

Zabbix 4.2 data processing and more

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CEO **ZABBIX**



ZABBIX 2019
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What is Zabbix?

Zabbix is a **universal** Open Source enterprise level monitoring solution



We have found a **good balance** between giving away free software and having a sustainable growth

Free Software

Free Software Services

Services that save your time and money



Customers in 75+
countries

Some of our users

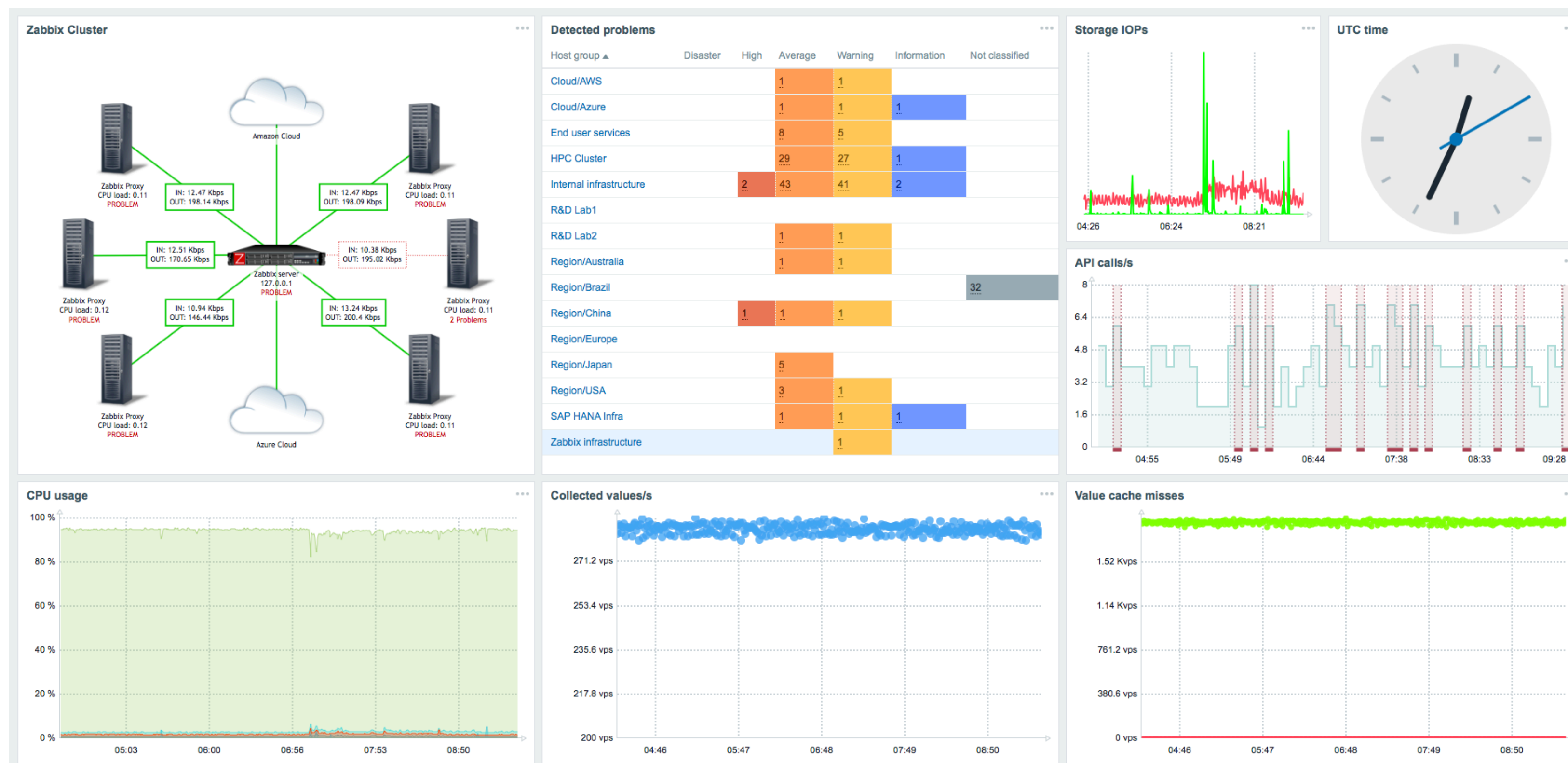


Data collection

Real-time
problem
detection

Alerting &
Remediation

Visualization



Where we are currently?

3.0 LTS 3.2 3.4 4.0 LTS

Release name	Release date	End of Full Support (3 years)*	End of Limited Support** (5 years)
Zabbix 4.0 LTS	1 October, 2018	31 October, 2021	31 October, 2023
Zabbix 3.0 LTS	16 February, 2016	28 February, 2019	28 February, 2021
Zabbix 2.2 LTS	12 November, 2013	31 August, 2017	31 August, 2019

Zabbix 4.0 LTS

Data preprocessing

```
{
  "host":
  {
    "name": "Linux #2356",
    "vms":
    [
      {
        "name": "vm034",
        "network":
        {
          "read": "0xfa673",
          "write": "0x45b30"
        }
      },
      {
        "name": "vm076",
        "network":
        {
          "read": "0x76ab",
          "write": "0xff3a"
        }
      }
    ]
  }
}
```

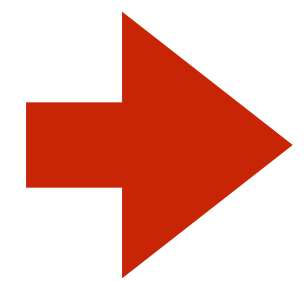

Data preprocessing

```
    "write": "0x45b30"  
  }  
},  
{  
  "name": "vm076",  
  "network":  
  {  
    "read": "0x76ab",  
    "write": "0xff3a"  
  }  
}]  
}
```

➔ 0x76ab

JSON Path: .host.vms[1].network.read

Data preprocessing

 0x76ab

JSON Path: .host.vms[1].network.read

Data preprocessing

➔ 0x76ab ➔ 76ab

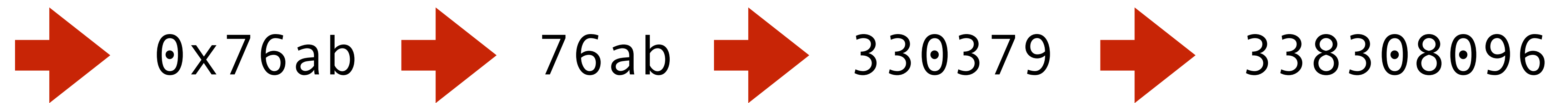
Regexp: 0x(.*)

Data preprocessing

➔ 0x76ab ➔ 76ab ➔ 330379

Hex to Decimal

Data preprocessing



KB -> bytes

Data preprocessing

Items

All hosts / KVM_012

Enabled

ZBX

SNMP

JMX

IPMI

Applications

Items

Triggers

Graphs

Discovery rules

Web scenarios

Item

Preprocessing

Preprocessing steps

Name

Parameters

Action



JSON Path



\$.host.vms[1].network.read

[Remove](#)



Regular expression



0x(.*)

\1

[Remove](#)



Hexadecimal to decimal



[Remove](#)



Custom multiplier



1024

[Remove](#)

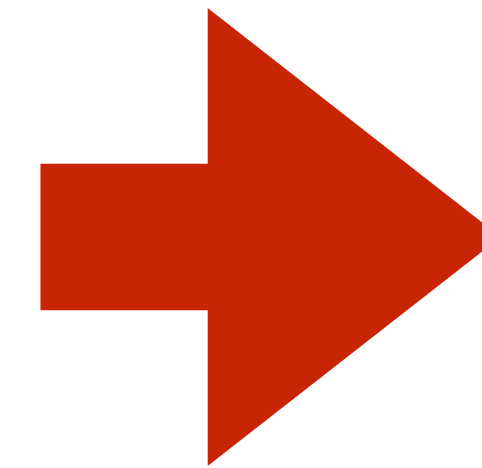
[Add](#)

Add

Cancel



```
Handler_update 0
Handler_write 414
Innodb_buffer_pool_dump_status Dumping of buffer pool not started
Innodb_buffer_pool_load_status Buffer pool(s) load completed at 170531 10:45:37
Innodb_buffer_pool_resize_status
Innodb_buffer_pool_pages_data 513
Innodb_buffer_pool_bytes_data 8404992
Innodb_buffer_pool_pages_dirty 0
Innodb_buffer_pool_bytes_dirty 0
Innodb_buffer_pool_pages_flushed 37
Innodb_buffer_pool_pages_free 7676
Innodb_buffer_pool_pages_misc 2
Innodb_buffer_pool_pages_total 8191
Innodb_buffer_pool_read_ahead_rnd 0
Innodb_buffer_pool_read_ahead 0
Innodb_buffer_pool_read_ahead_evicted 0
Innodb_buffer_pool_read_requests 2535
Innodb_buffer_pool_reads 479
Innodb_buffer_pool_wait_free 0
Innodb_buffer_pool_write_requests 515
Innodb_data_fsyncs 7
Innodb_data_pending_fsyncs 0
Innodb_data_pending_reads 0
Innodb_data_pending_writes 0
Innodb_data_read 7918080
Innodb_data_reads 505
Innodb_data_writes 54
Innodb_data_written 641024
```



Zabbix server

mysql[status]

Efficiency

Master item

Items

All hosts / MySQL server Enabled ZBX SNMP JMX IPMI Applications **Items 3** Triggers Graphs Discovery rules Web scenarios

<input type="checkbox"/>	Wizard	Name ▼	Triggers	Key	Interval	History	Trends	Type
<input type="checkbox"/>	...	MySQL status		mysql[status]	30s	90d		Zabbix agent
<input type="checkbox"/>	...	MySQL status: MySQL read operations per second		mysql[reads]		90d	365d	Dependent item
<input type="checkbox"/>	...	MySQL status: MySQL queries per second		mysql[questions]		90d	365d	Dependent item

Items

All hosts / MySQL server Enabled ZBX SNMP JMX IPMI Applications Items 3 Triggers Graphs Discovery rules Web scenarios

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<input type="checkbox"/>	...	MySQL status		mysql[status]	30s	90d		Zabbix agent
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<input type="checkbox"/>	...	MySQL status: MySQL queries per second		mysql[questions]		90d	365d	Dependent item



Dependent items

Efficiency



mysql[status]

Item Preprocessing

* Name MySQL queries per second

Type Dependent item

* Key mysql[questions]

* Master item MySQL server: MySQL status

Type of information Numeric (unsigned)

Units qps

Item Preprocessing

* Name MySQL read operations per second

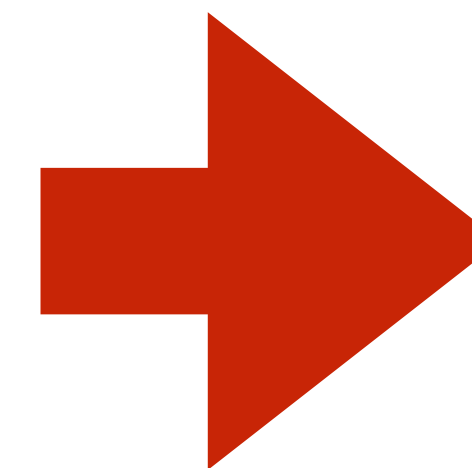
Type Dependent item

* Key mysql[reads]

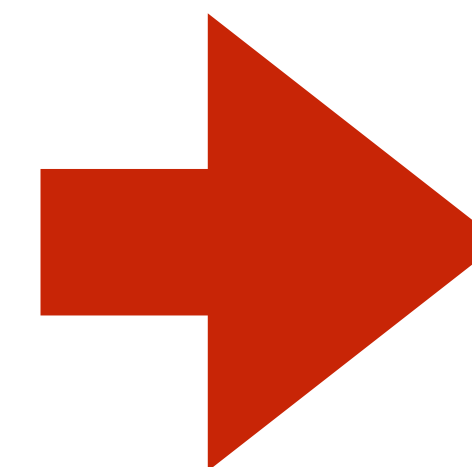
* Master item MySQL server: MySQL status

Type of information Numeric (unsigned)

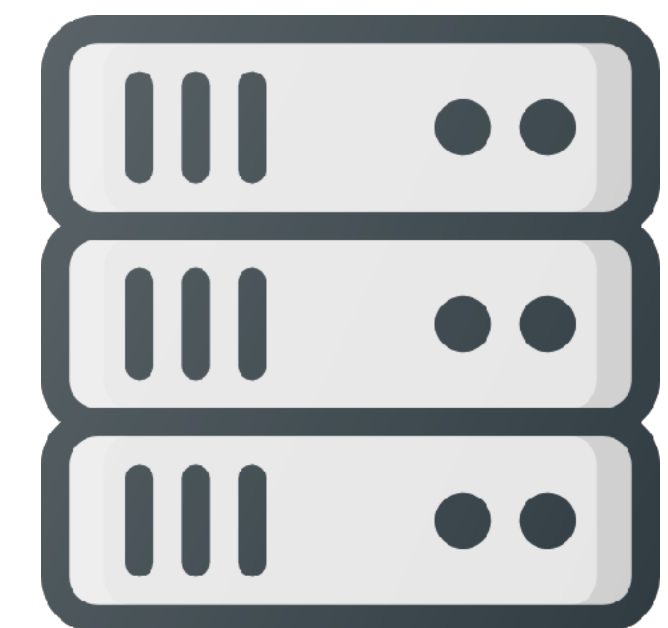
Units



mysql[questions]



mysql[reads]



Zabbix server

Efficiency



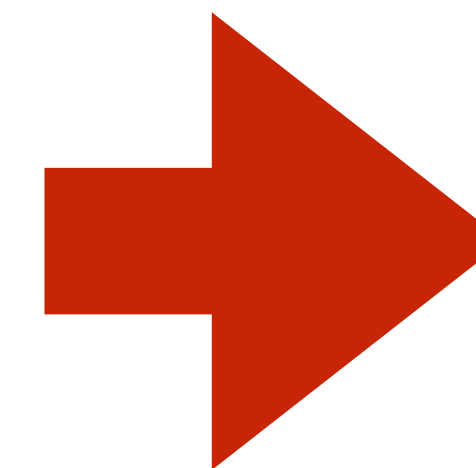
mysql[status]

Item Preprocessing

Preprocessing steps	Name	Parameters
Regular expression		.*Questions.*([0-9]+) \1
Change per second		

Add

Update Clone Check now Clear history and trends Delete Cancel



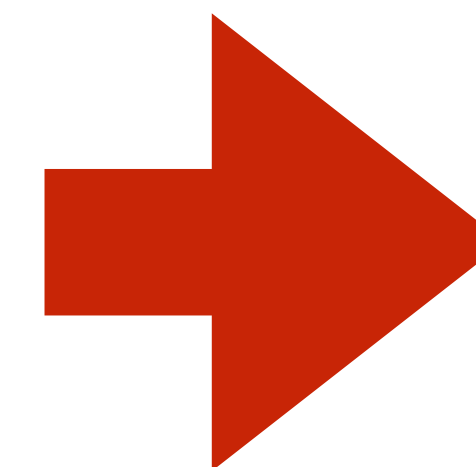
mysql[questions]

Item Preprocessing

Preprocessing steps	Name	Parameters
Regular expression		.*Innodb_data_read.*([0-9]+) \1
Change per second		

Add

Update Clone Check now Clear history and trends Delete Cancel



mysql[reads]



Zabbix server

Performance, less user parameters, all logic in templates

4.0 LTS

Not flexible enough for all use cases

Relies on user parameters

No support of preprocessing for LLD

4.2

Not anymore!

Zabbix 4.2

ETA: March, 2019

What is the ultimate goal?

4.2

No limits for data processing

Host and template tags

4.4

Versioning for templates

Official guidelines

Official templates

5.0 LTS

Self-contained templates

1

Validation, discarding
values and setting errors

- Text
 - ✓ Regular expression
 - Trim
 - Right trim
 - Left trim
- Structured data
 - XML XPath
 - JSONPath
- Arithmetic
 - Custom multiplier
- Change
 - Simple change
 - Change per second
- Numeral systems
 - Boolean to decimal
 - Octal to decimal
 - Hexadecimal to decimal
- Validation
 - In range
 - Matches regular expression
 - Does not match regular expression
 - Check for error in JSON
 - Check for error in XML
 - Check for error using regular expression
- Throttling
 - Discard unchanged
 - Discard unchanged with heartbeat

In range
Matches regular expression
Does not match regular expression
Check for error in JSON
Check for error in XML
Check for error using regular expression

Preprocessing

Item Preprocessing

Preprocessing steps	Name	Parameters	Custom on fail	Action
1:	In range	0 100	<input checked="" type="checkbox"/>	Remove

Custom on fail: Discard value Set value to **Set error to** Temperature is out of range!

Add

Discard value

Set value to

Set error to

Discard incorrect values

Name	Parameters	Custom on fail Action
1: Matches regular expression	<code>^[0-9]+ C\$</code>	<input checked="" type="checkbox"/> Remove
Custom on fail	<input type="button" value="Discard value"/> <input type="button" value="Set value to"/> <input type="button" value="Set error to"/>	

N/A
34 C
33 C
32 C
30 C
123 F



Zabbix

~~N/A~~ (dropped!)
34 C
33 C
32 C
30 C
~~123 F~~ (dropped!)



Discard out of range values

Name	Parameters	Custom on fail	Action
1: In range	0 100	<input checked="" type="checkbox"/>	Remove

Custom on fail: Discard value | Set value to | Set error to

N/A

34

33

999

32

30



Zabbix

~~N/A~~ (dropped!)

34

33

~~999~~ (dropped!)

32

30



Use default if does not match

Name	Parameters	Custom on fail	Action
1: Matches regular expression	^(OK NOT OK)\$	<input checked="" type="checkbox"/>	Remove

Custom on fail: Discard value | **Set value to** | Set error to | NOT OK

OK
ERR2
OK
OK
ERR4
NOT OK



Zabbix

OK
NOT OK (default!)
OK
OK
NOT OK (default!)
NOT OK



Set error message if not in range

Name	Parameters	Custom on fail	Action
1: In range	0 100	<input checked="" type="checkbox"/>	Remove

Custom on fail: Discard value | Set value to | **Set error to** | `sensor hardware failure, out of range temperature.`

34
33
32
30
999



Zabbix

34
33
32
30



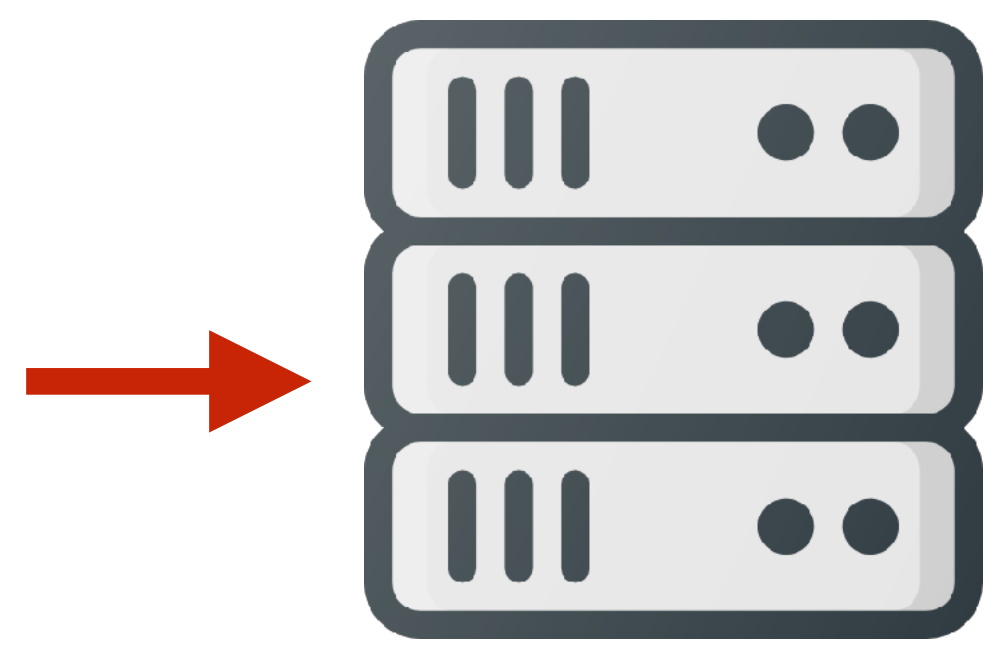
NOT SUPPORTED

Error: sensor hardware failure,
out of range temperature.

Extract error message

Name	Parameters	Custom on fail	Action
1: Check for error in JSON	\$.err	<input type="checkbox"/>	Remove
2: XML XPath	\$.status	<input type="checkbox"/>	Remove

```
{ "status": "on" }  
{ "status": "off" }  
{ "status": "off" }  
{ "err": "Node no longer exists" }
```



Zabbix

```
on  
off  
off  
NOT SUPPORTED
```

A red arrow points from the text above towards the database icon on the right.



Error: Node no longer exists

2

Throttling

Process on value change

Name	Parameters	Custom on fail	Action
1: Discard unchanged		<input type="checkbox"/>	Remove

0
0
1
1
1
0
0



Zabbix

0
(dropped)
1
(dropped)
(dropped)
0
(dropped)



Subsampling

Name	Parameters	Custom on fail Action
1: Discard unchanged with heartbeat	5s	<input type="checkbox"/> Remove

0s 0
1s 1
2s 0
3s 0
4s 0
5s 0
6s 0
7s 0
8s 0
9s 0

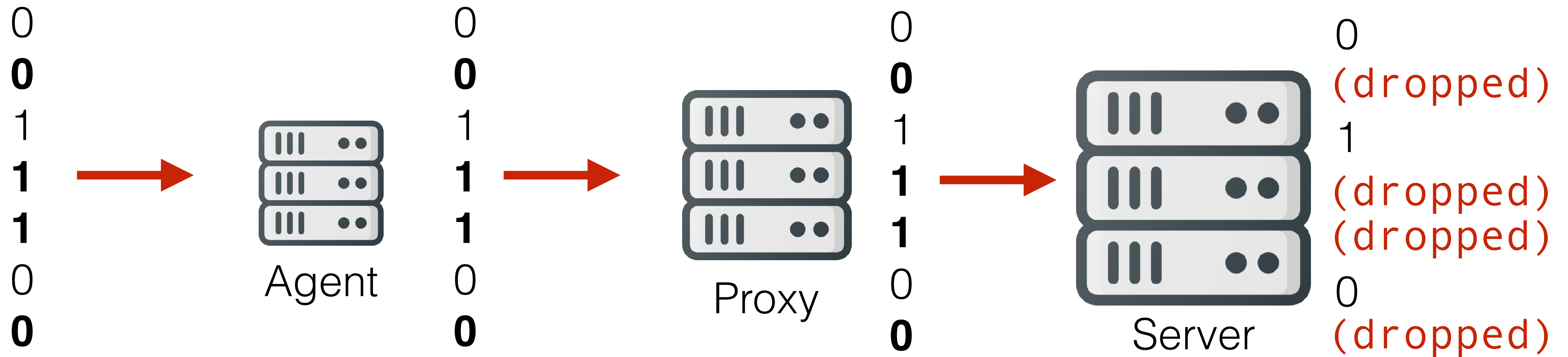


Zabbix

0s 0
1s 1
2s 0
(dropped)
(dropped)
(dropped)
(dropped)
7s 0
(dropped)
(dropped)



Who is doing throttling



3

Prometheus:
JS is not enough

```
# HELP cpu_usage_system Telegraf collected metric
# TYPE cpu_usage_system gauge
cpu_usage_system{cpu="cpu-total",host="host1"} 1.1940298507220641
cpu_usage_system{cpu="cpu0",host="host1"} 1.1940298507220641
cpu_usage_system{cpu="cpu1",host="host1"} 1.1340298507220641
```


Prometheus

```
# HELP cpu_usage_system Telegraf collected metric  
# TYPE cpu_usage_system gauge  
cpu_usage_system{cpu="cpu-total",host="host1"} 1.1940298507220641  
cpu_usage_system{cpu="cpu0",host="host1"} 1.1940298507220641  
cpu_usage_system{cpu="cpu1",host="host1"} 1.1340298507220641
```

PromQL

```
cpu_usage_system{cpu="cpu-total"}
```

```
1.1940298507220641
```

Prometheus

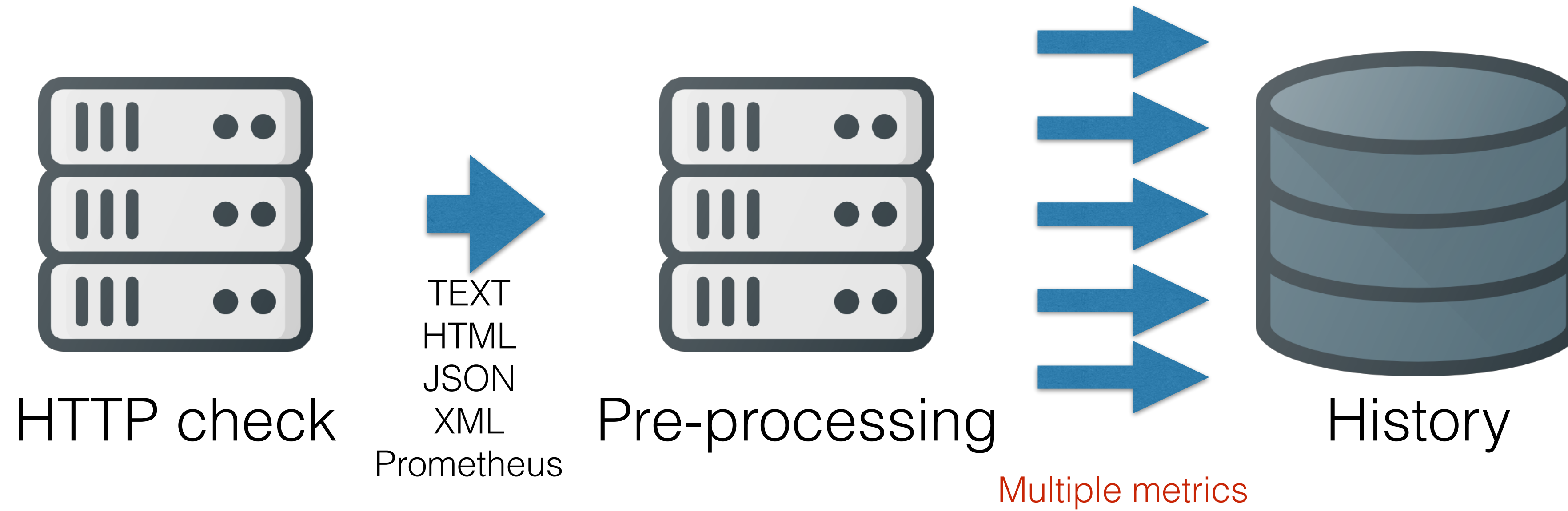
```
# HELP wmi_logical_disk_free_bytes Free space in bytes
(LogicalDisk.PercentFreeSpace)
# TYPE wmi_logical_disk_free_bytes gauge
wmi_logical_disk_free_bytes{volume="C:"} 3.5180249088e+11
wmi_logical_disk_free_bytes{volume="D:"} 2.627731456e+09
wmi_logical_disk_free_bytes{volume="HarddiskVolume4"} 4.598e+08
```

PromQL

```
wmi_logical_disk_free_bytes{volume
=~"[A-C]:"}

[
  {
    "name": "wmi_logical_disk_free_bytes",
    "help": "Free space in bytes
(LogicalDisk.PercentFreeSpace)",
    "type": "gauge",
    "labels": {
      "volume": "C:"
    },
    "value": "3.5180249088e+11",
    "line_raw":
"wmi_logical_disk_free_bytes{volume=\"C:\"}
3.5180249088e+11"
  }
]
```


HTTP endpoint monitoring



HTTP data processing

4

Ultimate flexibility

Converting C to F

```
return (input - 32) * 5 / 9;
```

Word count

```
return (input.match(new RegExp(  
    param, 'g')) || []).length;
```


JSON filtering

```
var data = JSON.parse(input);
var count = 0;

function iterate(obj)
{
    for (var key in obj)
    {
        if (typeof(obj[key]) == 'object')
        {
            iterate(obj[key]);
            continue;
        }

        if (key == 'id' && obj[key] == param)
            count++;
    }
}

iterate(data);

return count;
```

Apache Server Status for localhost (via ::1)

Server Version: Apache/2.4.23 (Unix)
Server MPM: prefork
Server Built: Aug 8 2016 16:31:34

Current Time: Wednesday, 15-Feb-2017 13:53:30 EST
Restart Time: Wednesday, 15-Feb-2017 13:39:55 EST
Parent Server Config. Generation: 1
Parent Server MPM Generation: 0
Server uptime: 13 minutes 35 seconds
Server load: 1.82 1.80 1.77
Total accesses: 33 - Total Traffic: 25 kB
CPU Usage: u0 s.02 cu0 cs0 - .00245% CPU load
.0405 requests/sec - 31 B/second - 775 B/request
1 requests currently being processed, 1 idle workers

_W.....
.....
.....
.....

Scoreboard Key:

"_" Waiting for Connection, "s" Starting up, "r" Reading Request,
"w" Sending Reply, "k" Keepalive (read), "D" DNS Lookup,
"c" Closing connection, "L" Logging, "G" Gracefully finishing,
"I" Idle cleanup of worker, "." Open slot with no current process

Srv	PID	Acc	M	CPU	SS	Req	Conn	Child	Slot	Client	Protocol	VHost	Request
0-0	15622	0/17/17	_	0.01	4	1	0.0	0.01	0.01	localhost	http/1.1		local:80 GET /server-status?auto HTTP/1.1
1-0	15629	0/16/16	W	0.01	0	0	0.0	0.01	0.01	:::1	http/1.1		local:80 GET /server-status HTTP/1.1

Items

All hosts / Zabbix server

Item Preprocessing

Preprocessing

JavaScript

```

1 var stats = {};
2 var lines = value.split("\n");
3 var i = 0;
4
5 var reVersion = new RegExp("Server Version: ([^$]+)");
6 var reUptime = new RegExp("Server uptime: ([0-9]+) days? ([0-9]+) hours? ([0-9]+) minutes? ([0-9]+) seconds?");
7 var reLoad = new RegExp("Server load: ([^ ]+) ([^ ]+) ([^ ]+)");
8 var reHits = new RegExp("Total accesses: ([^ ]+) \- Total Traffic: ([^ ]+) ([^ ]+)");
9 var reCpu = new RegExp("CPU Usage: u([^ ]+) s([^ ]+)");
10 var lines_num = lines.length;
11
12 for (i = 0; i < lines_num; i++)
13 {
14     var match = lines[i].match(reVersion);
15     if (match)
16     {
17         stats.version = match[1];
18         break;
19     }
20 }

```

5 symbols remaining

Save

Cancel

No user parameters, no shell scripts, thus easy maintenance

Super efficient, less impact on monitored devices due to bulk requests

All complex logic is part of the template

Templates becomes **self-contained**

5

TimescaleDB

Storage options



Zabbix



MySQL
PostgreSQL
Oracle
DB2
ElasticSearch

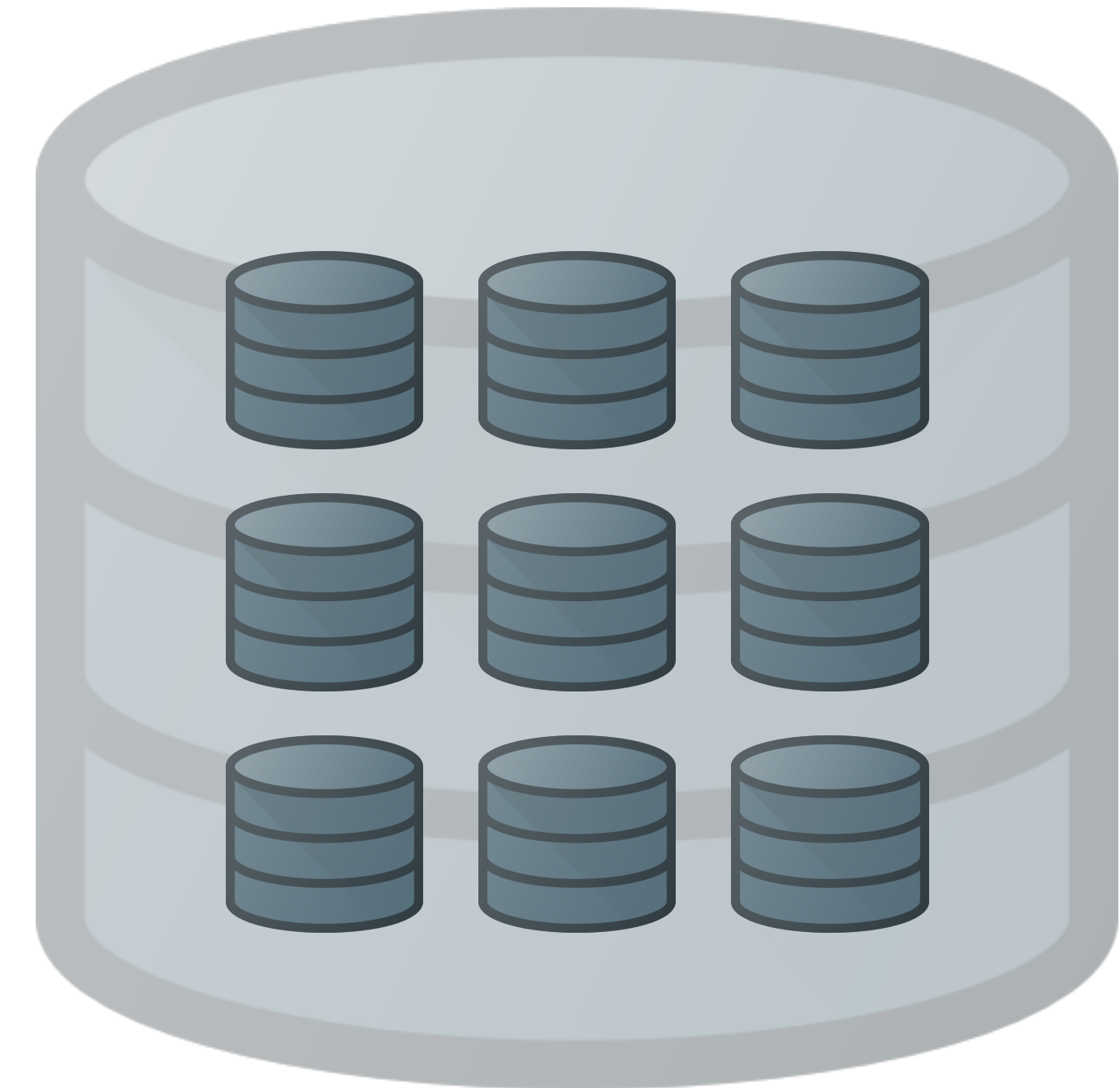


MySQL
PostgreSQL
Oracle
DB2



Partitioning

TimescaleDB



And much more!

Zabbix Roadmap

V 4.2

V 4.4

V 5.0 LTS

Zabbix 4.2

ETA: March, 2019

Infrastructure

- Migration to Git
Finally we can talk same language to devs around.
- Community and partners to review proposals
Design documents for all dev work will be shared with Zabbix users and community. Everyone will have a chance to review it and come up with useful suggestions.
- Official builds for new platforms
[ZBXNEXT-4013](#), [2473](#), [3047](#), [1348](#), [2378](#) Official builds for Docker, SuSE, Mac OS/X, Windows (with encryption support, MSI), Raspbian and other as well as images for cloud platforms will be provided.

Data collection

- [ZBXNEXT-4724](#) Validation and throttling rules for preprocessing
Zabbix will be able to validate incoming data to avoid processing of incorrect or out-of-range values. Throttling will enable to skip repetitive values without sacrificing real-time problem detection.

Better workflow

- Guidelines for template creators
A comprehensive guide having recommendations and best practices for template creators will be created and supported by Zabbix. Let's make all templates high quality and consistent!
- Versioning for templates
That is probably most important functionality planned in Zabbix 4.2. It will enable clear workflow for template management, it will also simplify daily maintenance of Zabbix systems very much.

Extreme flexibility

Zabbix 4.2



Zabbix capabilities



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SOLUTIONS

SERVICES

TRAINING

PARTNERS

COMMUNITY

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ZABBIX 4.0 LTS

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of your IT infrastructure
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 APC	 Appdynamics	 Application monitoring	 Arduino	 Arista	 DB2	 Debian	 Dell	 DNS	 Docker	 Ingress	 Intel	 Intersystems
 Aruba	 Asterisk	 Avaya	 AWS	 AWS CloudWatch	 Drupal	 Elasticsearch	 Eltex	 EMC	 Emerson	 IRC	 Jabber	 JasperReports
 AWS EC2	 AWS S3	 Backup	 Bacula	 Barracuda	 Exim	 Extreme Networks	 F5 Networks	 Facebook Messenger	 Fedora	 JBoss	 Jenkins	 Jira
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 Buffalo	 Bugzilla	 C#	 Capacity planning	 Cassandra	 FreshDesk	 Fujitsu Siemens	 Galera cluster	 Geckboard	 Git	 Kubernetes	 KVM	 Kyocera
 Centos	 Ceph	 Check Point	 Chef	 Chrome extension	 Glassfish	 GLPI	 Go	 Google Apps	 Google Cloud	 Lenovo	 Lexmark	 Lighttpd
 Cisco	 Citrix	 Cloud Foundry	 Cloud monitoring	 Cloudera	 Google Maps	 Grafana	 Graylog	 Hadoop	 HAProxy	 Logstash	 Lucidworks	 LXC
 Cloudstack	 ClusterControl	 Confluence	 Cooling	 CoreOS	 High Availability	 Hipchat	 Hitachi HDS, HNAS	 HP Enterprise	 HP-UX	 Mattermost	 Mellanox	 Memcached

Zabbix + HP Enterprise

- ALL Categories
- Network
- Servers
- Infrastructure
- Official Templates

Link	Source	Compatibility	Type, Technology	Created Updated	Rating
<p>Template Server HP iLO SNMPv2</p> <p>Official template for HP servers with iLO controller. Please see template description and follow the documentation link for more info. Depends on: https://share.zabbix.com/official-templates/template-modules-pack Please download and import them first, unless you already have it in your Zabbix instal</p> <p>✓ Low Level Discovery (LLD) ✓ SNMP Agent</p> <p>share.zabbix.com/template-server-hp-ilo-snmpv2</p>	<p>share.zabbix.com</p> <p>📄 91</p>	3.4	Template	<p>2018-09-28</p> <p>3 d</p>	<p>Official</p>

and import them first, unless you already have it in your Zabbix instal

✓ Low Level Discovery (LLD) ✓ SNMP Agent

share.zabbix.com/template-server-hp-ilo-snmpv2

Template Net HP Enterprise Switch SNMPv2

Official template for HP Enterprise Switch (Procurve and others). Please see Template Description and follow documentation link for more info. Depends on: <https://share.zabbix.com/official-templates/template-modules-pack> Please download

share.zabbix.com

📄 902 🗨 2

3.4

Template

2017-08-22

9 m

Official



VictorOps

Available solutions

Link	Source	Compatibility	Type, Technology	Created Updated	Rating
Zabbix Integration Guide. VictorOps' Zabbix plugin is a set of scripts that queue up trigger notifications and forward them to VictorOps servers for processing. help.victorops.com/knowledge-base/victorops-zabbix-integration/	victorops.com				Vendor

A N S I B L E Ansible

Ansible is an open source software that automates software provisioning, configuration management, and application deployment. Ansible connects via SSH, remote PowerShell or via other remote APIs.

Available solutions

Link	Source	Compatibility	Type, Technology	Created Updated	Rating
Core Ansible module for Zabbix docs.ansible.com/ansible/latest/modules/list_of_monitoring_modules.html#zabbix			Python		Vendor
Installing and maintaining zabbix-agent for RedHat/Debian/Ubuntu. github.com/dj-wasabi/ansible-zabbix-agent	GitHub ★ 167		Python	2014-11-01 7 d	Popular

It is a **moderated list** of all known solutions from community, vendors and partners!

<https://share.zabbix.com>

<https://www.zabbix.com/integrations>

Thank you!

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