ETSI NFV #19 SpecFest Denver 2017
VNF Scaling with Nokia VNFM

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Agenda

1. ETSI NFV
   Nokia VNF Manager

2. Nokia VNFM API
   Open API documentation

3. VNF lifecycle management
   Hands on exercise with VNF scaling

4. Conclusions
Nokia VNF Manager
Nokia Cloudband Application Manager
Inside and outside

- Create
- Delete
- Instantiate
- Heal
- Terminate
- Scale

- Or-Vnfm (NFVO) API
- Ve-Vnfm-Vnf (VNF commissioning)
- Ve-Vnfm-Em (EMS) API
- Vi-Vnfm (VIM) API
- Open Templating system
- Customizable VNF Lifecycle mgmt.
- Full blown cloud resource management

Nokia VNFM API
Nokia CloudBand Application Manager
VNFM API Capabilities based on ETSI NFV IFA 007 / IFA 011

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VNF lifecycle management
Hands on demo: how to scale a VNF
VNFM lifecycle management
Aspect based scaling in ETSI NFV SOL 003

Recap
- Two scaling aspects: service and dbBackend.
- An aspect can be scaled by steps
- Each aspect can be scaled out to its maximum
- Each aspect can be scaled in to 0.
- Selected elements are instantiation levels, e.g. yellow (small) or blue (large)
VNF Lifecycle Management
Demo application building blocks

**Service Node**
- Accepts SQL queries from external clients
- Stateless

**Database Backend**
- Stores the application data
- Responds to the service node queries
- Stateful
VNFM lifecycle management
Demo application: let’s make it scalable

Service Nodes

Static nodes

DB Backend Nodes

Steps: 0 ... M

Steps: 0 ... N

Access network

Internal network

DB sync network

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Two scaling aspects are used to test multi-dimensional scaling.

- The default instantiation level is “small”, which contains:
  - 3 backend nodes as static resources
  - 1 scaling step for serviceNodeAspect having 2 Service nodes

- Scaling is performed by adding / subtracting one or more steps.

- Scaling is limited by caps in both aspects.

Host level Anti-Affinity rules applied for the for both static and scaled out VMs.
VNF Lifecycle Management – Open API Schema

Nokia CBAM VNF Implemented Scale Operation

```
'/vnfs/{vnfInstance_id}/scale':
  post:
    description: Scales the VNF according to the given parameters
    parameters:
      - $ref: '#/parameters/vnfInstance_id'
      - name: scaleVnfRequest
        description: Input parameters for the scaling operation
        required: true
        in: body
        schema:
          $ref: '#/definitions/ScaleVnfRequest'
    responses:
      '202':
        $ref: '#/responses/operationExecutionCreated'
```
VNF Lifecycle Management – Open API Schema
Nokia CBAM Planned VNF Scale Operation

```
'\{vnfInstanceId\}/scale'

post:

description: Scales the VNF according to the given parameters

parameters:
  - $ref: '#/parameters/vnfInstanceId'
  - name: scaleVnfRequest
description: Input parameters for the scaling operation
required: true
in: body

schema:
  $ref: '#/definitions/ScaleVnfRequest'

responses:
  '202':
    $ref: '#/responses/operationExecutionCreated'
```

REST operation path
Input parameters
HTTP method
HTTP responses
VNFM lifecycle management
Demo Environment: VIM type and structure

**OpenStack**
- Keystone
- Heat
- Nova
- Neutron
- Cinder
- Glance

**Region - RegionOne**
- 1 Controller
-compute a
  - 4 Compute hosts
compute b
  - 2 Compute hosts

**VIM: Red Hat OpenStack Platform 9 (Mitaka)**

**VNFM: Nokia CBAM**
VNF Lifecycle Management
Scale VNF scenario one

• HTTP Request: 
  – Missing HTTP header: valid Oauth2 bearer token
• HTTP Response:
  – HTTP 401 Unauthorized
VNF Lifecycle Management
Scale VNF scenario two

• Pre-check:  
  – Query VNF information:  
    `dbBackendAspect : maxScaleLevel = 8`

• Input:  
  – Scale out `dbBAckend aspect` with 100 steps

• Output:  
  – HTTP 422 – Unprocessable entity
VNF Lifecycle Management
Scale VNF scenario three

- **Pre Check:**
  - VNF Query returns vnf_id and database backend node names: `<vnf_id>`-database*
  - OpenStack Horizon contain three database backend VMs

- **HTTP Request:**
  - Scale dbBackend aspect with 2 steps

- **HTTP Response**
  - HTTP 202 Accepted
  - Asynchronous operation started, takes 7 minutes to complete
  - VNF LCM operation occurrence link in header

- **Post – check**
  - dbBackend aspect increased with two additional nodes
  - OpenStack Horizon contains the five database backend VMs
  - Operation execution finishes successfully.
VNF Lifecycle Management
Scale VNF scenario four

- HTTP Request
  - Scale out while a scale out operation is ongoing
- HTTP Response
  - 409 Conflict
Conclusion
Conclusions

• ETSI NFV IFA 007, IFA 008 and IFA 0011 provide a solid basis for the information model.
• ETSI NFV SOL 002 and 003 are great achievements, providing the required data models and protocol descriptions.
• And it works!

• Open API initiative is useful to ensure interoperability between the components