ZABBIX 5.0

PREPROCESSING - HOW TO GET WHAT YOU WANT TO GET WITH 5.0

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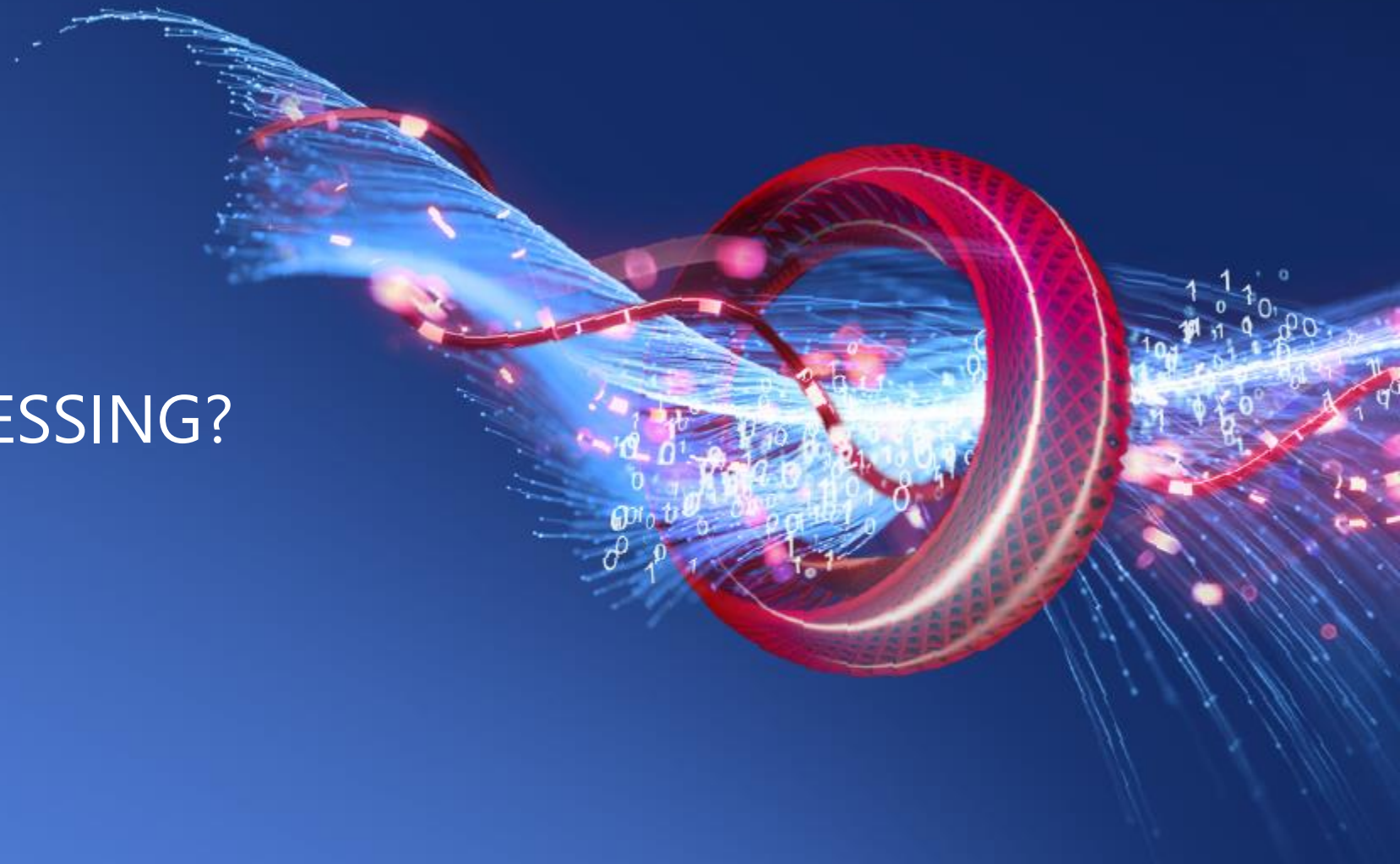
Technical Support Engineer

01

WHAT IS PREPROCESSING?



ZABBIX PREPROCESSING

WHAT IS PREPROCESSING?

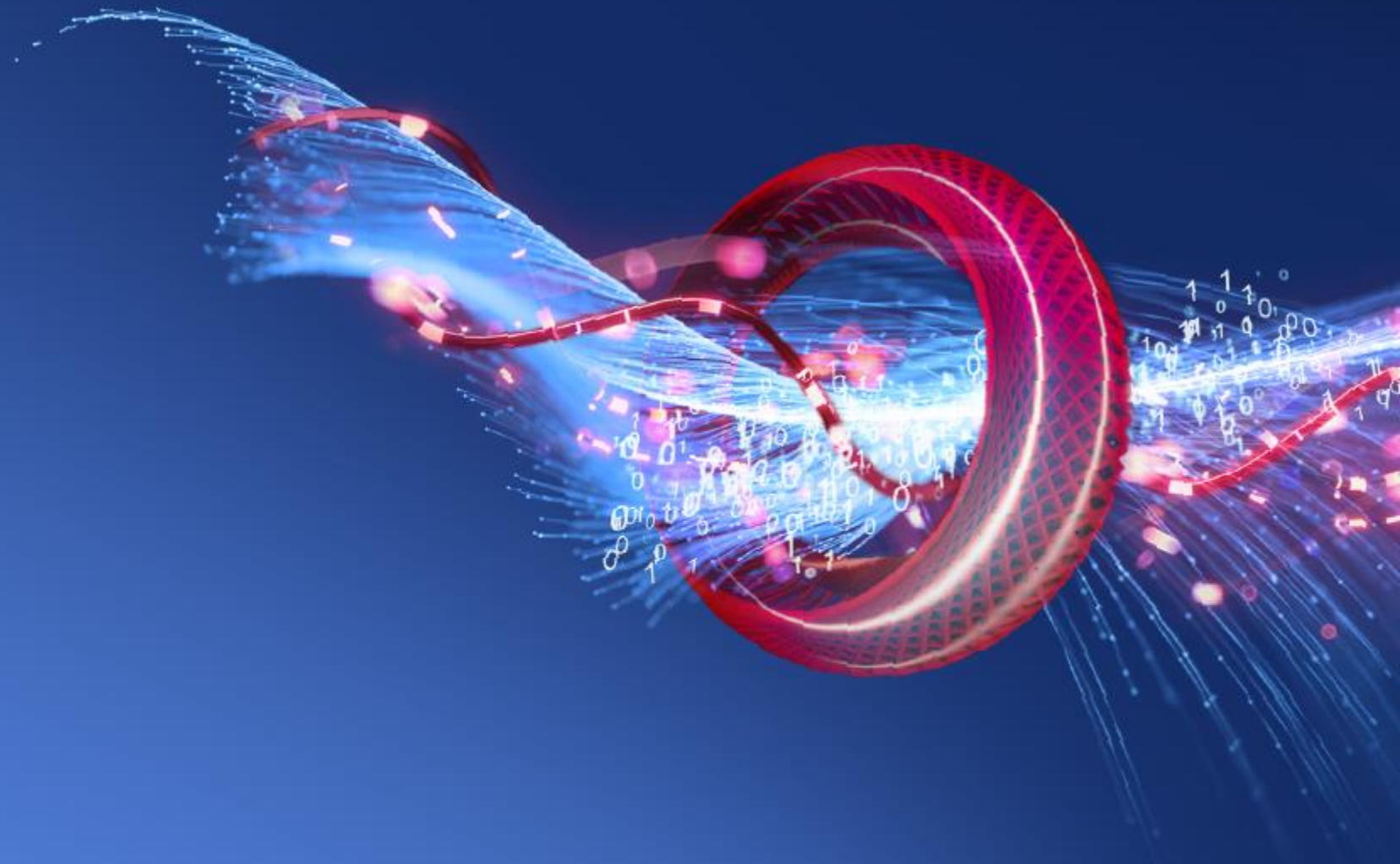
- In computer science, a preprocessor is a program that processes its input data to produce output that is used as input to another programBoth require tuning(e.g. buffer and transaction log) and is important.
- Data preprocessing, used in learning and data collecting to make input data easier to work with.

WHAT IS PREPROCESSING?

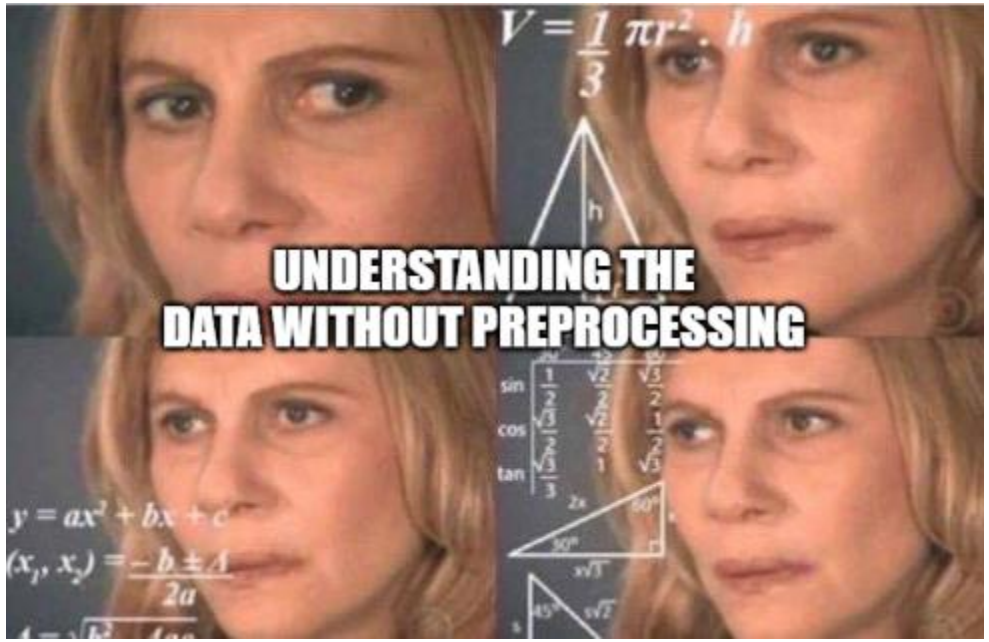
- Preprocessing allows to define transformation rules for the received item values.
- One or several transformations are possible before saving values to the database.
- Transformations are executed in the order in which they are defined.
- Preprocessing is done either by Zabbix server or by Zabbix proxy (for items monitored by proxy).

02

WHY DO WE NEED PREPROCESSING?



WHY DO WE NEED PREPROCESSING?



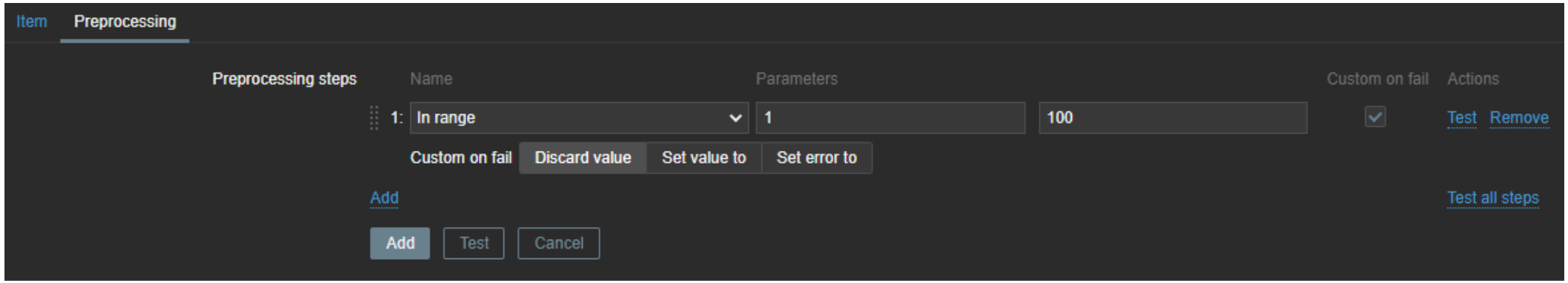
WHY DO WE NEED PREPROCESSING?

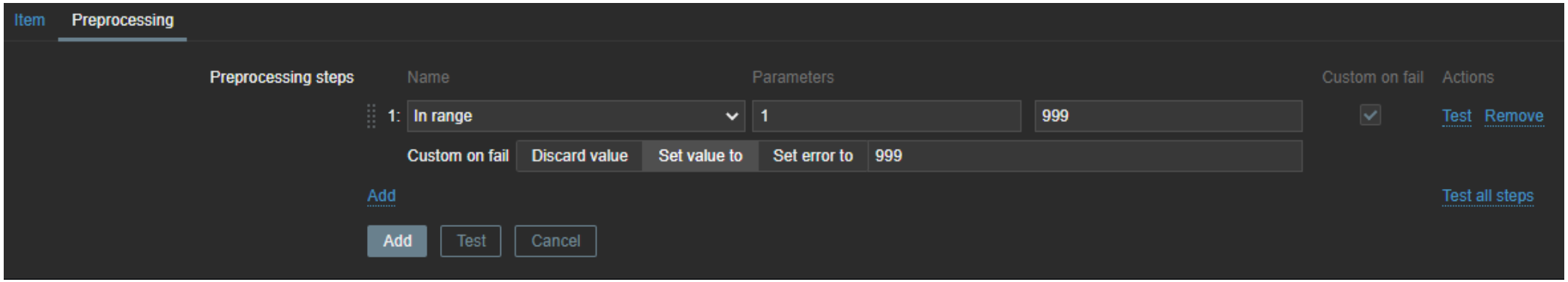
- Data cleansing
- Data editing
- Data reduction
- Data wrangling

DATA CLEANSING?

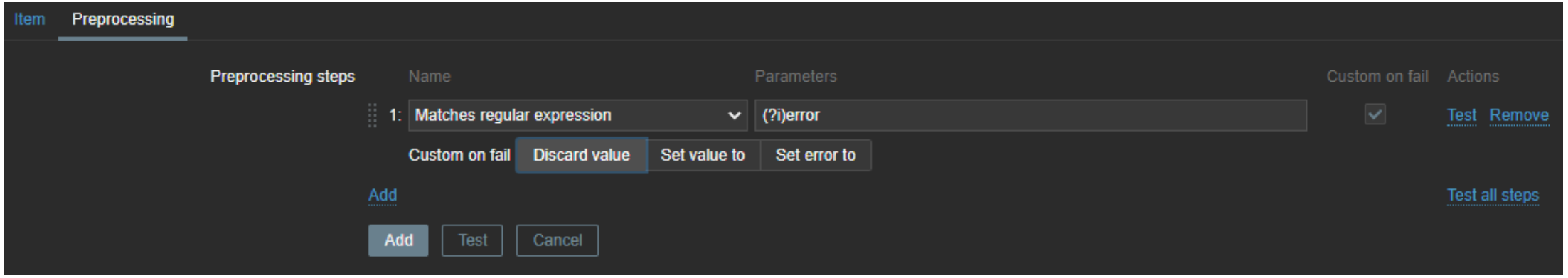
- Define a range by specifying minimum/maximum values (inclusive) .
- Specify a regular expression that will look for an error or a value that must match or not match.
- Check for an application-level error message located at JSONpath.
- Check for an application-level error message located at xpath.

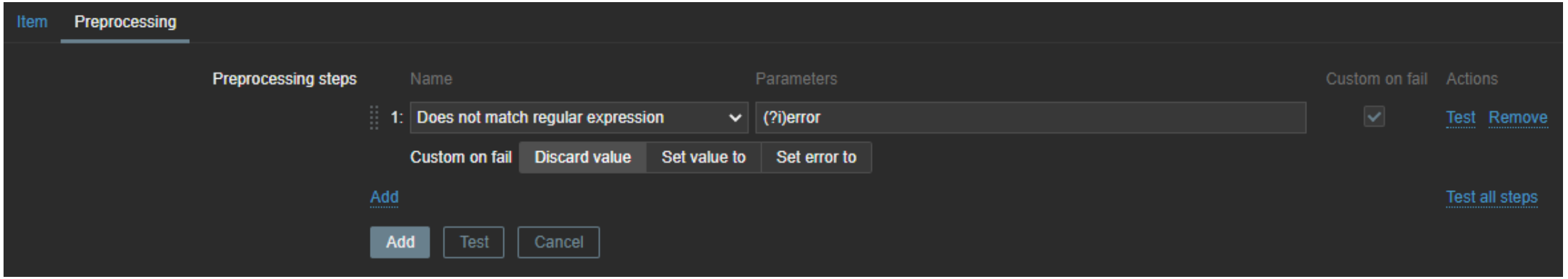
DEFINING A RANGE





USE A REGULAR EXPRESSION





USE MORE REGULAR EXPRESSIONS

- ^(automatic|automatic delayed|manual|disabled)$

  Windows service startup states

- ([1-9]+)

  collect only numbers

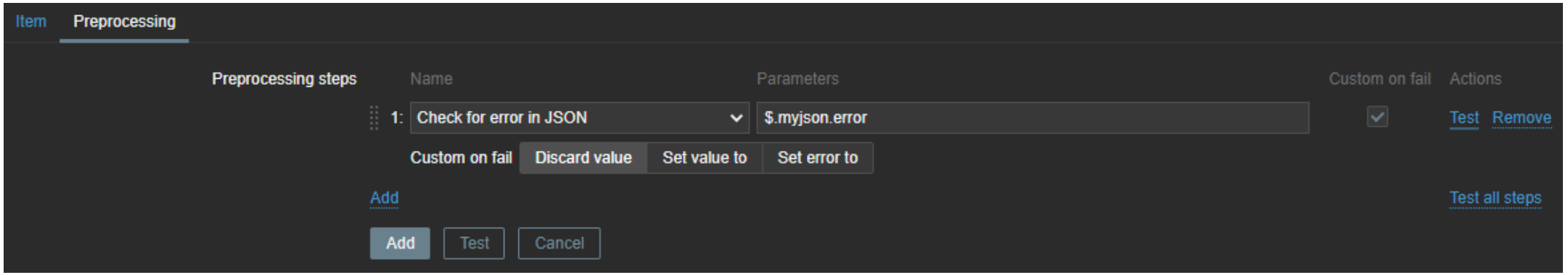
- ((?>[a-z\-0-9]{2,}\.){1,}[a-z]{2,8})(?:\s|\/)

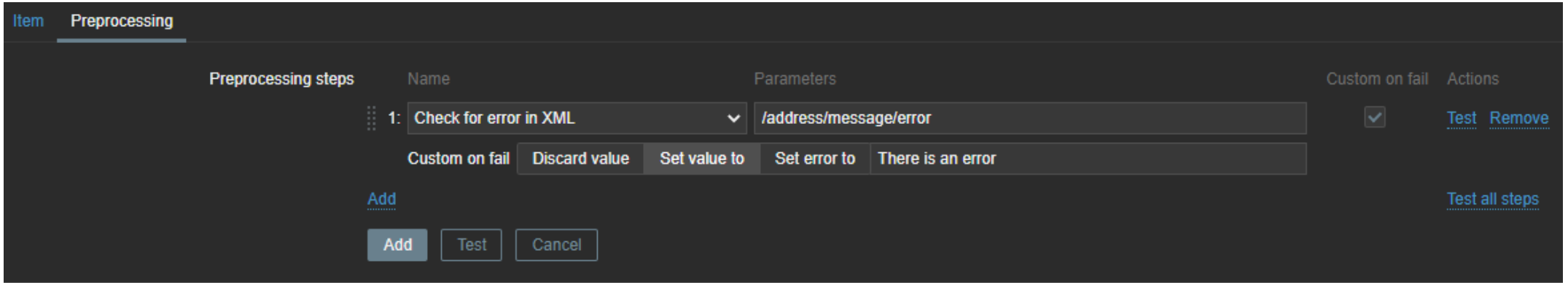
  domain name

- ([0-9A-Za-z'\&\-\.\/\(\)=:;]+)|((?::|;|=)(?:-)?(?:\)|D|P))

  smiley faces

USE JSONPATH

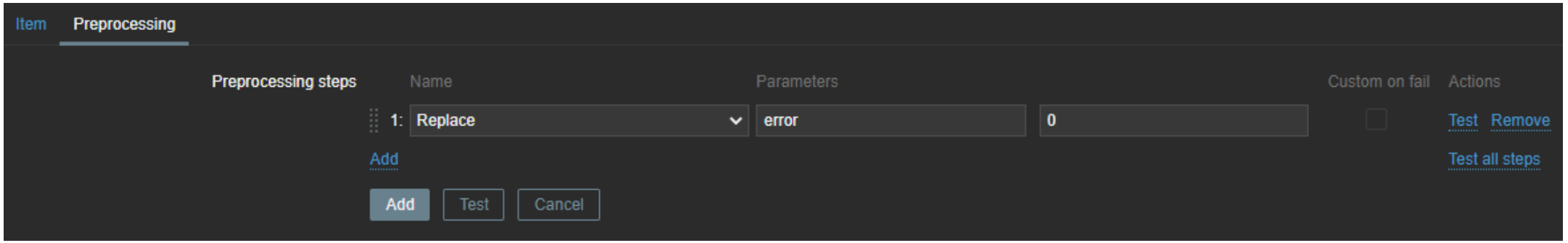


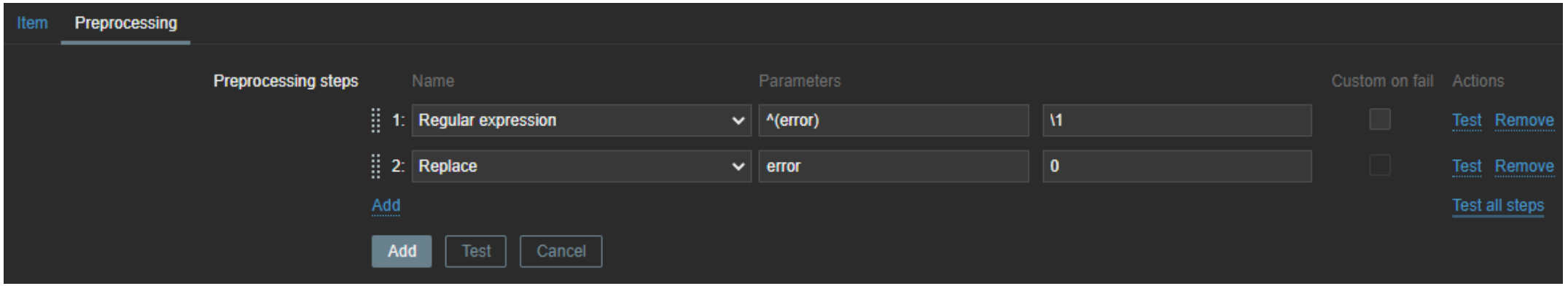


DATA EDITING?

- Replace.
- Trim.
- Use regex.
- Multiply.
- Javascript.

REPLACE


Item
Preprocessing
Preprocessing steps
Name
Parameters
Custom on fail
Actions
1:
Replace
error
0
Test
Remove
Add
Test all steps
Add
Test
Cancel


Item
Preprocessing
Preprocessing steps
Name
Parameters
Custom on fail
Actions
1:
Regular expression
^(error)
\1
Test
Remove
2:
Replace
error
0
Test
Remove
Add
Test all steps
Add
Test
Cancel

TRIM

Removes provided symbols on both sides (right/left) with **Trim**

t 36 C Trim: tC 36

Remove provided symbols on right side with **Right trim**

t 36 F Right trim: F t 36

Remove provided symbols on left side with **Left trim**

t 36 K Left trim: t 36 K

USE EVEN MORE REGULAR EXPRESSIONS

- ^(eth[0-9]$)|(^eth[0-9]:[1-9]$)

  Look for network adapters

- ^(ntfs|fat32|zfs)$

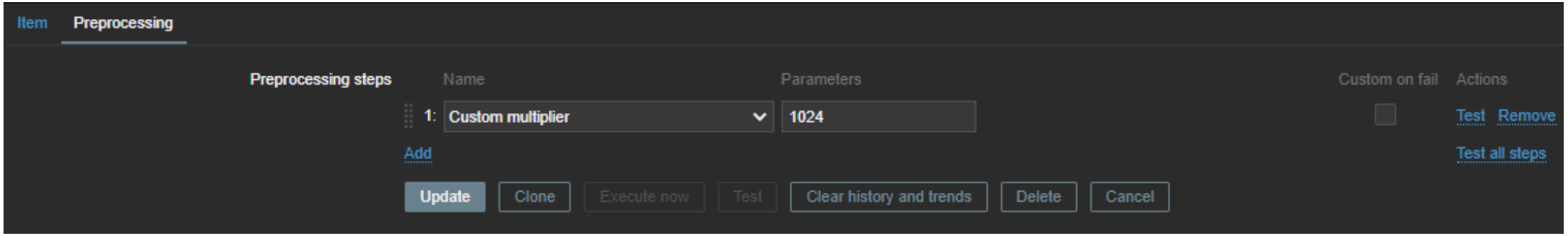
  Short filesystem regex

- ^(Physical memory|Virtual memory|Memory buffers|Cached memory|Swap space)$

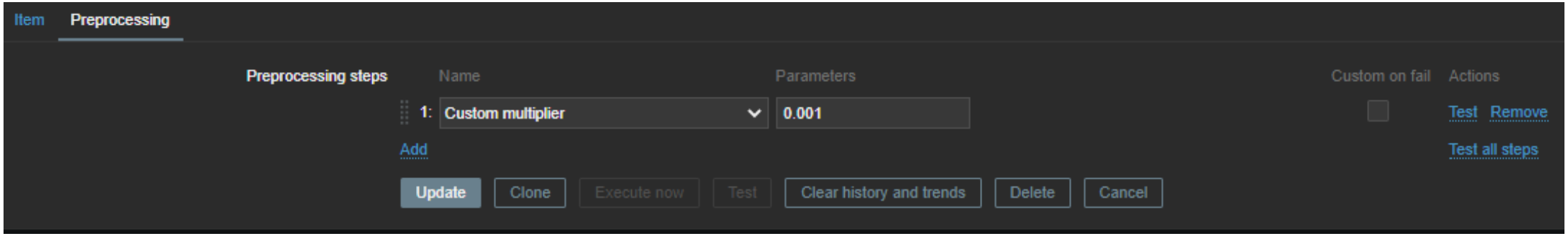
  SNMP storage devices

MULTIPLY

Kilobytes to bytes



Milliseconds to seconds

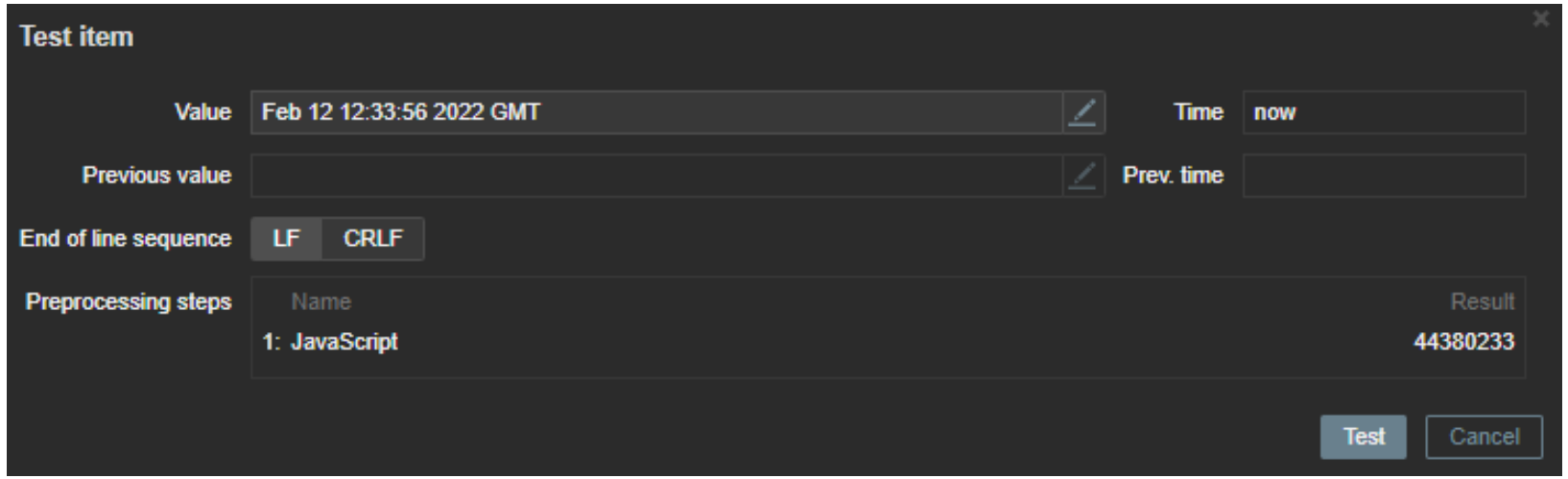


Note that if the item type of information is *Numeric (unsigned)*, incoming values with a fractional part will be trimmed (i.e. '0.9' will become '0') before the custom multiplier is applied.

USE JAVASCRIPT

Get time till the end of certificate in seconds

```
var split = value.split(' '),
MONTHS_LIST = ['Jan', 'Feb', 'Mar', 'Apr', 'May', 'Jun', 'Jul', 'Aug', 'Sep', 'Oct',
'Nov', 'Dec'],
month_index = ('0' + (MONTHS_LIST.indexOf(split[0]) + 1)).slice(-2),
ISOdate = split[3] + '-' + month_index + '-' + split[1] + 'T' + split[2],
now = Date.now();
return parseInt((Date.parse(ISOdate) - now) / 1000);
```



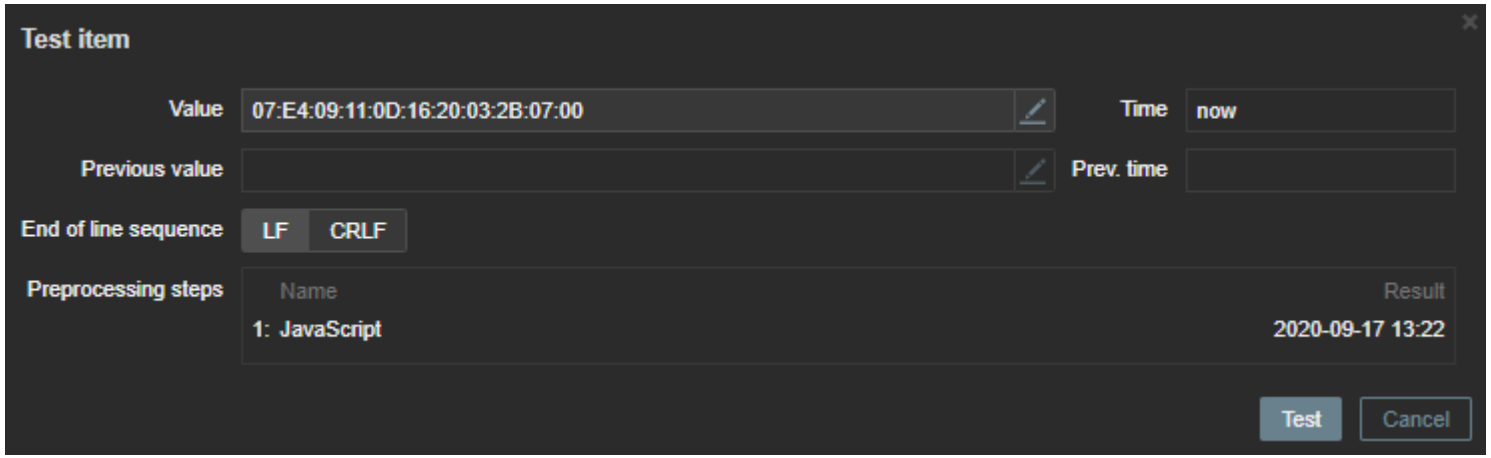
USE MORE JAVASCRIPT

Convert SNMP DateandTime to Timestamp

```
'use strict';
var str = value;
alert("str: " + str);
var y256 = str.slice(0,2); var y = str.slice(3,5); var m = str.slice(6,8);
var d = str.slice(9,11); var h = str.slice(12,14); var min = str.slice(15,17);
var y256Base10 = +("0x" + y256);
var yBase10 = +("0x" + y);
var Year = 256*y256Base10 + yBase10;
var mBase10 = +("0x" + m);
var dBase10 = +("0x" + d);
var hBase10 = +("0x" + h);
var minBase10 = +("0x" + min);
var YR = String(Year); var MM = String(mBase10); var DD = String(dBase10);
var HH = String(hBase10);
var MIN = String(minBase10);
if (mBase10 < 10)  MM = "0" + MM; if (dBase10 < 10) DD = "0" + DD;
if (hBase10 < 10) HH = "0" + HH; if (minBase10 < 10) MIN = "0" + MIN;
var Date = YR + "-" + MM + "-" + DD + " " + HH + ":" + MIN;
return Date;
```

USE MORE JAVASCRIPT

Convert SNMP DateandTime to Timestamp



DATA REDUCTION?

- XML XPath.
- JSON Path.
- Use regex.
- Throttling.
- Replace

XML XPATH

Prepare an XML

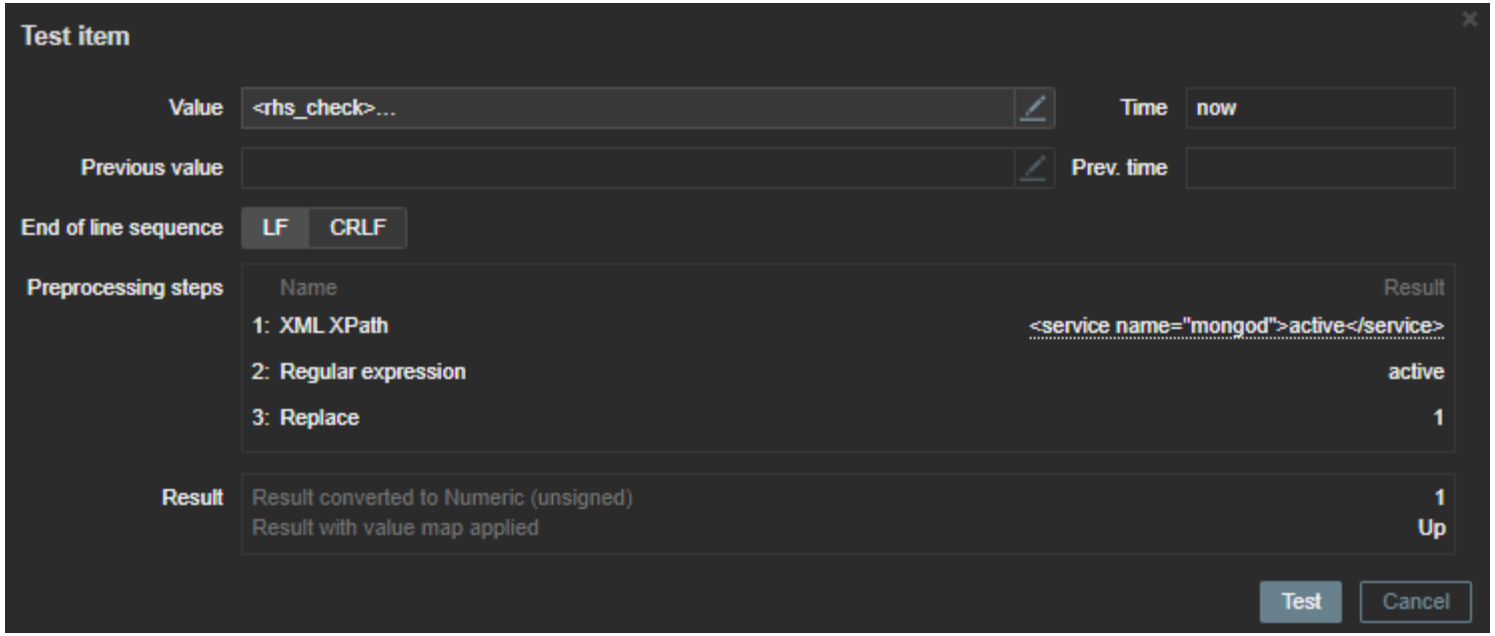
```
<rhs_check>
  <network>
    <ping host="cdn.redhat.com">passed</ping>
    <reverse_dns>passed</reverse_dns>
    <port address="80">passed</port>
    <port address="8080">passed</port>
    <port address="5671">passed</port>
    <port address="443">passed</port>
    <port address="8140">passed</port>
    <port address="9090">passed</port>
  </network>
  <services>
    <service name="mongod">active</service>
    <service name="qpidd">active</service>
    <service name="qdrouterd">active</service>
    <service name="tomcat">active</service>
    <service name="pulp_resource_manager">active</service>
    <service name="pulp_workers">active</service>
    <service name="httpd">active</service>
    <service name="puppet">inactive</service>
    <service name="elasticsearch">unknown</service>
  </services>
</rhs_check>
```

XML XPATH

Find a service you are looking for:

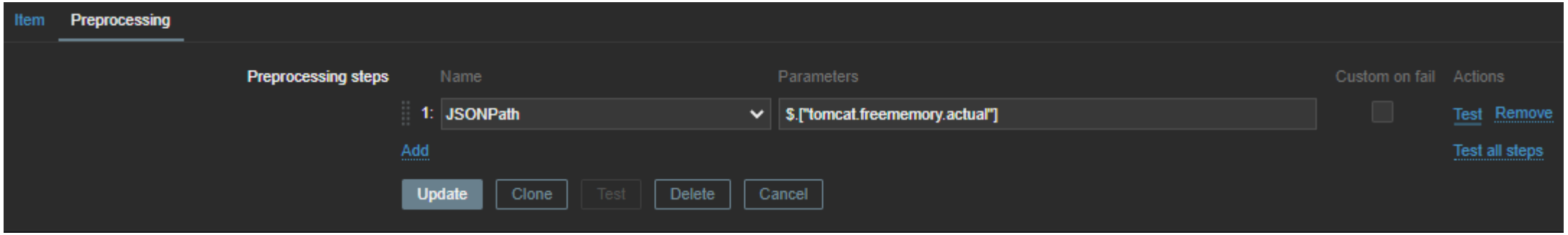
/rhs_check/services/service[1]

Add some more steps:

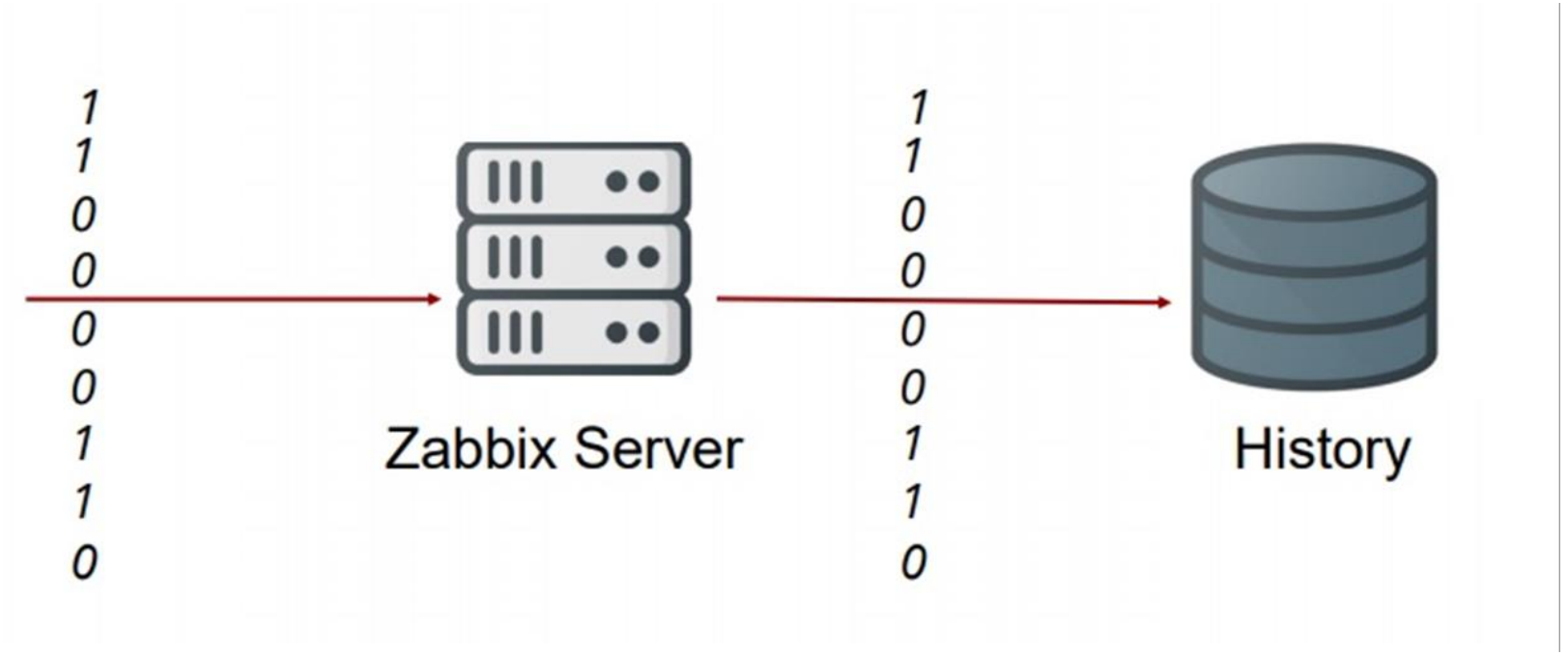


THE PATH OF THE JSON

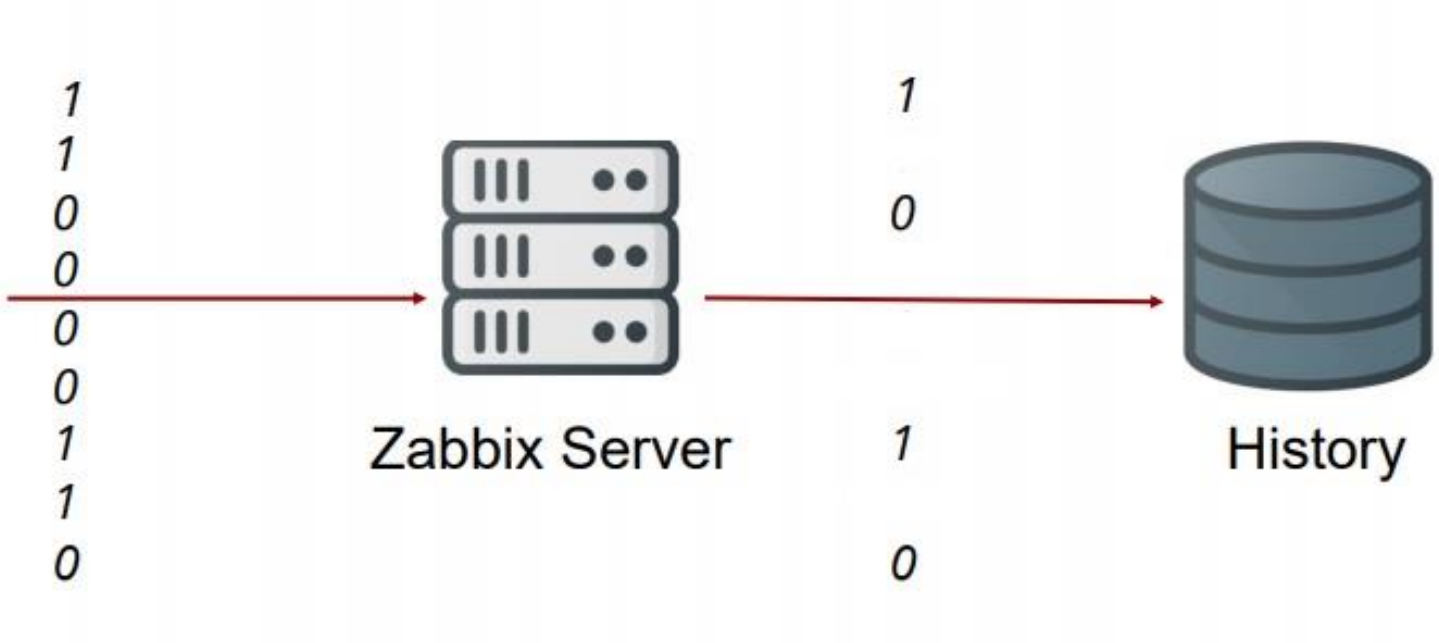
{ "obj2testobj2Connection": "OK", "objam.testHttpConnection": "OK",
"obj2.testobj2ServerComponents": "OK", "tomcat.freememory.threshold": "2132131000",
"tomcat.freememory": "OK", "tomcat.freememory.actual": "13123131121",
"objam.testNFSStore": "OK" }



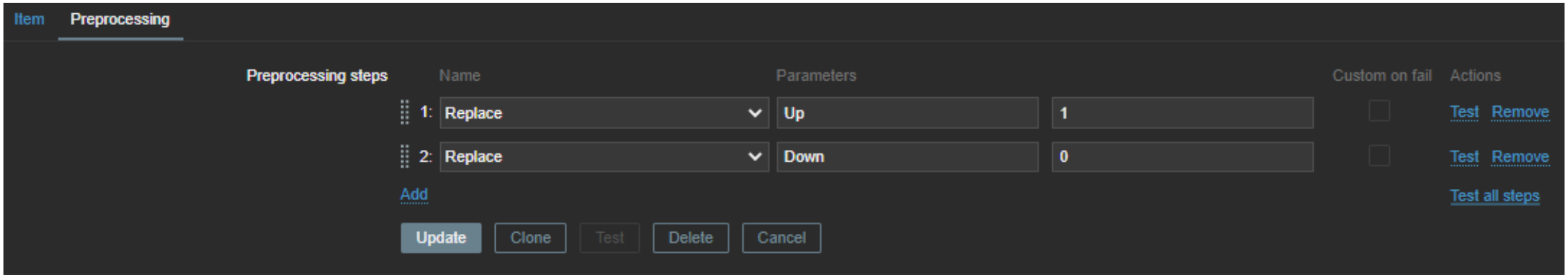
BEFORE THROTTLING



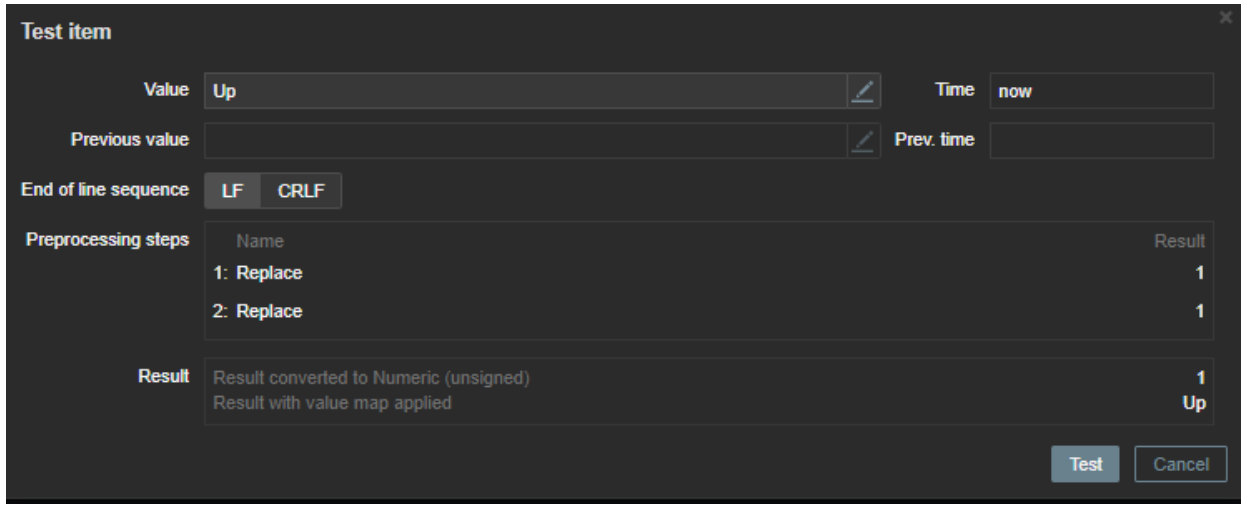
BEFORE THROTTLING

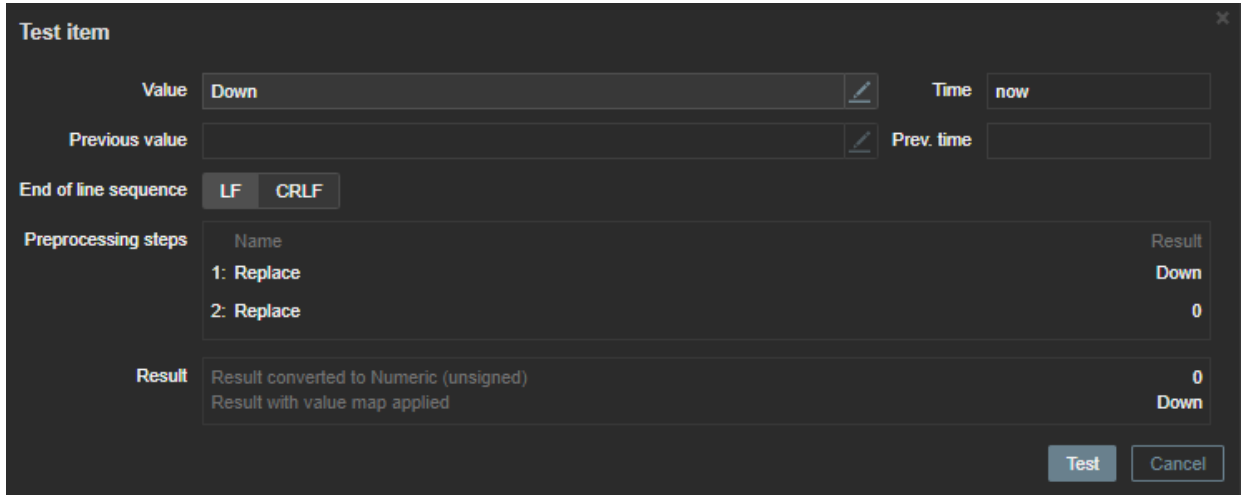


REPLACE


Item
Preprocessing
Preprocessing steps
Name
Parameters
Custom on fail
Actions
1:
Replace
Up
1
Test
Remove
2:
Replace
Down
0
Test
Remove
Add
Test all steps
Update
Clone
Test
Delete
Cancel

REPLACE

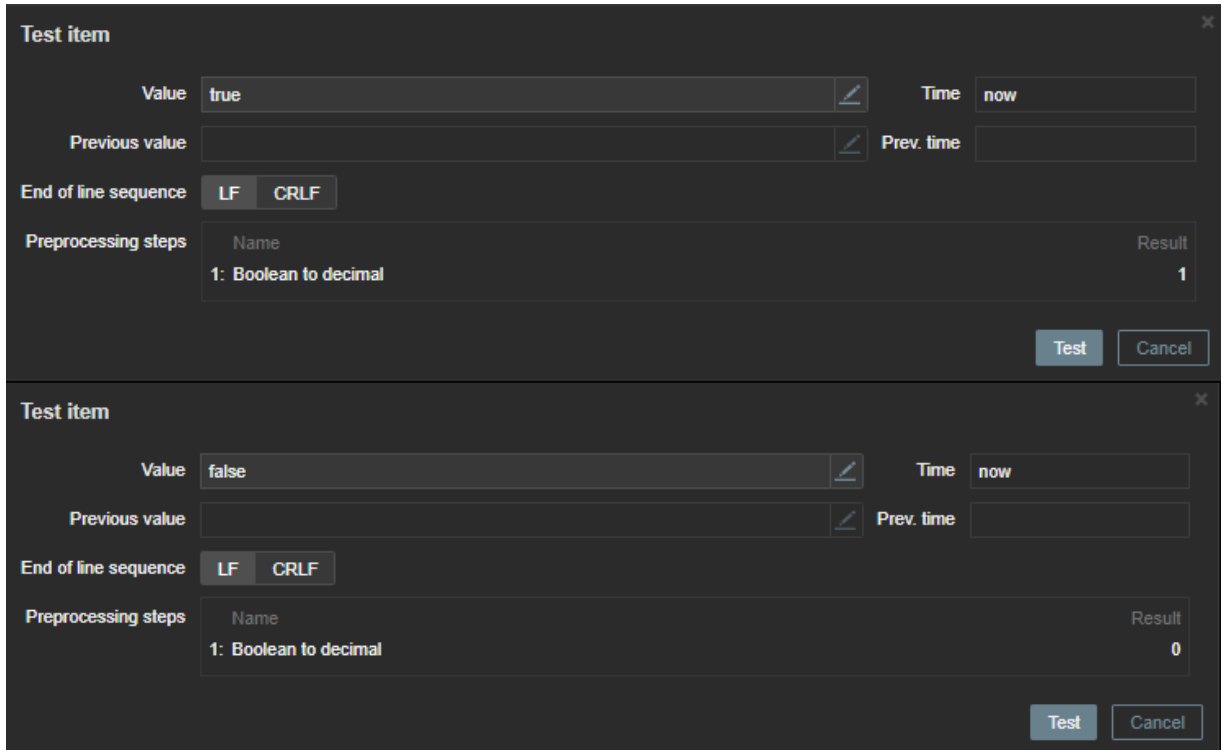

Test item
Value
Up
Time
now
Previous value
Prev. time
End of line sequence
LF
CRLF
Preprocessing steps
Name
Result
1: Replace
1
2: Replace
1
Result
Result converted to Numeric (unsigned)
1
Result with value map applied
Up
Test
Cancel


Test item
Value
Down
Time
now
Previous value
Prev. time
End of line sequence
LF
CRLF
Preprocessing steps
Name
Result
1: Replace
Down
2: Replace
0
Result
Result converted to Numeric (unsigned)
0
Result with value map applied
Down
Test
Cancel

DATA WRANGLING?

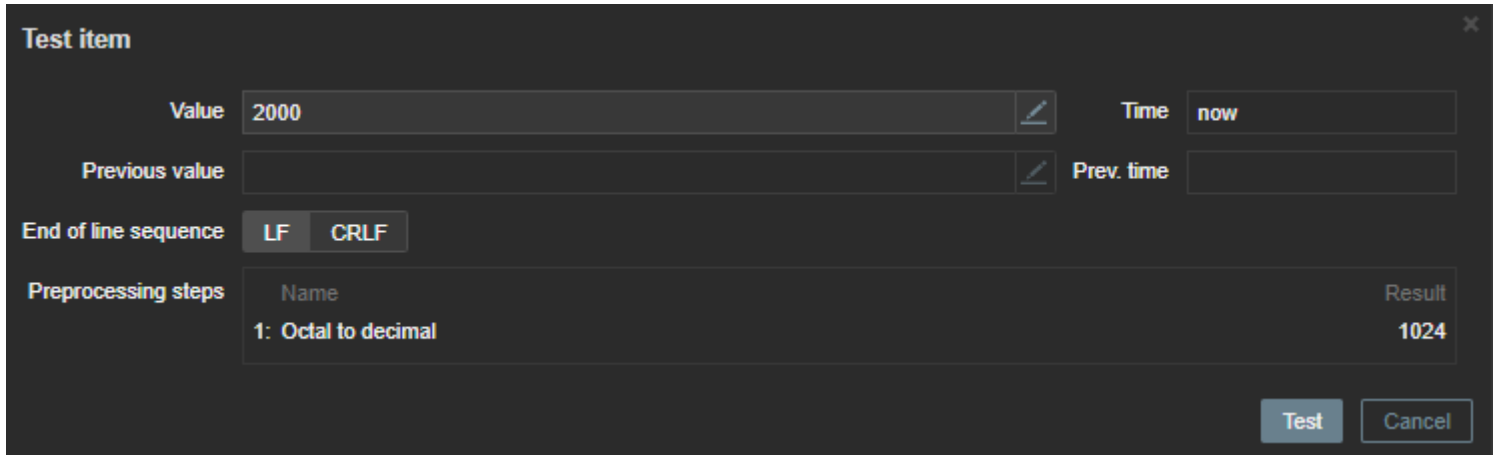
- Boolean/Octal/Hexadecimal to decimal.
- CSV to JSON.
- Prometheus pattern
- Simple change
- Change per second

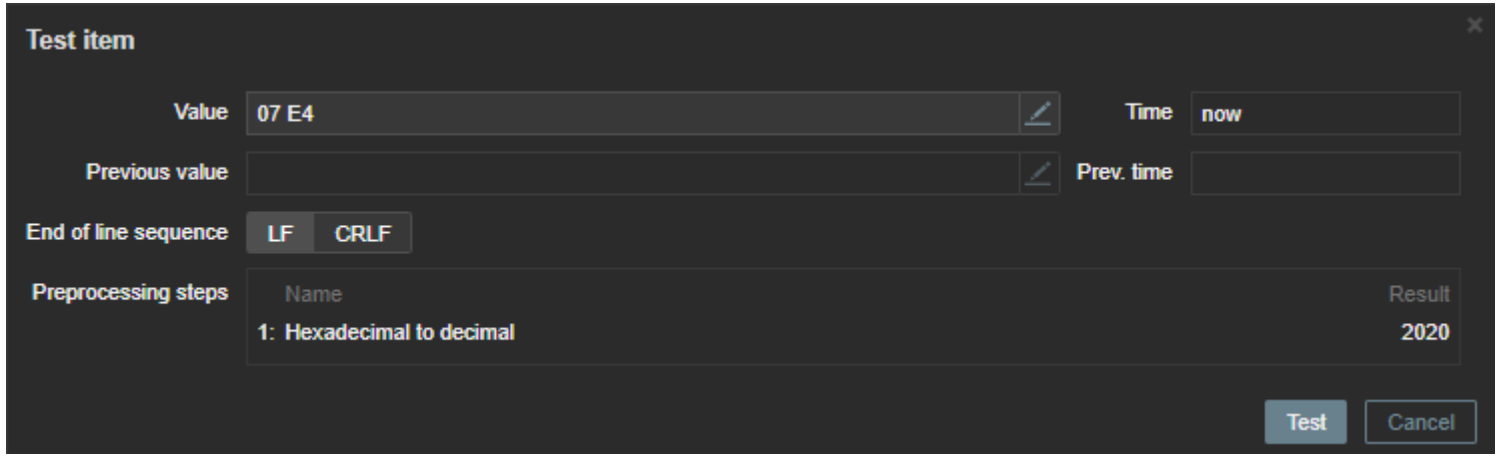
BOOLEN TO DECIMAL



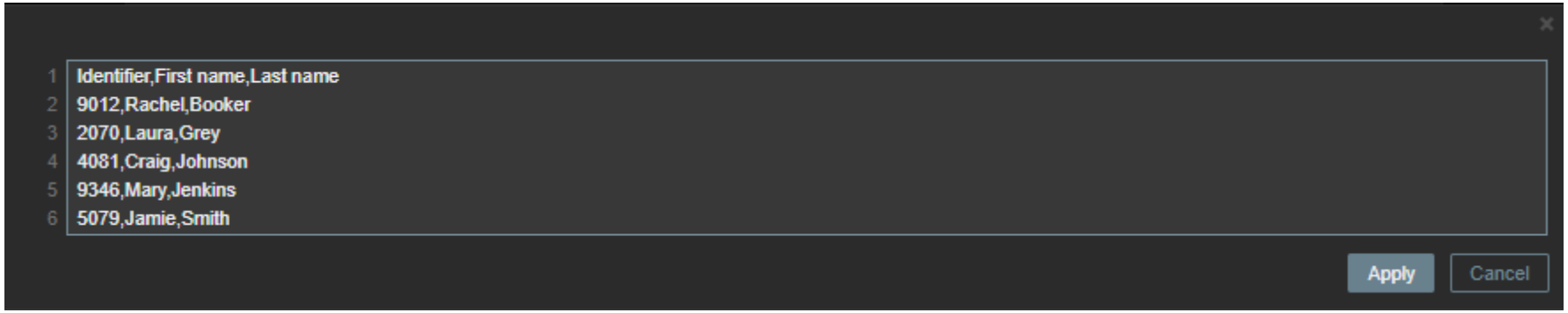
TRUE - true, t, yes, y, on, up, running, enabled, available
FALSE - false, f, no, n, off, down, unused, disabled, unavailable

OCTAL/HEXADECIMAL TO DECIMAL



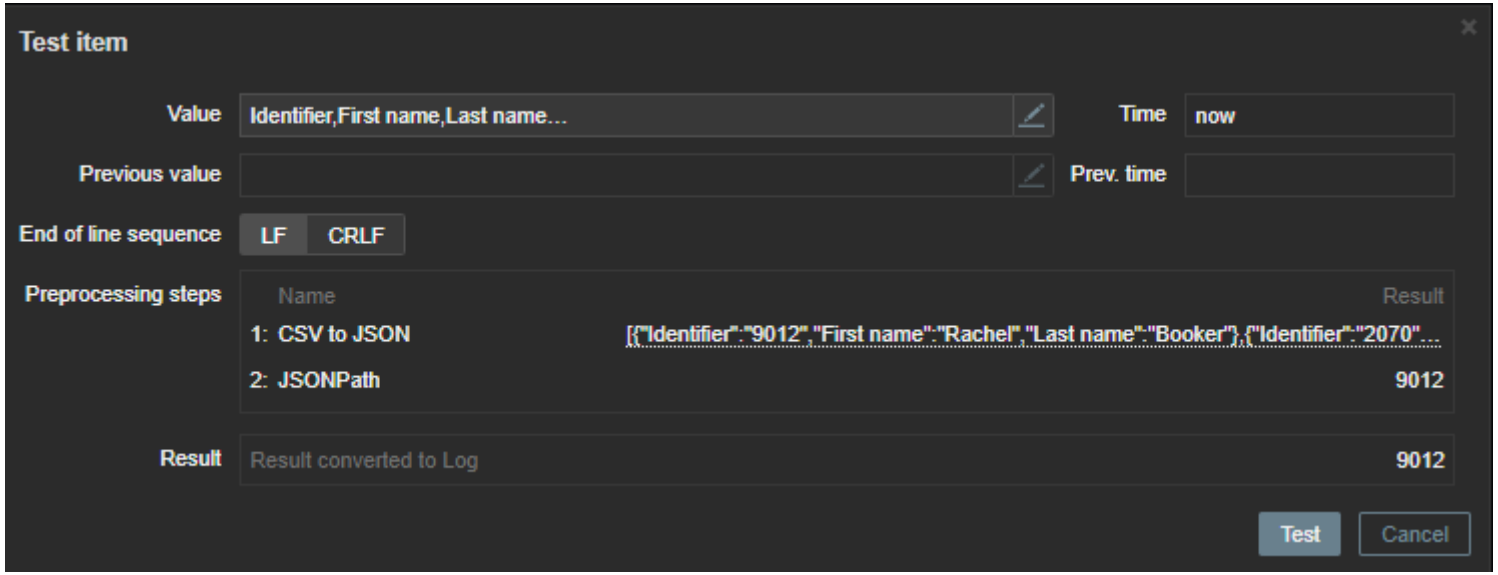


CSV TO JSON



[{"Identifier":"9012","First name":"Rachel","Last name":"Booker"},
{"Identifier":"2070","First name":"Laura","Last name":"Grey"},
{"Identifier":"4081","First name":"Craig","Last name":"Johnson"},
{"Identifier":"9346","First name":"Mary","Last name":"Jenkins"},
{"Identifier":"5079","First name":"Jamie","Last name":"Smith"}]

CSV TO JSON

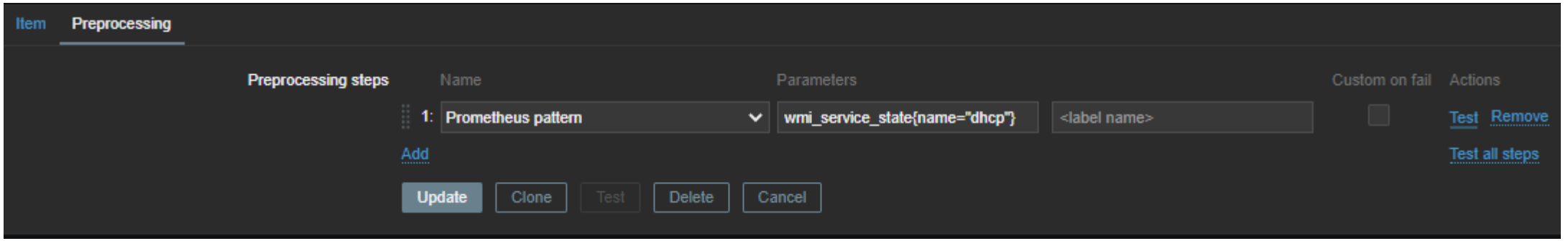

Test item
Value
Identifier,First name,Last name...
Time
now
Previous value
Prev. time
End of line sequence
LF
CRLF
Preprocessing steps
Name
Result
1: CSV to JSON
[{"Identifier":"9012","First name":"Rachel","Last name":"Booker"},{"Identifier":"2070"...
2: JSONPath
9012
Result
Result converted to Log
9012
Test
Cancel

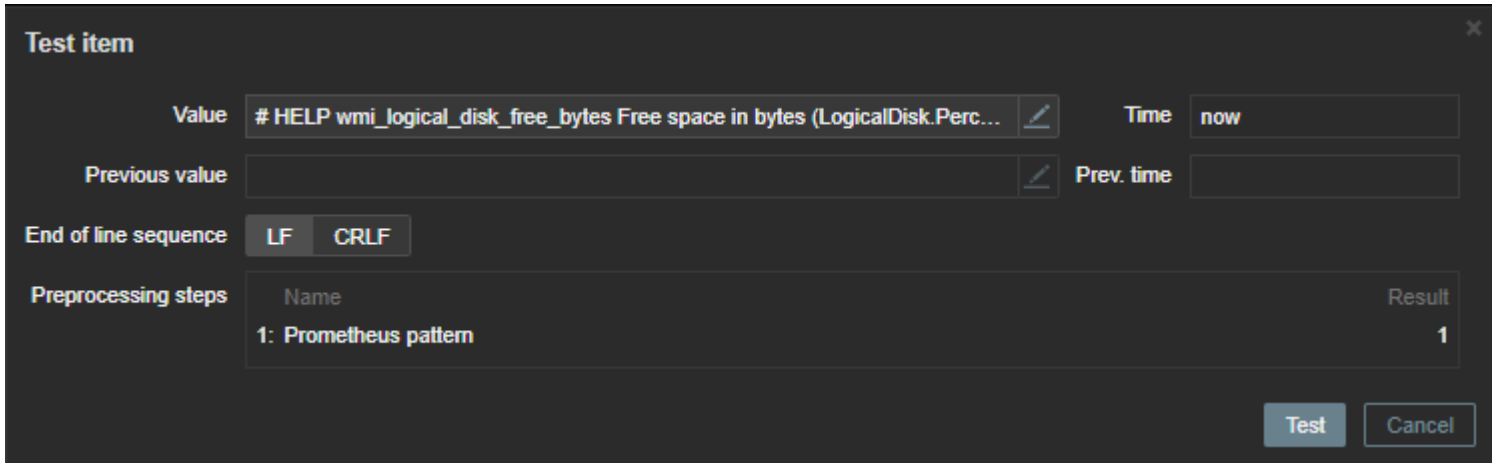
PROMETHEUS PATTERN

```
# 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"}
4.59276288e+08

wmi_service_state{name="dhcp",state="continue pending"} 0
wmi_service_state{name="dhcp",state="pause pending"} 0
wmi_service_state{name="dhcp",state="paused"} 0
wmi_service_state{name="dhcp",state="running"} 1
wmi_service_state{name="dhcp",state="start pending"} 0
wmi_service_state{name="dhcp",state="stop pending"} 0
wmi_service_state{name="dhcp",state="stopped"} 0
wmi_service_state{name="dhcp",state="unknown"} 0
```

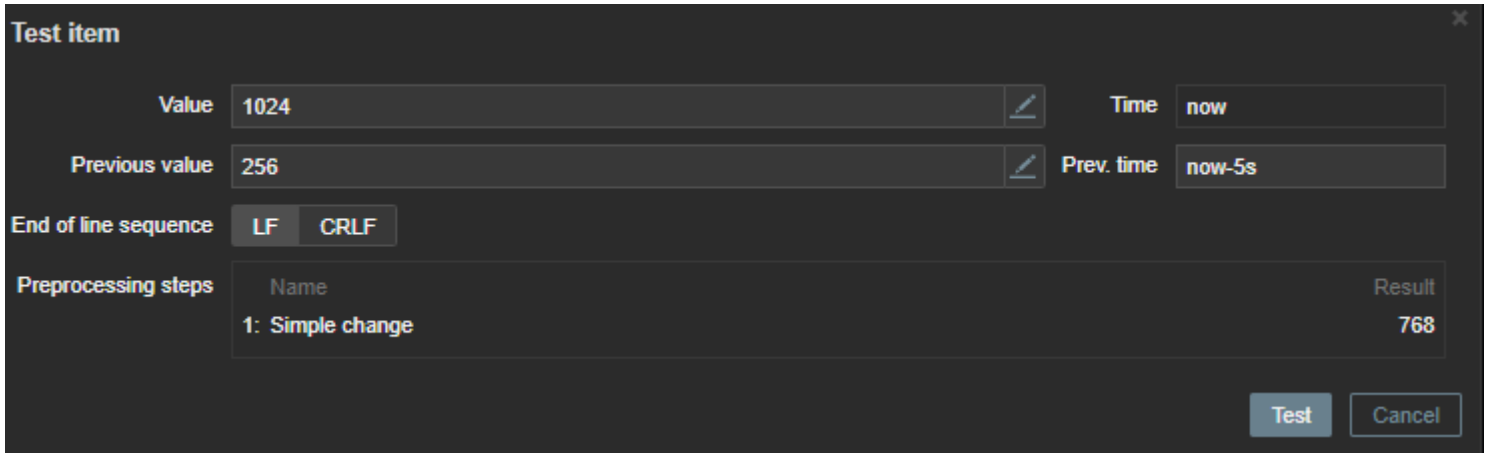
PROMETHEUS PATTERN





SIMPLE CHANGE

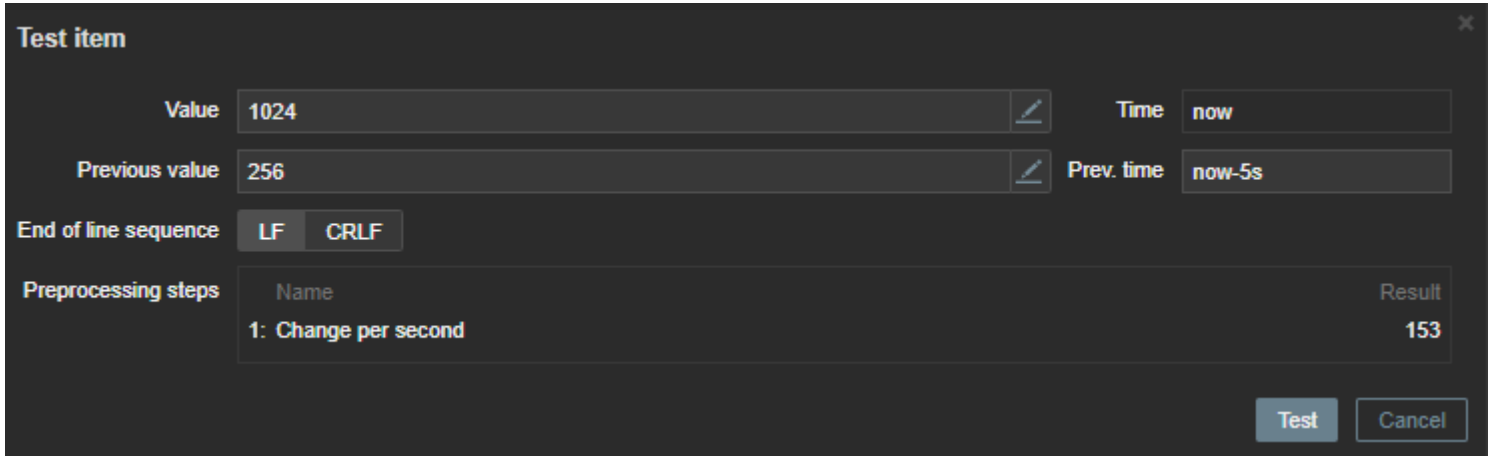
- Simple change - Calculate difference between the current and previous value. Evaluated as **value-prev_value**, where value - current value; prev_value - previously received value. This setting can be useful to measure a constantly growing value.



CHANGE PER SECOND

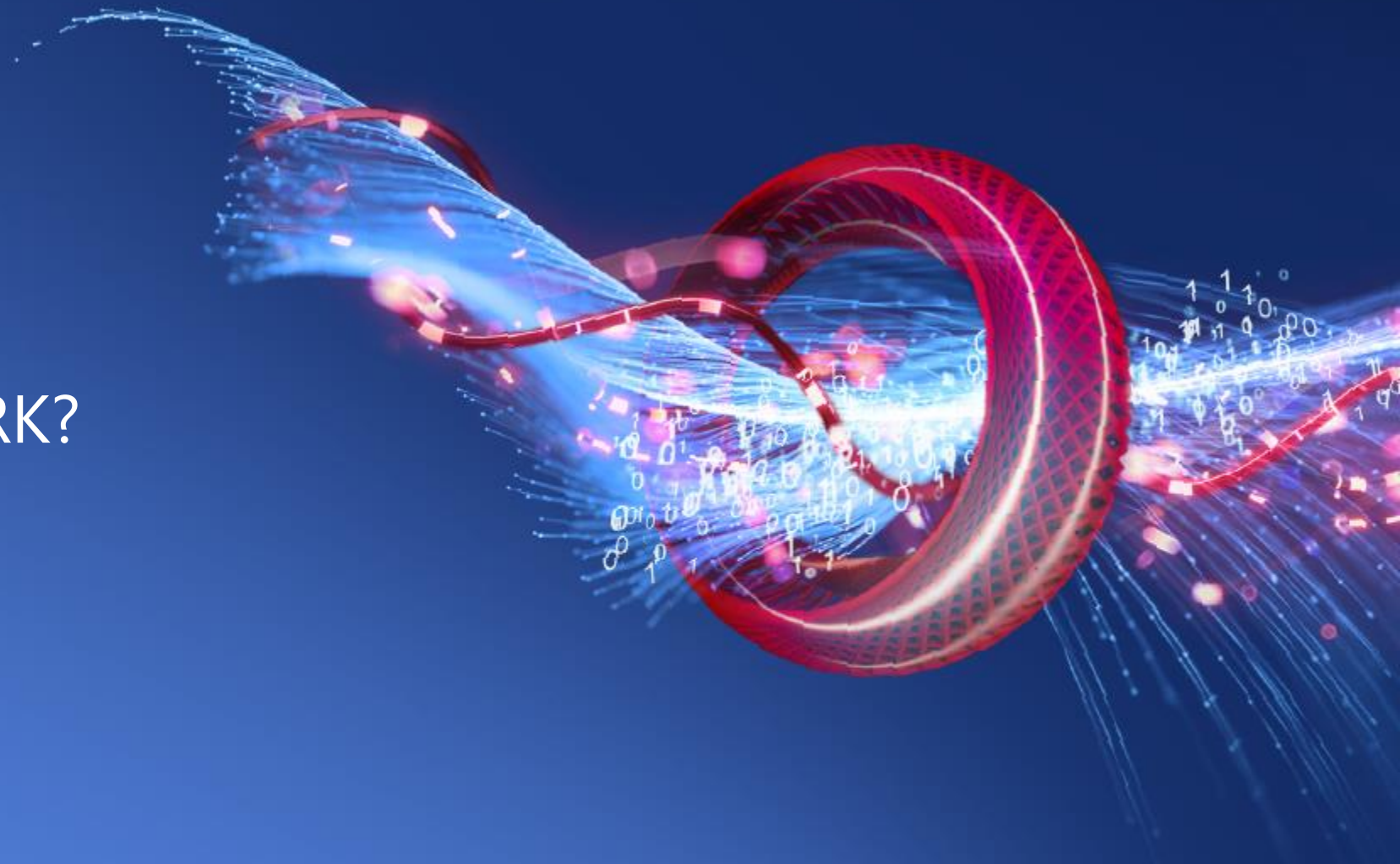
- Change per second - Calculate the value change (difference between the current and previous value) speed per second.

  Evaluated as (**value-prev_value)/(time-prev_time)**, where value - current value; prev_value - previously received value; time - current timestamp; prev_time - timestamp of previous value.

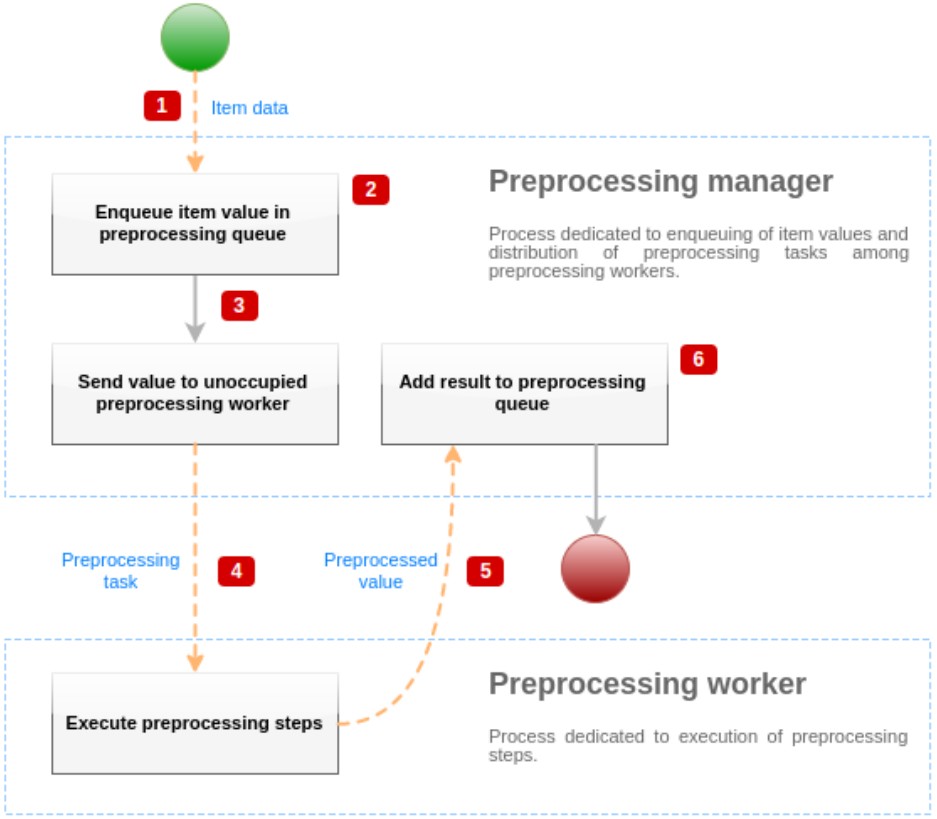


03

HOW DOES IT WORK?



HOW IT WORKS?



Item can be placed at the end or at the beginning of the preprocessing queue. Zabbix internal items are always placed at the beginning of preprocessing queue, while other item types are enqueued at the end.

5.0 IMPROVEMENTS

- Maximum count of dependent items for one master item is now 29999 (was 999)
- [ZBX-17694] Memory usage became significantly lower

  15K dependent items with master worth of 209 KB needed around 3 GB RAM with total busy time in manager of 2.115940 seconds, but after changes 4.6 MB is the peak and busy time is 0.688623 seconds.
- [ZBX-17720] Exclude disabled dependant items from preprocessing configuration
- [ZBX-17548] Don't store history in Proxy DB If History storage period is 0

Thank you!