ZABBIX internals 2.0

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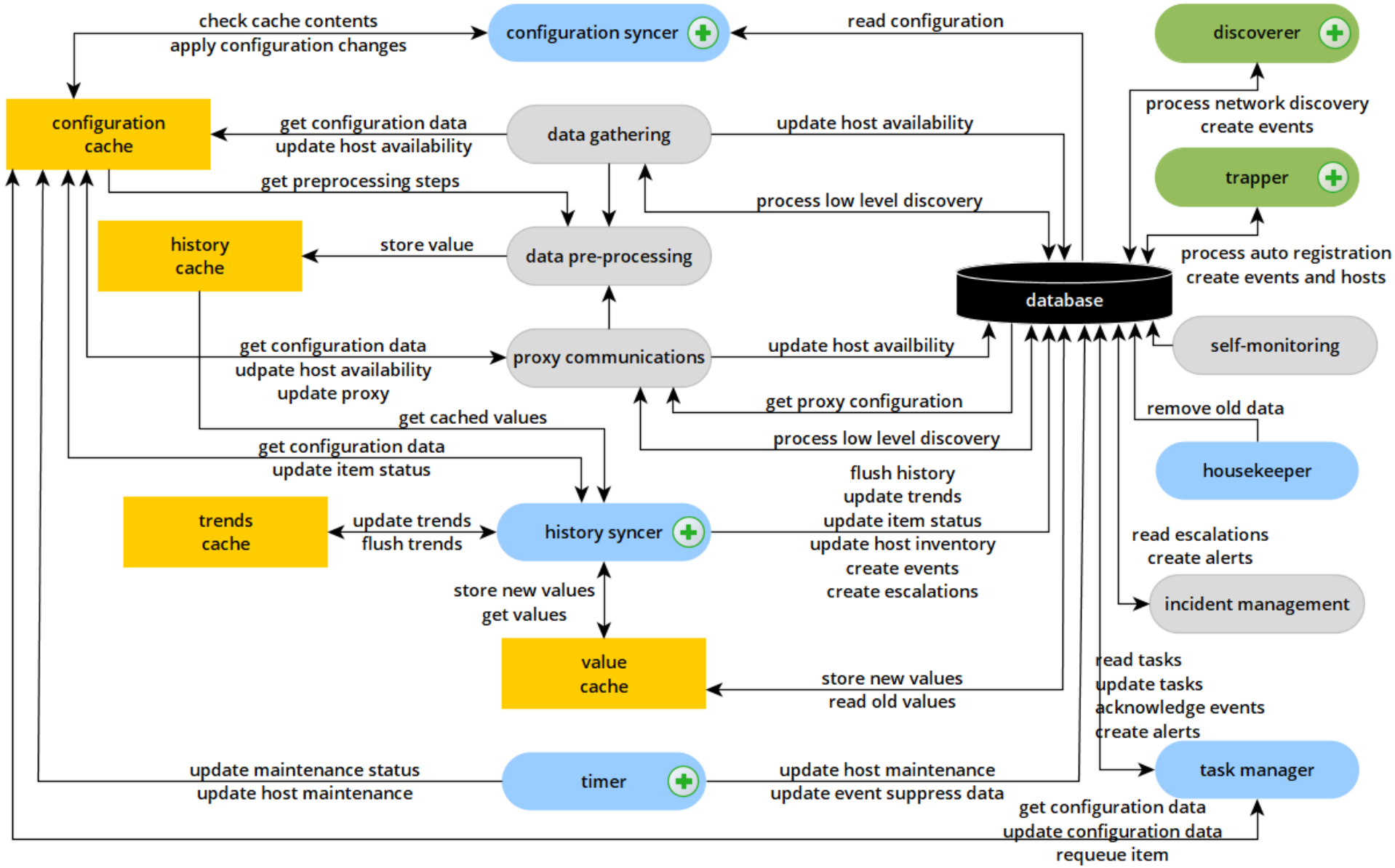
ZABBIX 2019
Conference
BENELUX

ZABBIX processes


```
/usr/sbin/zabbix_server -c /etc/zabbix/zabbix_server.conf
/usr/sbin/zabbix_server: configuration syncer [synced configuration in 0.169800 sec, idle 60 sec]
/usr/sbin/zabbix_server: alerter #2 started
/usr/sbin/zabbix_server: housekeeper [deleted 105688 hist/trends, 7874 items/triggers ...
/usr/sbin/zabbix_server: timer #1 [updated 0 hosts, suppressed 0 events in 0.000589 sec, idle 59 sec]
/usr/sbin/zabbix_server: http poller #1 [got 0 values in 0.000610 sec, idle 5 sec]
/usr/sbin/zabbix_server: discoverer #1 [processed 1 rules in 0.004817 sec, idle 60 sec]
/usr/sbin/zabbix_server: history syncer #4 [processed 136 values, 92 triggers in 0.008205 sec, idle 1 sec]
/usr/sbin/zabbix_server: escalator #1 [processed 0 escalations in 0.000745 sec, idle 3 sec]
/usr/sbin/zabbix_server: java poller #1 [got 0 values in 0.000002 sec, idle 5 sec]
/usr/sbin/zabbix_server: snmp trapper [processed data in 0.000014 sec, idle 1 sec]
/usr/sbin/zabbix_server: proxy poller #1 [exchanged data with 0 proxies in 0.000003 sec, idle 5 sec]
/usr/sbin/zabbix_server: self-monitoring [processed data in 0.000007 sec, idle 1 sec]
/usr/sbin/zabbix_server: vmware collector #1 [updated 0, removed 0 VMware services in 0.000001 sec, idle 5 sec]
/usr/sbin/zabbix_server: task manager [processed 0 task(s) in 0.000401 sec, idle 5 sec]
/usr/sbin/zabbix_server: poller #1 [got 27 values in 0.303246 sec, idle 1 sec]
/usr/sbin/zabbix_server: unreachable poller #1 [got 0 values in 0.000003 sec, idle 5 sec]
/usr/sbin/zabbix_server: trapper #1 [processed data in 0.001295 sec, waiting for connection]
/usr/sbin/zabbix_server: icmp pinger #1 [got 0 values in 0.000004 sec, idle 5 sec]
/usr/sbin/zabbix_server: alert manager #1 [sent 0, failed 0 alerts, idle 5.007591 sec during 5.007593 sec]
/usr/sbin/zabbix_server: preprocessing manager #1 [queued 0, processed 236 values, idle 5.031538 sec during 5.032590 sec]
/usr/sbin/zabbix_server: preprocessing worker #1 started
```

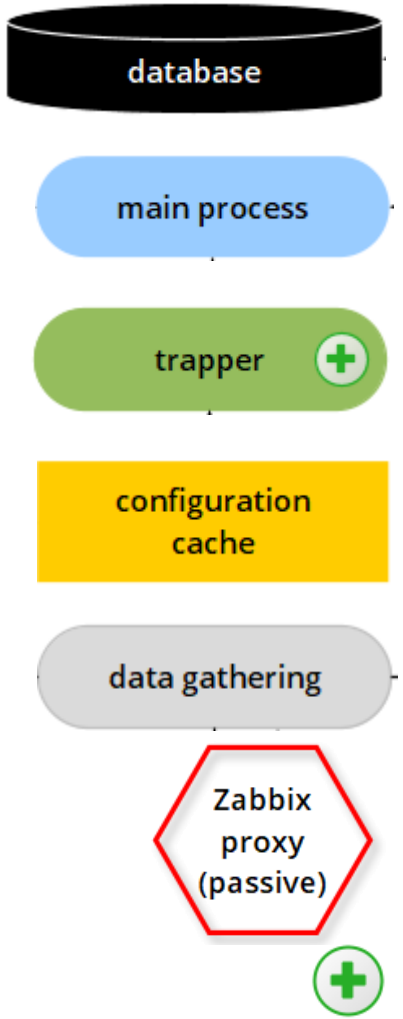
ZABBIX processes



ZABBIX processes

It is already confusing? No?! Now, let's discuss Zabbix processes

Legend



– database (DB)

– internal process

– process interacting with outside

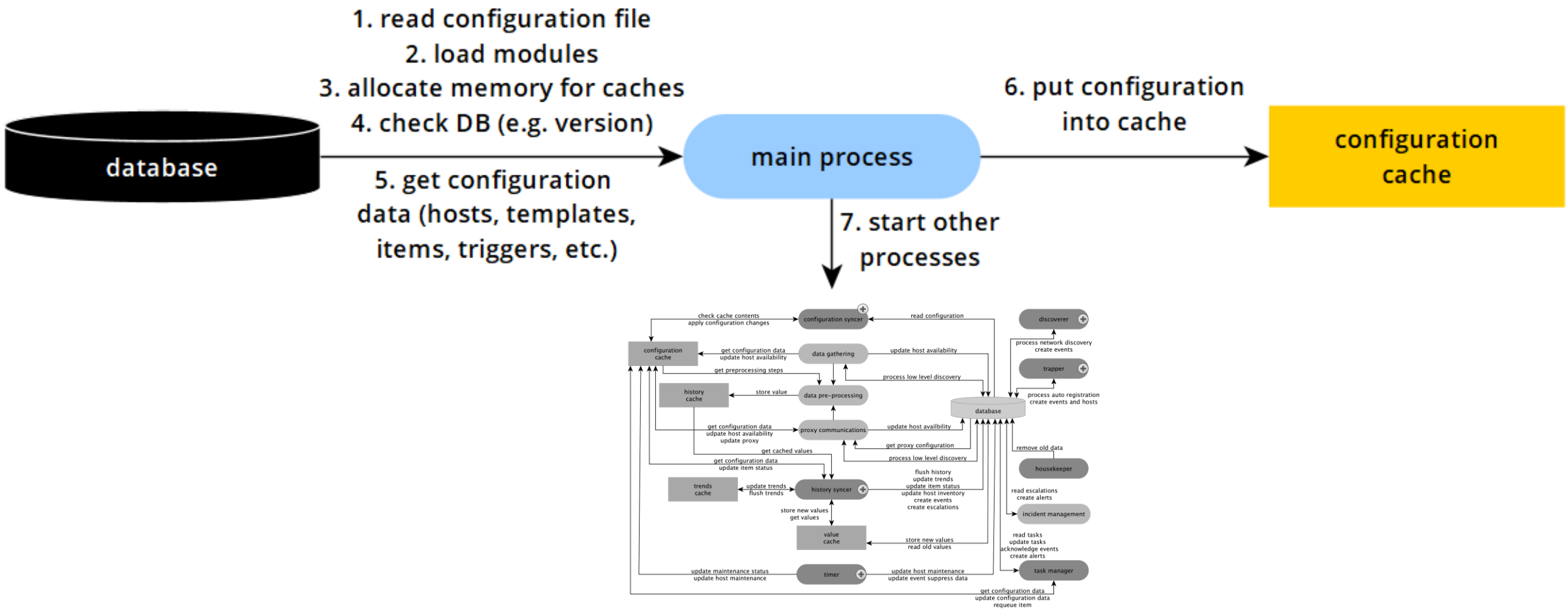
– cache/memory

– group of processes

– Zabbix component

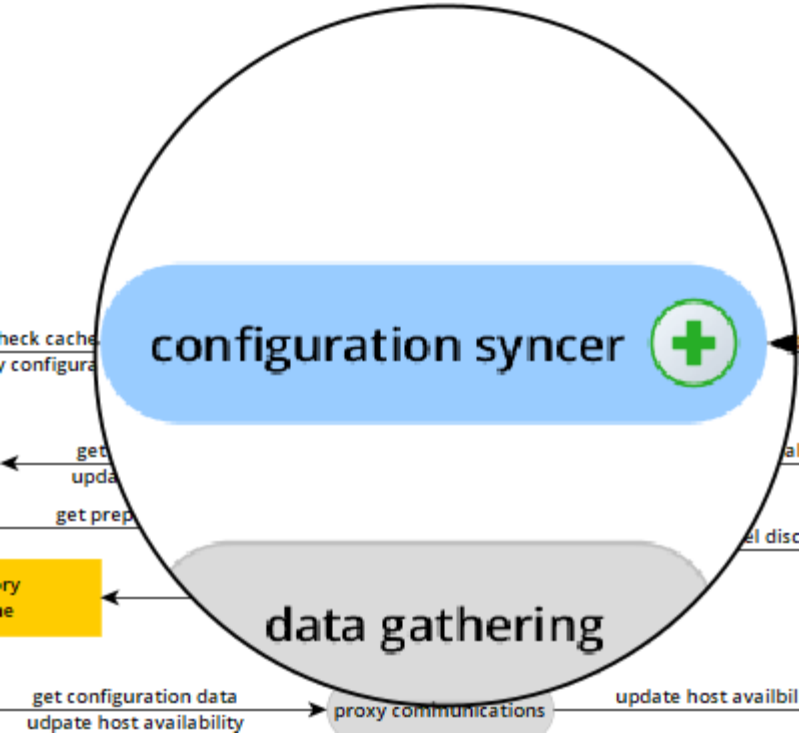
– can have multiple parallel processes

Start & Main process




```
[root@zabbix ~]# systemctl start zabbix-server
```

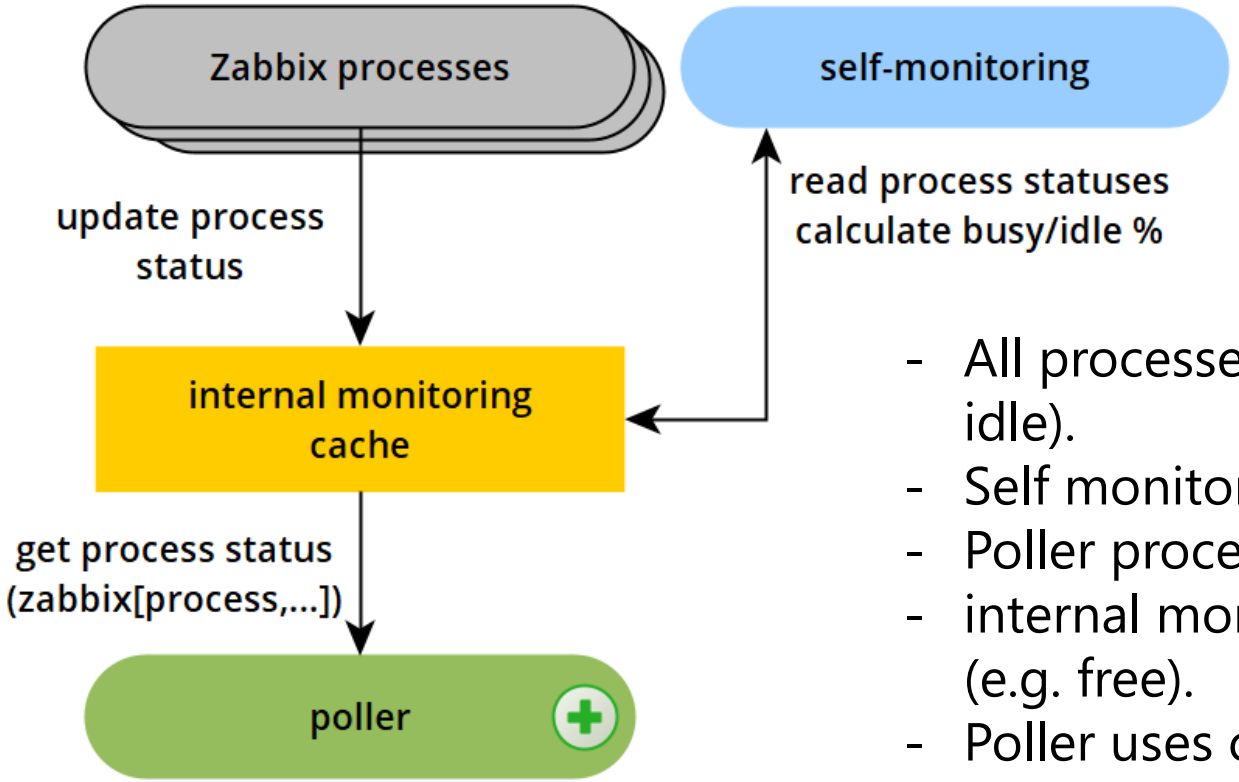
Configuration syncer



- gets all configuration data from DB (e.g. hosts, items, triggers, etc.) and puts it into "Configuration cache".
- updates item queue (next check)
- then every 1 minute checks for updates and performs incremental changes in the cache (if any)

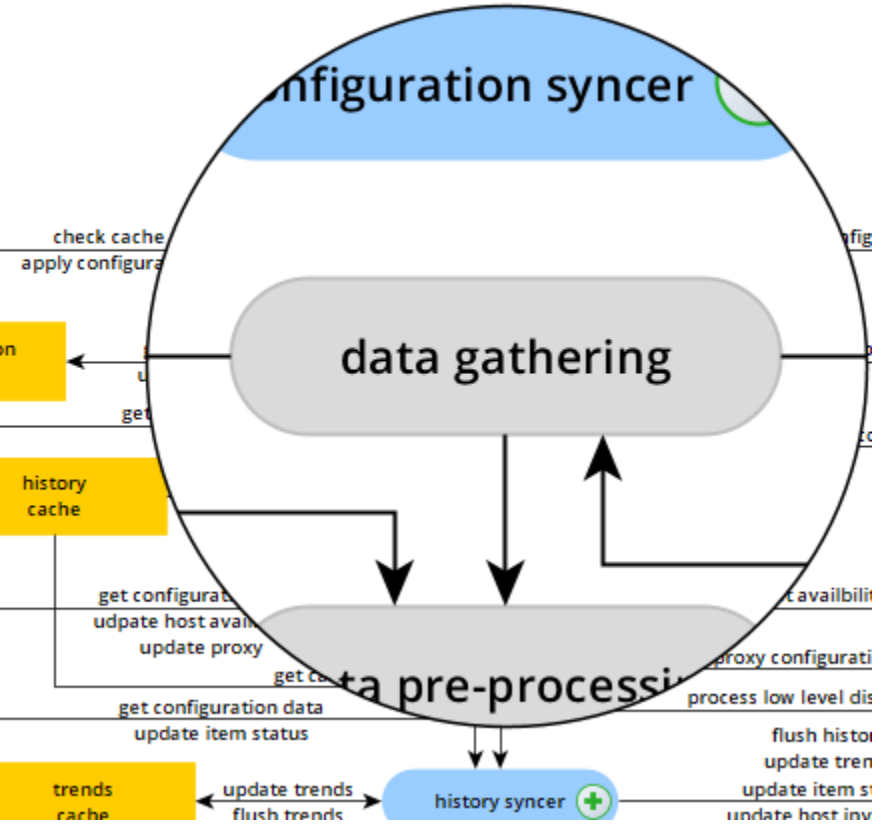
```
[root@zabbix ~]# zabbix_server -R config_cache_reload
zabbix_server [14418]: command sent successfully
[root@zabbix ~]#
```

Self-monitoring



- All processes use internal monitoring cache to keep status (busy, idle).
- Self monitoring reads statuses and calculates busy/idle.
- Poller processes this data
- internal monitoring cache has no information about other caches (e.g. free).
- Poller uses cache allocators to get cache usage.
- Caches have statistics (e.g. history cache - received values).
- Poller may use DB to get number of historical values (there is an internal item).

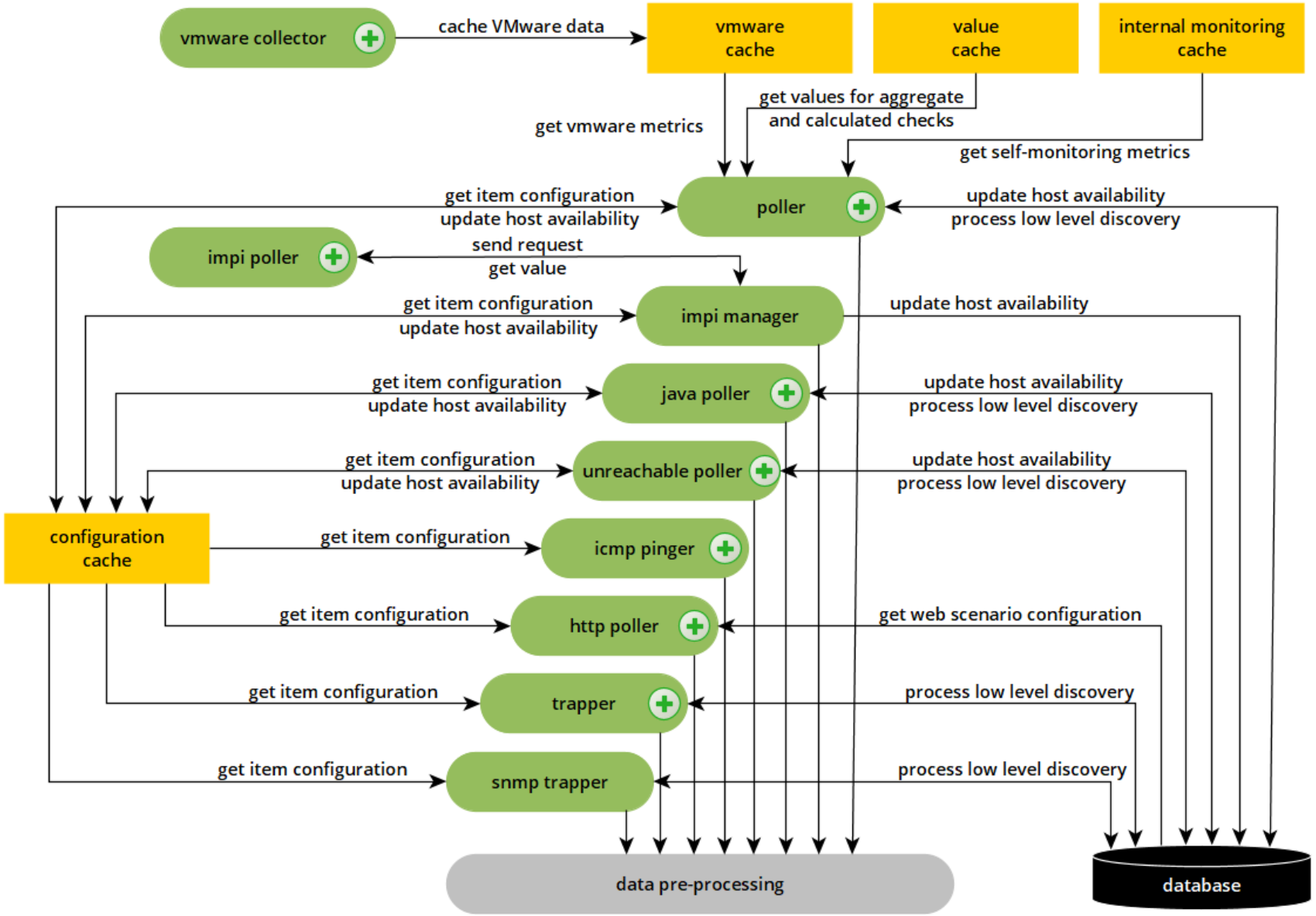
Data gathering



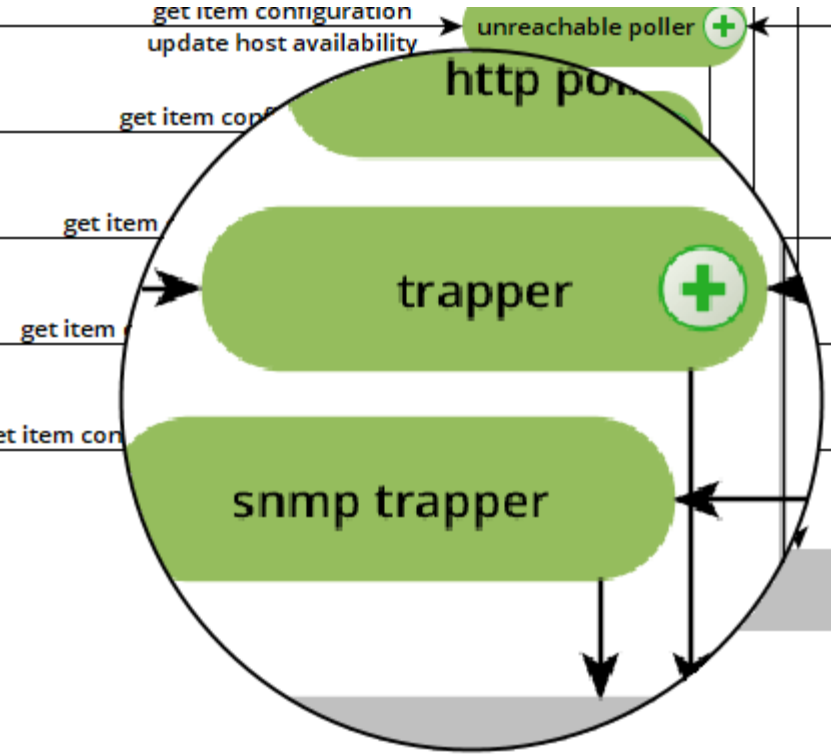
- obtains item values/metrics and delivers to data pre-processing
- updates host availability (cache and DB)
- manages LLD* by creating entities, links to templates directly in DB

*LLD = Low Level Discovery

Data gathering



Data gathering - trappers



active check

Trapper

- listening on TCP/10051 port by default
- receives data from:
  - active Zabbix agents
  - active proxies
  - Zabbix-sender utility (special item type)

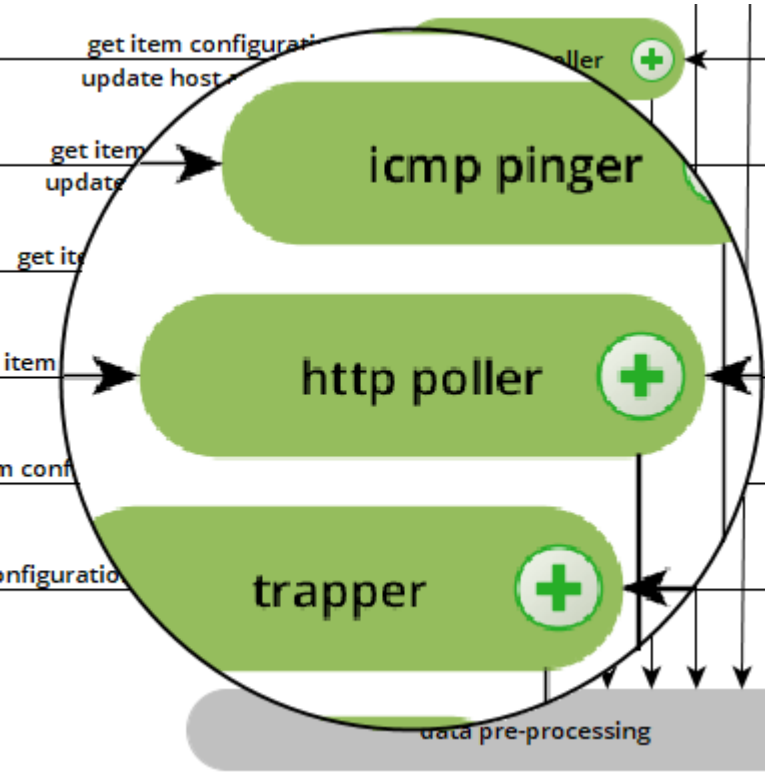
Option: StartTrappers=5

SNMP trapper

- direct interaction with the DB and Configuration cache
- uses snmptrapd to cache traps
  - perl_script (my Zabbix Devs)
  - snmptt

Option: StartSNMPTrapper=0

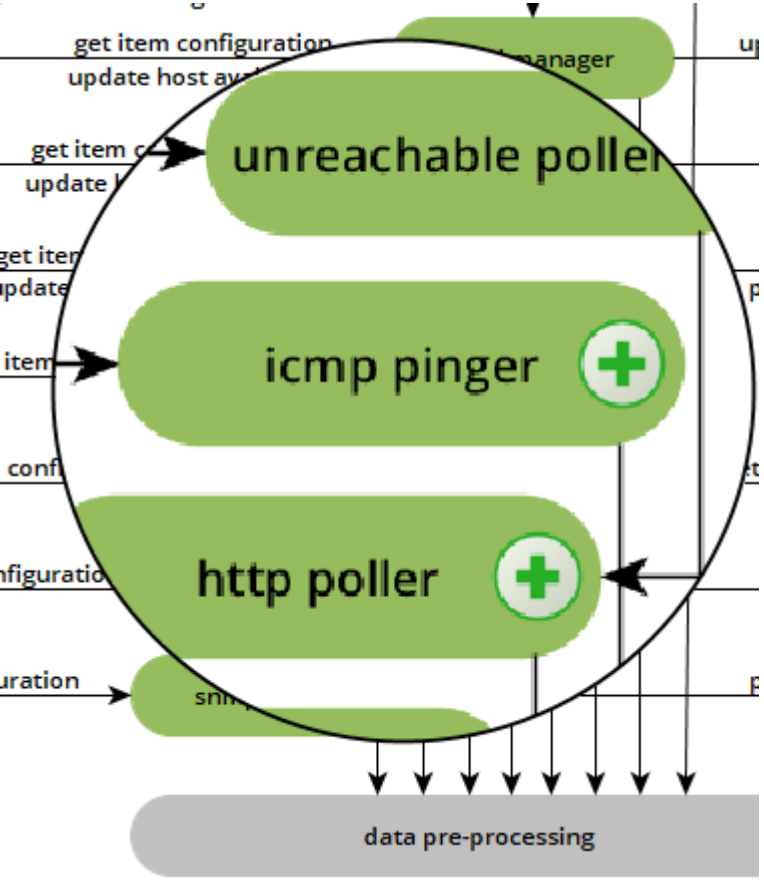
Data gathering – http poller



- passive check (done by server/proxy)
- uses cURL (libcurl)
- retreives http/https page headers/body
- http response code
- emulates browser
- do not require any agent running on a host
- can follow redirects (hard-coded to 10 (using cURL option CURLOPT_MAXREDIRS)

Option: StartHTTPPollers=1

Data gathering – icmp pinger

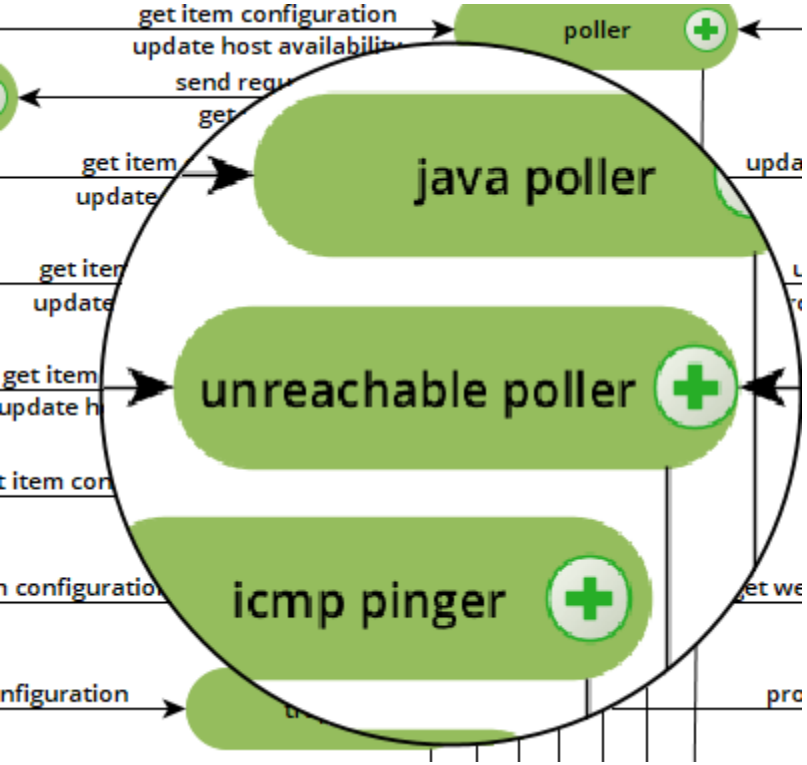


performs so called: **Simple checks**
- icmpping[<target>,<packets>,<interval>,<size>,<timeout>]
- icmppingloss[<target>,<packets>,<interval>,<size>,<timeout>]
- icmppingsec[<target>,<packets>,<interval>,<size>,<timeout>,<mode>]

uses fping and fping6 system utility
by default evaluates 3 pings

Option: StartPingers=1

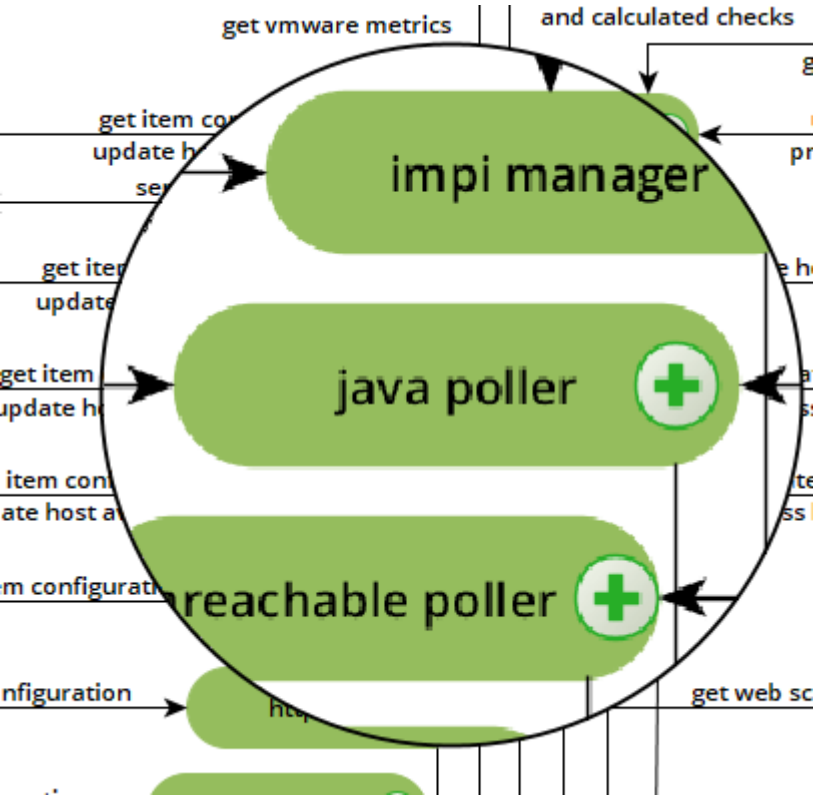
Data gathering - unreachable poller



- processes items for unreachable or unavailable hosts.
- pollers, ICMP pingers, IPMI pollers and Unreachable pollers do direct DB access in both directions for unsupported items.

Option: StartPollersUnreachable=1
Option: UnreachablePeriod=45
Option: UnavailableDelay=60
Option: UnavailableDelay=15

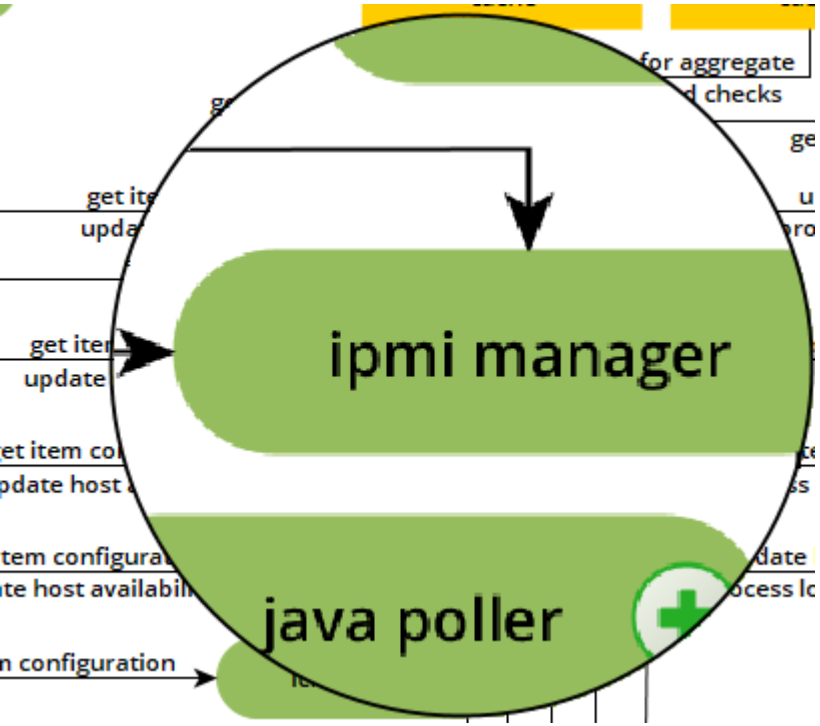
Data gathering – java poller



- needs Zabbix-java-gateway
- Native support for monitoring JMX applications
- java app must be started with:
  -Dcom.sun.management.jmxremote

Option: JavaGateway=<IP/DNS>
Option: StartJavaPollers=0

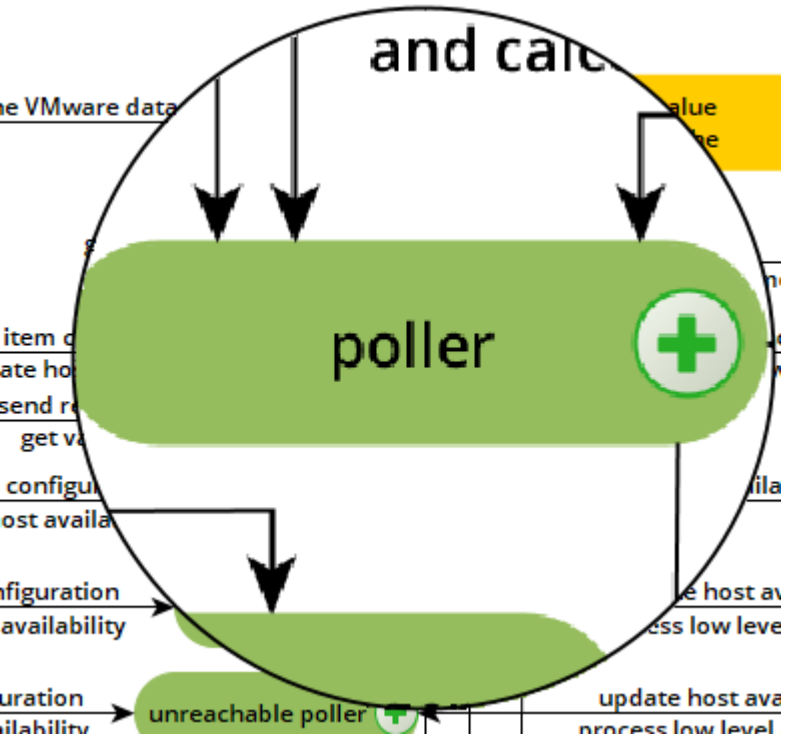
Data gathering – ipmi manager



- uses ipmi pollers to get data
- manager uses configuration (queue)
- keeps a track of which poller was used to poll a device
- execution of ipmi script:
  - frontend -> trapper -> ipmi manager

Option: StartIPMIPollers=0

Data gathering - poller

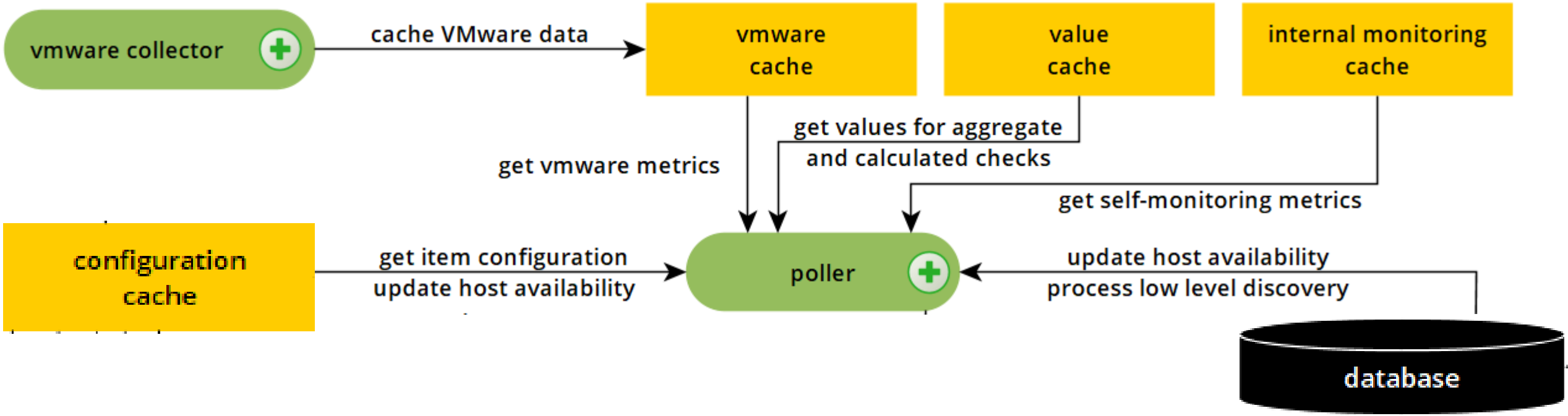


Processes cheks for item types:

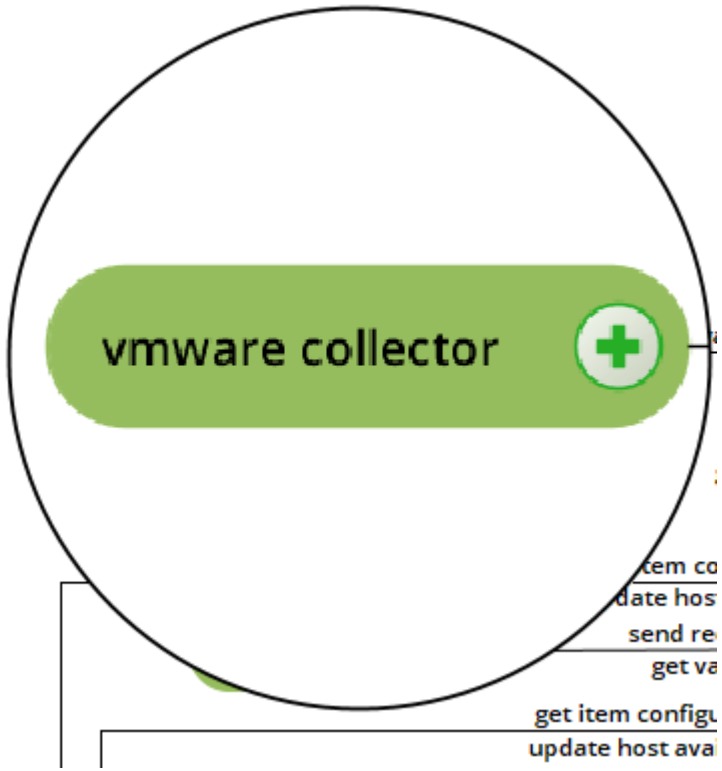
- zabbix agent (passive)
- external
- SNMP
- simple checks
- internal
- aggregate
- calculated
- ssh
- telnet
- DB monitoring

Option: StartPollers=5

Data gathering - poller



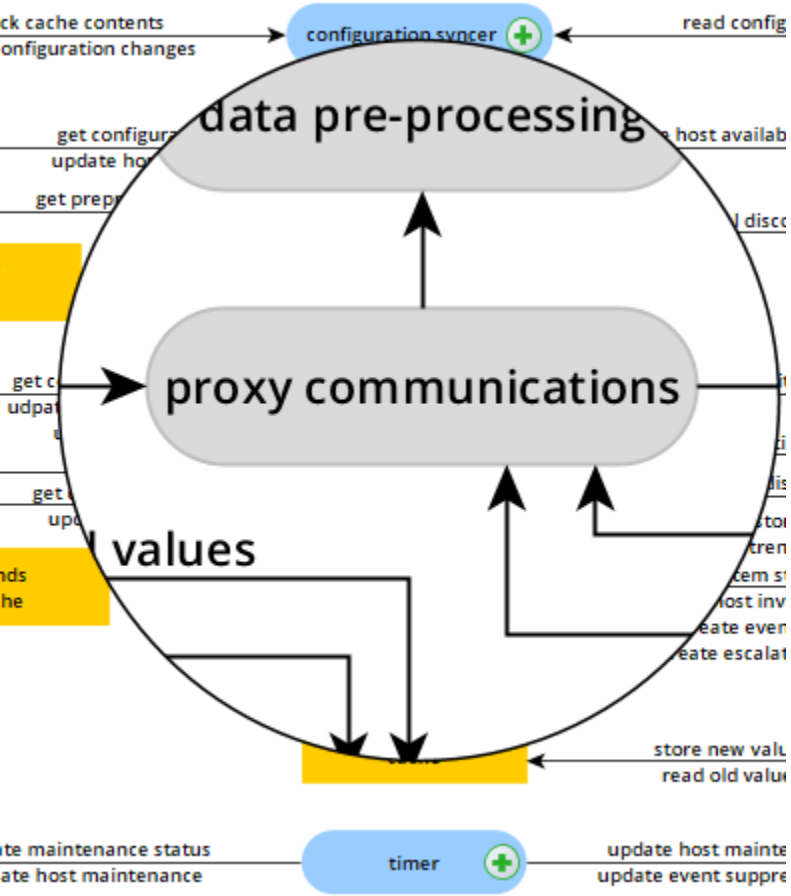
Data gathering – vmware collector



- gets data from VCenter/Hypervisor using API
- uses VMware cache
- controlled by settings in Zabbix_server.conf
  ### VMwareFrequency=60 #config data
  ### VMwarePerfFrequency=60 #performance data

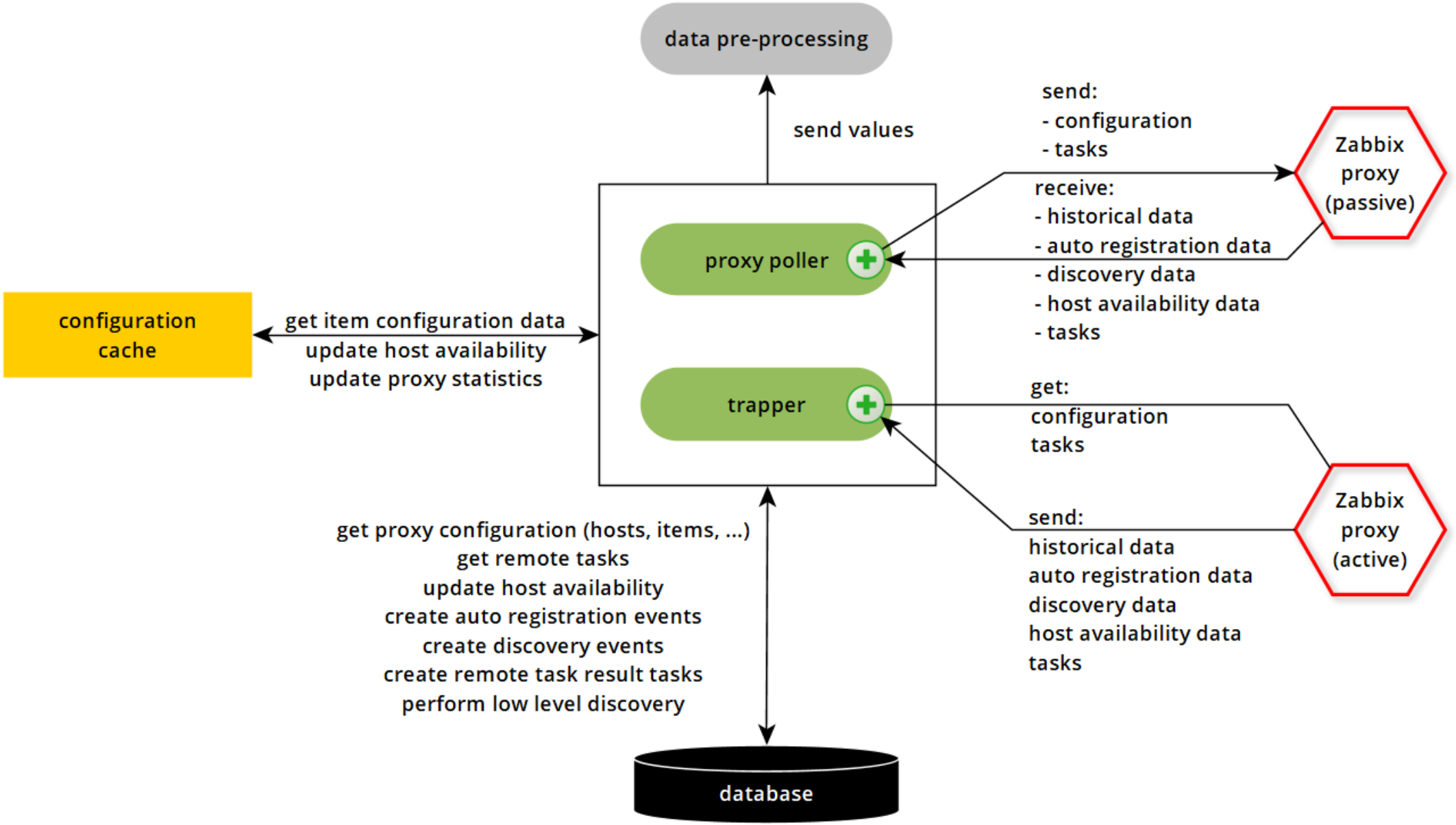
- grab all available information from VCenter
- poller extracts needed data -> pre-processing
- if something is missing -> task -> retrieved during next fetch cycle.

Proxy communication



manages active and passive proxy communications
- pushes or delivers configuration data for proxies
- retrieves values/metrics
- updates host availability
- updates proxy heartbeat for internal monitoring
- auto registration
- LLD processing

Proxy communication

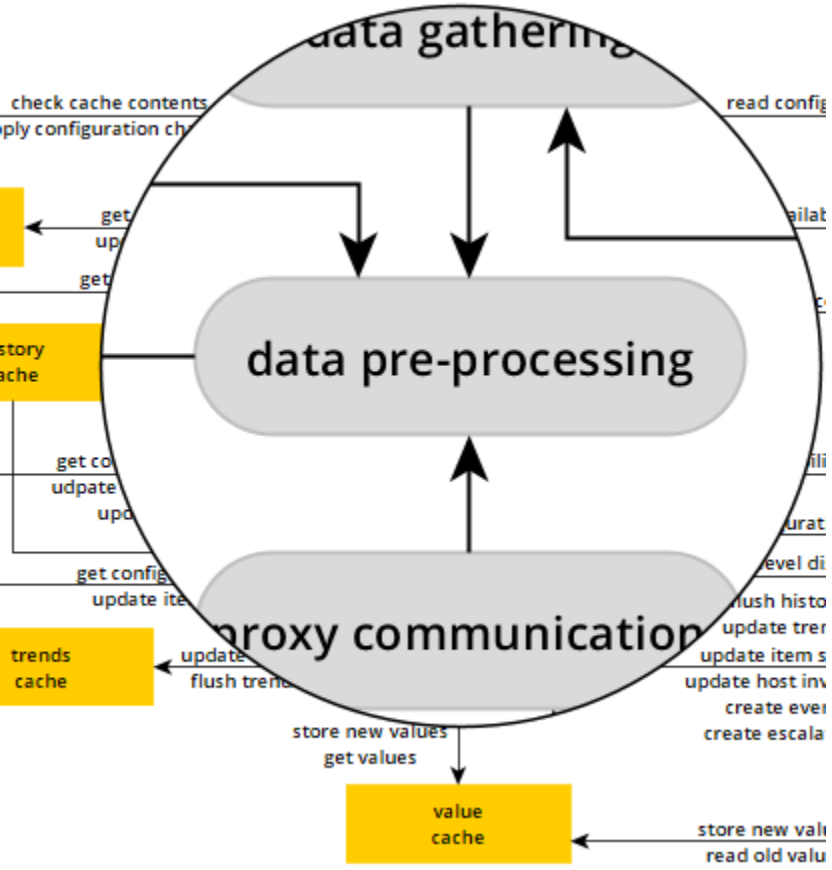


Data gathering – notes

data gathering processes don't use DB or history cache to write metrics

everything is sent to "preprocessing manager"

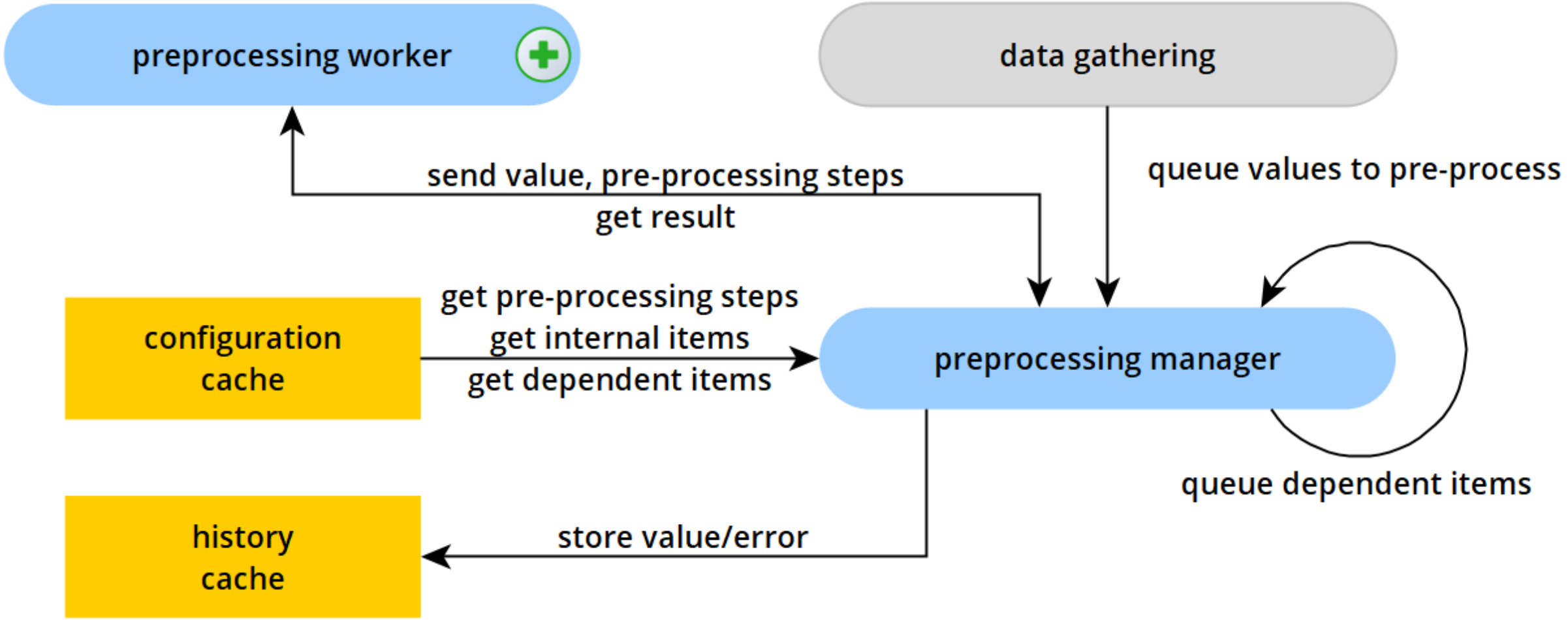
Data pre-processing



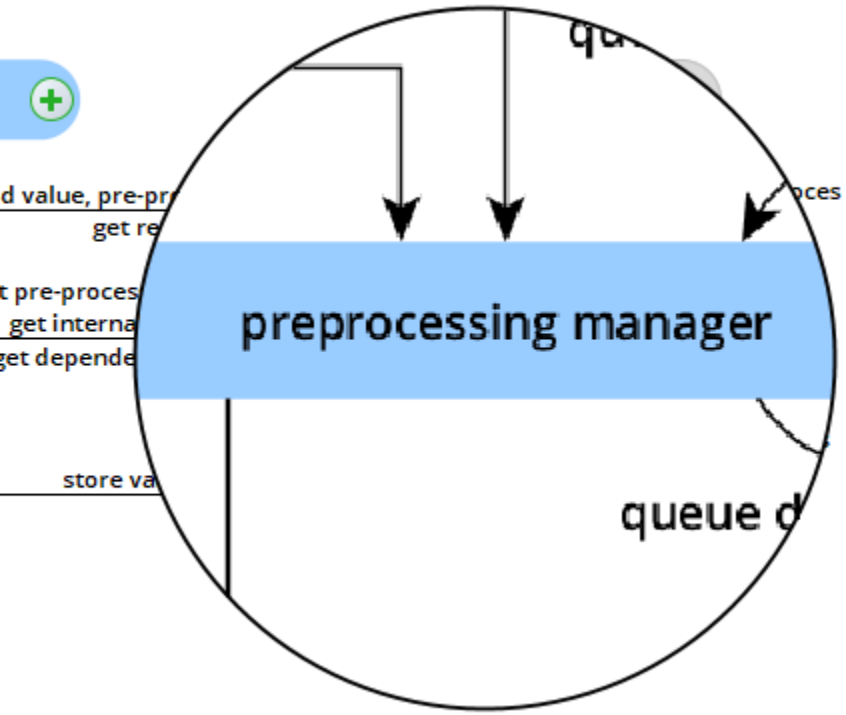
- converts/transforms values according to defined pre-processing steps
  - trim
  - regex
  - json-path
  - xml-path
  - multiply
  - other…

Option: StartPreprocessors=3

Data pre-processing



Data pre-processing

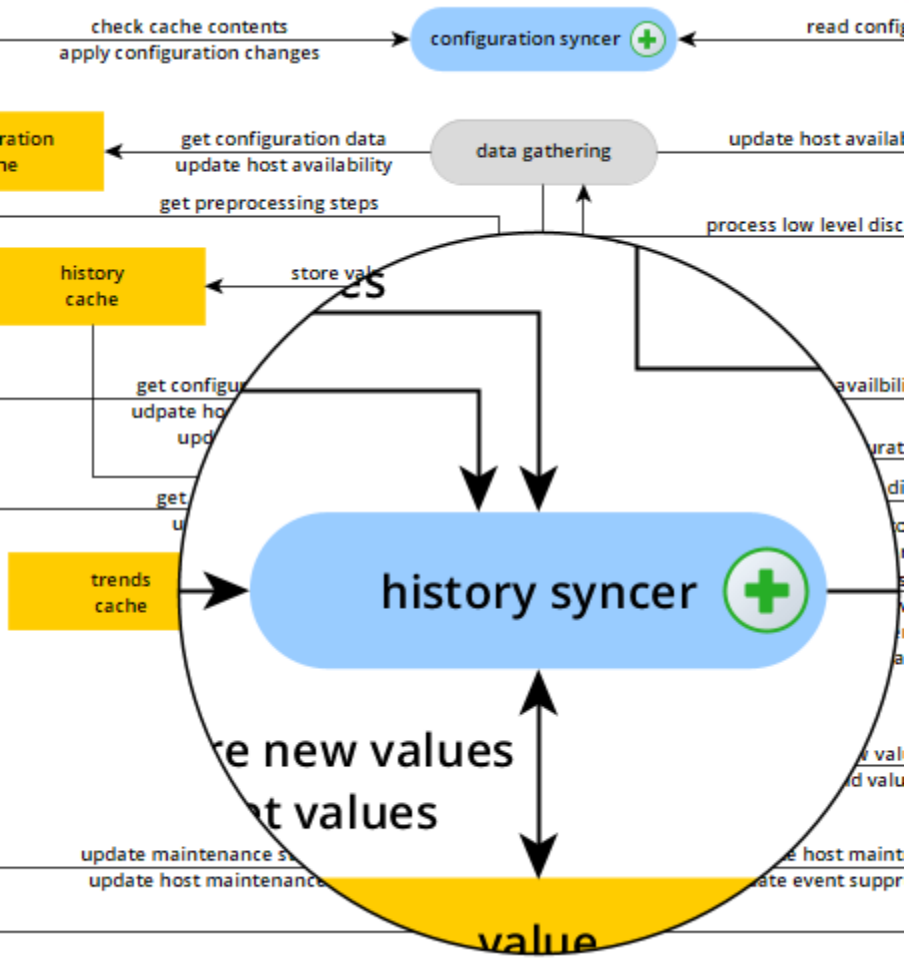


- All incoming values get to preprocessing manager queue (itemid and value)
- uses preprocessing workers to apply steps
- re-queues dependent items with the received master item value
- Incoming data rule: fist in – first out
- can handle >100 000 NVPS (up to 300k)

Option: StartPreprocessors=3

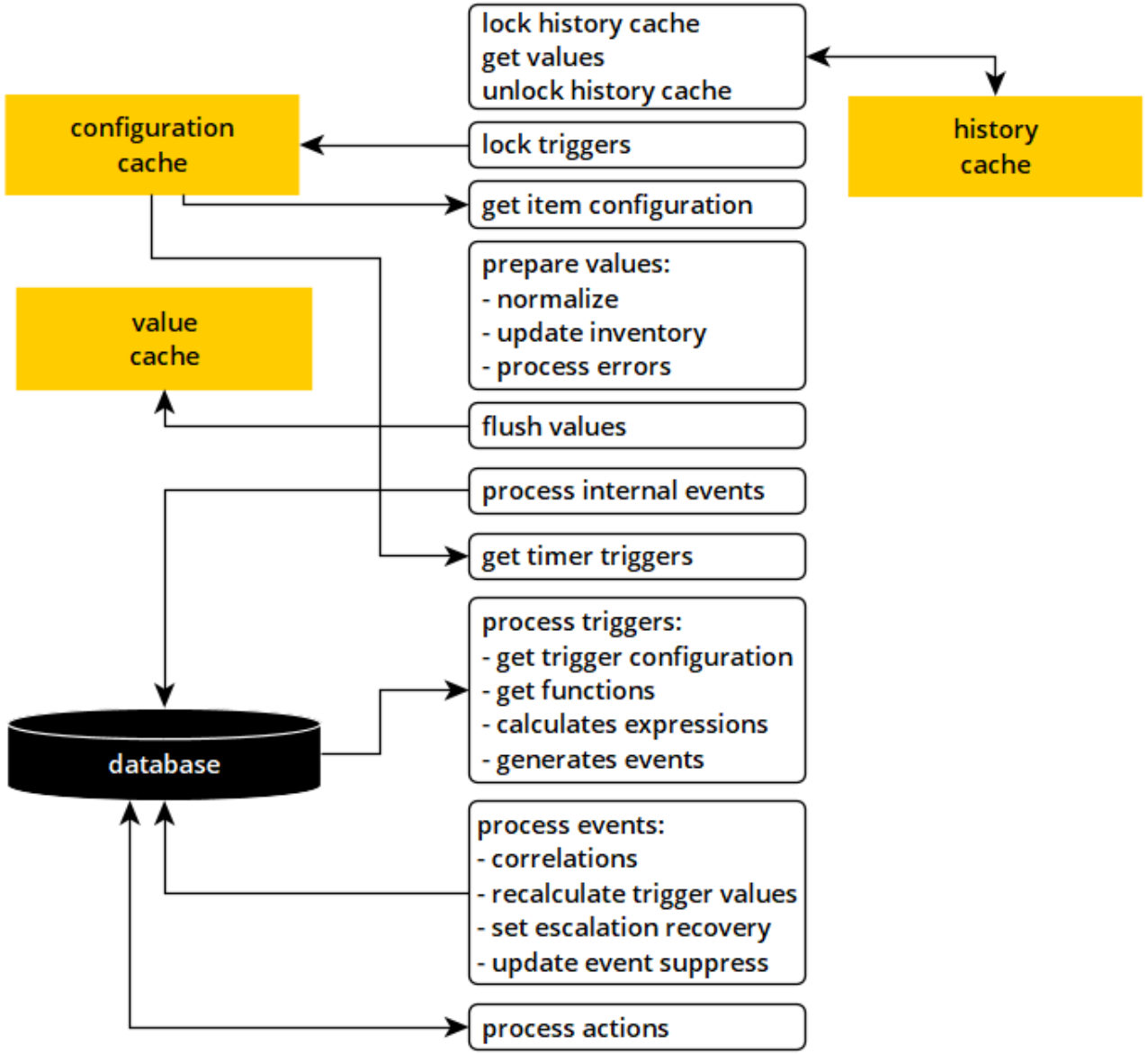
More details: https://www.zabbix.com/documentation/4.0/manual/appendix/items/preprocessing

History syncer

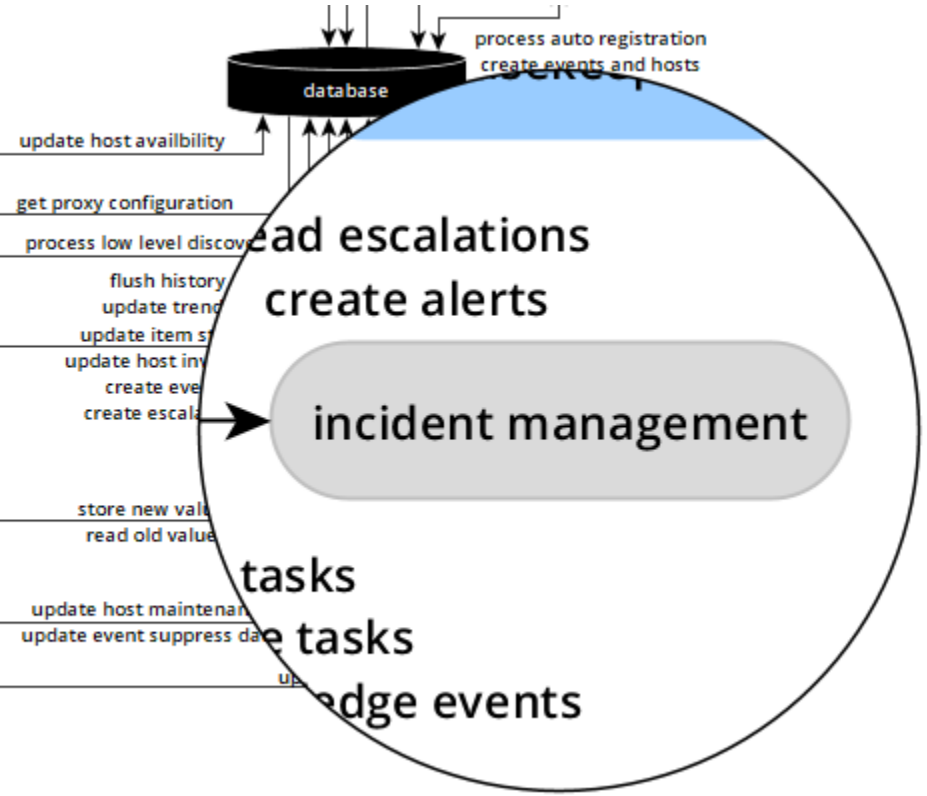


- get up to 1000 values from history cache (uses index)
- flushes pre-processed values to database
- calculates and updates trends
- updates host inventory
- calculates triggers including those with time based functions (uses value cache)
- generates, correlates and flushes events
- processes actions and creates escalations
- creates IT service alarms
- exports data

History syncer

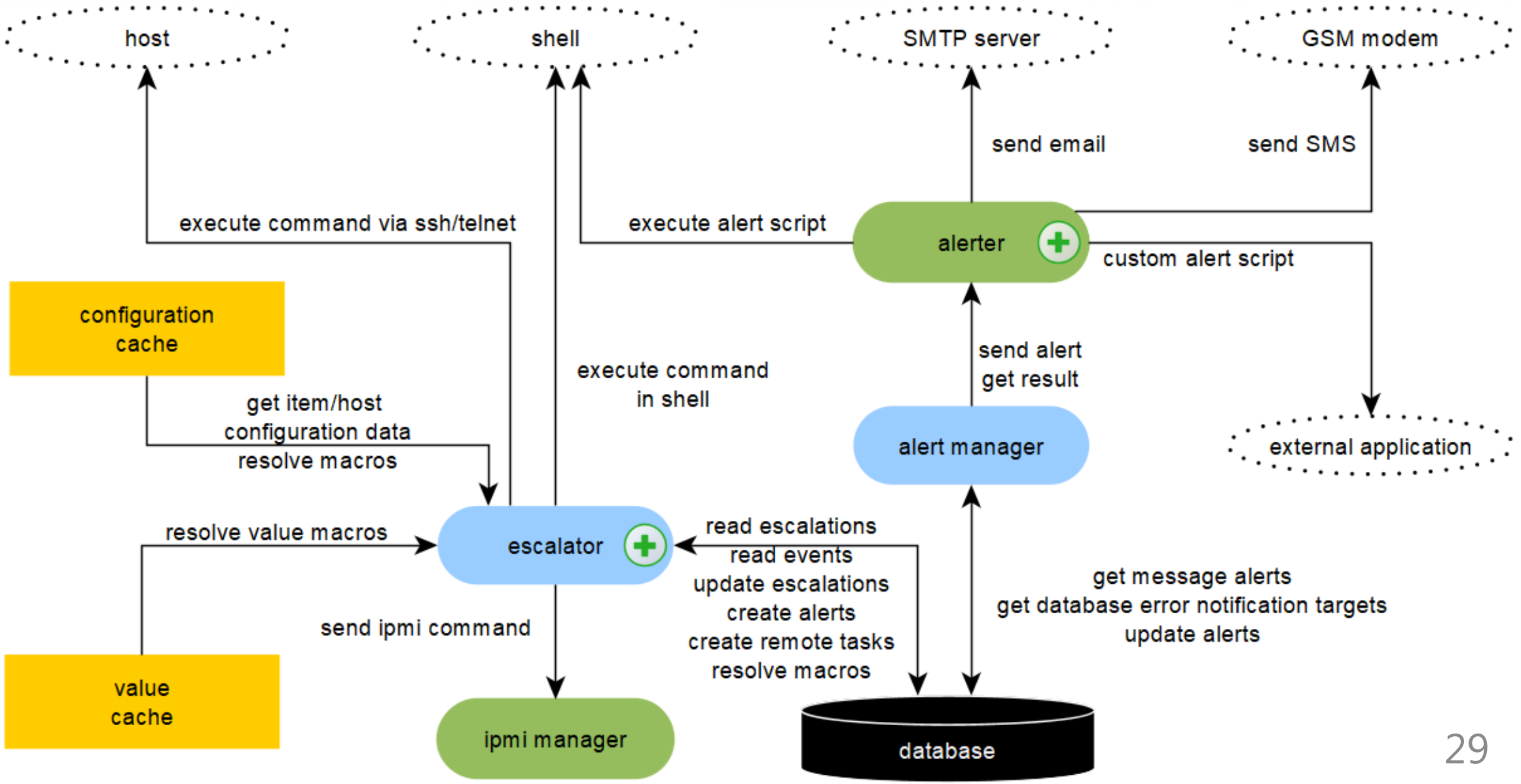


Incident management

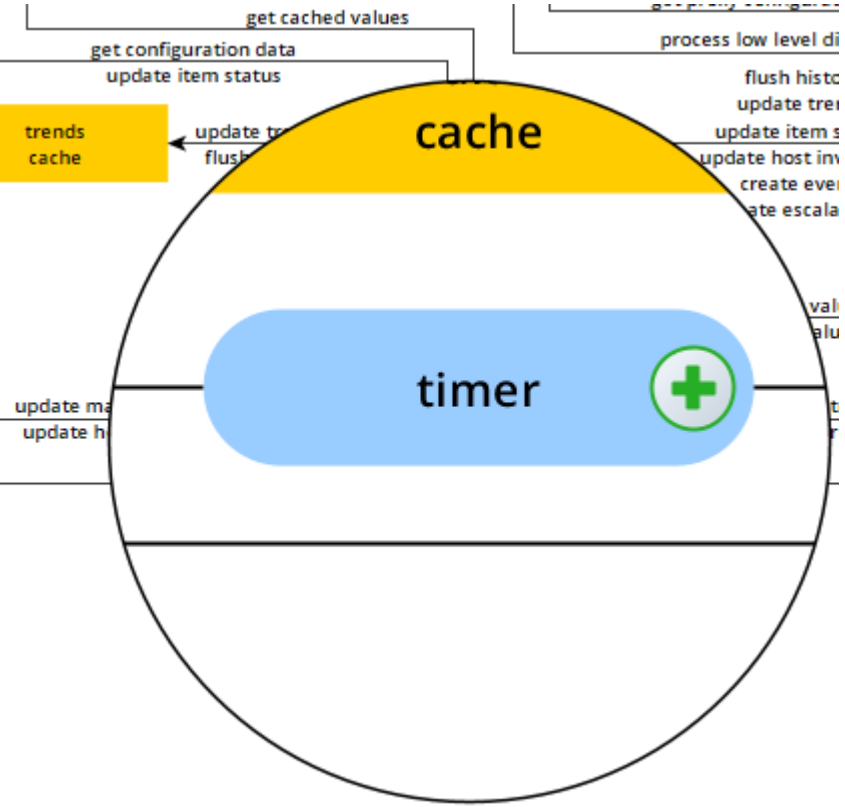


- processes escalations
- executes remote commands
- sends notifications

Incident management

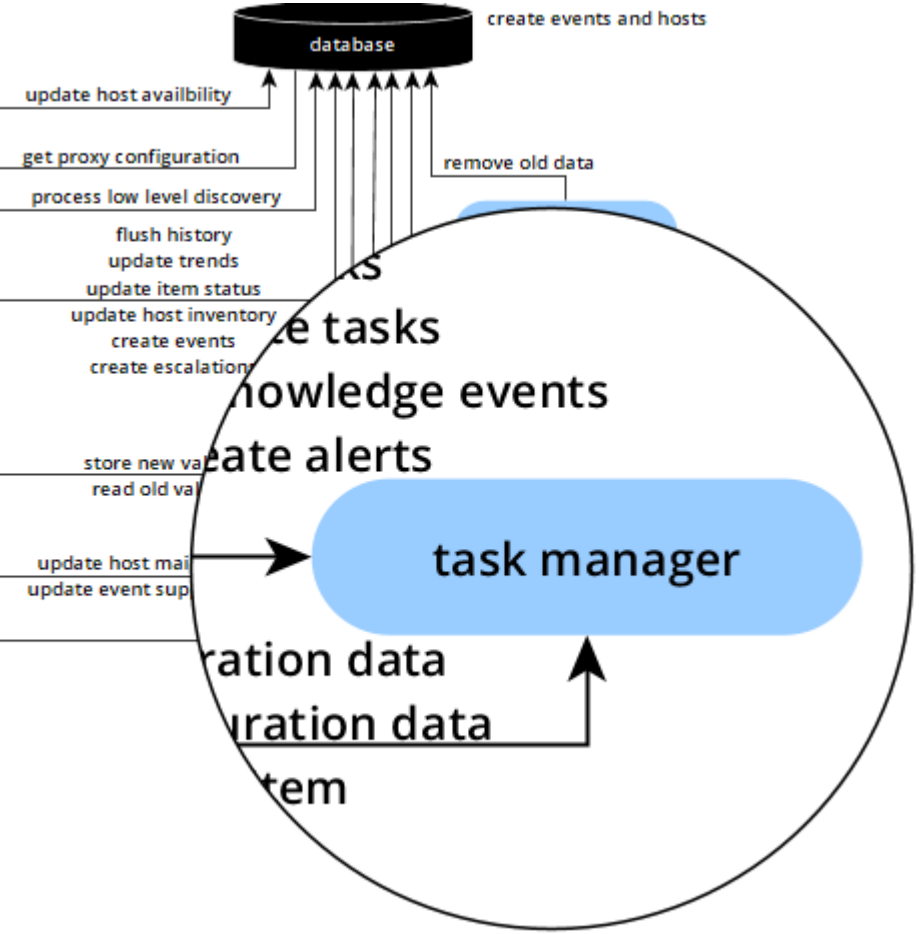


Timer



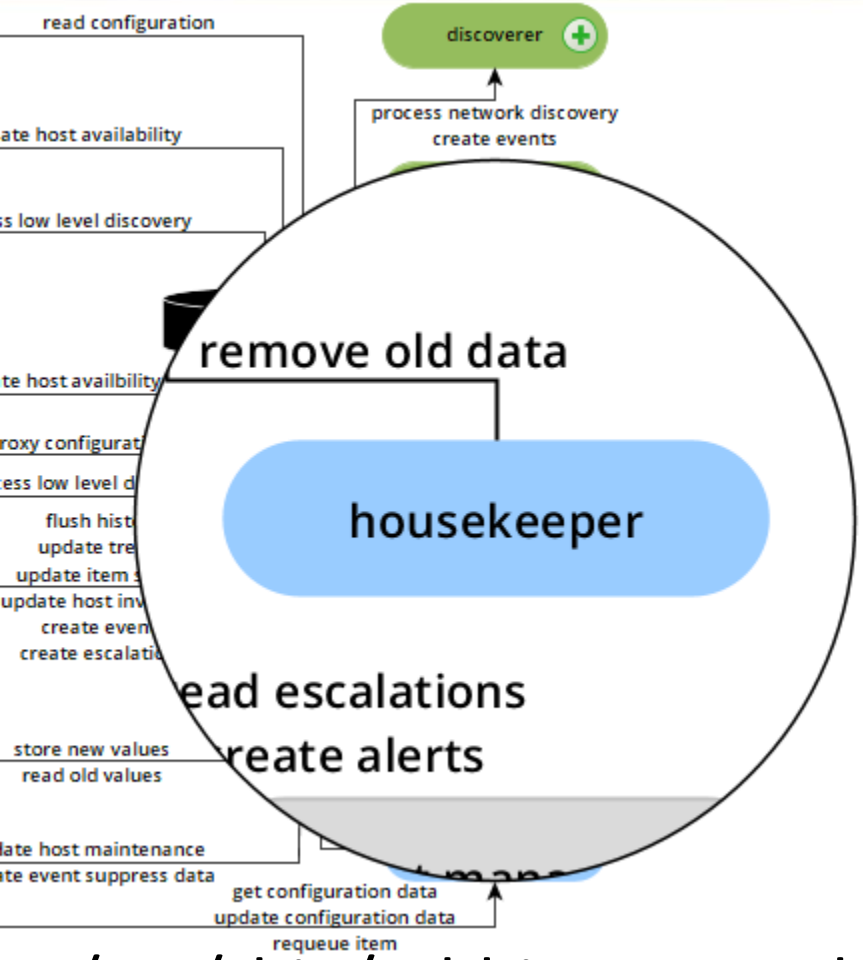
- processes maintenance
- puts hosts in and out of maintenance
- handles event supression

Task manager



- reads tasks from DB
- handles manual problem closing
- expires remote commands
- processes remote command results
- performs problem acknowledge updates
- Handles ‘check now’ task by re-queuing item in configuration cache

Housekeeper

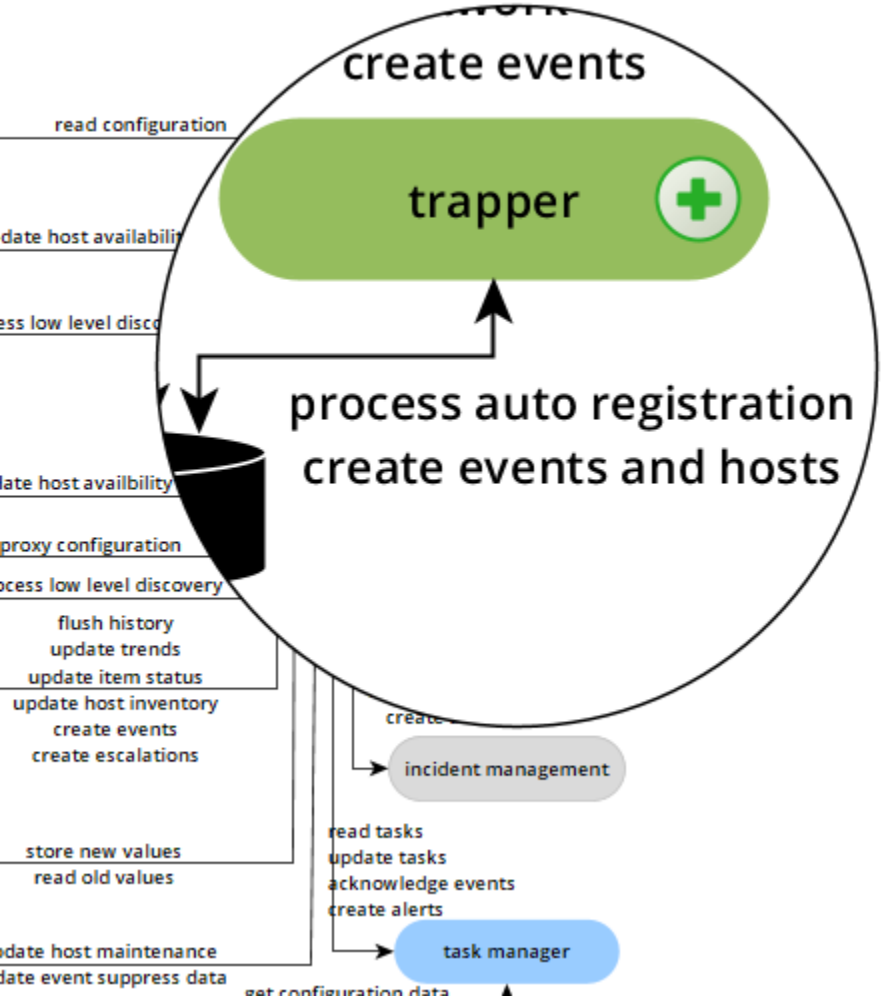


- removes old data
- settings: Administration -> General -> Housekeeper
- historical data (history, trends, events) are not immediately deleted.
- By default Housekeeper runs every hour

Option: HousekeepingFrequency=1

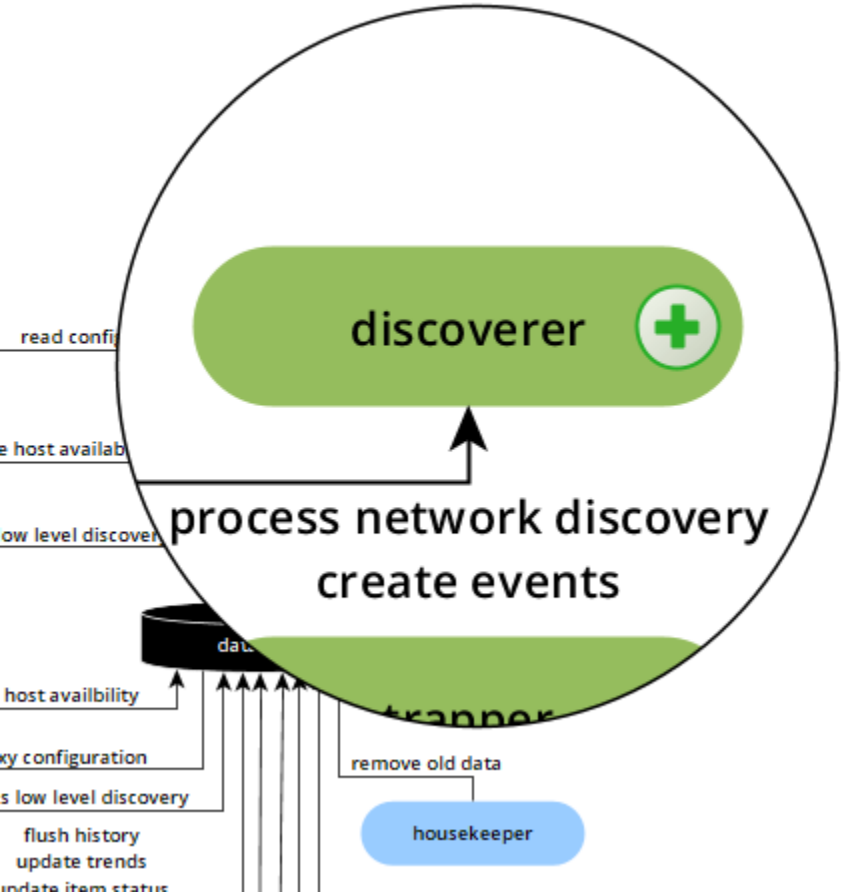
/usr/sbin/zabbix_server: housekeeper [deleted 105573 hist/trends, 2304 items/triggers, 885 events, 0 sessions, 0 alarms, 0 audit items in 36.626682 sec, idle for 1 hour

Trapper



- Listens on TCP/10051 (by default)
- data gathering
- proxy management tasks
- performs auto registration
- will create a new hosts directly in database (check all conditions, generate new event and process it).
- will execute frontend commands/scripts (e.g. ping, traceroute, etc).
- Queue (calculates by using configuration cache) – **uses items next check to understand add it or not**

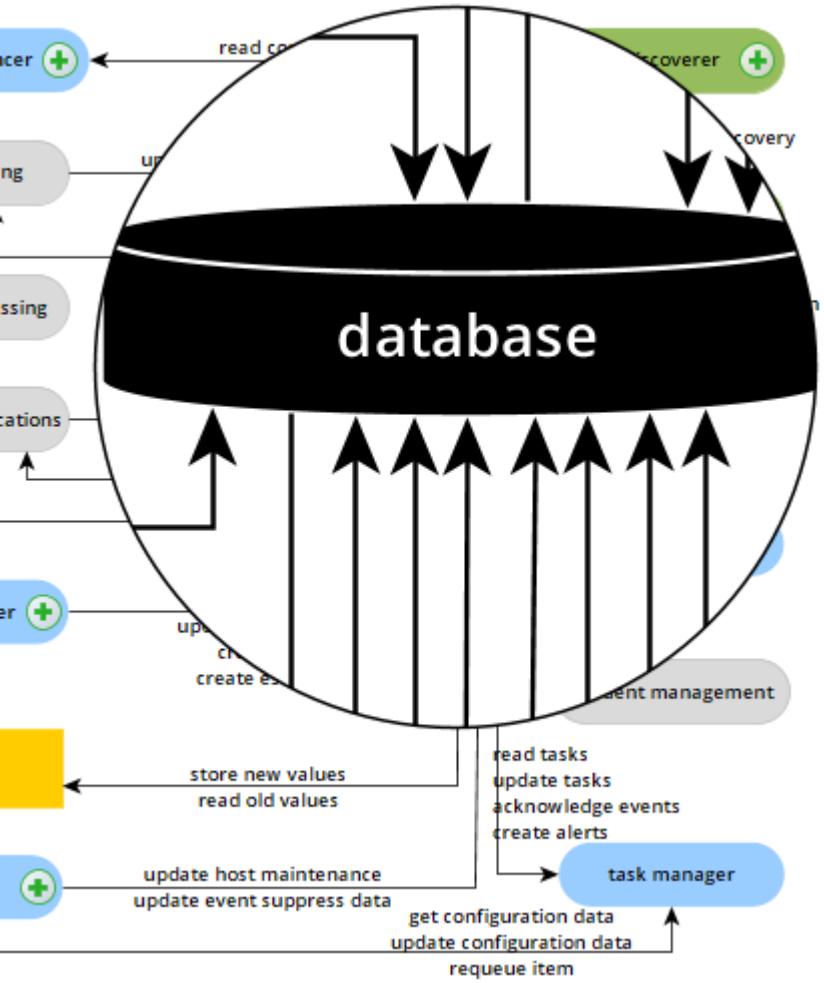
Discoverer



- performs network discovery.
- works with DB directly (i.e. gets rules and creates hosts)

Option: StartDiscoverers=1

Database



DB down!

Be ready for that!

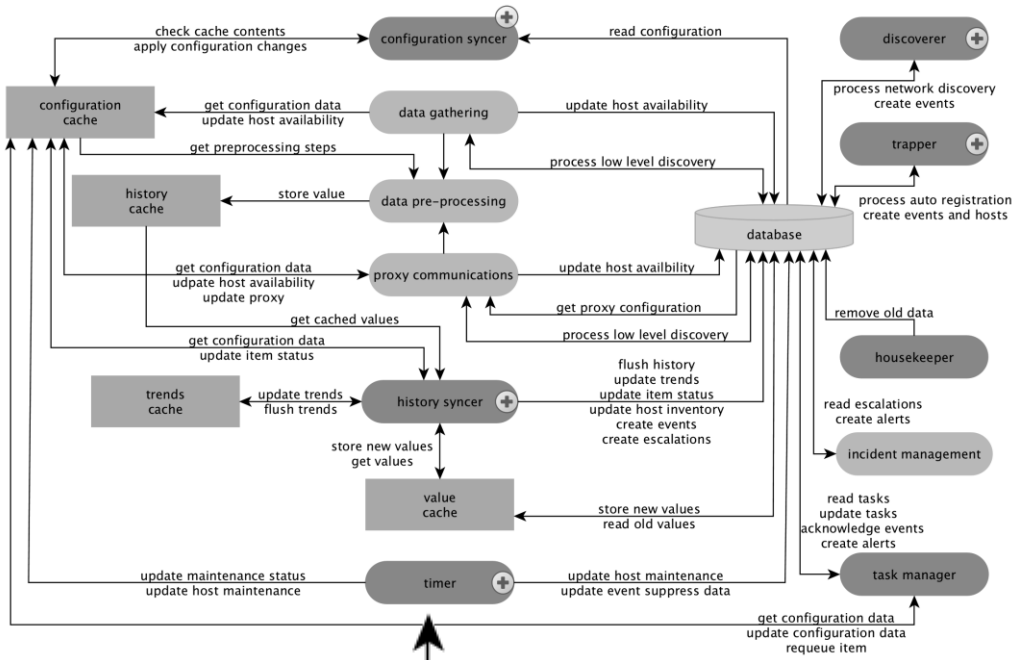
Administration -> General -> other:

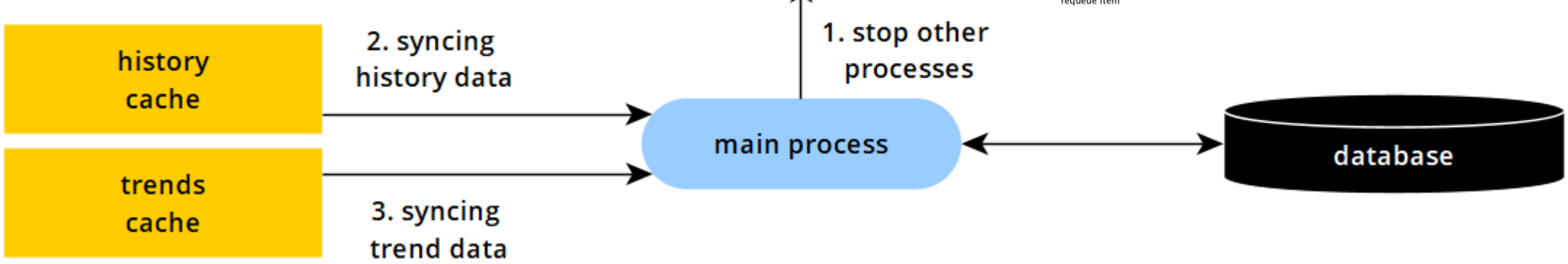
User group for database down message | Zabbix administrators

Alerter caches users and will send “DB Down” message via all configured media types

Stop & main process


```
[root@zabbix ~]# systemctl stop zabbix-server
```





Want to know more?

Documentation

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

Look in to Zabbix sources

debug level increase

```
[root@zabbix ~]# zabbix_server -R log_level_increase=<process name>,<NR>
```

search the internet of course ☺

Questions?

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Thank you!

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