Preprocessing

Preprocessing allows to define transformation rules for the received item values:

- One or several transformations are possible
- Transformations are executed in the order in which they are defined

Preprocessing can be performed by:

- Zabbix server
- Zabbix proxies (if a host is monitored by proxy)

| Monitored device | Collected data | Preprocessing | Transformed data | Database |
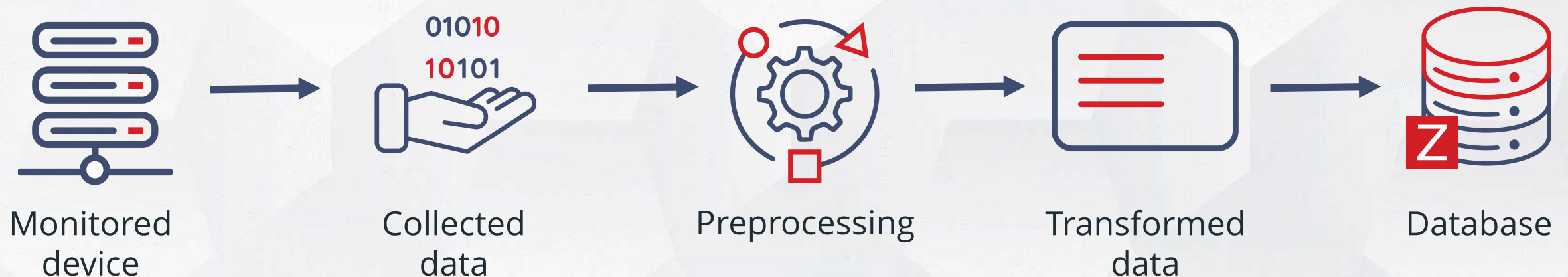
Preprocessing steps are defined in a separate tab of the item configuration form:

- ᴧ The number of steps is displayed in the tab
- ᴧ The order of execution can be changed by dragging and dropping

Type of information for the item is also displayed:

- ᴧ It is possible to change the type of information without leaving the Preprocessing tab

If a preprocessing step fails multiple scenarios are possible:

- Error handling can be introduced using "custom on fail" scenarios
- Otherwise, the item will become unsupported, and no more steps will be processed

Custom on fail offers three options:

- Discard value — The value is discarded, and no more steps are processed
- Set value to — The value will be changed to the predefined value
- Set error to — The item will become not supported with a custom error

⚠ If value is discarded, next preprocessing steps are ignored!

Every collected value goes through preprocessing queue:

- Data are passed to preprocessing manager and placed into preprocessing queue
- Preprocessing manager assigns tasks from the preprocessing queue to workers
- Preprocessing workers are performing the preprocessing steps

```
### Option: StartPreprocessors
# Number of pre-forked instances of preprocessing workers.
# The preprocessing manager process is automatically started when preprocessor worker is started.
# Range: 1-1000
StartPreprocessors=10
```
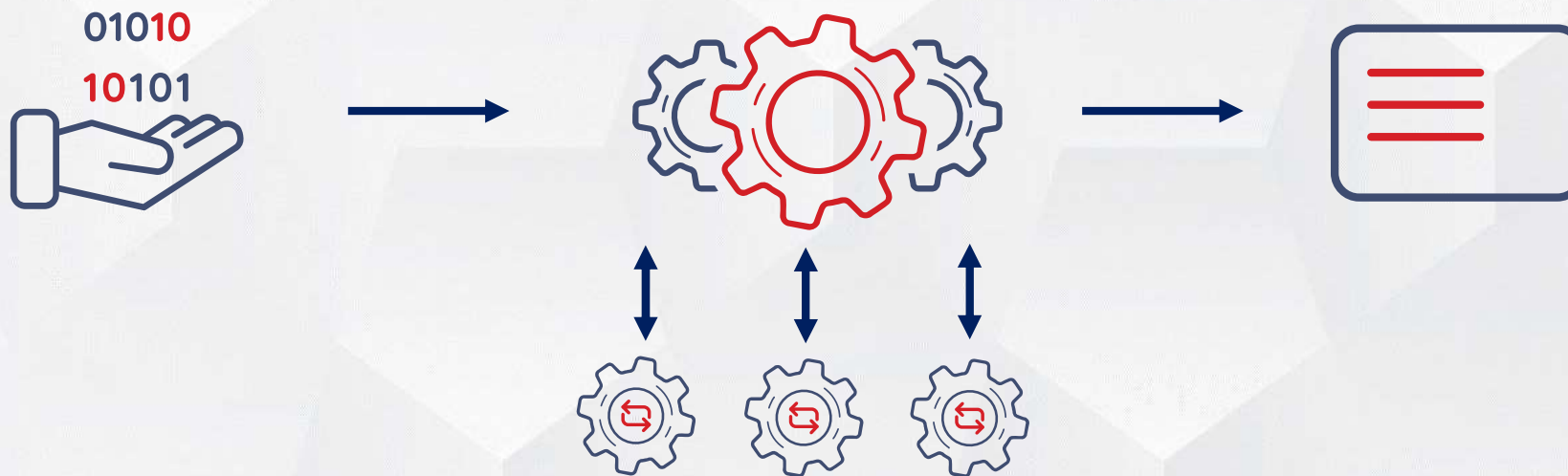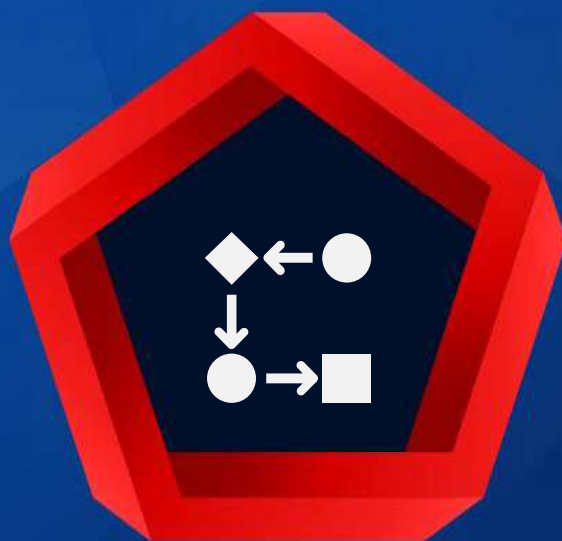
Preprocessing steps

Multiply the value by the specified integer or floating-point value:

- User macro can be used to specify the multiplier
- Scientific notation is supported (e.g. 1e+70)

Division is also possible if multiplier < 1 is used:

$$24 * 0.125 = 3$$

Notes for Numeric (unsigned) item type:

- Incoming values with a fractional part will be trimmed before multiplying
- The result will also be trimmed before saving

numeric (unsigned) 2.5 * 2.9 = 2 * 2.9 = 5.8 = 5

numeric (float)   2.5 * 2.9 = 7.25

Simple change calculates the difference between the current value and the previous value:

Formula: value - previous value   135 - 80 = 55

Speed per second calculates the result based on the two values and time:

$$\text{Formula: } \frac{\text{value} - \text{previous value}}{\text{time} - \text{previous time}} \qquad \frac{135 - 80}{1600329600 - 1600329590} = \frac{55}{10} = 5.5$$

A few important notes:

- These steps can only be used for a constantly growing value
- Zabbix stores nothing if the current value is smaller than the previous value
- Only one change operation per item is allowed

The following Zabbix agent keys report back metrics as counters:

- ⎍ net.if.in, net.if.out, net.if.total
- ⎍ system.cpu.intr, system.cpu.switches
- ⎍ system.swap.in, system.swap.out

Many other data collectors (e.g. SNMP) can also report data as counters

Without change per second preprocessing step
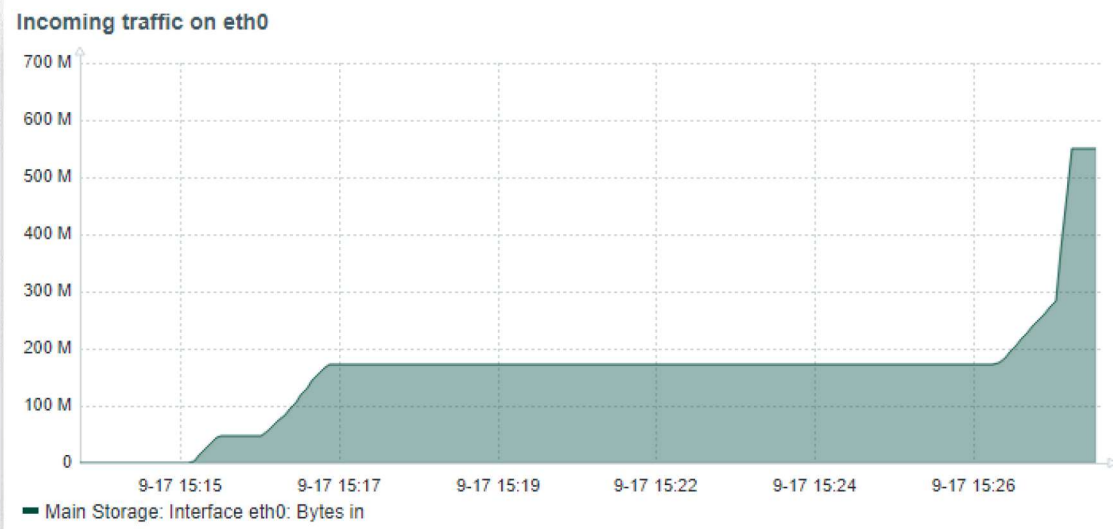
With change per second preprocessing step
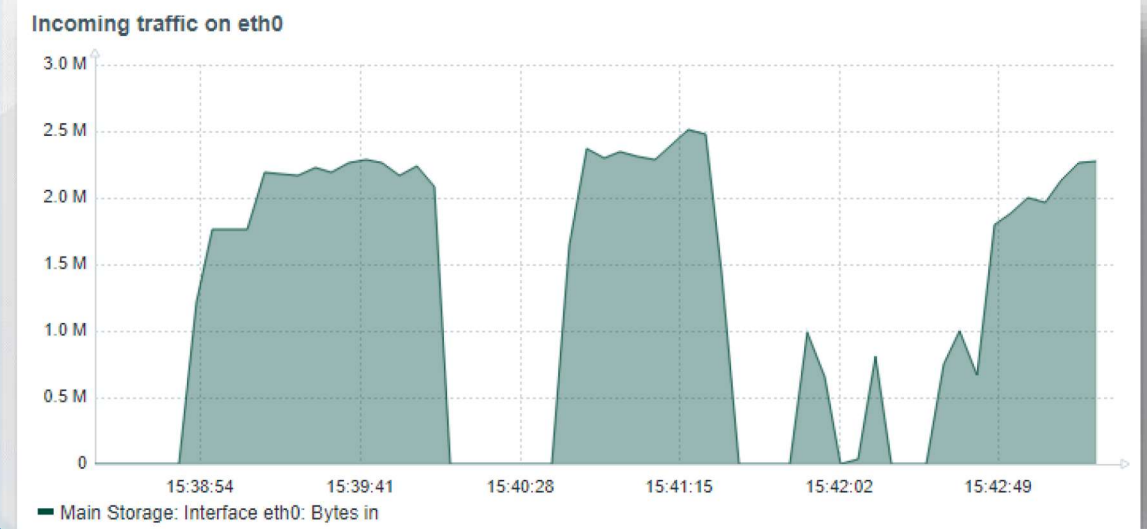
Regular expression captures the matched text into a numbered group:

- Zabbix supports PCRE (Perl Compatible Regular Expressions) format
- Both PCRE and PCRE2 libraries are supported starting from Zabbix 6.0

Regular expression supports extraction of maximum 10 captured groups

- An \N (where N=1...9) escape sequence is replaced with the Nth matched group
- \0 escape sequence is replaced with the matched text

Source data

	total	used	free
Mem:	1827	840	75

Regular Expression

Mem:\s+(\d+)\s+(\d+)\s+(\d+)

Capturing groups

\0 = Mem: 1827 840 75   \1 = 1827   \2 = 840   \3 = 75

In Zabbix frontend, two fields must be specified:

- ⎍ Pattern - regular expression
- ⎍ Output - capturing group

Regex pattern

Capturing group

Preprocessing steps	Name		Parameters	
	1:	Regular expression ⌄	Mem:\s+(\d+)\s+(\d+)\s+(\d+)	\1
	Add			

Result can be tested from the frontend ⇨

Test item ✕

Get value from host	☐		
Value	Mem: 1827 840 75 ✎	Time	now
	☐ Not supported		
Previous value		✎ Prev. time	
End of line sequence	**LF** CRLF		
Preprocessing steps	Name		Result
	1: Regular expression		1827

Test **Cancel**

DISCARD UNCHANGED

Time	Values	Discard unchanged	Discard unchanged with heartbeat 30s	Explanation
00:00	0	0	0	
00:05	0			No value because same as previous
00:10	0			
00:15	1	1	1	Received different value
00:20	1			
00:25	1			
00:30	1			
00:35	1			
00:40	0	0	0	Received different value
00:45	0			
00:50	0			
00:55	0			
01:00	0			
01:05	0			
01:10	0		**0**	Value written because of heartbeat 30s
01:15	0			
01:20	1	1	1	Received different value
01:25	1			
01:30	0	0	0	Received different value
01:35	0			
01:40	0			
01:45	0			
01:50	0			
01:55	0			
02:00	0		**0**	Value written because of heartbeat 30s
02:05	0			

Check if there was an error in collecting item value:

⎍ Normally that would lead to the item turning unsupported

⎍ Modify that behaviour by specifying the "Custom on fail" error-handling options

⎍ This step is always executed as the first preprocessing step

Preprocessing steps	Name	Parameters	Custom on fail	Actions
1:	Check for not supported value		✓	Test Remove
	Custom on fail	Discard value **Set value to** Set error to 0		
2:	Custom multiplier	8	☐	Test Remove
Add				Test all steps

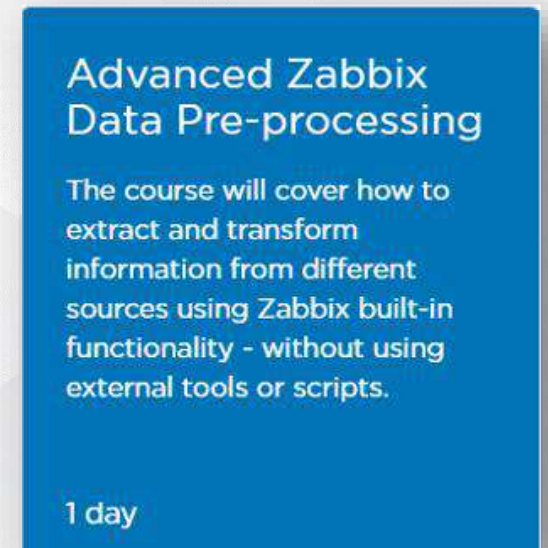Timeout → Check for not supported value → 0 → Custom multiplier 8 → 0 →

Preprocessing steps are covered in other Zabbix courses:

- ⎍ Zabbix 6.0 Certified Professional course:
  - ✓ XML Xpath
  - ✓ JSONPath
  - ✓ Prometheus patterns
  - ✓ Conversion to JSON

- ⎍ A specialized one-day Preprocessing course:
  - ✓ How preprocessing works
  - ✓ All preprocessing steps in much more details

Level 3

Zabbix Certified Professional

Manage big, distributed, highly loaded installations in large companies

3 days

Advanced Zabbix Data Pre-processing

The course will cover how to extract and transform information from different sources using Zabbix built-in functionality - without using external tools or scripts.

1 day

ⓘ https://www.zabbix.com/training?language=english#training_courses

PRACTICAL SETUP

1) Create two new items on Training-VM-XX host to monitor network traffic:
   - ✓ Incoming network traffic
   - ✓ Outgoing network traffic

2) Assign preprocessing steps to the items:
   - ✓ Monitor speed per second
   - ✓ Convert bytes to bits

3) Check that items are reporting correct data

4) Update "swapped in pages" item to report pages per hour