Open Source MANO

OSM-MR#9 Hackfest
Day 1: Adding Monitoring to VNFs

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Current Architecture & Features

OSM Service Assurance

Service Assurance MDG

Main components

MON

- Covers the basic uses cases, with a solid architecture to expand them easily.
- Opportunities to enhance usability.

POL

- Designed around the autoscaling use case.
- Starting to cover VNF alarms.

PLA

- Provides computation of optimal placement of NFs over VIMs
- Considers cost of compute/network

Prometheus

- OSM's TSDB for metrics since REL5
- Opportunities to enhance multi-tenancy to match new RBAC capabilities.

Grafana

- Integrates seamlessly with Prometheus.
- Great tool for enhancing usability of the system's Service Assurance

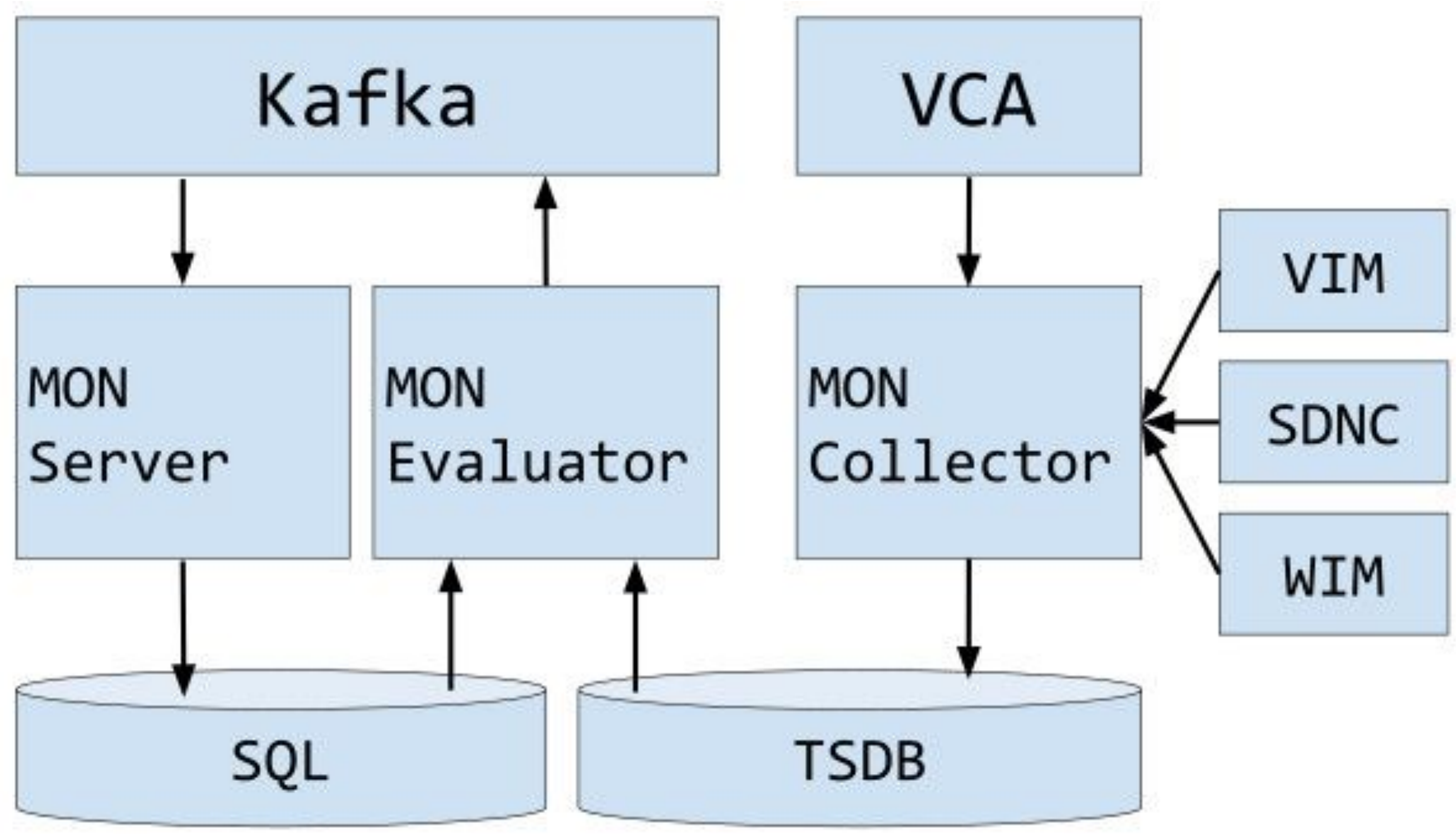
Auxiliary/ Optional

ELK

- Proved seamless integration with OSM.
- Main use case remains at log processing where stack is used.

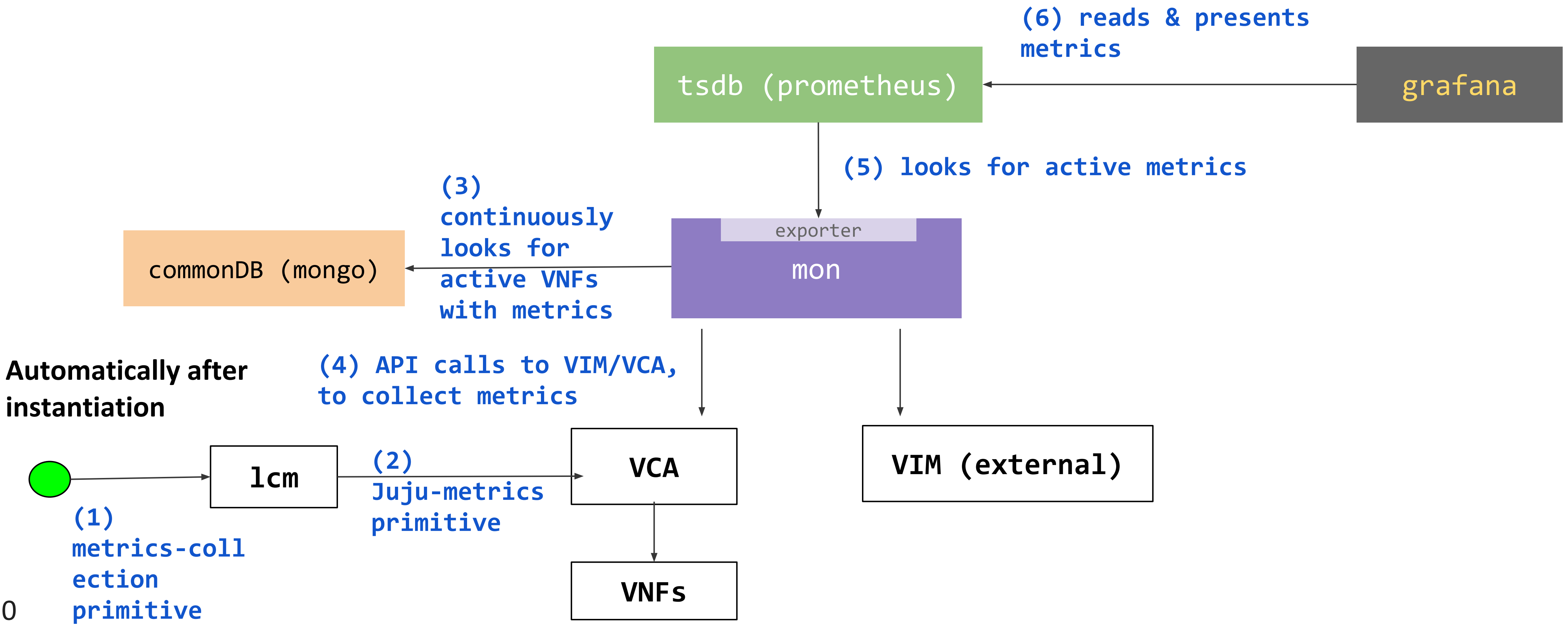
MON Architecture

Formal documentation: https://osm.etsi.org/gitlab/osm-architecture/osm-arch-doc/blob/master/04-mon.md



Collection & Dashboards for Metrics

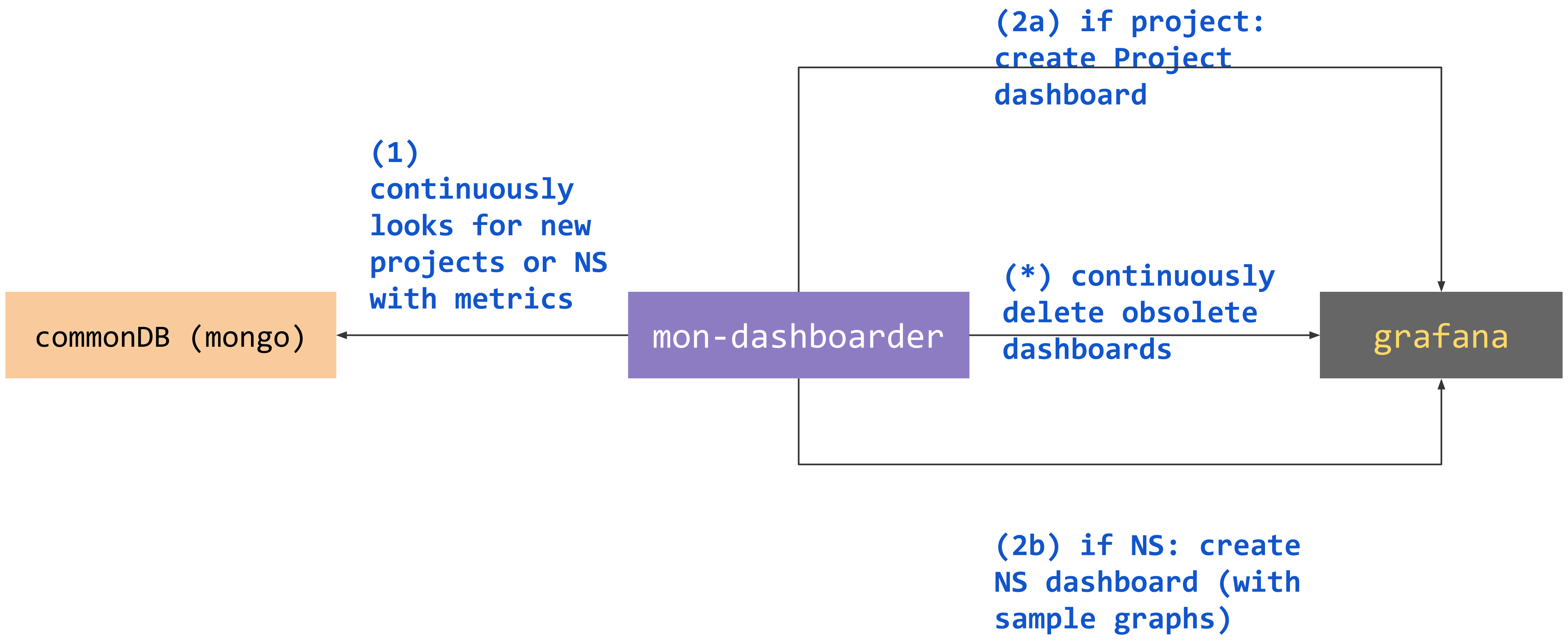
When launching a new instance of a Network Service or Slice Instance (n x VNFs) which is described with the collection of VNF Metrics that come from infrastructure (NFVI), the following components interact.



(6) reads & presents metrics
tsdb (prometheus)
grafana
(5) looks for active metrics
(3) continuously looks for active VNFs with metrics
commonDB (mongo)
exporter
mon
Automatically after instantiation
(4) API calls to VIM/VCA, to collect metrics
lcm
(2) Juju-metrics primitive
VCA
VIM (external)
(1) metrics-coll ection primitive
VNFs

Automatic Dashboards

When creating Projects or Network Services, Grafana dashboards are created automatically and the following elements interact.


commonDB (mongo)
mon-dashboarder
grafana
(1) continuously looks for new projects or NS with metrics
(2a) if project: create Project dashboard
(*) continuously delete obsolete dashboards
(2b) if NS: create NS dashboard (with sample graphs)

Metrics Collection

```
monitoring-param:
    - aggregation-type: AVERAGE
      id: agw_cpu_util
      name: agw_cpu_util
      vdu-monitoring-param:
        vdu-monitoring-param-ref: agw_cpu_util
        vdu-ref: magma-agw-vdu
    - aggregation-type: AVERAGE
      id: agw_memory_util
      name: agw_memory_util
      vdu-monitoring-param:
        vdu-monitoring-param-ref: agw_memory_util
        vdu-ref: magma-agw-vdu
    - aggregation-type: AVERAGE
      id: agw_packets_received
      name: agw_packets_received
      vdu-monitoring-param:
        vdu-monitoring-param-ref: agw_packets_received
        vdu-ref: magma-agw-vdu
    - aggregation-type: AVERAGE
      id: agw_packets_sent
      name: agw_packets_sent
      vdu-monitoring-param:
        vdu-monitoring-param-ref: agw_packets_sent
        vdu-ref: magma-agw-vdu
```

- VDU Metric Collection from VIM

Metrics collection

Prometheus collects the following metrics from “MON Exporter”

Metrics Collection @ OSM				
Metric	**Collection type**	**Behavior**	**KPI**	**Labels**
VIM Status	Infrastructure	By default	status (up/down)	vim_id
SDNC Status			status (up/down)	sdnc_id
VM Status	VNF		status (up/down)	nsr_id, vnf_member_index, vdu_name
VDU CPU Utilization		Enabled by descriptor	utilization, rate, etc.	
VDU Memory Utilization				
VDU Packet forwarding				
SNMP Metrics				

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New Features

OSM Service Assurance

New Execution environments

A new way of interaction between OSM and VNFs

- Helm charts to manage dependencies and new companion pods
- Useful for collecting metrics like SNMP
- New API to send primitives (Day 0/1 configuration)
- Fully customizable new endpoints for the API

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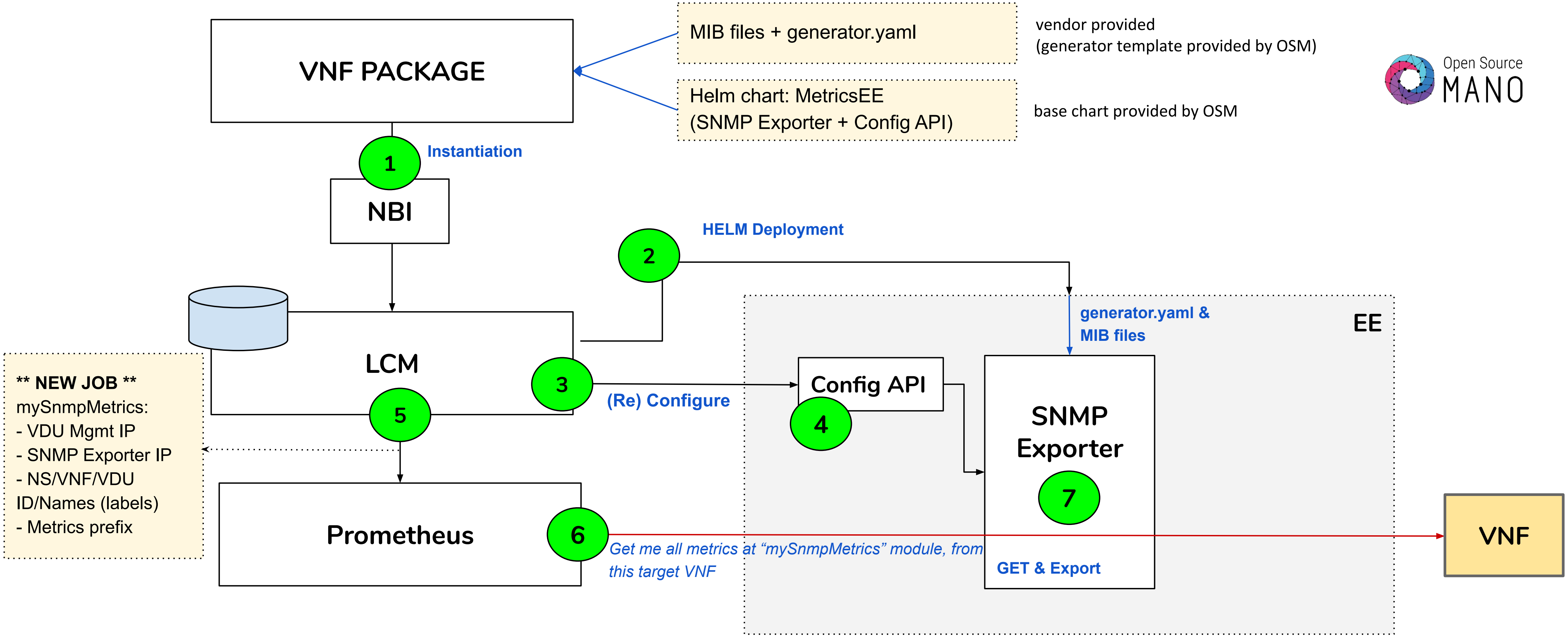
New methods for VNF Indicator Collection



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Hands-on!

VNF Monitoring

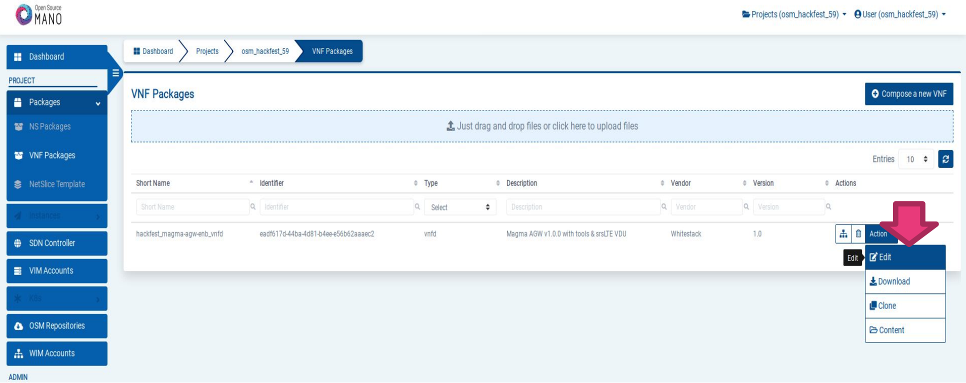
Let’s play with metrics and (auto)dashboards!

- On the already created VNF package make the following changes for VNF package ‘hackfest_magma-agw-enb_vnfd’

Let’s play with metrics and (auto)dashboards!

```
monitoring-param:
-  aggregation-type: AVERAGE
 id: agw_cpu_util
 name: agw_cpu_util
 vdu-monitoring-param:
    vdu-monitoring-param-ref: agw_cpu_util
    vdu-ref: magma-agw-vdu
-  aggregation-type: AVERAGE
 id: agw_memory_util
 name: agw_memory_util
 vdu-monitoring-param:
    vdu-monitoring-param-ref: agw_memory_util
    vdu-ref: magma-agw-vdu
-  aggregation-type: AVERAGE
 id: agw_packets_received
 name: agw_packets_received
 vdu-monitoring-param:
    vdu-monitoring-param-ref: agw_packets_received
    vdu-ref: magma-agw-vdu
-  aggregation-type: AVERAGE
 id: agw_packets_sent
 name: agw_packets_sent
 vdu-monitoring-param:
    vdu-monitoring-param-ref: agw_packets_sent
    vdu-ref: magma-agw-vdu
```

- In the VNF Package editor add the following lined in YAML after line #8



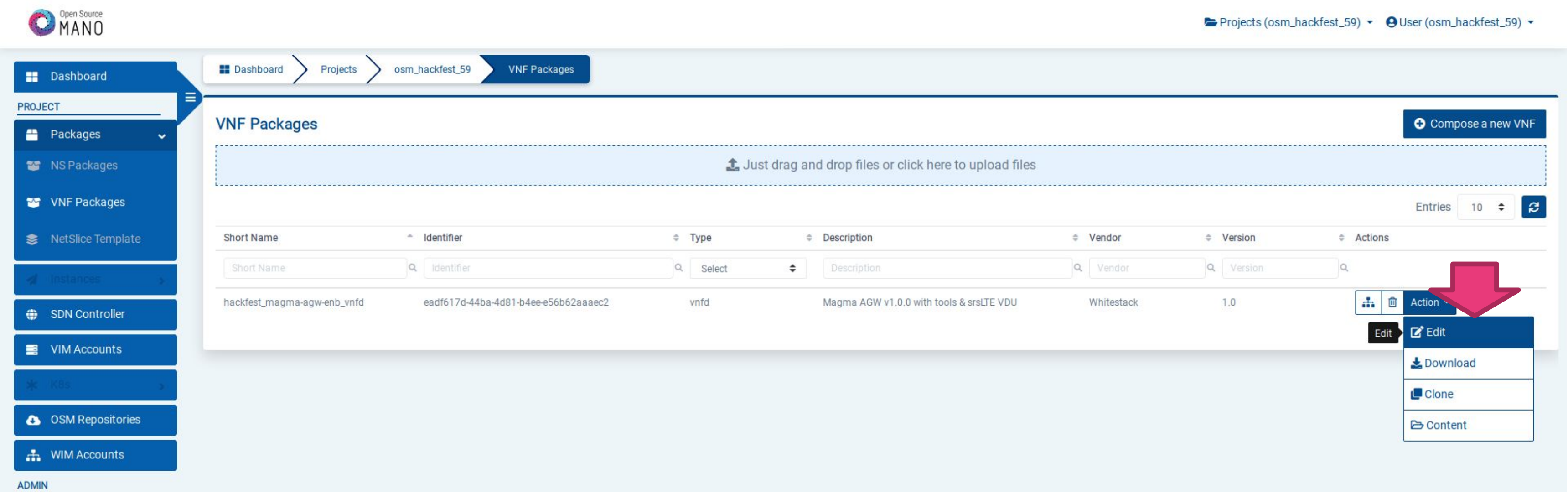
VNF Packages

Short Name	Identifier	Type	Description	Vendor	Version	Actions
Short Name	Identifier	Select	Description	Vendor	Version	
hackfest_magma-agw-enb_vnfd	eadf617d-44ba-4d81-b4ee-e56b62aaaec2	vnfd	Magma AGW v1.0.0 with tools & srsLTE VDU	Whitestack	1.0	Action

Let’s play with metrics and (auto)dashboards!

```
            monitoring-param:
        -    id: agw_cpu_util
              nfvi-metric: cpu_utilization
        -    id: agw_memory_util
              nfvi-metric: average_memory_utilization
        -    id: agw_packets_received
              nfvi-metric: packets_received
        -    id: agw_packets_sent
              nfvi-metric: packets_sent
```

- In the VNF Package editor add the following lined in YAML after line #35/ 61 and update.



VNF Packages

Short Name	Identifier	Type	Description	Vendor	Version	Actions
Short Name	Identifier	Select	Description	Vendor	Version	
hackfest_magma-agw-enb_vnfd	eadf617d-44ba-4d81-b4ee-e56b62aaaec2	vnfd	Magma AGW v1.0.0 with tools & srsLTE VDU	Whitestack	1.0	Action

Let’s play with metrics and (auto)dashboards!

- Delete your previous instance and launch a new one!

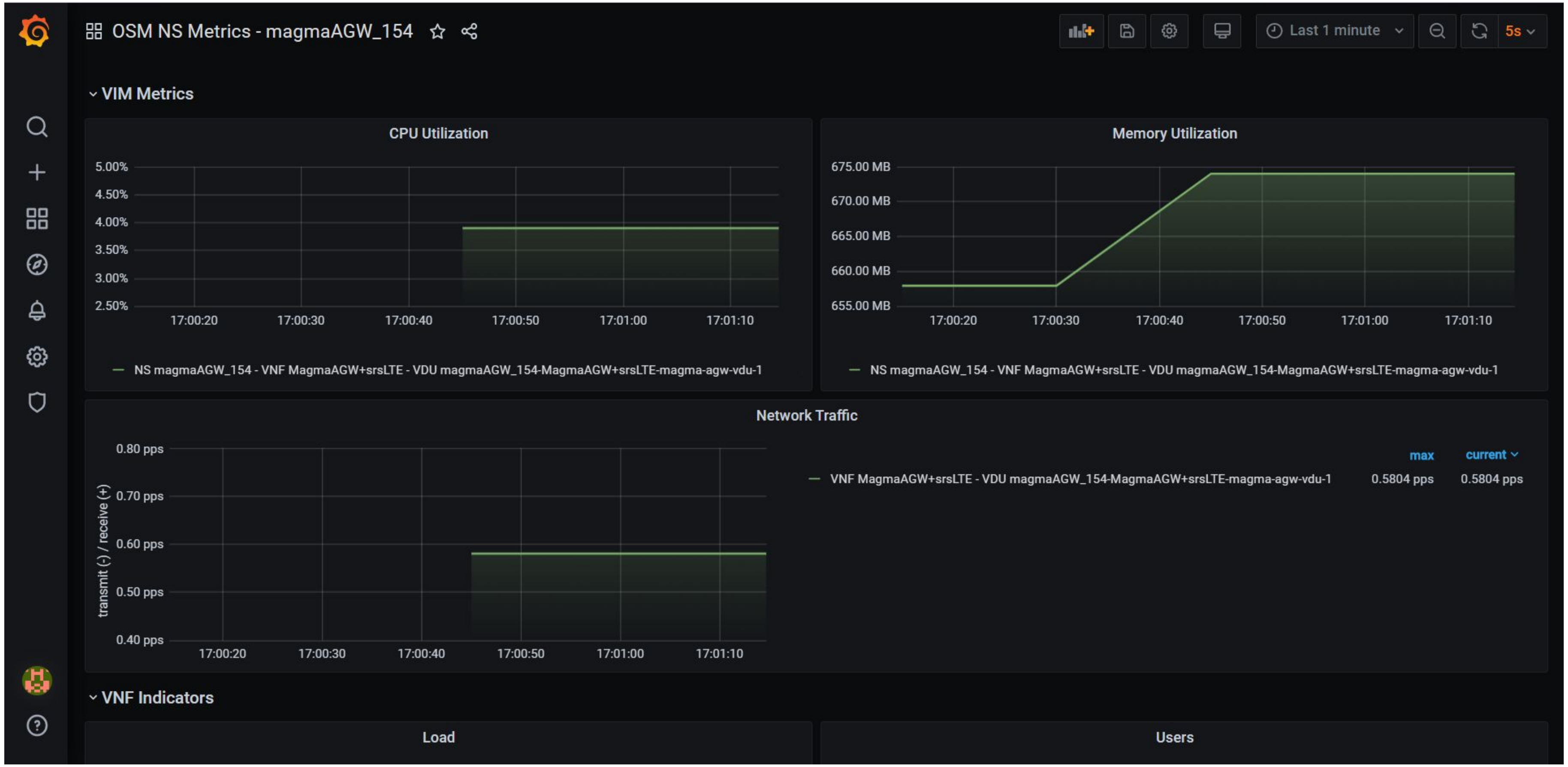
```
$ osm ns-list
$ osm ns-delete ac51ab3d-3972-49c8-9748-a3c22a67a553
```

- Recreate the network service with monitoring enabled.

```
$ osm ns-create --ns_name magmaAGW_x --nsd_name
hackfest_magma-agw-enb_nsd --vim_account etsi-openstack-x --config_file
params.yaml
```

Let’s play with metrics and (auto)dashboards!

Metrics collection is starts (5 to 10 minutes due to current collection period)



Let’s play with metrics and (auto)dashboards!

Let’s play with SNMP metrics!

- First you need to download and install an SNMP exporter Helm Chart:

```
$ helm repo add whitestack http://helm.whitestack.com
$ helm repo update

$ cd ~/magma/hackfest_magma-agw-enb_vnf/
$ mkdir helm-charts
$ cd helm-charts

$ helm fetch whitestack/eechart --untar
```

Let’s play with SNMP metrics!

```
global:
  osm:
    vnf_id: AVNFId

...

ingress:
  enabled: false
  annotations: {}
    # kubernetes.io/ingress.class: nginx
    # kubernetes.io/tls-acme: "true"
  hosts:
    - host: chart-example.local
    paths: []
  tls: []

resources: {}

nodeSelector: {}

tolerations: []

affinity: {}

snmpexporter:
  enabled: true
```

- In helm-charts/eechart edit values.yaml to have snmpexporter as enabled:true (last line)

Let’s play with SNMP metrics!

```
execution-environment-list:
    - id: monitor
      helm-chart: eechart
      metric-service: snmpexporter
      connection-point-ref: vnf-mgmt
initial-config-primitive:
    - seq: 1
      name: generate_snmp
      execution-environment-ref: monitor
config-primitive:
    - name: generate_snmp
      execution-environment-ref: monitor
```

- Edit the VNFD to reference the chart

Let’s play with SNMP metrics!

Or even faster:

```
$ cp /home/ubuntu/examples/02-snmp/hackfest_magma-agw-enb_vnfd.yaml
~/magma/hackfest_magma-agw-enb_vnf/hackfest_magma-agw-enb_vnfd.yaml
```

Let’s play with metrics and (auto)dashboards!

- Delete your previous instance and packages:

```
$ osm ns-list
$ osm ns-delete ac51ab3d-3972-49c8-9748-a3c22a67a553
$ osm nsd-delete hackfest_magma-agw-enb_nsd
$ osm vnfd-delete hackfest_magma-agw-enb_vnfd
```

- Recreate the packages with SNMP enabled:

```
$ tar -czf hackfest_magma-agw-enb_vnfd.tar.gz hackfest_magma-agw-enb_vnf/
$ tar -czf hackfest_magma-agw-enb_nsd.tar.gz hackfest_magma-agw-enb_ns/
$ osm upload-package hackfest_magma-agw-enb_vnfd.tar.gz
$ osm upload-package hackfest_magma-agw-enb_nsd.tar.gz
```

Let’s play with SNMP metrics!

- Launch the network service again and watch its metrics at Prometheus

```
$ osm ns-create --ns_name magmaAGW_x --nsd_name hackfest_magma-agw-enb_nsd
--vim_account etsi-openstack-x --config_file params.yaml
```

Let’s play with SNMP metrics!

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