Integrating OpenDaylight with OpenStack
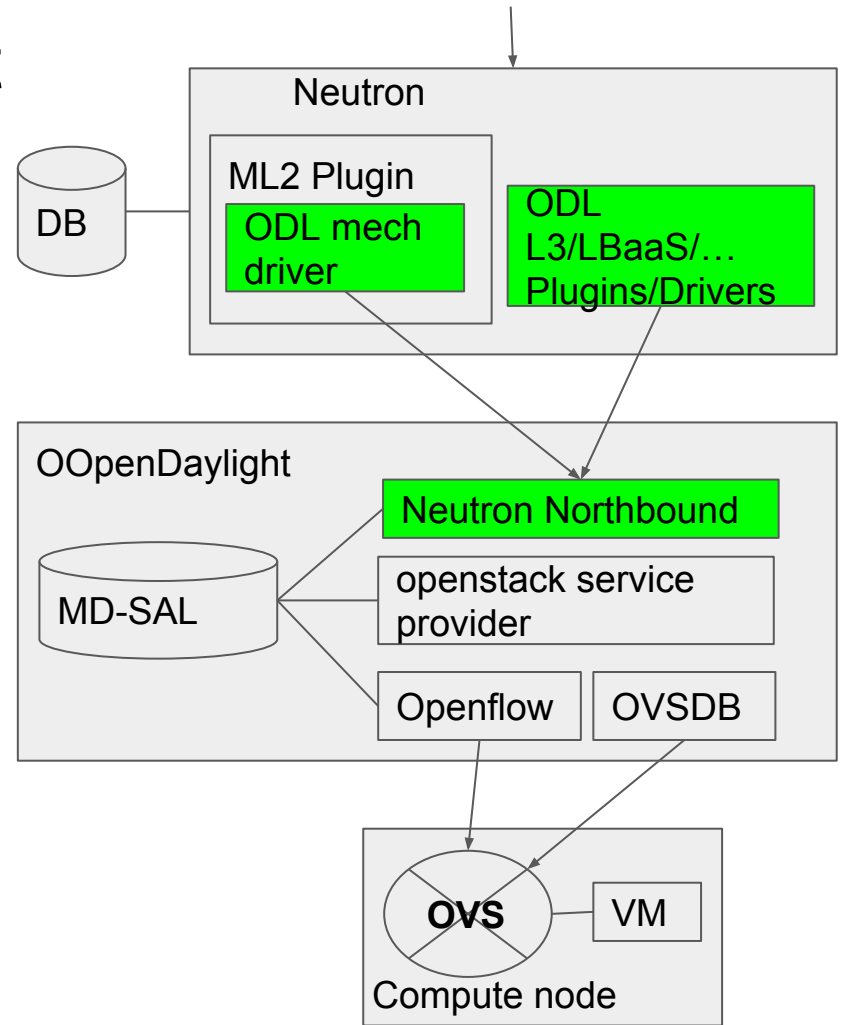
Syncing OpenDaylight with OpenStack Neutron

Isaku Yamahata
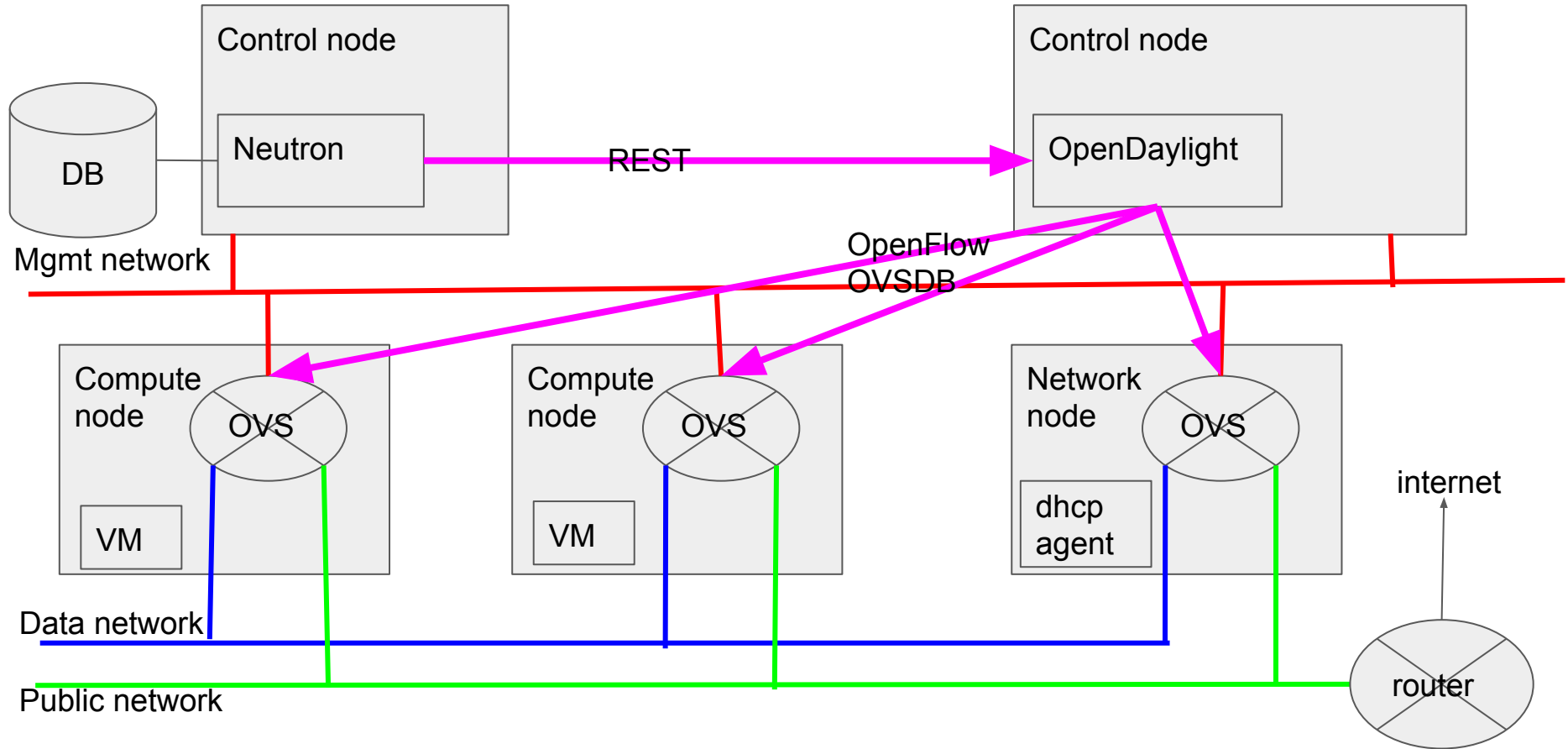OpenDaylight Mini summit: Mar 14, 2016

Agenda

- Opendaylight and openstack
- problem
- v2 driver to overhauling driver architecture
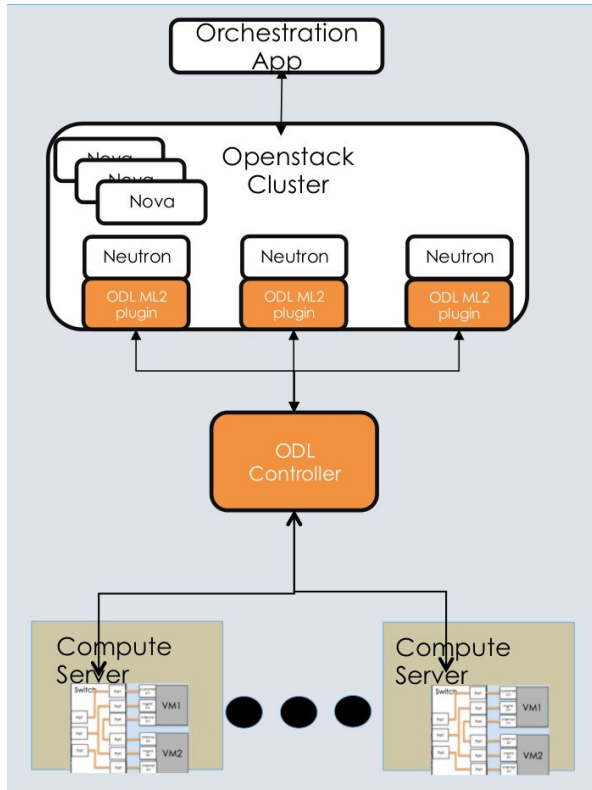- future plan

Openstack and OpenDaylight

- OpenStack Neutron
  - Plugin: Modular Layer 2 Plugin
- networking-odl
  - ODL L3 plugin
  - Drivers for LBaaS,FWaaS, VPNaaS…
- OpenDaylight
  - Neutron northbound
  - OpenStack service providers
    - ovsdb/netvirt, groupbasedpolicy, VTN, lispflowmapper, NIC
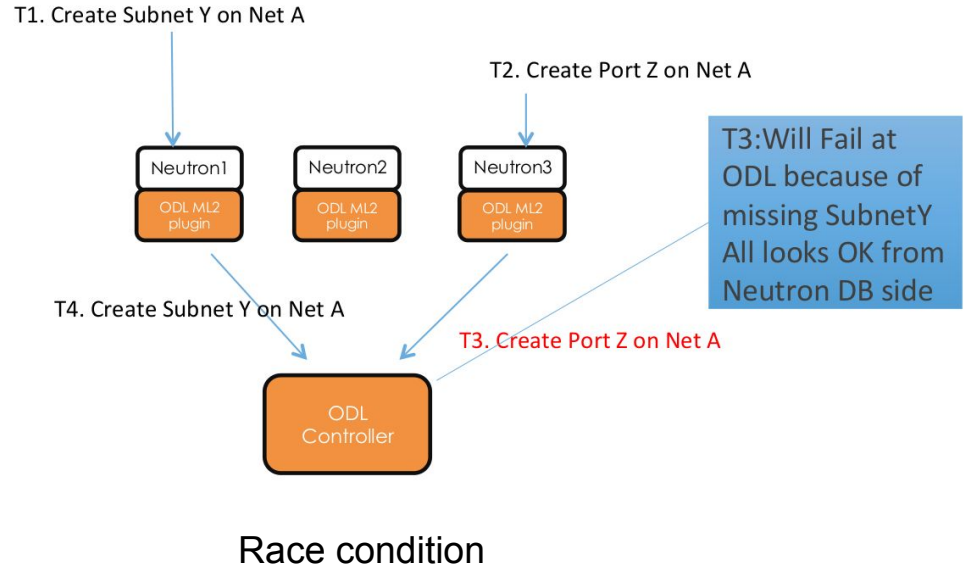 - Southbound protocol
    - openflow
    - ovsdb

Physical view

Problems with the existing driver(v1 driver)

Deployment with Neutorn HA

T1. Create Subnet Y on Net A

T2. Create Port Z on Net A

T3:Will Fail at ODL because of missing SubnetY All looks OK from Neutron DB side

T4. Create Subnet Y on Net A

T3. Create Port Z on Net A

Race condition

Why networking-odl v2 driver?

- There are some gaps with the existing(v1) implementation
  - it was good for PoC, but it's a toy for production environment
  - reported at the last OpenDaylight summit
- It's quite difficult to address the found issues with modifying/enhancing the existing implementation

This effort is started and mainly driven by Arvind Somya and Rich Curran

Eventual goal
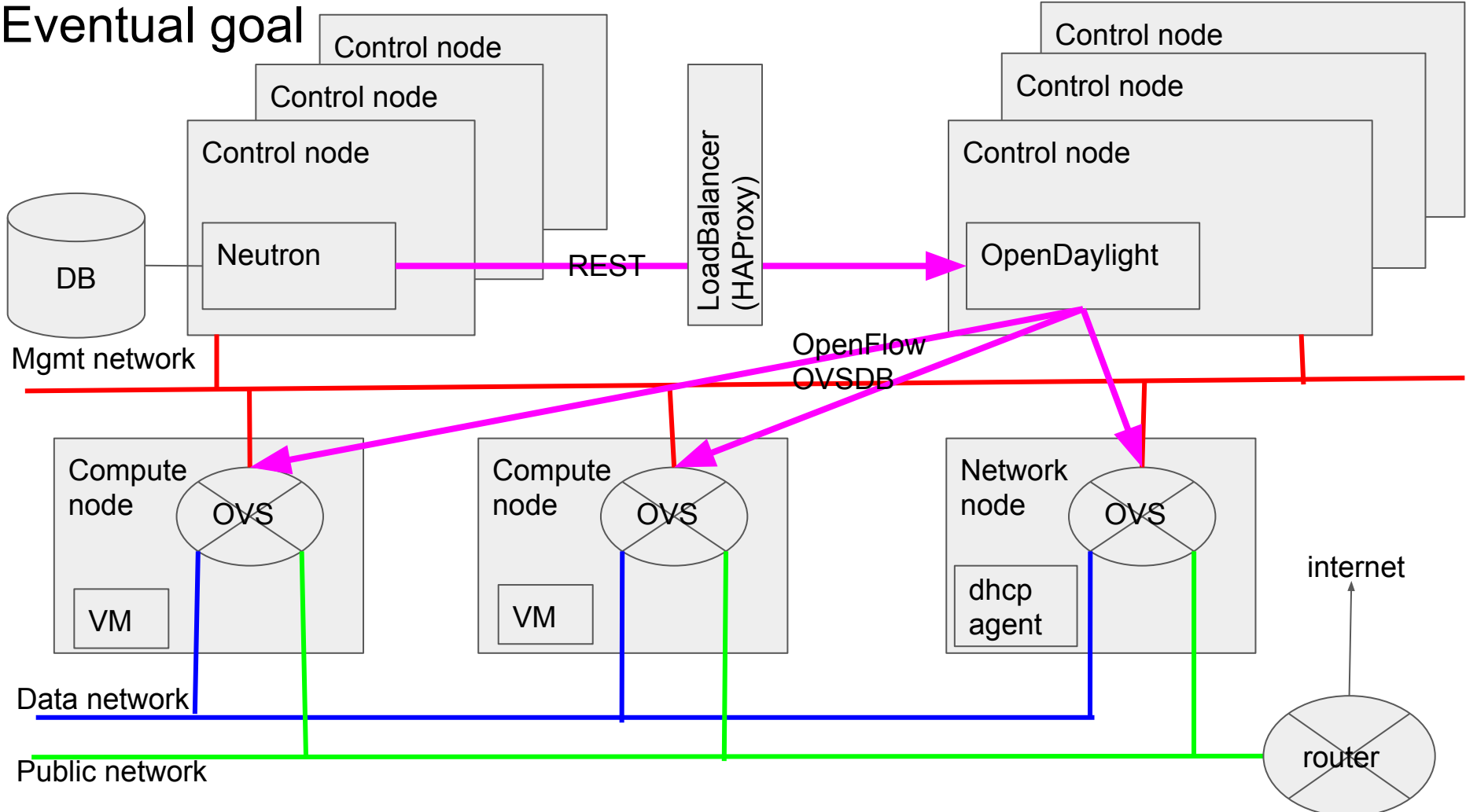
Goal of networking-odl v2 driver?

- Make networking-odl usable in production environment

    - Eliminate race conditions

    - support neutron HA: to have multiple instance of openstack neutron servers

    - Scalability/performance

    - well-tested code

- smooth transition from v1 to v2 driver

- Introduce a solid design for feature

https://wiki.opendaylight.org/view/NeutronNorthbound:NeutronDriverOverhaul

What impact on ODL?

- Goal is to minimize impact on ODL. Ideally no impact

- At first phase, no impact on ODL. just drop-in replacement with the old code
- At second phase, consider modification/enhancement of the communication between networking-odl and OpenDaylight
  - Mainly the modification would be in ODL Neutron Northbound
  - The current openstack-service provider could work without (major) modification
  - For better functionality, modification to openstack service-provider would be necessary
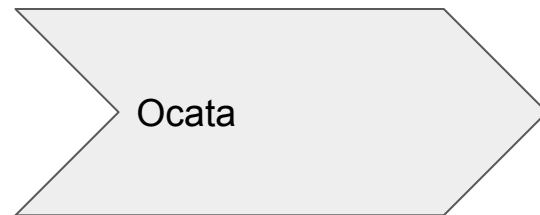
Timeline

Mitaka
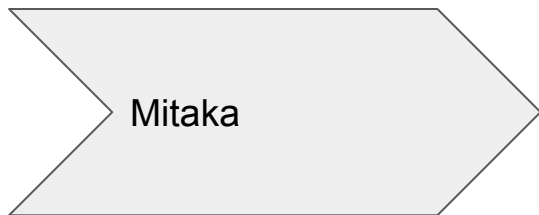
- Introduce v2 driver
- migrate to v2 ODL driver, eliminate the existing ODL driver
- ML2 driver, L3 pluing
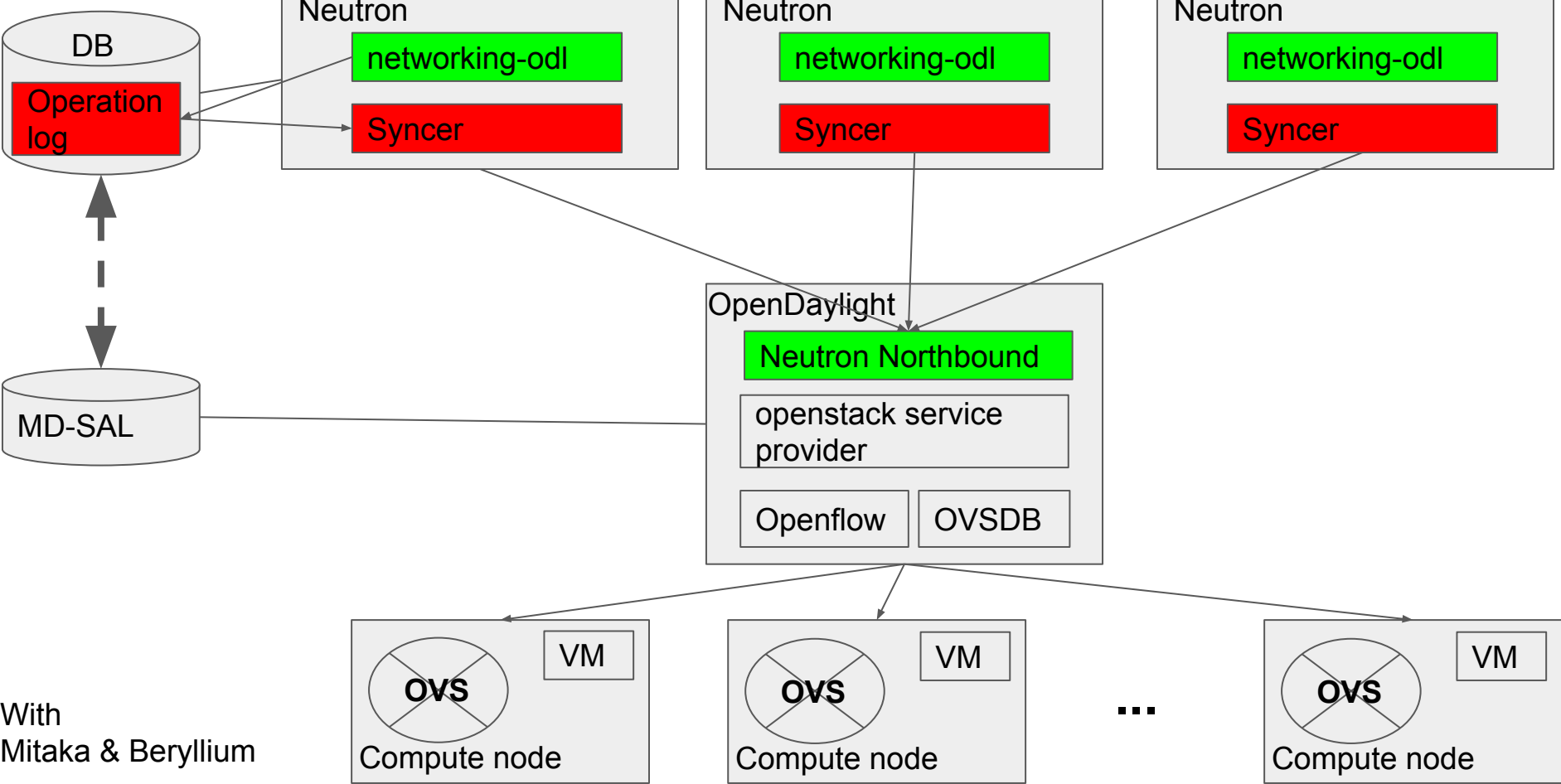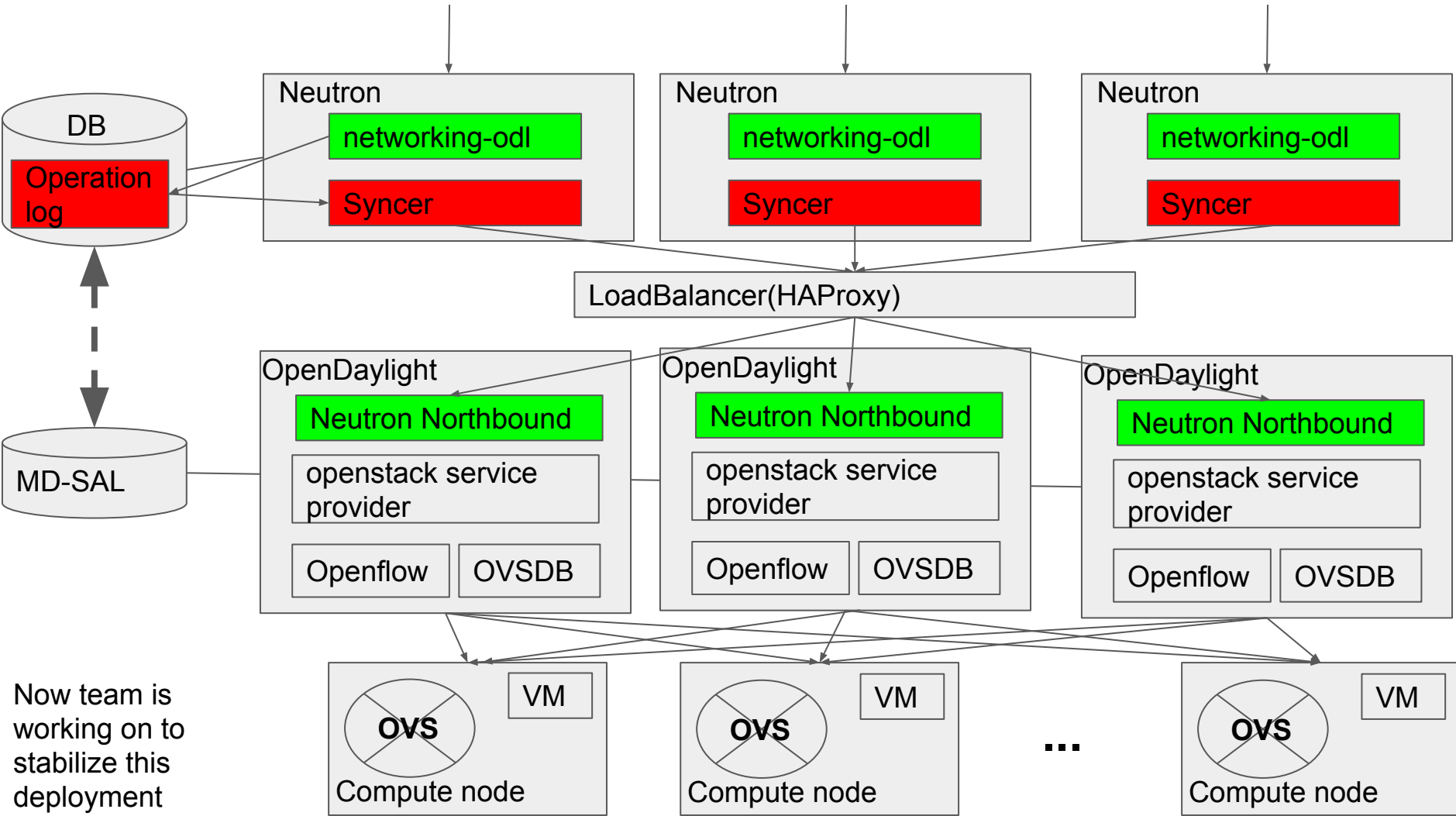- lightweight test framework for neutron HA

Newton

- migrate all services: lbaas, fwaas etc…
- introduce advanced features
  - healing data breakage
  - notification
  - restconf
- evaluation

Ocata

Done!

Architecture ovewview

DB

Operation log

Neutron

networking-odl

Syncer

Neutron

networking-odl

Syncer

Neutron

networking-odl

Syncer

MD-SAL

OpenDaylight

Neutron Northbound

openstack service provider

| Openflow | OVSDB |

VM

OVS

Compute node

VM

OVS

Compute node

...

VM

OVS

Compute node

With
Mitaka & Beryllium

DB
Operation log

Neutron
networking-odl
Syncer

Neutron
networking-odl
Syncer

Neutron
networking-odl
Syncer

LoadBalancer(HAProxy)

MD-SAL

OpenDaylight
Neutron Northbound
openstack service provider
Openflow   OVSDB

OpenDaylight
Neutron Northbound
openstack service provider
Openflow   OVSDB

OpenDaylight
Neutron Northbound
openstack service provider
Openflow   OVSDB

Now team is working on to stabilize this deployment

VM
OVS
Compute node

VM
OVS
Compute node

...

VM
OVS
Compute node

Journaling and neutron HA

JournalEntry

precommit

sync thread
or
postcommit(fastpath)

rest request to ODL
success

PENDING → PROCESSING → COMPLETED
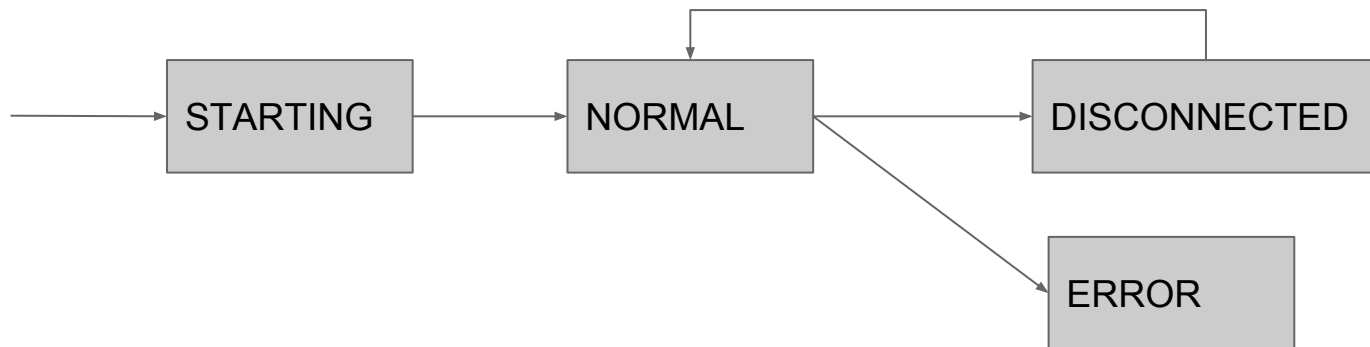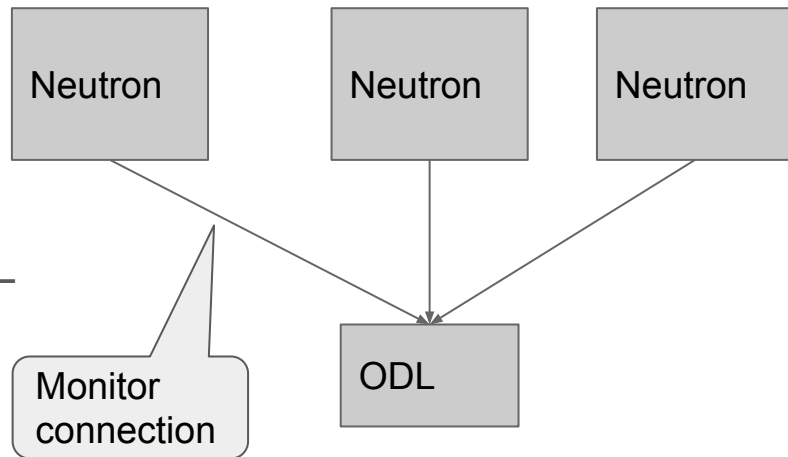
Retry upto X
number of
times

failure even
after X
retries

FAILED
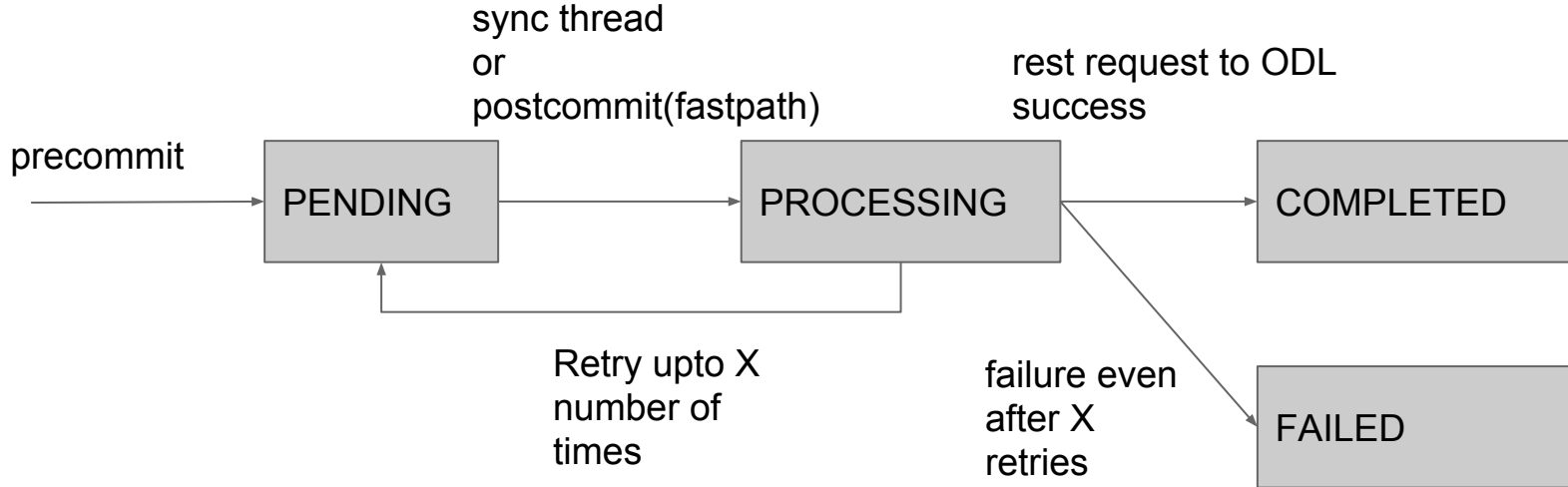
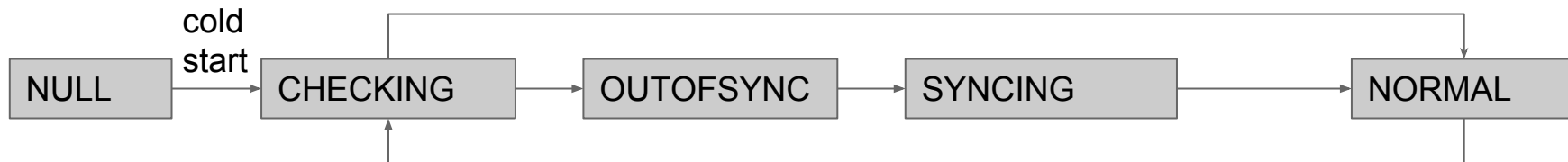BONUS: this introduces resiliency against Neutron Server Crash.

Neutron HA support

- Have multiple instances of Neutron server
- Monitor neutron server state to connect ODL
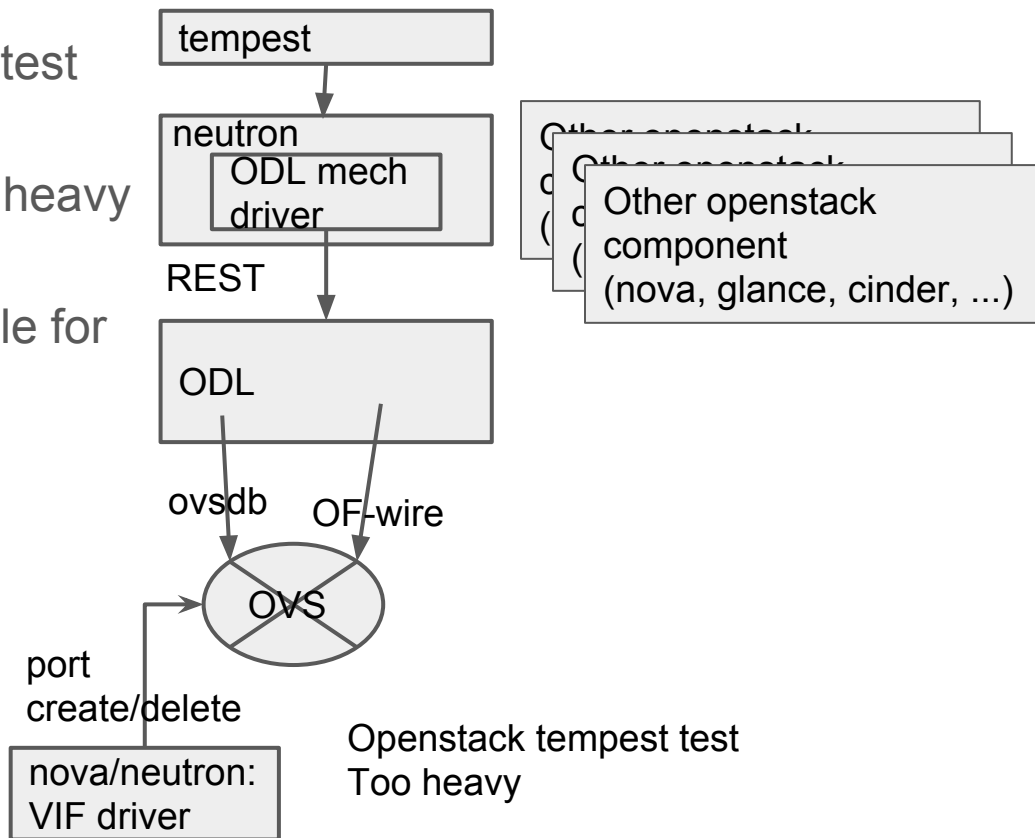- Introduce state machine to track neutron

Full sync

- ODL cold boot(or ODL boot first time)

- (transient) network failure or ODL reboot with persistence

- healing random data breakage in ODL neutron northbound

```
                    cold
                    start
  ┌──────┐       ┌──────────┐     ┌──────────┐    ┌──────────┐       ┌──────────┐
  │ NULL │──────▶│ CHECKING │────▶│ OUTOFSYNC│───▶│ SYNCING  │──────▶│ NORMAL   │
  └──────┘       └──────────┘     └──────────┘    └──────────┘       └──────────┘
```

Test framework

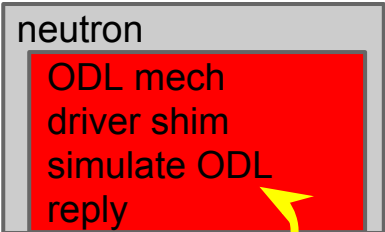# Test framework

- HA logic needs extensive test coverage
- Openstack tempest is too heavy weight
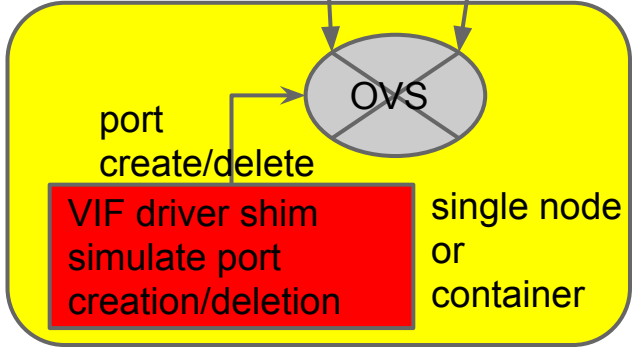- Lightweight test is desirable for developers
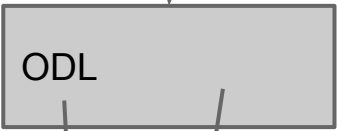
tempest

neutron

ODL mech driver

REST

Other openstack
Other openstack
Other openstack component
(nova, glance, cinder, ...)

ODL

ovsdb   OF-wire

OVS

port create/delete

nova/neutron: VIF driver

Openstack tempest test
Too heavy

Lighter Test Framework

New component

ODL mech driver shim simulate neutron request

REST

ODL

ovsdb   OF-wire

OVS

neutron

ODL mech driver shim simulate ODL reply

allows neutron side test without ODL version match concern

port create/delete

VIF driver shim simulate port creation/deletion

single node or container

neutron test without ODL

ODL only test without openstack

mocking tempest for ODL

New
component

tempest

neutron client
mock

API test

REST

ODL

ovsdb   OF-wire

mock
port
create/delete

OVS

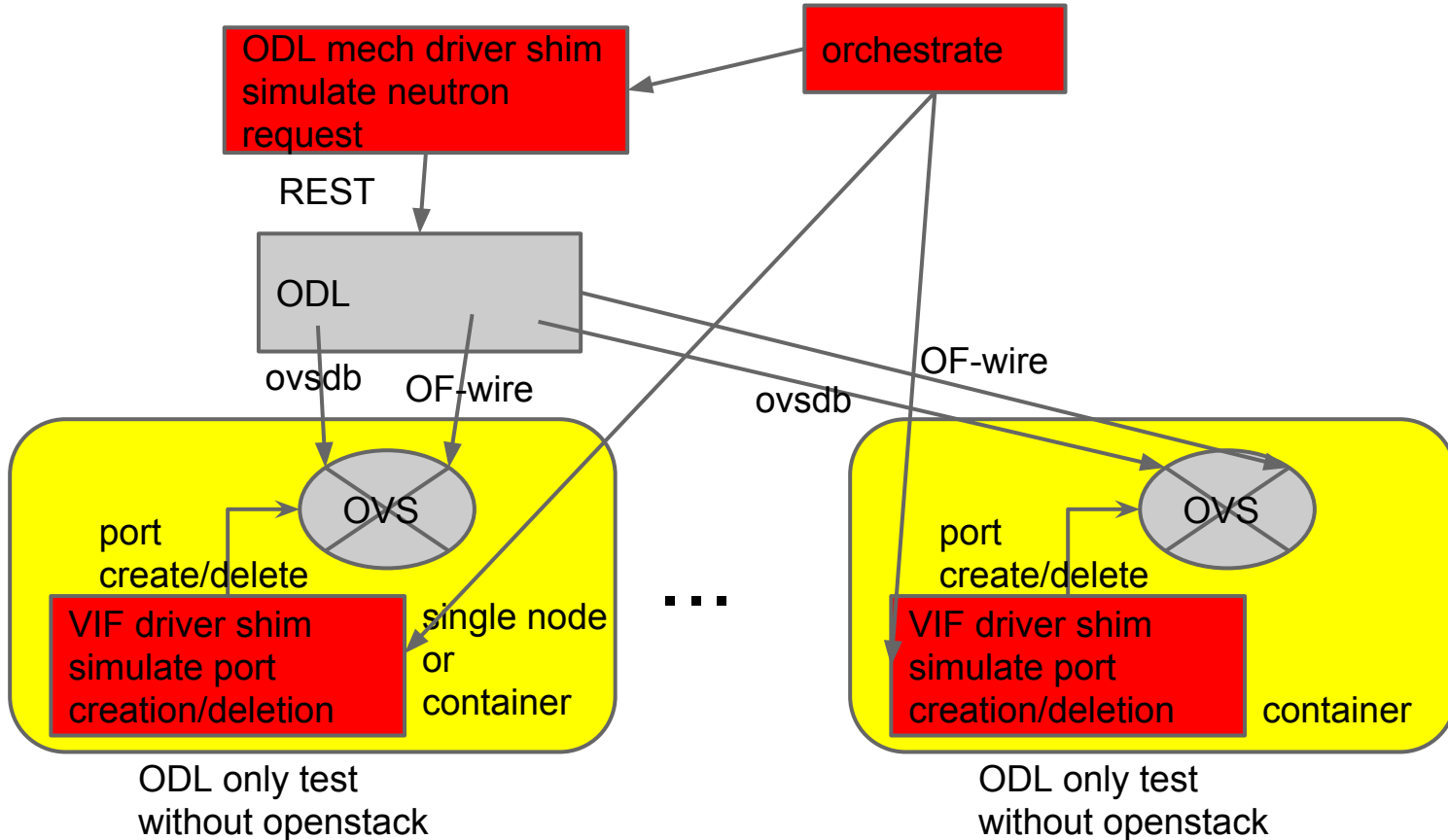cf.
https://github.com/flavio-fernandes/odl-openstack-ci-1/blob/master/tools/createFloat.sh
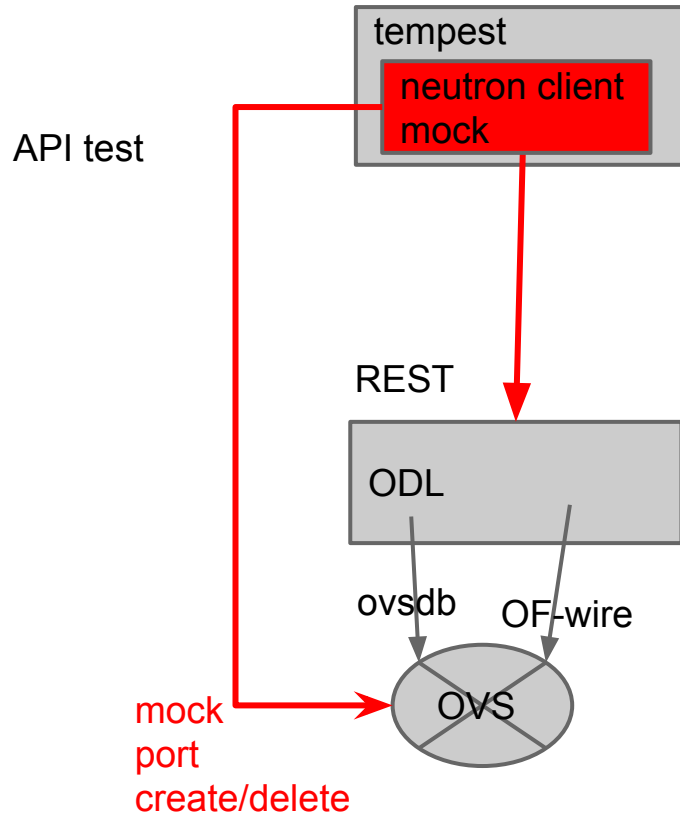
tempest runs only iwth ODL

Multi Node Emulation

Future plan(Newton and Boron)

- Healing of random data out-of-sync
  - Due to bug, user mis-operation, etc...
- Notification from ODL to networking-odl
- Extension discovery
- Switching to custom REST API to RESTCONF(?)
  - Needs to understand upgrade process

Thank you

https://wiki.opendaylight.org/view/NeutronNorthbound:NeutronDriverOverhaul

Openstack summit austin 2016
https://www.openstack.org/summit/austin-2016/vote-for-speakers/presentation/6973
Openstack and Opendaylight: the current status and future direction