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OSM#9 Hackfest
Hack 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.
- Architecture needs a revisit based on expected use cases.

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

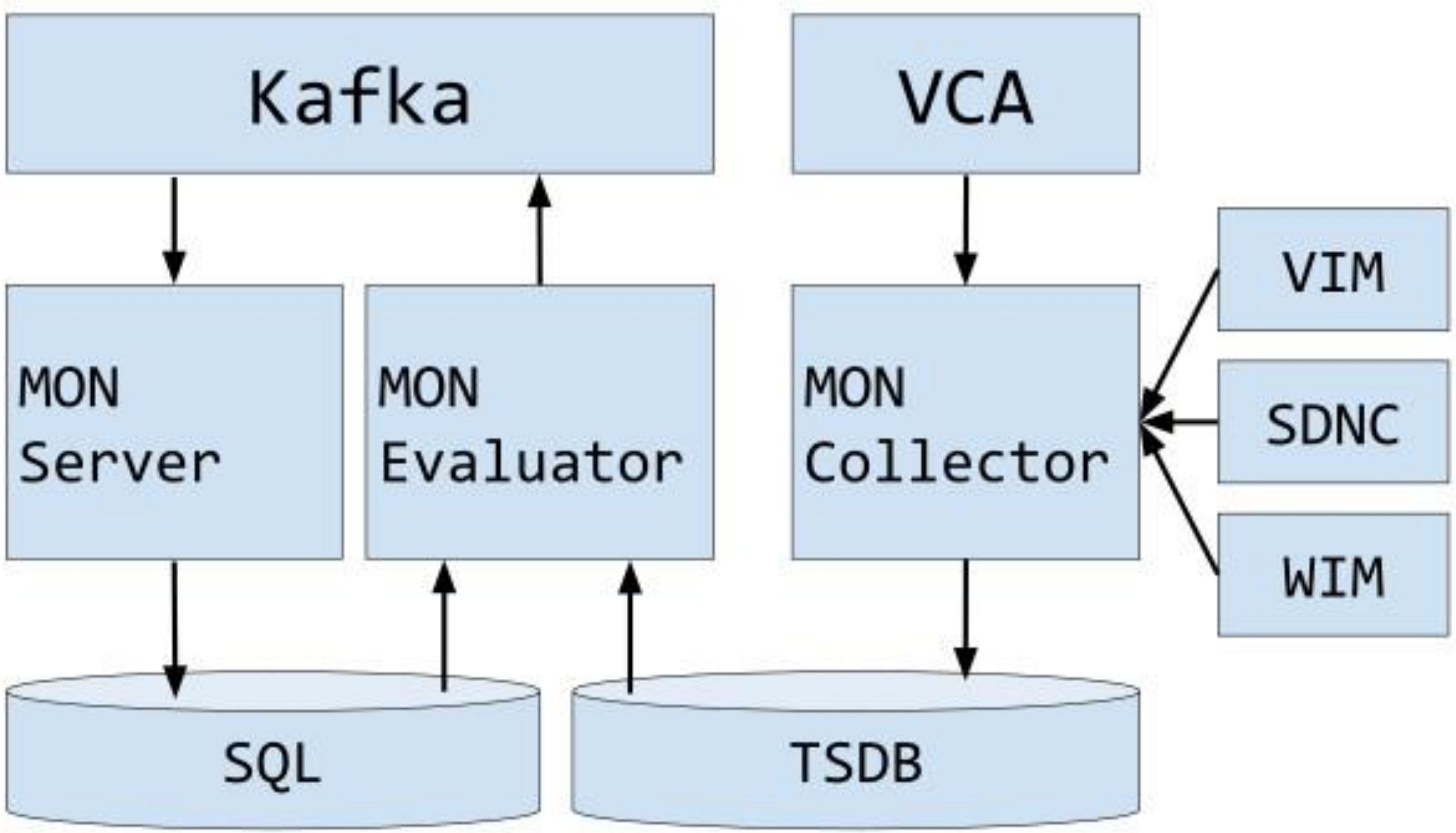
ELK

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

And an upcoming Placement module!

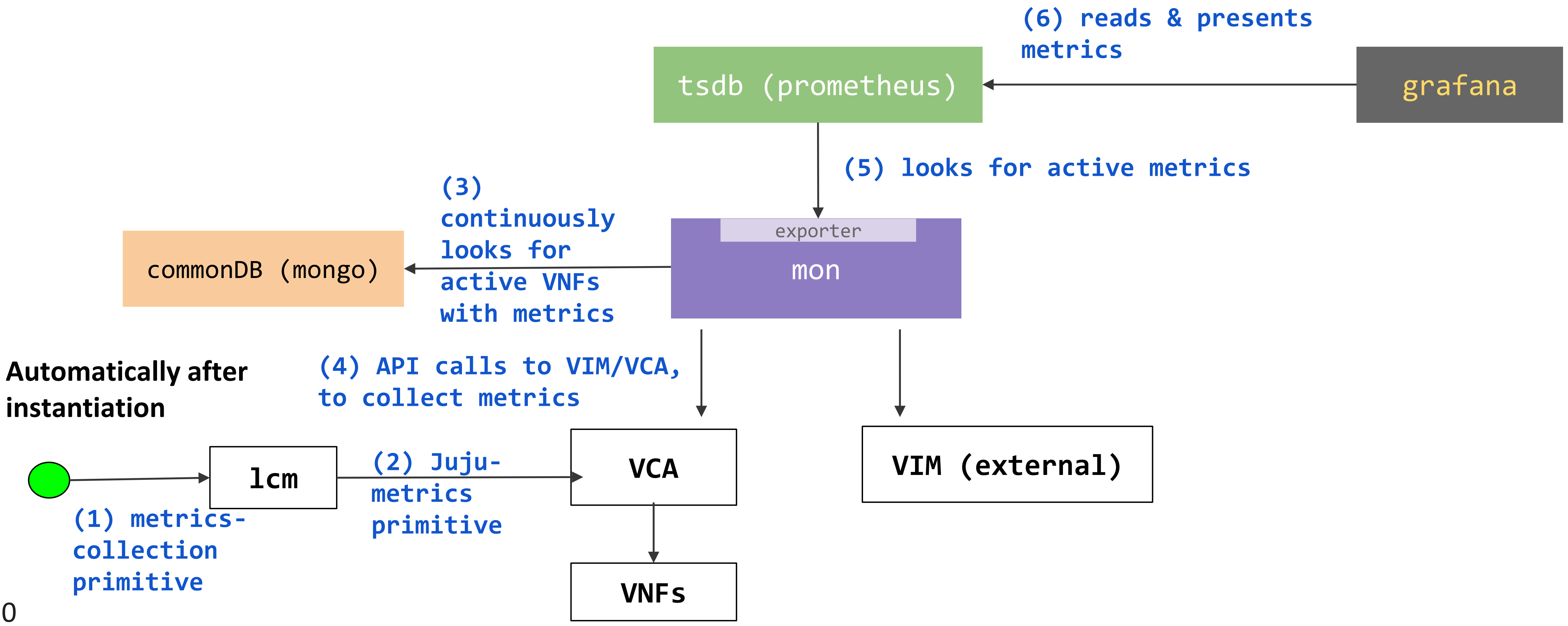
MON Architecture

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



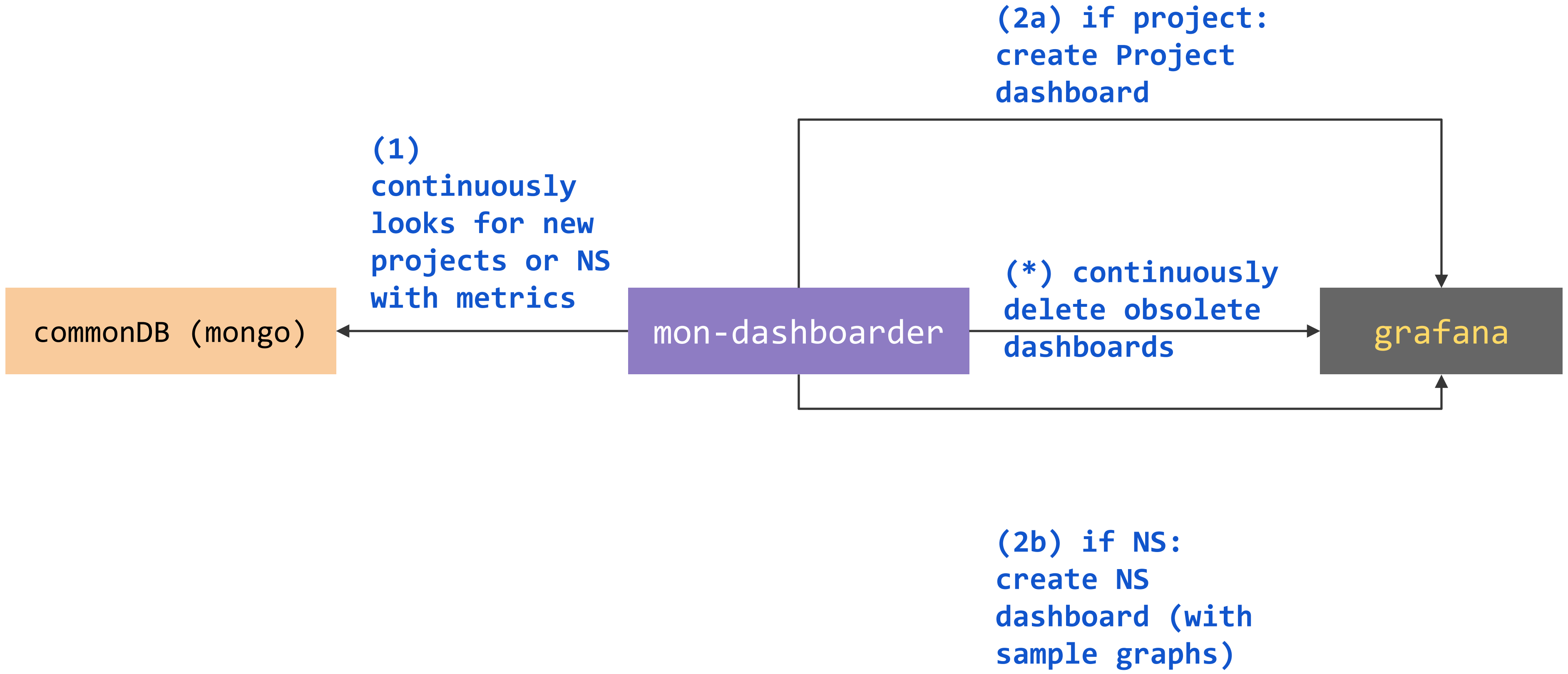
Collection & Dashboards for Metrics

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-collection primitive
VNFs

Automatic Dashboards

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



commonDB (mongo)

(1) continuously looks for new projects or NS with metrics

mon-dashboarder

(2a) if project: create Project dashboard

(*) continuously delete obsolete dashboards

grafana

(2b) if NS: create NS dashboard (with sample graphs)

Metrics Collection

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```
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				
VNF Metrics through Juju *(to be deprecated)*				

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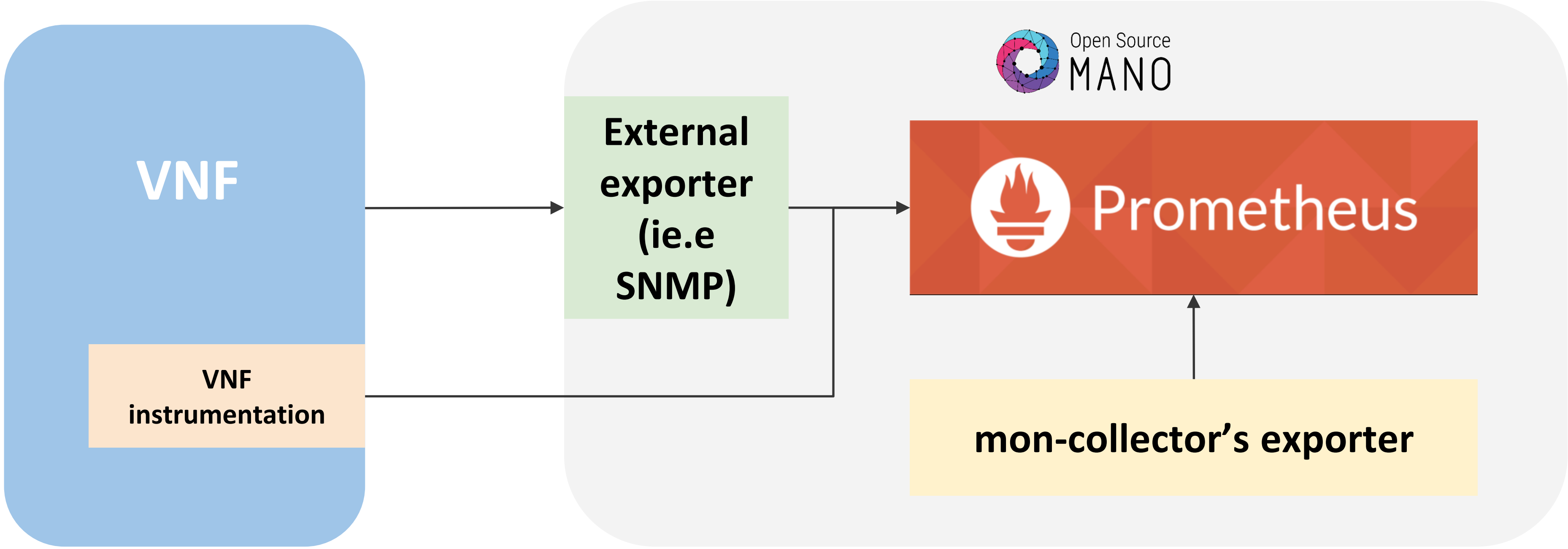
New Proposals

OSM Service Assurance

New methods for VNF Indicator Collection

Objective: Evolve the way OSM collects VNF indicators to allow for more compatibility with VNFs, real-time collection and standards alignment.

A first approach is using additional “Prometheus exporters”



OSM System Metrics

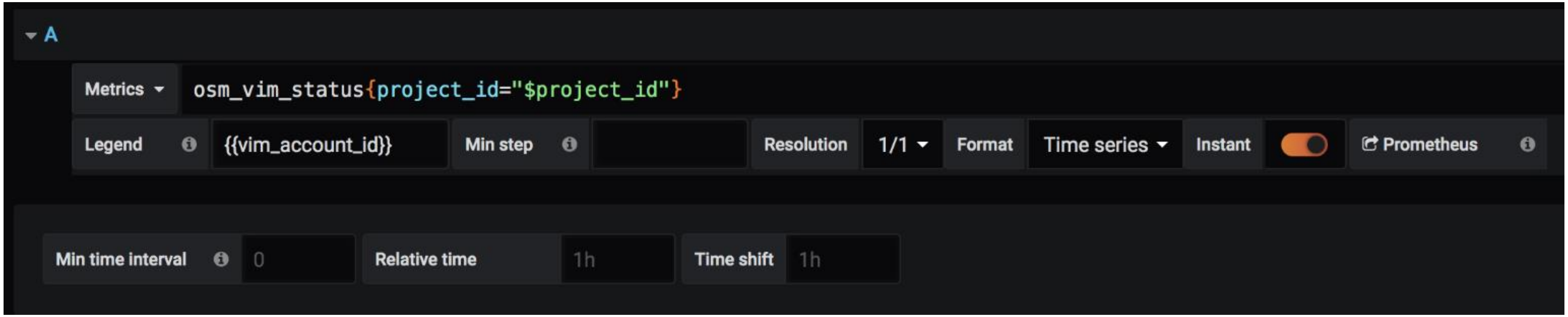
Objective: OSM Operators can install OSM and immediately and permanently know the health of the system.

	Feature 7898	Feature 8132
Coverage	OSM on Kubernetes	OSM on Docker Swarm
Additional components	● Prometheus Operator Chart (New prometheus instance, Grafana and different exporters: node, cadvisor, etc.) ● Other charts: MongoDB, MySQL and Kafka exporters	● Grafana promoted to OSM stack. ● Node exporter ● CAdvisor exporter
Implements	Multiple Grafana dashboards for a comprehensive health check of the system.	Single Grafana dashboard with the most important system metrics.

Project-scoped VIM/VNF Metrics

Objective: Follow RBAC structure for metric consumption.

- Prometheus does not support multi-tenancy, other projects need to be explored (e.g. Cortex)
- **Short-term proposal is to add a label for project_id in all Prometheus metrics**



A

Metrics: `osm_vim_status{project_id="$project_id"}`

Legend: {{vim_account_id}}

Min step:

Resolution: 1/1

Format: Time series

Instant

Prometheus

Min time interval: 0

Relative time: 1h

Time shift: 1h

Grafana Dashboard Automation

Objective: adding to the previous feature, a new “MON Dashboarder” component will take care of dashboard “lifecycle”.

Updates in...	...automates these dashboards...	...and these Grafana resources
OSM installation	System Metrics, Admin Project-scoped	Admin-privileges
OSM Projects	Project-scoped (Grafana “team” privileges)	Grafana “team” privileges
OSM Users	-	Grafana users to teams
OSM Network Services	NS-scoped	-

`...Let’s play with the prototype!`

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Hands-on!

VNF Monitoring

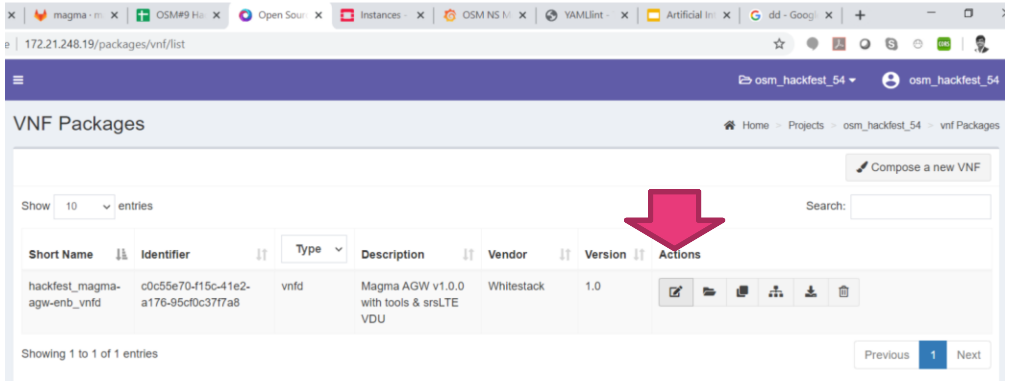
Let’s play with metrics and (auto)dashboards!

- On the already created packages 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 at line #8



VNF Packages

Home > Projects > osm_hackfest_54 > vnf Packages

Compose a new VNF

Show 10 entries

Search:

Short Name	Identifier	Type	Description	Vendor	Version	Actions
hackfest_magma-agw-enb_vnfd	c0c55e70-f15c-41e2-a176-95cf0c37f7a8	vnfd	Magma AGW v1.0.0 with tools & srsLTE VDU	Whitestack	1.0	

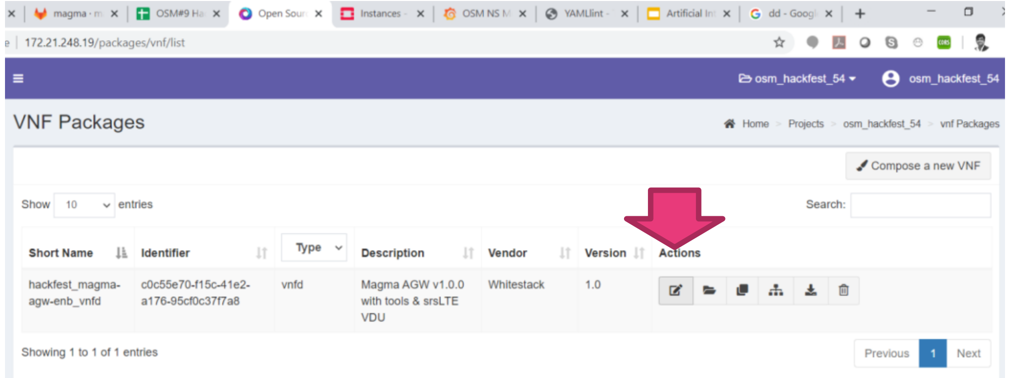
Showing 1 to 1 of 1 entries

Previous 1 Next

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 at line #61 and update.



172.21.248.19/packages/vnf/list

VNF Packages

Show 10 entries

Search:

Short Name	Identifier	Type	Description	Vendor	Version	Actions
hackfest_magma-agw-enb_vnfd	c0c55e70-f15c-41e2-a176-95cf0c37f7a8	vnfd	Magma AGW v1.0.0 with tools & srsLTE VDU	Whitestack	1.0	

Showing 1 to 1 of 1 entries

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

- Delete your previous instance and launch a new one!

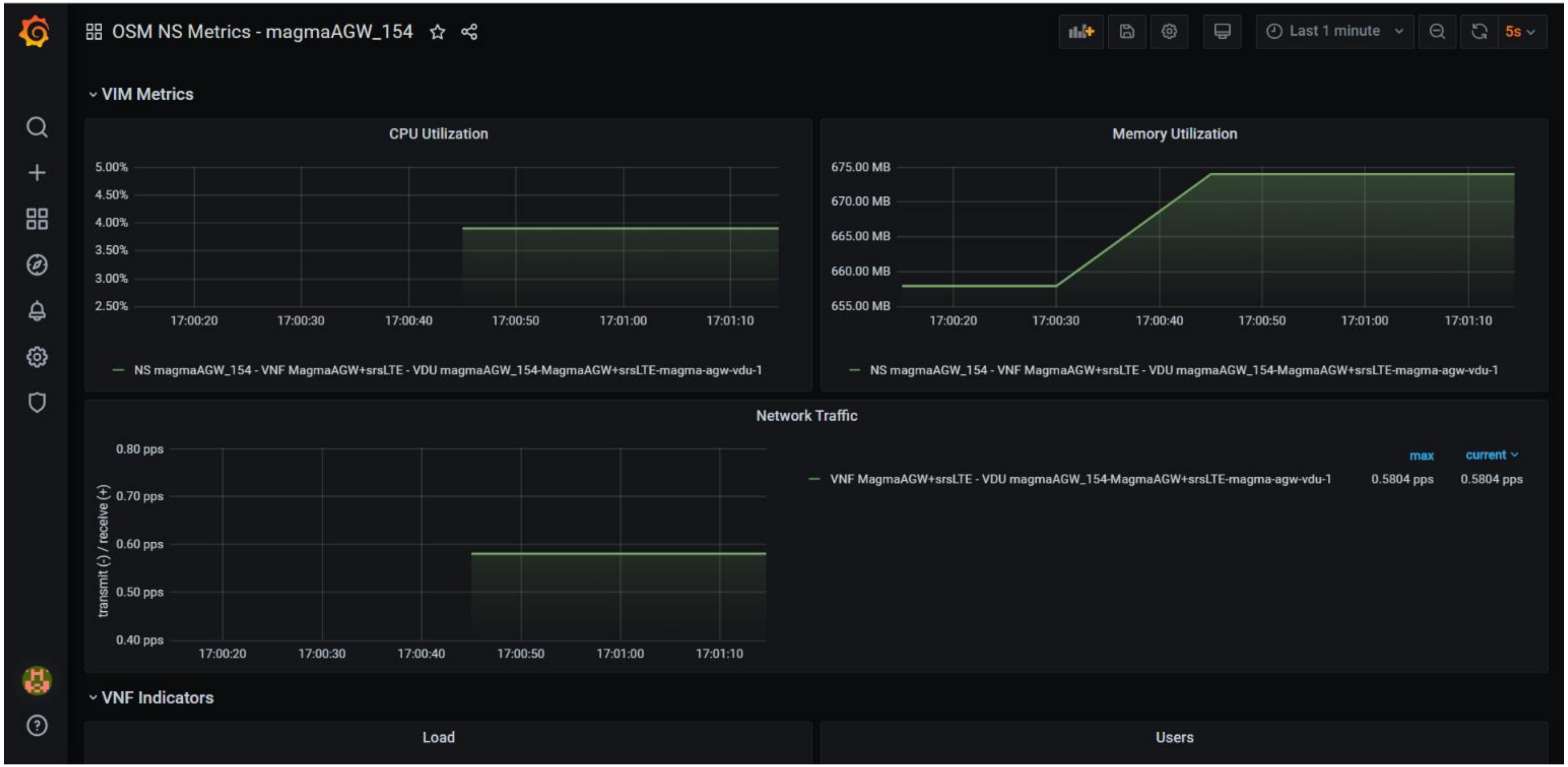
```
$ osm ns-list
$ osm ns-delete ac51ab3d-3972-49c8-9748-a3c22a67a553
```

- 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



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