ONAP Close Loop Control for Edge Cloud with Distributed MultiCloud

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Sept. 2018 Open Networking Summit Europe
Agenda

- ONAP Multi-VIM/Cloud and Edge Automation

- Workshop: Close Loop Control for Edge Cloud with distributed MultiCloud
Challenges of Edge Automation

- **Edge Infrastructure for NFV**
  - Could consist of hundreds of physical data centers of small scale
  - With dynamic changes during their lifecycles
  - Comes with very limited resources which requires good utilization by various intelligent and automated orchestration
  - Requires near real-time close loop automation and aggregation of FCAPS data streaming

- **The challenges**
  - LCM of Edge Infrastructure: On-Boarding, De-Commissioning.
  - LCM of Resource of Edge Infrastructure: Discovery/Updating/Representing.
  - Increase resource utilization while remains flexible
  - Near real-time collecting/aggregating/reacting to FCAPS data/events
ONAP Multi-VIM/Cloud and Edge Automation

- Automating the on-boarding of Edge Clouds
- Supports to policy based VNF placement/homing to Edge Clouds
- Automating the discovery/representation of Infrastructure Resources of Edge Clouds
- Aggregates FCAPS data and Near real-time control on Edge Clouds
MultiCloud automates the on-boarding of Edge Clouds

- Edge Infrastructure with Hundreds of Physical Data Centers
  - Could be a burden for Infrastructure providers.
  - **Multi-Region** could be one of solution to mitigate the pain of O&M for Infra. Providers.
  - ONAP could leverage this multi-region solution to automate the on-boarding process of hundreds of Physical Data Centers into ONAP.
    - ONAP user will fill the access information for the primary region only
    - MultiCloud plugin will discover all secondary regions and register the corresponding cloud regions into AAI.
  - Will be realized in ONAP Multi-VIM/Cloud in Casablanca Release
MultiCloud aggregates FCAPS data and support NRT close loop control on Edge Clouds

- **MultiCloud@Edge**
  - MultiCloud micro-services could be deployed approaching to edge infrastructures
    - Local cache of part of AAI inventory.
    - Synchronization
  - VESAgent in the MultiCloud@Edge
    - Collect FCAPS data of local edge infrastructures
    - Aggregate the data and events according to configuration/policy rules
    - Convert data/events conforming to VES specs, send them back via DMaaP/RESP
    - Policy based Near Real-Time close loop control
Workshop: Close Loop automation for Edge Cloud with distributed ONAP MultiCloud

- This workshop will
  - Showcase how MultiCloud could help ONAP to assure services by close loop control over Infrastructure resources
  - Be featured of distributed MultiCloud on edge clouds and the configurable VESagent to consolidate/aggregate telemetry data
  - PoC to evaluate how distributed MultiCloud to support edge automation by enhancing the close loop control over edge clouds
  - Walk you through the comprehensive process to deploy and provision ONAP, orchestrate VNF and setup close loop control.
Deployment Topology
Control/Data Flow for Close Loop Control

Central Cloud

Edge Cloud

Report FCAPS events

Check VM health

VNF/VM

Central Cloud

VES collector

MultiCloud

DMaaS

DMaaS collector

Policy

Mocking Policy Actor

APPC-LCM-READ

APPC-CL-OUT

SECFault_OU

TPUT

Control/Data Flow for Close Loop Control
Recipes

- **Infrastructures**
  - Central Cloud powered by **Wind River Titanium Cloud**
    - Titanium Cloud is the Carrier Grade OpenStack distribution offered by Wind River
    - Upstreamed to Open Source Communities
      - OpenStack StarlingX project, LFN Akraino
    - Verified and validated with various Open Source community and 3rd party’s offerings
      - ONAP, OPNFV, etc.
    - Most of ONAP Open Labs are powered by Titanium Cloud:
      - ONAP Integration lab
      - CMCC Open Lab and China Telecom Open Lab
  - Edge Clouds powered by **Wind River Titanium Cloud, Distributed Cloud mode**
    - Support distributed subclouds of small scale with HA, high performance, low latency features,
    - scalable from 1 or 2 hardware nodes to many.
Recipes

- Platform
  - Heat templates to deploy ONAP Beijing Release
  - Heat templates to deploy distributed ONAP MultiCloud services
  - Patches to enhance ONAP Robot scripts
  - Mocking Policy Actor to control infrastructure resource
Recipes

- VNF
  - vDNS heat templates

- Tools
  - POSTMAN
  - Curl
Step 1: Deploy ONAP instance to Central Cloud

- Provision OpenStack resources for ONAP instance
  - Admin creates tenant with user, allocate Quota. e.g. tenant “VIM”, tenant user: “demo”.
  - Admin creates flavors, e.g. m1.small, m1.medium, m1.large, m1.xlarge
  - Admin creates shared external network, e.g. “external”
  - Admin uploads images of ubuntu-14.04LTS and ubuntu-16.04LTS, e.g. “ubuntu-14-04-cloud-amd64”, “ubuntu-16-04-cloud-amd64”
  - Tenant user to create keypair, e.g. “onap_key”
  - Tenant user collects: keystone endpoint, OpenStack Region ID, dns list,

- Populate ONAP heat env file
  - Clone demo project
    - $ git clone -b beijing https://gerrit.onap.org/r/demo
  - Populate the parameters to “demo/heat/ONAP/onap_openstack.env”
    - With collected info
    - Further tweaking:
      - dcae_deployment_profile: R2MVP
      - mvim_docker: 1.2.0-STAGING
      - mvim_openstack_docker: 1.2.0-STAGING
Step 1: Deploy ONAP instance to Central Cloud

- Deploy ONAP instance with heat templates
  - Login to horizon and download the access file, e.g. VIM-openrc.sh
  - Launch the ONAP with populated heat template
    - $ source VIM-openrc.sh
    - $ openstack stack create -t onap_openstack.yaml -e onap_openstack.env onap_beijing_heat
  - Wait till the stack is created completed
  - List all ONAP VMs and capture the floating IPs for each VM
    - $ openstack server list

- Healthcheck
  - Now ONAP is to booting up, check the status by robot script on the robot VM:
    - $ ssh -o StrictHostKeyChecking=no -i /home/wruser/.ssh/onap_key ubuntu@<robot_vm_ip>
    - $ sudo docker exec -it openecompete_container /var/opt/OpenECOMP_ETE/runTags.sh -i health h -d ./html -V /share/config/integration_robot_properties.py -V /share/config/integration_preload_parameters.py -V /share/config/vm_properties.py
Step 1: Deploy ONAP instance to Central Cloud

- Portals access
  - If the healthcheck is passed, provision your local hosts resolving file like below:
    - $ cat /etc/hosts
    - 10.12.6.191 policy.api.simpledemo.onap.org
    - 10.12.7.24 portal.api.simpledemo.onap.org
    - 10.12.6.182 sdc.api.simpledemo.onap.org
    - 10.12.5.24 vid.api.simpledemo.onap.org
    - 10.12.6.175 aai.api.simpledemo.onap.org
    - 10.12.5.187 sdnc.api.simpledemo.onap.org
    - 10.12.6.199 so.api.simpledemo.onap.org
    - 10.12.7.25 msb.api.simpledemo.onap.org
    - 10.12.7.25 msb-discovery
  - Browse the portal GUI with url:
  - The user guide can be found:
Step 1: Deploy ONAP instance to Central Cloud

- Build and launch your own robot service
  - Login to Robot VM, build and lunch the robot service with following instruction:

- Build Mocking Policy Actor (multicloud-dmaapclient)
  - Login to Policy VM, build and launch mocking service with following instruction:
    - https://github.com/biny993/onap-multicloud-edge-demo/tree/master/docker4dmaapclient/readme.txt
Step 2: Deploy Distributed MultiCloud to Edge Cloud

- **Provision the Edge Cloud**
  - Similar to Central Cloud

- **Populate heat env file**
  - Download heat template from github
  - Populate the heat env file
    - aai1_ip_addr refers to floating IP of “vm0-aai-inst1” from ONAP on central cloud
    - dcae_ip_addr refers to floating IP of “vm0-dcae” from ONAP on central cloud

- **Deploy distributed ONAP MultiCloud to Edge Cloud**
  - $ openstack stack create -t onap_beijing_edge.yaml -e onap_beijing_edge.env onap_edge_beijing_heat

- **Healthcheck**
  - Execute the same script as central ONAP,
  - Observe the healthcheck status for following components:
    - multicloud-framework
    - multicloud-titaniumcloud
    - msb
Step 3: Prior to VNF orchestration

- Prior to VNF orchestration:
  - Load default customer and distribute model
  - Create complex: clli3
  - On-board the edge cloud to ONAP as a cloud region
  - Register the cloud region to SO
  - Add a customer
  - Associate the cloud region with the customer
  - Instructions can be found
Step 4: VNF orchestration: instantiate NS/VNF/VF module

- To orchestrate a VNF:
  - Instantiate NS, add generic VNF by VID portal
  - Preload data for VF module by robot script
  - Add VF module with VID portal
  - Validate the VF module by OpenStack Horizon
  - Bridge heat resource into AAI
    - Curl command with postman
  - Instruction can be found:
Step 5: Setup Close Loop Control

- To setup the close loop control:
  - Provision mocking policy actor with curl command
  - Provision policy
  - Provision holmes rules with curl command
  - Provision multicloud vesagent with curl command
  - Instruction can be found:
    - https://github.com/biny993/onap-multicloud-edge-demo/tree/master/close-loop
Step 6: Test and observe the Close Loop Control

- To test with this close loop:
  - Simulate VM failures
  - Observing the action upon the failed VM
  - Instruction can be found
Summary and Vision

- **ONAP MultiCloud**
  - Ready for distributed deployment to support edge automation
  - With the complete edge automation solution, it can not only aggregate the FCAPS traffic, but also enable the whole close loop on edge with lower latency to recover from a failure.
  - The VESagent will be enhanced and integrated with clamp/policy project to automate the provision
  - There should be a Policy Actor developed to allow policy control infrastructure resource via multicloud.
Q & A

- ONAP wiki
  - https://wiki.onap.org/

- ONAP discussion mail list
  - https://lists.onap.org/g/main

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