ENGLISH

ZABBIX MEETUP ONLINE '23

Optimizing your data collection with Low-level discovery and dependent items

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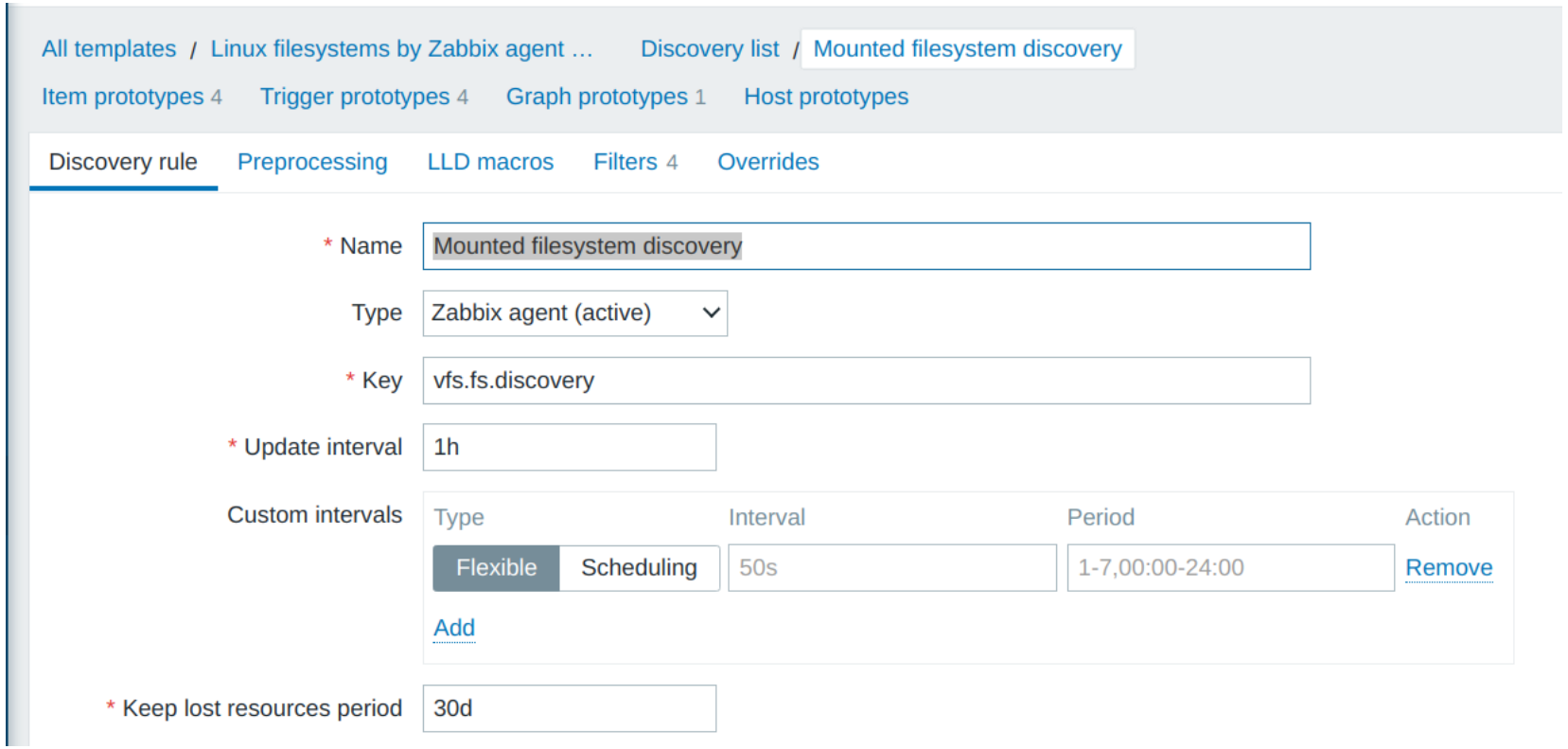
Low-level discovery

- *a way to automatically create items, triggers, graphs and hosts*
- *used in most of Out of The Box Zabbix Templates*
- *highly customizable base on your needs*



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Out Of The Box Discovery Rules

- mounted filesystems
- network interfaces
- CPUs and CPU cores
- SNMP OIDs
- JMX objects
- ODBC SQL queries
- Windows services
- Windows performance counter instances
- Systemd services
- host interfaces in Zabbix
- IPMI sensors
- WMI queries
- Prometheus data
- VMWare Entities

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LLD Main components

- **Discovery rule** - specifies, most importantly, the built-in item or custom script to retrieve discovery data
- **Preprocessing** - *applies some preprocessing to the discovered data*
- **LLD macros** - allows to extract some macro values to use in discovered items, triggers, etc
- **Filters** - allows to filter the discovered values
- **Overrides** - *allows to modify items, triggers, graphs or host prototypes when applying to specific discovered objects*

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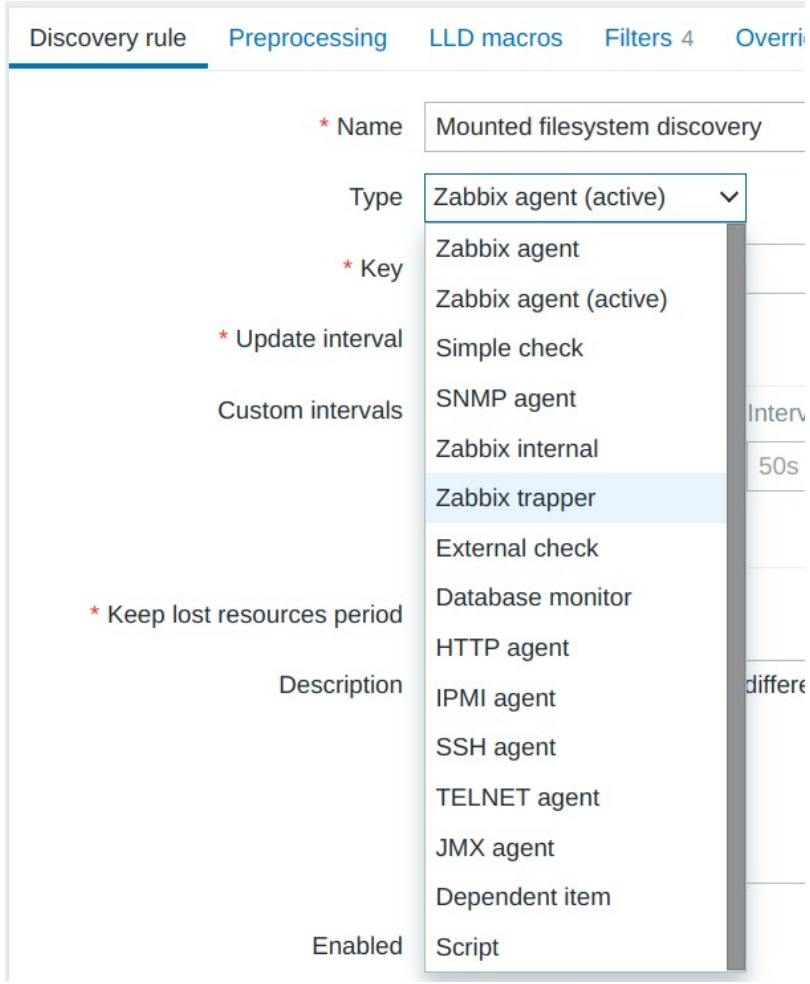
LLD how it works

Discovery Rule → Collect the required data using ALL the Zabbix Type available



Example of output of LLD

```
[
  { "{#FSNAME}":"/",              "{#FSTYPE}":"rootfs"   },
  { "{#FSNAME}":"/sys",           "{#FSTYPE}":"sysfs"    },
  { "{#FSNAME}":"/proc",          "{#FSTYPE}":"proc"     },
  { "{#FSNAME}":"/dev",           "{#FSTYPE}":"devtmpfs" },
  { "{#FSNAME}":"/dev/pts",       "{#FSTYPE}":"devpts"   },
  { "{#FSNAME}":"/lib/init/rw",   "{#FSTYPE}":"tmpfs"    },
  { "{#FSNAME}":"/dev/shm",       "{#FSTYPE}":"tmpfs"    },
  { "{#FSNAME}":"/home",          "{#FSTYPE}":"ext3"     },
  { "{#FSNAME}":"/tmp",           "{#FSTYPE}":"ext3"     },
  { "{#FSNAME}":"/usr",           "{#FSTYPE}":"ext3"     },
  { "{#FSNAME}":"/var",           "{#FSTYPE}":"ext3"     },
]
```

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Most used Item Type

HTTP Agent → Many use cases like Kubernetes monitoring, Application Monitoring, RestAPI

SNMP Agent → For all Router/SAN Switches etc

Dependent Item → Similar use case of HTTP Agent

Script → More complex scenarios with multiple RestAPI calls and data conversion. Ex. RestAPI execute login and receive a Token with the Token you can request the final data...

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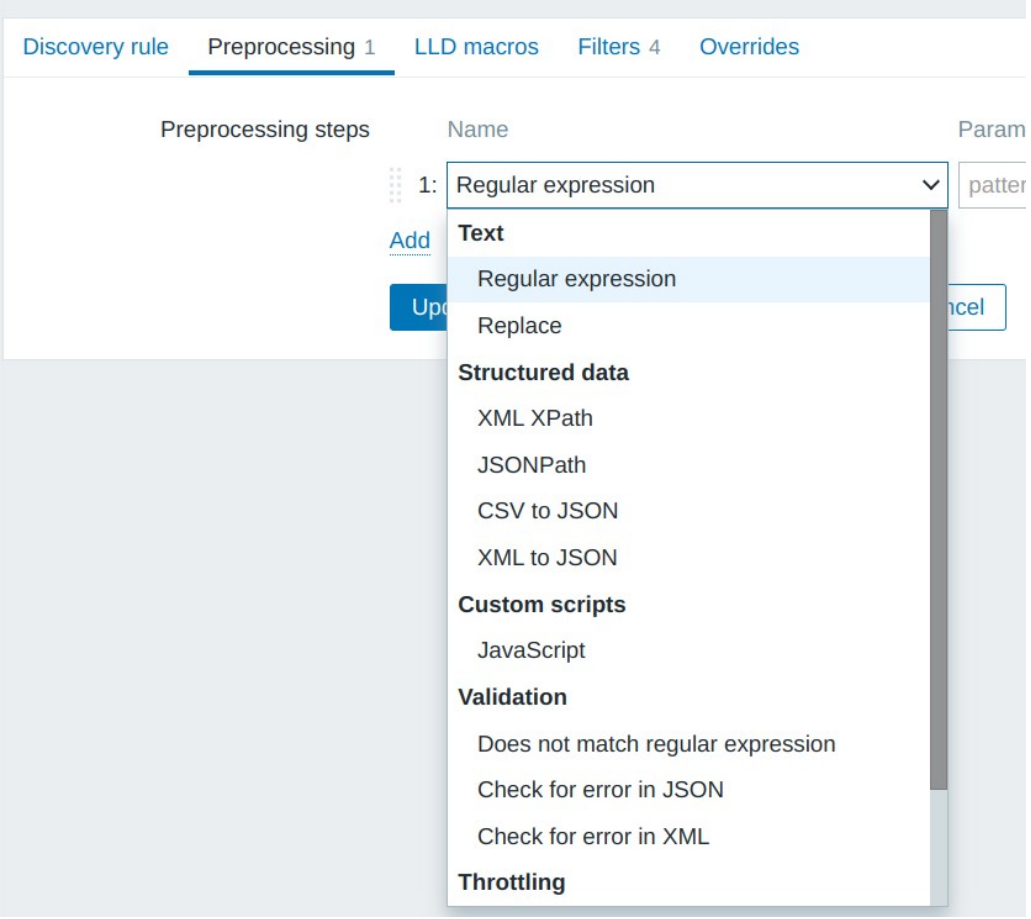
Where magic comes true

Preprocessing → Multiple way to extract the information you require coming from the LLD rule



Most used Preprocessing Steps

- Regular expression
- JSONPath
- JavaScript

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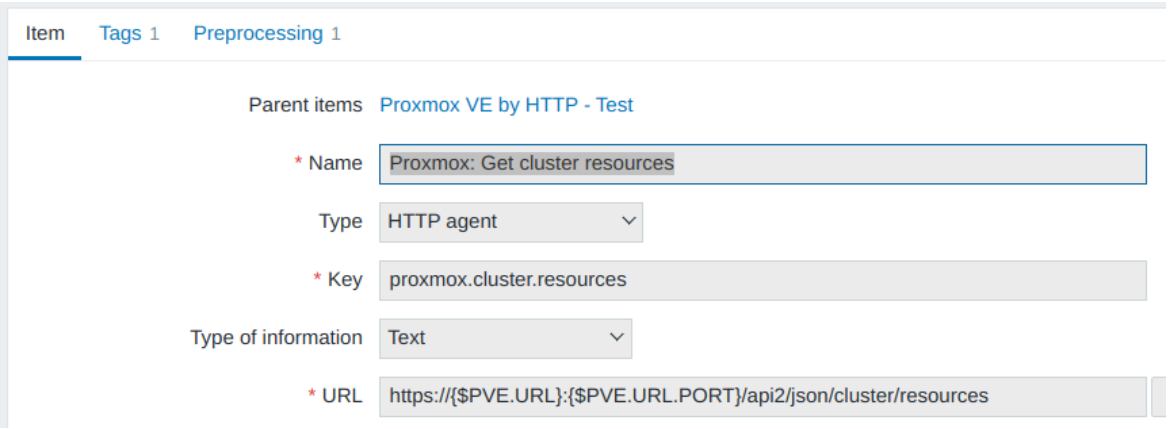
Next-Gen LLD discovery

- Reduce number of polling to your device using “Master/Dependant Items”
- Enhance Automation with LLD Overrides
- Enrich your LLD data using Javascript Preprocessor step
- Bring User Macros every where :-)
- Solve Tricky situations

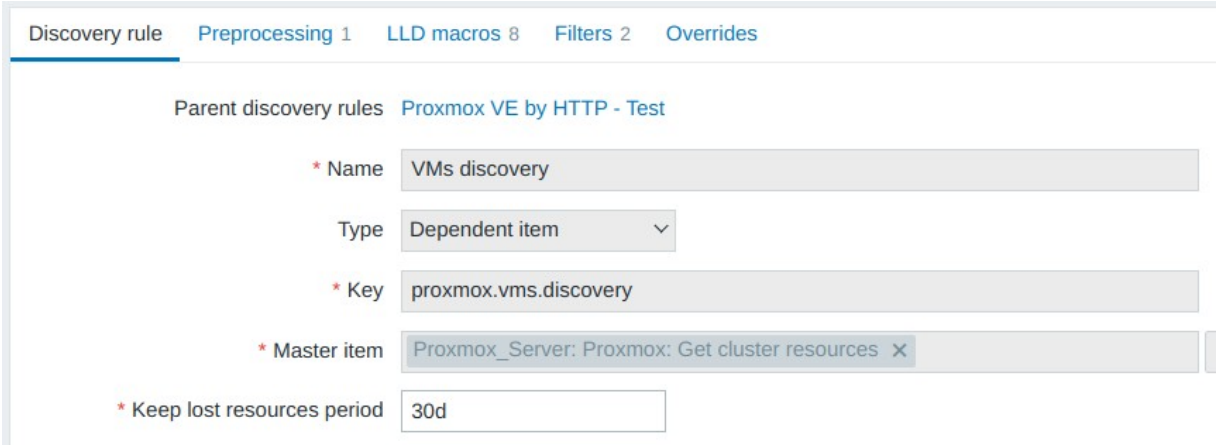
Master/Dependant on LLD

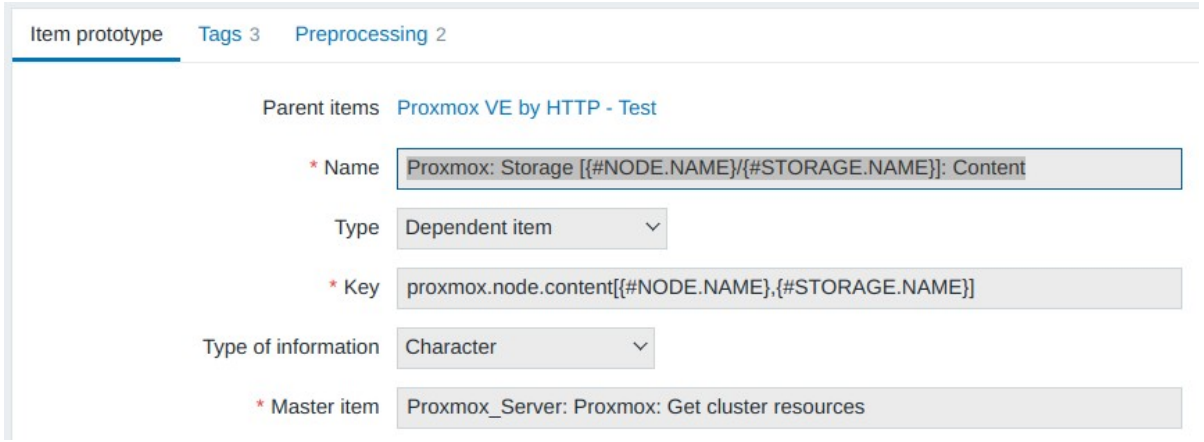


HTTP Agent → Master Item Collect the main Data

- Less polling to monitored device
- Single Fetch for all the chain

Discovery Rule → Dependant from HTTP Agent Item





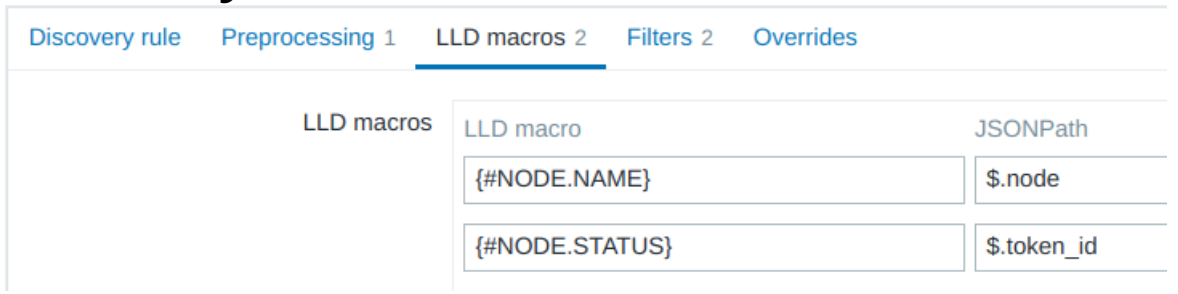
Item Prototype → Dependant from HTTP Agent Item

Master/Dependant on LLD

HTTP Agent → Raw data

```
[
  {
    "data": [
      {
        "cpu": 0.723949571936942,
        "status": "running",
        "name": "zabbix",
        "mem": 2793138336
       },
      {
        "cpu": 1.423949571936942,
        "status": "running",
        "name": "fedora",
        "mem": 2793138336
      },
      {
        "cpu": 0.2793138336,
        "status": "running",
        "name": "ubuntu",
        "mem": 2793138336
      }
     ]
  }
]
```

Discovery Rule → Hosts informations




```
[
   { "{#NODE.NAME}":"zabbix", "{#NODE.STATUS}":"running" },
   { "{#NODE.NAME}":"fedora", "{#NODE.STATUS}":"running" },
   { "{#NODE.NAME}":"ubuntu", "{#NODE.STATUS}":"running" }
]
```

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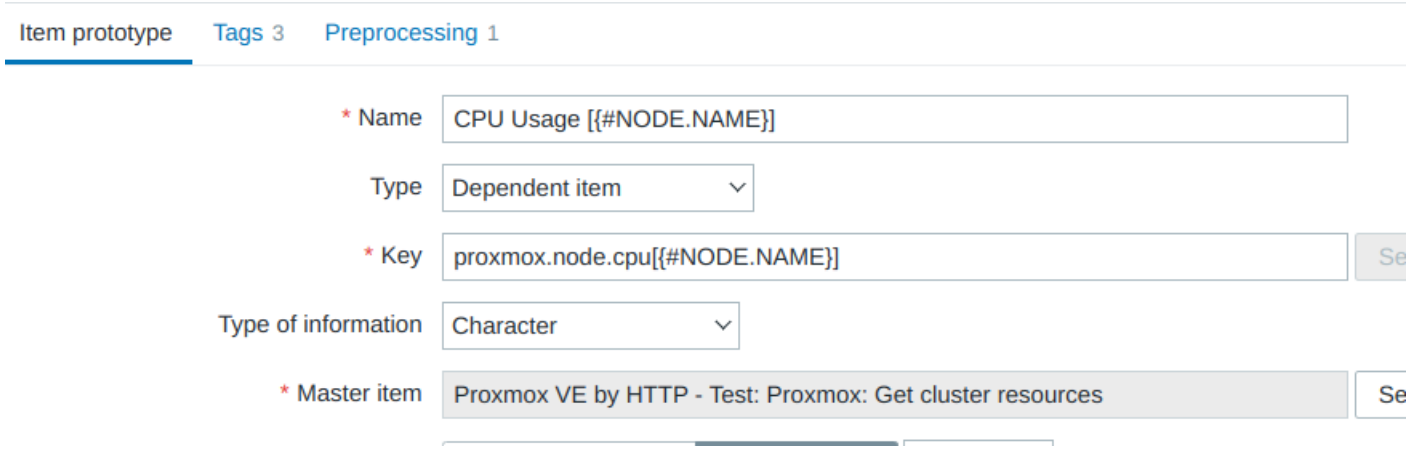
Master/Dependant on LLD

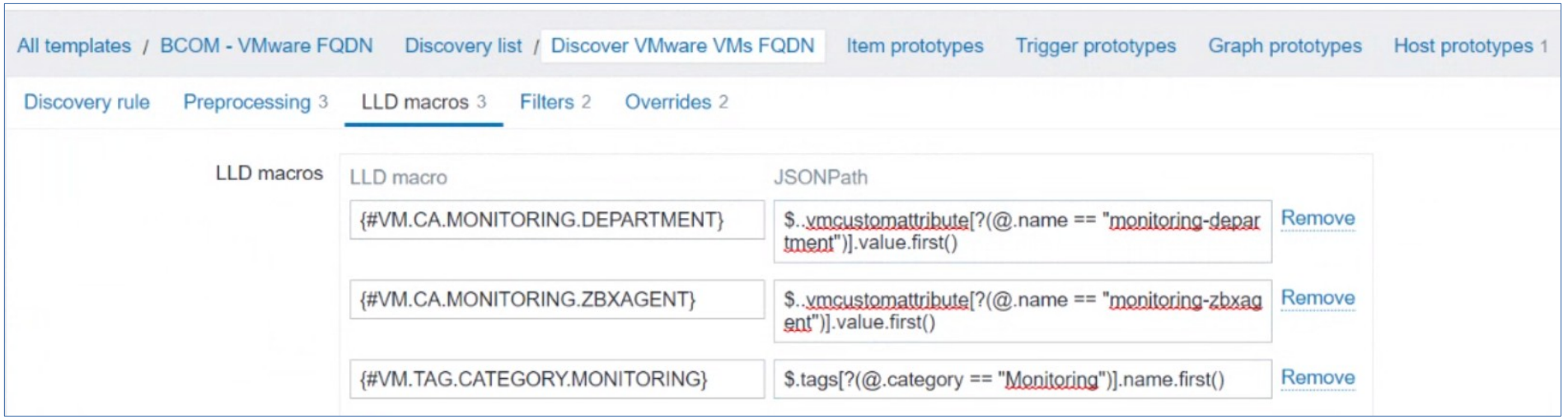
Item Prototype → For all VMs create relative Items

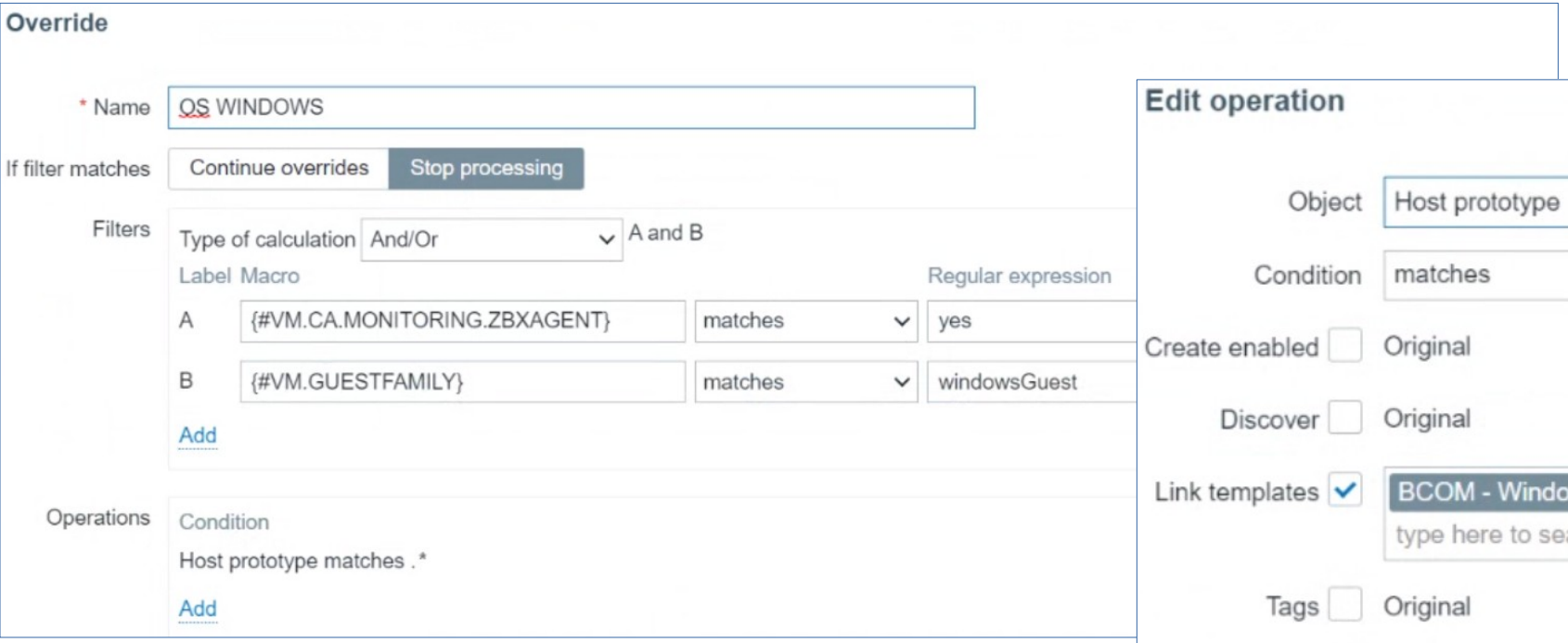


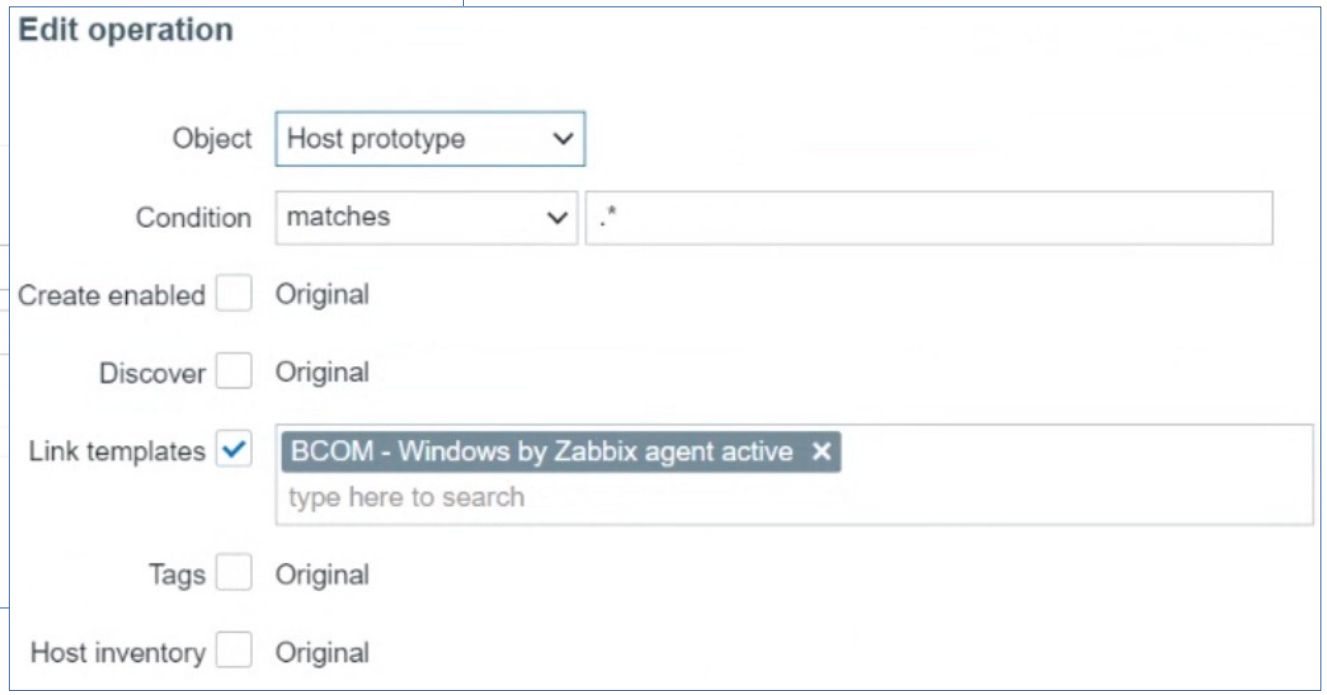
Item Preprocessing → Extract the value CPU coming from Master Item

Enhance Automation with LLD Overrides

VMWare Tag/Custom Attribute used to automate the Template association







Enrich your LLD data using Javascript Preprocessor step

All hosts / IREI

Discovery rule

JavaScript

```
var j = JSON.parse(value);
var name;
for (elem = 0; elem < Object.keys(j).length; elem++) {
        if (typeof j[elem]["{#SYSNAME}"] != 'undefined') {
                name = j[elem]["{#SYSNAME}"]
                delete j[elem]["{#SYSNAME}"];
        }
}
jclean = j.filter(function (e) {return e != null;})
if (typeof name != 'undefined') {
        var endpoint = '{$ENDPOINT}'+'/'+name;
        try {
                var fields = {};
                var req = new CurlHttpRequest();
                resp = req.Get(endpoint, JSON.stringify({"fields": fields}));
        } catch (error) {
                Zabbix.Log(3, "Brocade_Virt_Generic_v3: cannot reach external API")
                return JSON.stringify(jclean);
```

Push new Array elements to your Discovery Rule,
maybe based on result of a custom RestAPI

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Bring User Macros every where

All hosts / Prox

Discovery rule

JavaScript

```
function (value) {
  1  // Add User Macro to Discovery Output as an LLD Macro
  2  var vms = JSON.parse(value);
  3  var i= 0;
  4  for (i = 0; i < vms['data'].length; i++) {
  5      vms['data'][i]['token_id'] = '{$PVE.TOKEN.ID}';
  6      vms['data'][i]['token_secret'] = '{$PVE.TOKEN.SECRET}';
  7      vms['data'][i]['pve_url'] = '{$PVE.URL}';
  8      vms['data'][i]['pve_url_port'] = '{$PVE.URL.PORT}';
  9  }
 10  //Zabbix.log(3, "Proxmox Discovery VMs: "+JSON.stringify(vms));
 11  return JSON.stringify(vms);
}
```

Add new Array elements to your Discovery Rule output
to bring your User MACROS everywhere

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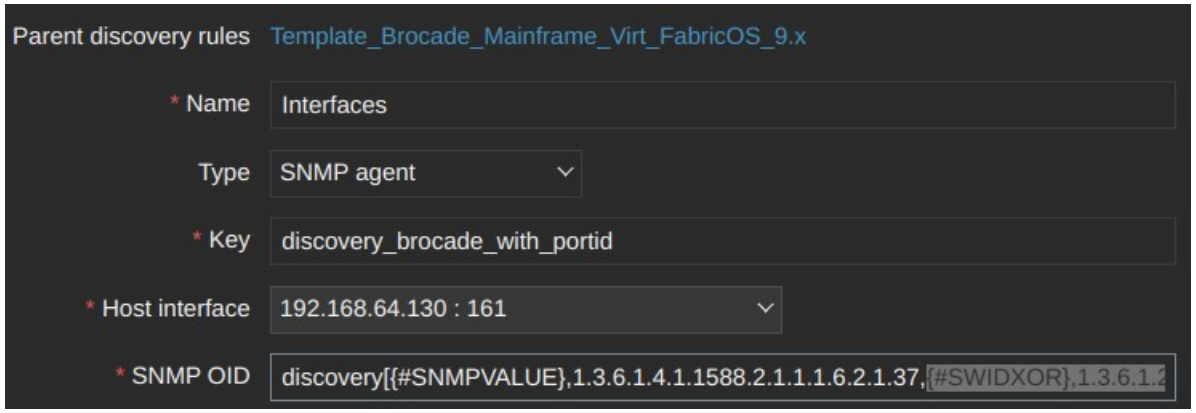
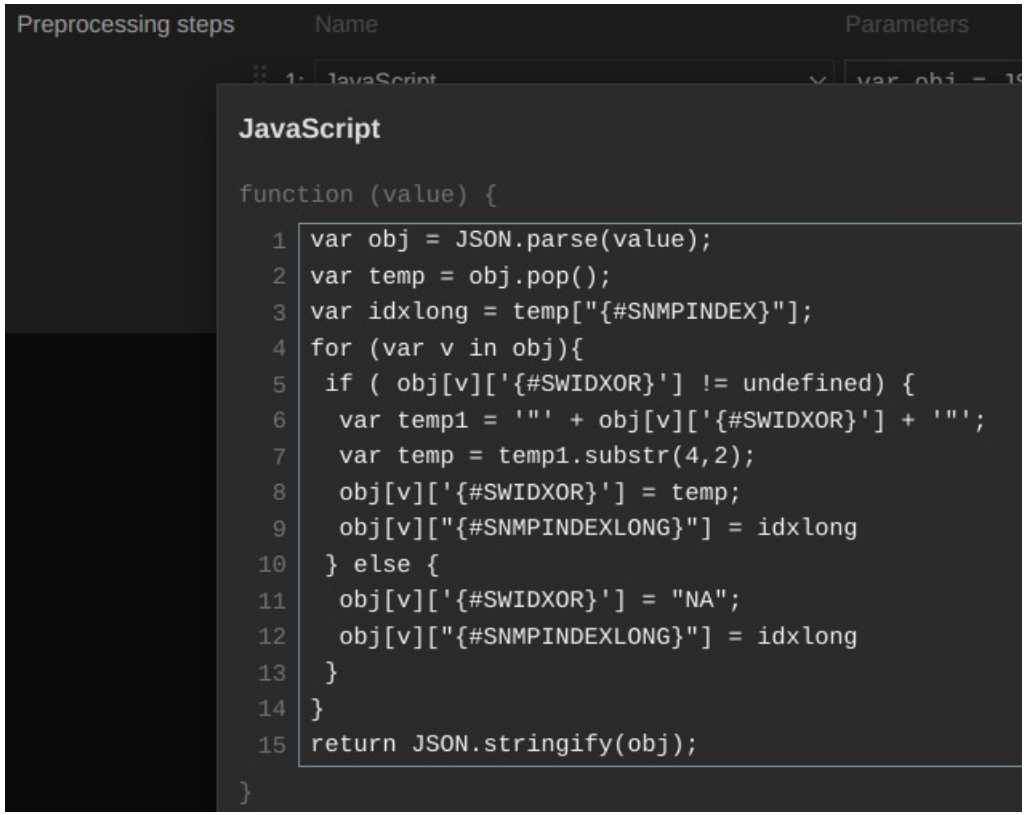
Solve Tricky situations



Add new Array elements to your Discovery Rule output to bring some Specific usefull OIDs or transform the value contents



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Solve Tricky situations

```
<Impianto Hostaddress=[redacted] Hostname=[redacted] NumeroCartelli="3" PosizioneImpianto="P" RevisioneSwCr01="1.29 ( build 5 )" SottoTipo="*" Tipologia="A__"
UltimoAggiornamento="20230213_151754">
  <Snmp EnterpriseOid="17377" SogliaOccupazioneFS1="80" SogliaOccupazioneFS2="88"/>
  <StatoFunzionamento AvvioControlloDisplay="20230212_162019" OutputLed="00010101" Protezione="1">
  ...
  </StatoFunzionamento>
  <Cartelli NumeroCartelliInclusi="3" NumeroTotaleCartelli="3">
    <Cartello Descrizione="" IdCartello="0" IdPanel="0" NomeCartello="" SottoTipo="*" Tipologia="A__">
      <StatoFunzionamento Protezione="1">
      ...
      </StatoFunzionamento>
      <Displays NumeroDisplay="2">
        <Display IdRow="0" IndirizzoDisplay="A" Installato="1" LenCodicePitto="8" NomeDisplay="PITTO1" ProtocolloCCLDisplay="3_10" RevisioneFw="DSPMV72144UBRE\D8C11
        Semaforo_acceso="0">
        ...
        </Display>
        <Display IdRow="1" IndirizzoDisplay="B" Installato="1" LenCodicePitto="8" NomeDisplay="FC1" ProtocolloCCLDisplay="3_10" RevisioneFw="DSPMV48048UBRE\D9E28C[2
        Semaforo_acceso="0">
```

First Level LLD MACRO

Second Level LLD MACRO

Single Discover with Multiple LLD MACRO Levels

```
for (j = 0; j < displayCount; j++) {
  Zabbix.log(3, "PMV Display Inizio Count: "+displayCount);
  query="/Impianto/Cartelli/Cartello[@IdCartello="+i+"]/Displays/Display[@IdRow="+j+"]";
  Zabbix.log(3, "PMV display Cartelli Query String: "+query);
  out = XML.query(value,query);
  out = XML.query(out,'/Display/@IdRow');
```

Solved with JavaScript Preproc:

- XML.query
- Array.push

Still *waiting* interesting enhancements

- **Ability to show LLD MACRO output** → ZBXNEXT-6812 (see if LLD macros are correctly populated)

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Thank you!

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