

# ZABBIX 2023 Conference

LATIN AMERICA



# Understanding Zabbix Data Flows

# WHO AM I

```
debian:~$ whoami  
root
```

```
debian:~$ getent passwd vl | cut -d ':' -f 5  
Vladimir Levijev (aka dimir)
```

- Born in Tallinn, Estonia
- Live in Riga, Latvia
- Work for Zabbix as software developer
  - for 12 years



# WHO AM I



# TOPICS

- Communication between Zabbix components
- Getting configuration
- Upgrading proxies
- Export to files
- Streaming to external systems
- Frontend commands
- Frontend tasks



# ZABBIX COMPONENTS

Zabbix communication protocol.

- TCP protocol
- Non-persistent
- JSON based
  - Except: passive agent checks
- Compression (optional, zlib, default settings)
- Encryption (optional user-controlled)



# ZABBIX COMMUNICATION PROTOCOL

<HEADER><DATA>

This is the way all requests and responses between Zabbix components look like.

The **header** tells:

- if it is a *large* packet
- data *size*
- if data is *compressed*

The **data** in most cases is a string representing JSON object.



# ZABBIX COMMUNICATION PROTOCOL

The <HEADER> - 13 (or 21) bytes

| Field      | Size | Size (large packet) | Description   |
|------------|------|---------------------|---|
| <PROTOCOL> | 4    | 4                   | "ZBXD" or 5A 42 58 44   |
| <FLAGS>    | 1    | 1                   | Protocol flags:<br>0x01 - Zabbix communications protocol<br>0x02 - compression<br>0x04 - large packet |
| <DATALEN>  | 4    | 8                   | Data length   |
| <RESERVED> | 4    | 8                   | When compression is used - the length of uncompressed data  |





# ZABBIX COMMUNICATION PROTOCOL

Limits.

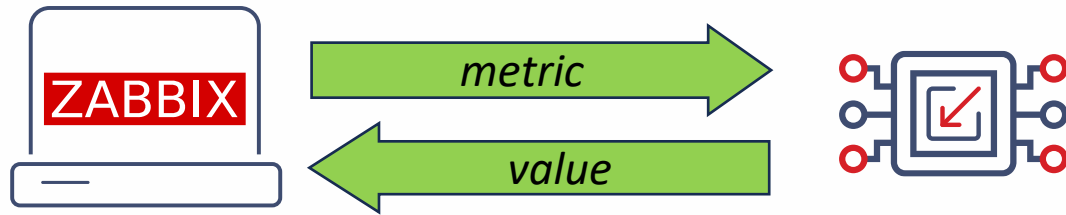
Zabbix communications protocol has **1GB** packet size limit. The limit is applied to both the received packet data length and the uncompressed data length.

For sending configuration to Zabbix proxy the limit is raised to **16GB**. When sending data over 4GB the **large packet** mode is automatically set.



# Zabbix agent

# PASSIVE AGENT



Process *metric*:

- System call (e. g. *system.cpu.usage*)
- TCP connection (e. g. *web.page.get*)
- Execute shell command (e. g. *UserParameter*)

- Server (request): *<HEADER><item key>*
- Agent (response): *<HEADER><value>[\0<error>]*

Example:

- Server: *<HEADER>agent.ping*
- Agent: *<HEADER>1*



# PASSIVE AGENT

Availability

Agent encryption

ZBX

None

Interface

Status

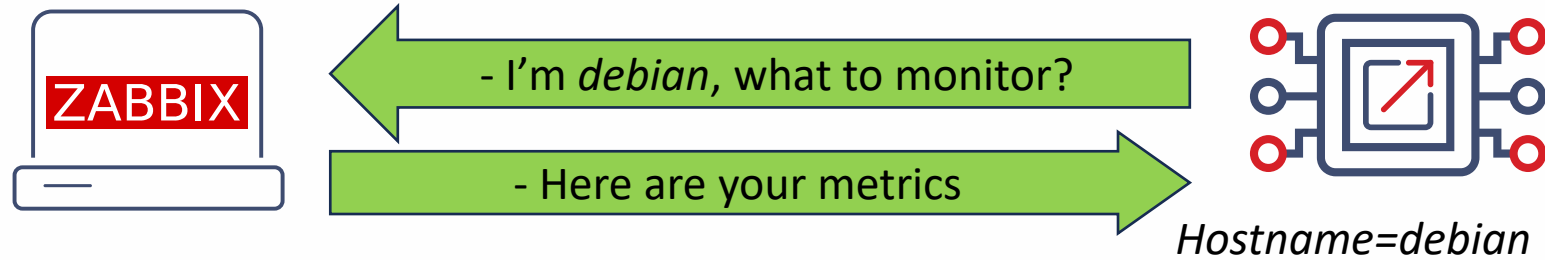
Error

127.0.0.1:10050

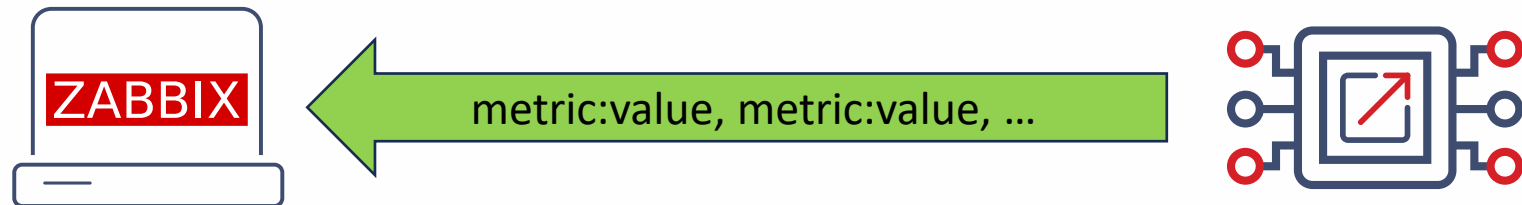
Available



# ACTIVE AGENT



Later...



# ACTIVE AGENT COMMANDS

Communication format: **JSON**. Available commands:

***active checks*** - retrieve the list of items

- *ServerActive=<ServerIP>*
- *RefreshActiveChecks=5 (seconds)*

***agent data*** - send collected data

- *BufferSend=5 (seconds)*
- *BufferSize=100 (number of values)*

***active check heartbeat*** - heartbeat message (since 6.2, ZBXNEXT-5088)

- *HeartbeatFrequency=60 (seconds)*



# REQUESTING ACTIVE CHECKS

Request to the server:

```
{  
  "request": "active checks",  
  "host": "debian",  
  "session": "056122124dfa215b0dff080001d0fa18",  
  "config_revision": 1  
}
```

If server does not find such host:

```
{  
  "response": "failed",  
  "info": "host [debian] not found"  
}
```

<server log>

*cannot send list of active checks to "<IP>": host [debian] not found*



# REQUESTING ACTIVE CHECKS

Response from Zabbix server:

```
{  
  "response": "success",  
  "data": [  
    {  
      "key": "system.cpu.util",  
      "delay": 30,  
      ...  
    },  
    {  
      "key": "net.if.in[eno1]",  
      "delay": 30,  
      ...  
    },  
    {  
      "key": "system.swap.size[,pfree]",  
      "delay": 60,  
      ...  
    }  
  ],  
  "config_revision": 2  
}
```





# SENDING COLLECTED DATA

Send collected data to the server:

```
{  
  "request": "agent data",  
  "clock": 1685011826,  
  "data": [  
    {  
      "host": "debian",  
      "key": "net.if.in[eno1]",  
      "value": "2721941445",  
      "clock": 1685011821,  
      "id": 713  
    },  
    {  
      "host": "debian",  
      "key": "system.swap.size[,pfree]",  
      "value": "99.958054",  
      "clock": 1685011821,  
      "id": 714,  
    }  
  ]  
}
```



# ACTIVE AGENT

Availability

Agent encryption

ZBX

None

Interface

Status

Error

Active checks

Available



# ACTIVE AGENT

Availability

Agent encryption

ZBX

None

Interface

Status

Error

127.0.0.1:10050

Available

Active checks

Available



# ACTIVE AGENT

Troubleshooting:

```
zabbix_agentd -R log_level_increase="active checks"
```

When finished:

```
zabbix_agentd -R log_level_decrease="active checks"
```



# Zabbix proxy

# PROXY CONFIGURATION

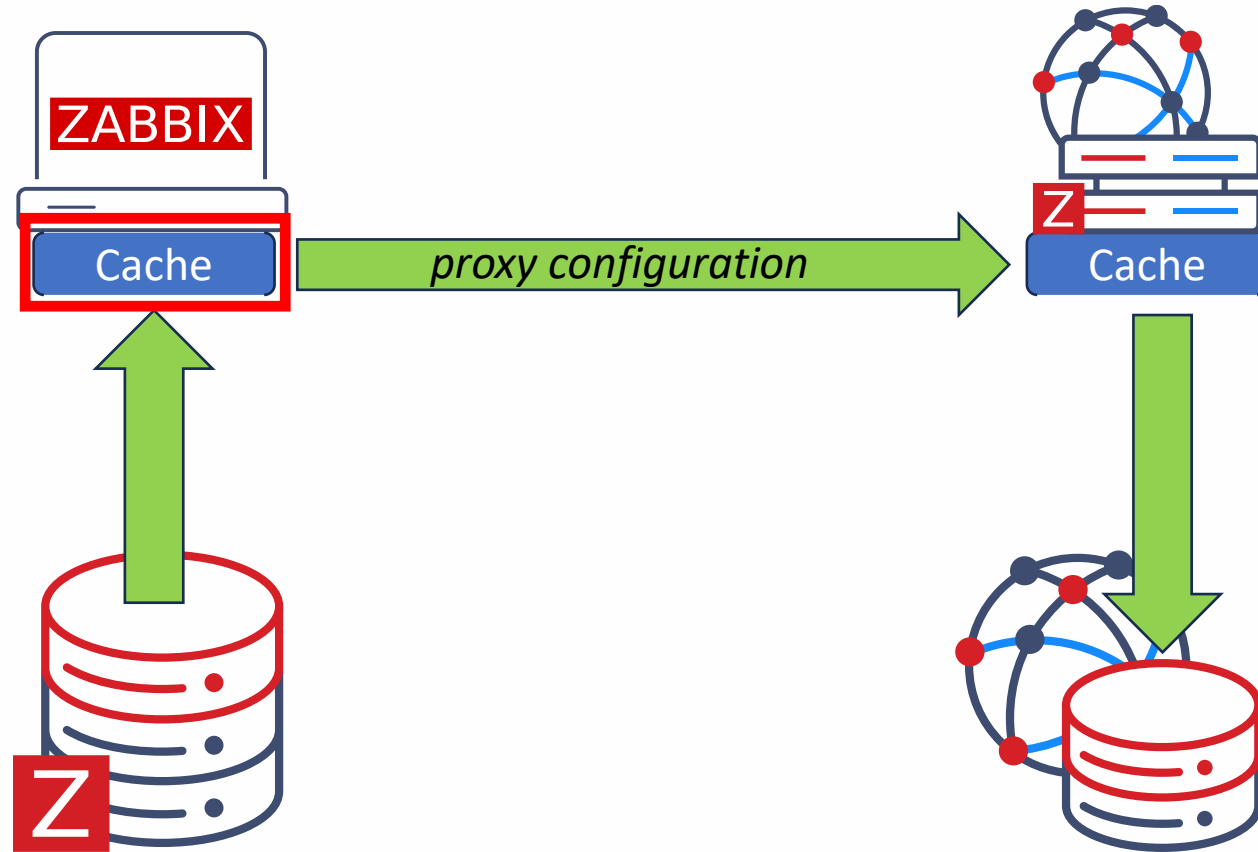
**Zabbix configuration** means everything you see in the frontend: everything that is related to monitoring. Sometimes it is also referred to as *monitoring configuration*.

**Proxy configuration** means part of Zabbix configuration that relates to a specific proxy.

When proxy receives its configuration it starts to monitor items of type *Simple check*, *Zabbix agent* and others. Items of type ***Zabbix agent (active)*** must be delivered to appropriate active agent first.



# PROXY CONFIGURATION



# PASSIVE PROXY CONFIGURATION

zabbix\_server.conf:

***ProxyConfigFrequency=10 (seconds)***

Within one TCP connection now 4 commands are sent.

| Server sends                          | Proxy replies                               | Logged on<br>DebugLevel=4 |
|---------------------------------------|---|---------------------------|
| {"request": "proxy config"}           |   | Yes                       |
|                                       | {"version": "6.4.2", "config_revision": 0}  | No                        |
| {"data": {...}, "config_revision": 1} |   | No                        |
|                                       | {"response": "success", "version": "6.4.2"} | Yes                       |





# PASSIVE PROXY

## Troubleshooting:

```
zabbix_server -R log_level_increase="proxy poller"  
zabbix_proxy -R log_level_increase=trapper
```

## When finished:

```
zabbix_server -R log_level_decrease="proxy poller"  
zabbix_proxy -R log_level_decrease=trapper
```



# ACTIVE PROXY CONFIGURATION

zabbix\_proxy.conf

**ProxyConfigFrequency=10** (seconds)

ConfigFrequency deprecated

Within one TCP connection 2 commands are sent.

| Server replies                                   | Proxy sends  | Logged on DebugLevel=4                                  |
|--|--|---|
|  | <pre>{   "request": "proxy config",   "host": "Zabbix proxy",   "version": "6.4.0",   "session": "...",   "config_revision": 0 }</pre> | <b>No</b> (in server log, <i>trapper process</i> – yes) |
| <pre>{"data": {...}, "config_revision": 1}</pre> |  | <b>No</b>   |



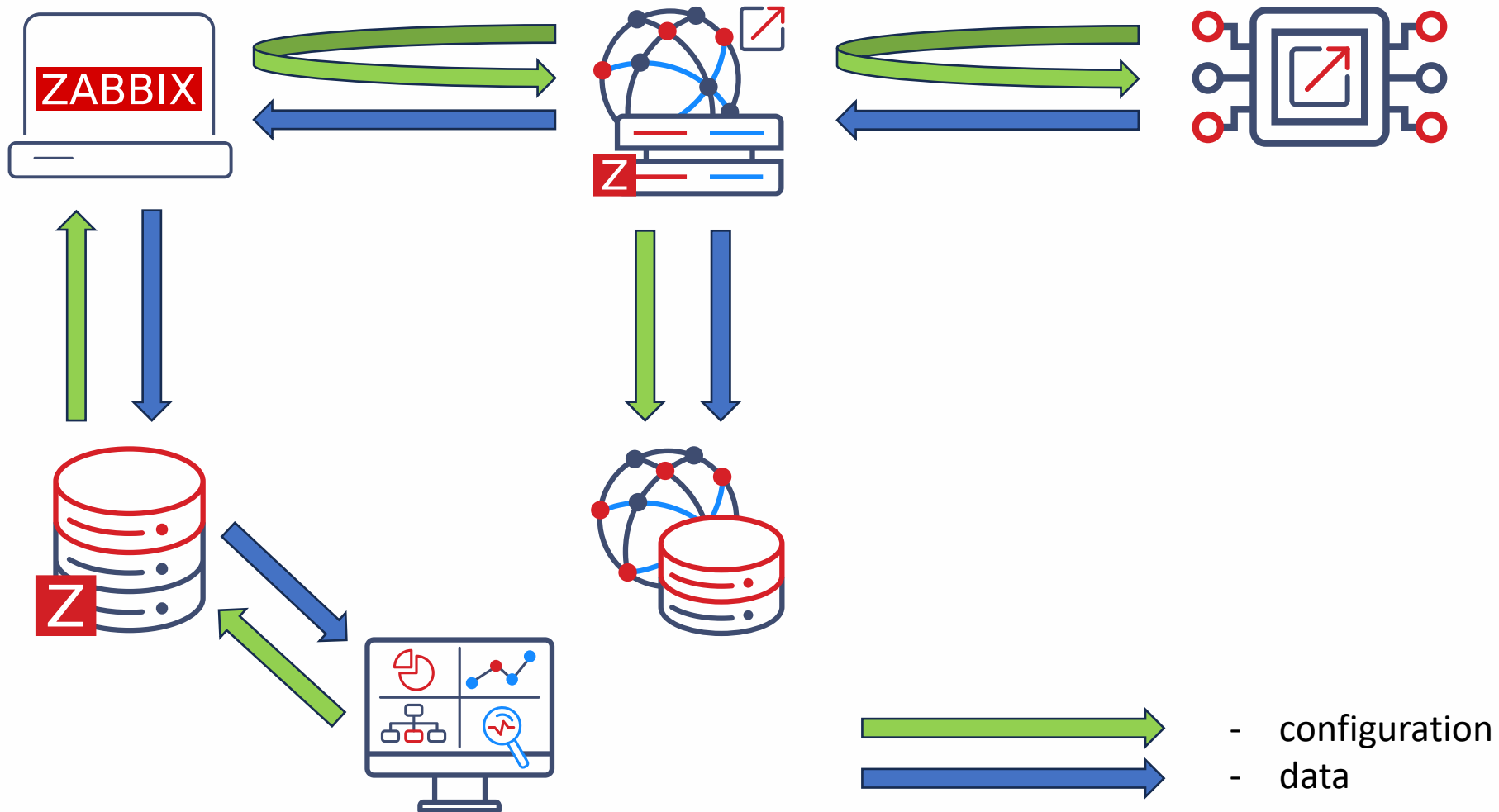
# GETTING FIRST ACTIVE AGENT VALUES

When a user opens a frontend and adds new item of type *Zabbix agent (active)* the following actions must be performed before the collected data appears on the **Latest data** page:

- **server reads** the item from the database into the cache
- **proxy requests** it from the server (*proxy config*)
- **proxy saves** it to the database keeping the copy in its cache
- **active agent requests** it from proxy (*active checks*)
- **agent starts monitoring** the new item
- when it's time, **agent sends** first collected values to the proxy (*agent data*)
- **proxy saves** them to the database
- **proxy sends** them to server (*proxy data*)
- **server saves** them to the database



# VISUALIZATION WITH ACTIVE PROXY



# SPEEDING THINGS UP

Ask server to update configuration *from the database*:

```
zabbix_server -R config_cache_reload
```

Ask **active proxy** to *request* configuration from server:

```
zabbix_proxy -R config_cache_reload
```

Ask server to *send* configuration to **passive proxies** (optionally specify which ones):

```
zabbix_server -R proxy_config_cache_reload=Proxy1,Proxy2
```



# Zabbix server

# ZABBIX CONFIGURATION

The process of getting zabbix configuration from the database has been significantly improved in 6.4 .

The default value of *CacheUpdateFrequency* has been lowered from 60 to **10** seconds.



# UPGRADING PROXIES

Problems

Hosts

Latest data

Maps

Discovery

Services

Inventory

Reports

Data collection

Alerts

Users

Administration

TAG VALUES

DATA

[With data](#) [Without data](#)

| <input type="checkbox"/> | Host   | Name ▲                                     | Last check | Last value | Change    | T |
|--------------------------|--------|--|------------|------------|-----------|---|
| <input type="checkbox"/> | debian | <a href="#">Agent ping</a>                 | 8s         | 1          |           |   |
| <input type="checkbox"/> | debian | <a href="#">CPU utilization percentage</a> | 12s        | 0.3358     | -0.0104   |   |
| <input type="checkbox"/> | debian | <a href="#">Free swap space</a>            | 12s        | 99.3446 %  |           |   |
| <input type="checkbox"/> | debian | <a href="#">Incoming traffic</a>           | 12s        | 2.83 GB    | +13.53 KB |   |
| <input type="checkbox"/> | debian | <a href="#">Uptime</a>                     | 12s        | 1M 13d 14h | +15s      |   |

0 selected

Display stacked graph

Display graph

Execute now





# UPGRADING PROXIES

ZBXNEXT-2557 - allow older proxies to work with newer server

```
{  
  "request": "proxy config",  
  "version": "6.4.2",  
  ...  
}
```

Server defines *proxy version* as:

- **Current**  
proxy major version = server major version
- **Outdated**  
proxy major version  $\geq$  server previous LTS major version **and** proxy major version  $<$  server major version
- **Not supported**  
proxy major version  $<$  server previous LTS major version **or** proxy major version  $>$  server major version



# UPGRADING PROXIES

Given Zabbix server version **6.4.2**:

| Proxy version | Compatibility        |
|---------------|----------------------|
| 6.4.2         | <i>Current</i>       |
| 6.4.1         | <i>Current</i>       |
| 6.4.3         | <i>Current</i>       |
| 6.2.1         | <i>Outdated</i>      |
| 6.0.1         | <i>Outdated</i>      |
| 5.4.1         | <i>Not supported</i> |
| 5.0.1         | <i>Not supported</i> |
| 7.0.1         | <i>Not supported</i> |




# UPGRADING PROXIES

| Compatibility        | Data | Configuration | Tasks   |
|----------------------|------|---------------|---|
| <i>Current</i>       | Yes  | Yes           | Yes   |
| <i>Outdated</i>      | Yes  | No            | Yes: <ul style="list-style-type: none"><li>• remote commands</li><li>• execute now</li></ul> No: <ul style="list-style-type: none"><li>• preprocessing step tests</li></ul> |
| <i>Not supported</i> | No   | No            | No  |



# UPGRADING PROXIES

| Version   | Last seen (age) | Host count | Item count | Required vps | Hosts          |
|---|-----------------|------------|------------|--------------|----------------|
| 7.0.0  | 44s             | 2          | 5          | 0.4          | debian, debian |

Proxy version is outdated, only data collection and remote execution is available with server version 7.2.0.

| Version   | Last seen (age) | Host count | Item c |
|---|-----------------|------------|--------|
| 7.0.0  | 24s             | 2          | 5      |

Proxy version is not supported by server version 6.4.0.



# EXPORT TO FILES

```
/etc/zabbix/zabbix_server.conf
```

```
ExportDir=/opt/zabbix-data-export  
ExportType=history,events
```

Create directory:

```
mkdir /opt/zabbix-data-export  
sudo chown zabbix !$  
sudo systemctl restart zabbix-server
```



# EXPORT TO FILES

```
vl@debian:~$ ls -l /opt/zabbix-data-export
total 256
-rw-rw-r-- 1 zabbix zabbix 60925 May 10 18:58 history-history-syncer-1.ndjson
-rw-rw-r-- 1 zabbix zabbix 52260 May 10 18:58 history-history-syncer-2.ndjson
-rw-rw-r-- 1 zabbix zabbix 67094 May 10 18:58 history-history-syncer-3.ndjson
-rw-rw-r-- 1 zabbix zabbix 61165 May 10 18:58 history-history-syncer-4.ndjson
-rw-rw-r-- 1 zabbix zabbix 0 May 10 18:47 history-main-process-0.ndjson
vl@debian:~$
```

```
vl@debian:~$ head -3 /opt/zabbix-data-export/history-history-syncer-1.ndjson
{"host":{"host":"Global macro history","name":"Global macro history"},"groups":
RSM.RDAP.MAXREDIRS value","clock":1683733635,"ns":401030049,"value":10,"type":
{"host":{"host":"Probe statuses","name":"Probe statuses"},"groups":["Mon"],"it
enabled IPv4","clock":1683733642,"ns":633267850,"value":0,"type":3}
{"host":{"host":"Probe statuses","name":"Probe statuses"},"groups":["Mon"],"it
enabled IPv6","clock":1683733643,"ns":624072698,"value":0,"type":3}
vl@debian:~$
```



# EXPORT TO FILES

```
vl@debian:~$ head -1 /opt/zabbix-data-export/history-history-syncer-4.ndjson | jq -SC .
{
  "clock": 1683733640,
  "groups": [
    "Mon"
  ],
  "host": {
    "host": "Probe statuses",
    "name": "Probe statuses"
  },
  "item_tags": [],
  "itemid": 100100,
  "name": "Number of online probes for DNS tests",
  "ns": 622657110,
  "type": 3,
  "value": 0
}
vl@debian:~$
```



# STREAMING TO EXTERNAL SYSTEMS

- *Administration* → *General* → *Connectors*

New connector ?

\* Name

Protocol Zabbix Streaming Protocol v1.0

Data type  Item values  Events

\* URL

Tag filter  And/Or  Or

Equals  [Remove](#)

[Add](#)

HTTP authentication

▼ [Advanced configuration](#)

Description

Enabled



# STREAMING TO EXTERNAL SYSTEMS

```
/etc/zabbix/zabbix_server.conf
```

```
StartConnectors=5
```



# Zabbix frontend

# FRONTEND COMMANDS



```
zabbix.conf.php:  
$ZBX_SERVER      = '192.168.0.10';  
$ZBX_SERVER_PORT = '10051';
```

or

```
SQL> select * from ha_node;
```

```
+-----+-----+-----+-----+-----+-----+-----+  
| ha_nodeid | name | address | port | lastaccess | status | ha_sessionid |  
+-----+-----+-----+-----+-----+-----+-----+  
| cleo4xcx90001 | | localhost | 10051 | 1685546713 | 3 | cliaugq5b00wd |  
+-----+-----+-----+-----+-----+-----+-----+
```

# QUEUE

**ZABBIX** << 🔍

## Latest data

< ⌵

Subfilter affects only filtered data

**HOSTS**  
[debian](#) 5 [debian active](#) +3 [debian passive](#) +1 [Zabbix server](#) +119

**TAGS**

**TAG VALUES**

**DATA**  
[With data](#) [Without data](#)

| <input type="checkbox"/> Host                   | Name ▲                                     | Last check | Last |
|---|--|------------|------|
| <input type="checkbox"/> <a href="#">debian</a> | <a href="#">Agent ping</a>                 |            |      |
| <input type="checkbox"/> <a href="#">debian</a> | <a href="#">CPU utilization percentage</a> | 1m 38s     | 0.41 |
| <input type="checkbox"/> <a href="#">debian</a> | <a href="#">Free swap space</a>            | 1m 38s     | 99.3 |
| <input type="checkbox"/> <a href="#">debian</a> | <a href="#">Incoming traffic</a>           | 1m 38s     | 2.81 |
| <input type="checkbox"/> <a href="#">debian</a> | <a href="#">Uptime</a>                     | 1m 38s     | 1M   |

0 selected

Zabbix 7.0.0alpha2. © 2001–2021



# QUEUE

```
{  
  "request": "queue.get",  
  "type": "overview",  
  "sid": "8fdeab1108b5669b8c108bd0ceb5c562"  
}
```

```
{  
  "response": "success",  
  "data": [  
    {  
      "itemtype": 7,  
      "delay5": 0,  
      "delay10": 4,  
      "delay30": 0,  
      "delay60": 0,  
      "delay300": 0,  
      "delay600": 0  
    }  
  ]  
}
```



# FRONTEND COMMANDS

- `queue.get`
  - `overview`
  - `overview by proxy`
  - `details`
- `command`
- `item.test`
- `preprocessing.test`
- `alert.send`
- `report.test`
- `status.get`
- `expressions.evaluate`



# FRONTEND COMMANDS

Troubleshooting:

```
zabbix_server -R log_level_increase=trapper
```

When finished:

```
zabbix_server -R log_level_decrease=trapper
```



# TASKS

- *execute now*
- *close problem*
- *execute remote command*
- *acknowledge*

```
MariaDB [zabbix_master]> show tables like 'task%';
```


```
+-----+  
| Tables_in_zabbix_master (task%) |  
+-----+  
| task |  
| task_acknowledge |  
| task_check_now |  
| task_close_problem |  
| task_data |  
| task_remote_command |  
| task_remote_command_result |  
| task_result |  
+-----+
```





# EXECUTE NOW

## Latest data

< 

Subfilter affects only filtered data

HOSTS  
[debian](#) 1 [debian passive](#) +1 [Zabbix server](#) +2

TAGS

TAG VALUES

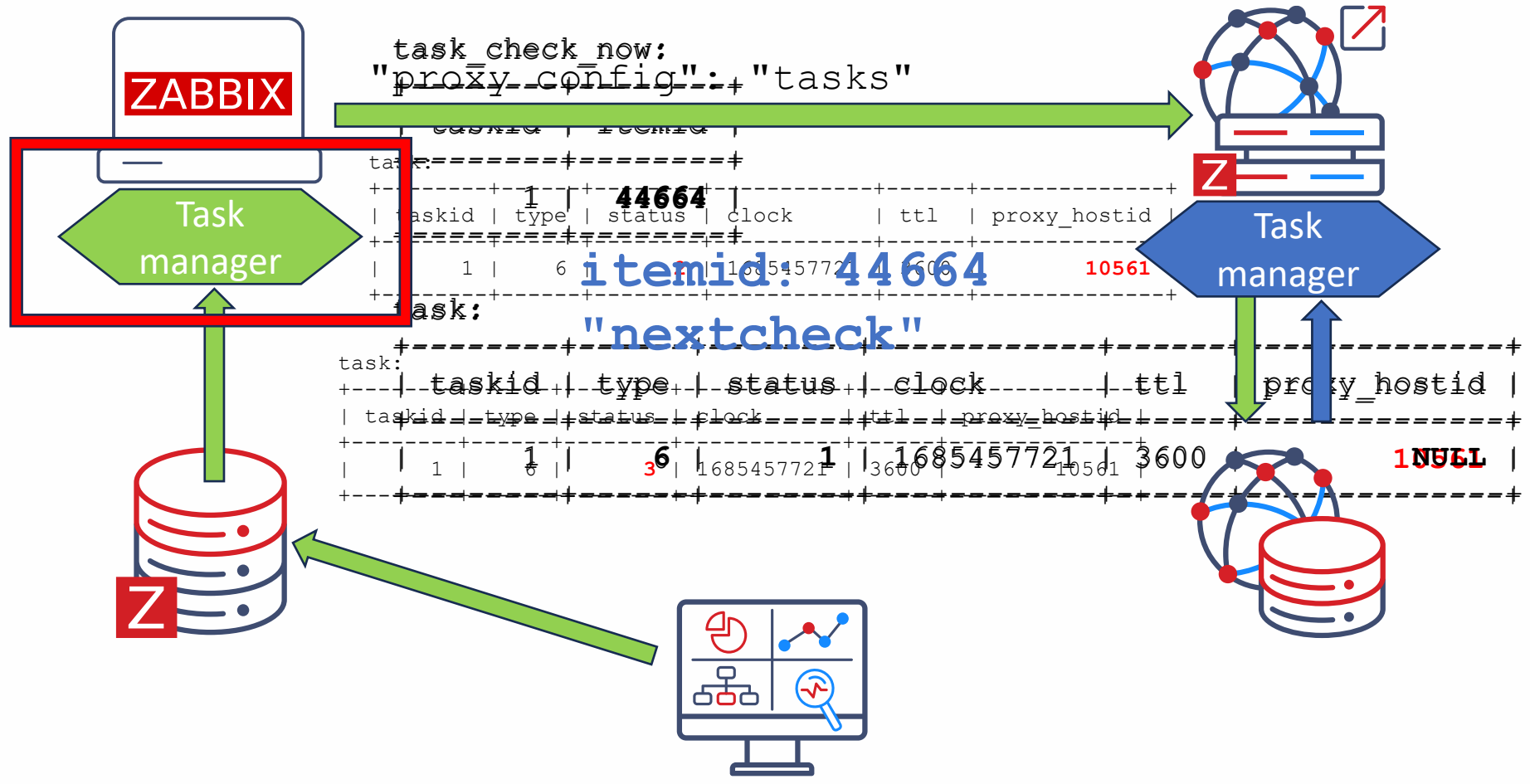
DATA  
[With data](#) [Without data](#)

| <input type="checkbox"/> Host                   | Name ▲                     | Last check |
|---|----------------------------|------------|
| <input type="checkbox"/> <a href="#">debian</a> | <a href="#">Agent ping</a> | 6m         |

0 selected Display stacked graph Display graph Execute now



# EXECUTE NOW IN DETAIL



Perguntas?