OPNFV and Openstack
Getting Edgy
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What Exactly is The Edge?

• There is only one universally accepted definition for The Edge

David Howell Evans
(Lead guitarist, U2)
“The edge is anything that’s not cloud.” — Keith Townsend, The CTO-Advisor

“The edge is the bumper of a car.” — Anonymous

“Edge computing is compute that’s closer to the consumer.” — Mark Imbriaco, Pivotal

Features For The Edge

- Light weight control
- Resource Heterogeneity
- Remote provisioning
- Hardware/software acceleration
- Autonomous
Where Is The Edge? Telco China Mobile Example

Distance From UE

- 1km: 10us
- 10km: 100us
- 50km: 500us
- 200~300km: 2000~3000km
- 500~1500km: 15~20ms
- 2000~3000km: 40~80ms

Number of Servers per DC

<table>
<thead>
<tr>
<th>Year</th>
<th>Access-level DC</th>
<th>County-level DC</th>
<th>Municipal-level DC</th>
<th>Provincial-level DC</th>
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Retail Example – Clip Art Only

Edge

Stores

Regional Hub

Central Datacentre
Healthcare Example – Also Clip Art

Edge

Sensor Network

IoT Gateway

Central Datacentre
And Why is This Important?

- Faster data processing and analysis
- Less network traffic (backhaul)
- Increased efficiency
- Lower costs
- Increased security/compliance
- Legacy interoperability
What’s Missing from OpenStack?

• Scale (# of edge sites)
  – Single pane of glass at the regional datacentre
  – Services not multi-cloud aware
  – Availability when network not reliable

• Federation
  – Single source of truth for services

• Caching
What is OPNFV?

• Founded in 2015, became LF project 2018
• Integration with other open source projects to meet the needs of NFV requirements
• New Features
• Testing of the entire stack
What is OPNFV Doing?

• Established Edge WG
  – Solicit feedback from End User Advisory Group
  – Provide unified view of activities to collaborate and avoid duplication
  – Maintain list of perceived gaps in upstream
  – Develop position in regards to ETSI MEC
What is OPNFV Doing?

- Collaborating with upstream
  - Defining use cases, test cases
  - Keystone and Glance for edge testing
  - Seeking to integrate StarlingX as scenario
  - Define and create execution environments

- Creating Edge Deployment
  - Define Edge scenario for testing
OPNFV Edge Projects

- Auto – ONAP integration
- C-RAN – Use case definition for mobile radio access networks
- Cloud Edge – Reference Platform
- Clover – VNF containerization
- DPACC – Data plane acceleration
- Rocket – Acceleration API
OPNFV XCI

• Cross (X) Community Installer
• Based on Bifrost/Ironic
• OpenStack installation from Master
• Scale/sizing
  – Mini – everything in VMs on single server
  – HA – 3 controller, 2 compute bare metal
OPNFV Edge Simulation

- **OPNFV XCI**
  - Mini flavour installs OpenStack from master in VMs
  - 2 full OpenStack environments in 1 server
- **Impairment VM**
OPNFV Keystone Federation Testing

- Work in progress
- Set up two sites with network impairment
- Deploy Keystone on both
- Regional site Keystone is IdP
- Edge site Keystone uses Shibboleth as SP
Value of Keystone Testing

• Prove federation works
  – It does, but not the way originally envisioned
• Discover limitations
  – Authentication when network is down
  – Synchronization of passwords
  – Centralized limits enforcement
As a user of Glance, want to upload an image in the regional datacenter and boot that image in an edge datacenter: fetch the image to the edge datacenter with its metadata.
OPNFV Glance Testing

- Image distribution to edge sites
- How is Glance affected by
  - Latency? Packet Loss?
  - Interruption of network
  - Image Size?
Glance Image Caching – Distributed Control

Nova at Edge: autonomy to start instances even if network to Regional is lost
No Nova in Edge: Cannot start instances if Regional to Edge network is lost
OPNFV Investigation Points for Edge

- Acceleration
- Containers and Kubernetes
- OpenStack - light weight
- SDN Controller
- Orchestration
Where Do We Go From Here?

• Participate!
  – OpenStack Edge Working Group
  – OPNFV
  – StarlingX
  – Akraino
  – Airship
References

- https://www.openstack.org/edge-computing/
- https://wiki.openstack.org/wiki/Keystone_edge_architectures
- https://etherpad.openstack.org/p/tripleo-edge-mvp
- https://opnfvdocsdemo.readthedocs.io/en/latest/submodules/edgecloud/docs/development/requirements/requirements.html#
- https://wiki.opnfv.org/display/EC
- https://www.starlingx.io/
- https://www.akraino.org/
- https://www.airshipit.org/
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