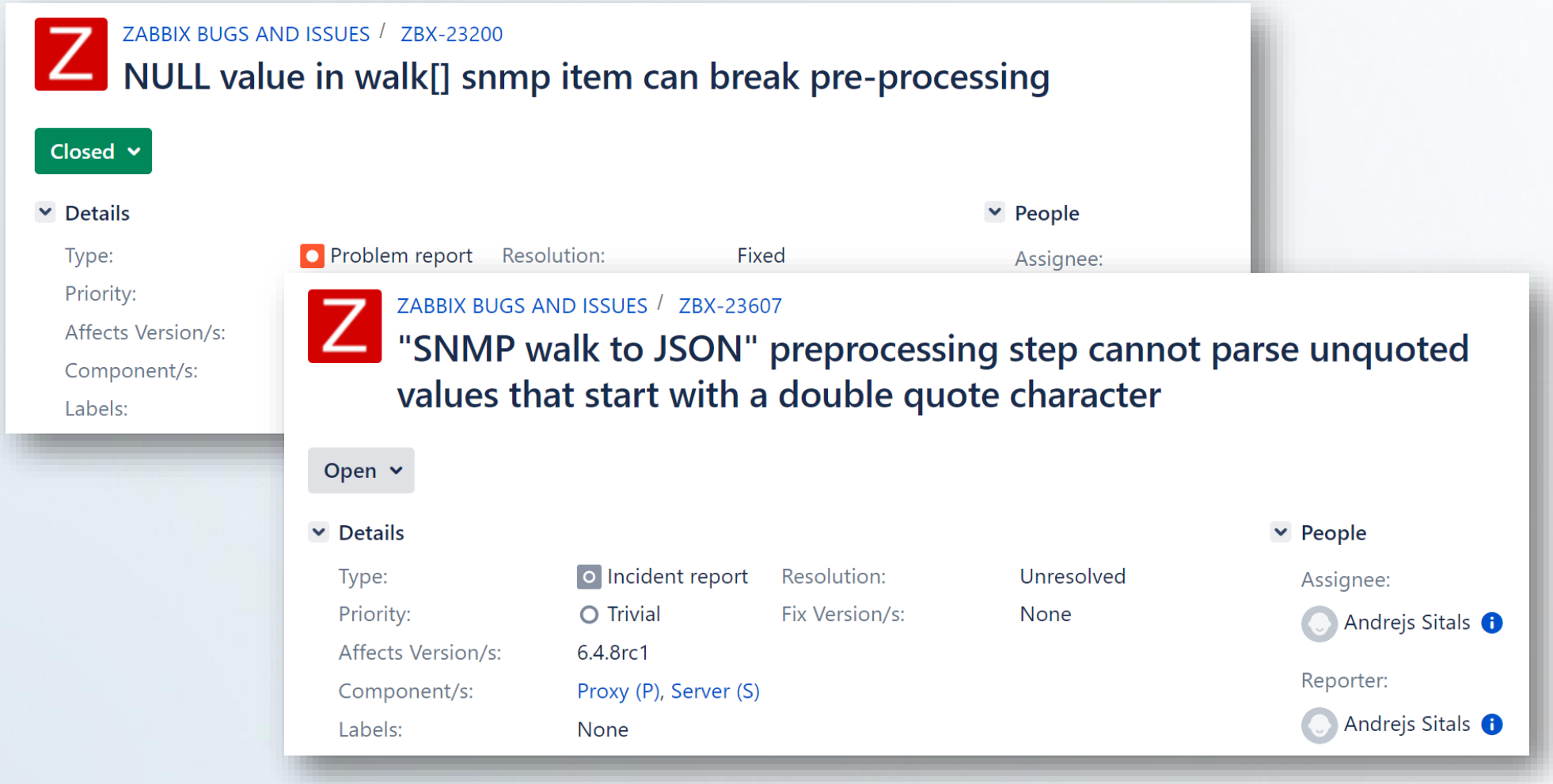
Zabbix memory usage



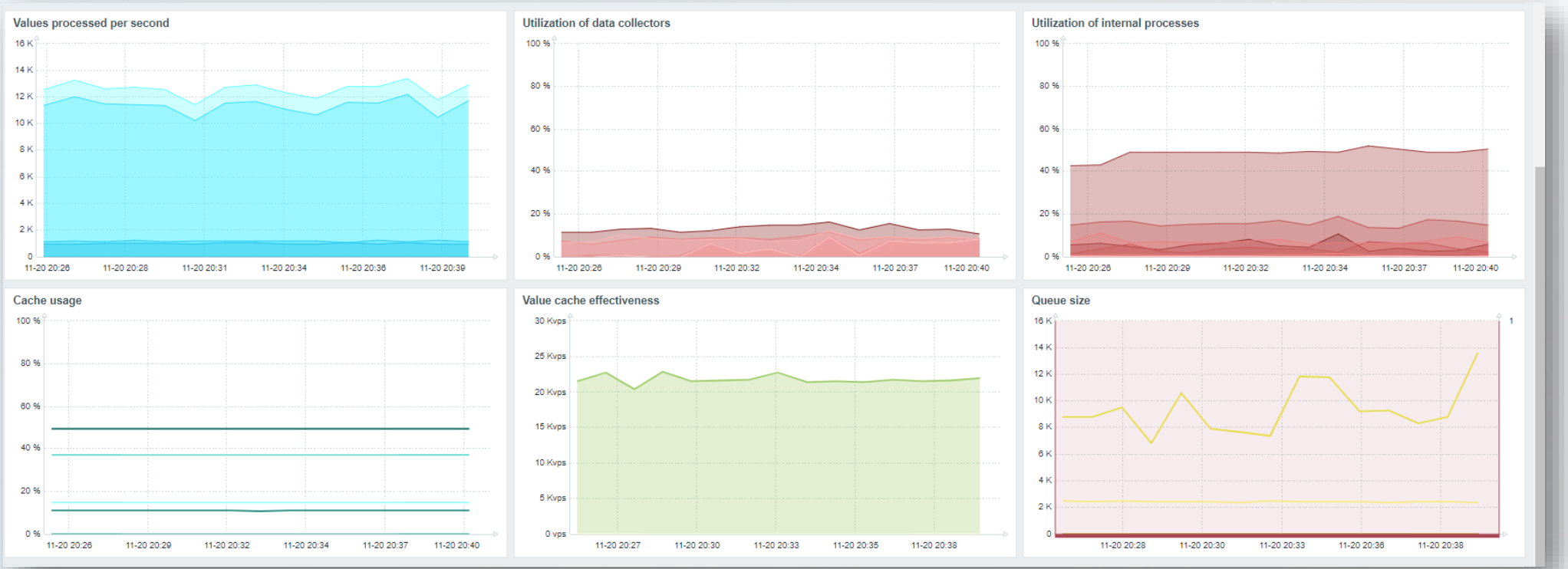
Most of it used by unreachable pollers.

Dev team promises major improvements with async pollers in 7.0 :
https://support.zabbix.com/browse/ZBXNEXT-8460

Bugs


ZABBIX BUGS AND ISSUES / ZBX-23200
NULL value in walk[] snmp item can break pre-processing
Closed
Details
Type:
Problem report
Resolution:
Fixed
Priority:
Affects Version/s:
Component/s:
Labels:
People
Assignee:
ZABBIX BUGS AND ISSUES / ZBX-23607
"SNMP walk to JSON" preprocessing step cannot parse unquoted values that start with a double quote character
Open
Details
Type:
Incident report
Resolution:
Unresolved
Priority:
Trivial
Fix Version/s:
None
Affects Version/s:
6.4.8rc1
Component/s:
Proxy (P), Server (S)
Labels:
None
People
Assignee:
Andrejs Sitals
Reporter:
Andrejs Sitals

Results


Values processed per second
16 K
14 K
12 K
10 K
8 K
6 K
4 K
2 K
0
11-20 20:26
11-20 20:28
11-20 20:31
11-20 20:34
11-20 20:36
11-20 20:39
Utilization of data collectors
100 %
80 %
60 %
40 %
20 %
0 %
11-20 20:26
11-20 20:29
11-20 20:32
11-20 20:34
11-20 20:37
11-20 20:40
Utilization of internal processes
100 %
80 %
60 %
40 %
20 %
0 %
11-20 20:26
11-20 20:29
11-20 20:32
11-20 20:34
11-20 20:37
11-20 20:40
Cache usage
100 %
80 %
60 %
40 %
20 %
0 %
11-20 20:26
11-20 20:29
11-20 20:32
11-20 20:34
11-20 20:37
11-20 20:40
Value cache effectiveness
30 Kvps
25 Kvps
20 Kvps
15 Kvps
10 Kvps
5 Kvps
0 vps
11-20 20:27
11-20 20:30
11-20 20:33
11-20 20:35
11-20 20:38
Queue size
16 K
14 K
12 K
10 K
8 K
6 K
4 K
2 K
0
1
11-20 20:28
11-20 20:30
11-20 20:33
11-20 20:36
11-20 20:38

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THANK YOU!