OSM#10 Hackfest
Closed-Loop Operations
Adding Auto-Scaling & Alerting to VNFs
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Current Auto Scaling & Alarms Feature
OSM Service Assurance
Revisiting 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

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

Auxiliary/Optional
Auto Scaling & Alarms Features

Auto Scaling

- Auto scaling allows to automatically scale VNFs with a VDU granularity and based on any available metric.
- Scaling descriptors can be included and be tied to automatic reaction to VIM/VNF metric thresholds.
- Supported metrics are both VIM and VNF metrics.

Alarms

- An internal alarm manager has been added to MON through the 'mon-evaluator' module, so that both VIM and VNF metrics can also trigger threshold-violation alarms and scaling actions.
Revisiting MON Architecture

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

Formal documentation: https://osm.etsi.org/gitlab/osm-architecture/osm-arch-doc/blob/master/05-pol.md
When configuring alarms associated to scaling actions or just webhook notifications (through the VNFD), the following components interact.

- **commonDB (mongo)**: continuously looks for configured alarms at VNF record.
- **mon-evaluator**: queries for metric values.
- **tsdb (prometheus)**: when triggered, puts alarm in bus for pol to take actions.
- **pol**: if action is to scale: send to bus for LCM to proceed and store action to commonDB; if action is to notify, send notification to webhook service.
- **webhook service (external)**: notified by pol for actions.
- **lcm**: configured alarms can be queried.

**NBI**: under construction (REL8 - Mid 2020).
The scaling descriptor is part of a VNFD. Like the example shows, it mainly specifies:

- An existing metric to be monitored, which should be pre-defined in the monitoring-param list (vnf-monitoring-param-ref).
- The thresholds to monitor (scale-in/out-threshold)
- The minimum and maximum amount of scaled instances to produce.
- The minimum time it should pass between scaling operations (cooldown-time)
- The VDU to be scaled (vdu-id-ref) and the amount of instances to scale per event (count)
Alarms based on metric thresholds can be sent to webhooks. The alarm descriptor is also part of a VNFD. Like the example shows, it mainly specifies:

- An existing metric to be monitored, which should be pre-defined in the monitoring-param list (vnf-monitoring-param-ref).
- The thresholds to monitor (alarm-threshold)
- The webhook to be invoked url
Hands-on!
Auto Scaling & Alerting
Let’s play with metrics and (auto)dashboards!

- We will use slice created previously and stress the VDU of AGW VNF

**This is your IP**
Let’s play with metrics and (auto)dashboards!

- Login to AGW VM from your OSM command line
  
  $ ssh magma@172.21.248.106

- Increase CPU load with this command. Not down the process id.
  
  $ yes > /dev/null &


- Observe increase in CPU load and eventually a new VDU is created through auto scaling.
Let’s play with metrics and (auto)dashboards!

- Check webhook invoked at https://webhook.site/ when alarm is generated.
- Now locate the IP of the process and kill it to reduce the extra CPU load

  $ kill 3904

- Observe decrease in CPU load and eventually a additional VDU is deleted.
New Proposals
OSM Service Assurance
Closed-loop automation powers autonomous networks.

1. Observe
Collect network metrics through different telemetry interfaces.

2. Decide
Processes collected metrics to determines the network status, decides action to be taken based on network policies. This phase is not responsible for executing the action.

3. Act
Acts upon orchestrated object and implements given lifecycle action.
Auto-Scaling & Alarms – New Architecture

VIM Alarms (aodh)

VNF metrics (prometheus)

OSM VNF Metric Exporters

VNF Alarms (ex. snmp traps → webhook)

(1a) Aodh notification

(1b) AlertManager notification

(1c) Custom webhooks

(2c) if action is to scale: send to bus for LCM to proceed and store action to commonDB

(2d) if action is to notify, send notification to webhook service

In the future, POL could act upon combined alarms

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OSM#10 Hackfest - Closed-Loop Operations
Auto-Scaling & Alarms – New Architecture

• Setting threshold on correlated metrics (multiple metrics)
• Move away from threshold to dynamic ML based anomaly detection
Thank You !!

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