Openstack Astara:
A Hands-on Installation & Tutorial Workshop

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Who we are?

- Eric Lopez - Solution Architect @ Akanda
- Phil Hopkins - Principle Engineer @ Rackspace
- Shashank Hegde - Software Engineer @ Arista

Logistics

- Slides:
  - https://github.com/akanda/astara-summit-tutorial/files/Openstack_Summit_Austin_Tutorial.pdf
- Tutorial :
  - https://github.com/akanda/astara-summit-tutorial
- Hands on Lab:
  - See handout for access information

Agenda

- High level architectural viewpoint of Astara
- Tutorial - Install and Configure Astara
- Next Steps:
  - How to contribute and additional information
- Q & A

Astara Core Principle

- Simple
- Compatible
- Open Development (Apache v2 License)

Astara Orchestrator

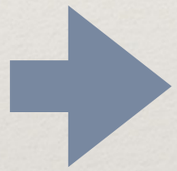
- Control Plane Orchestration
- Logically Centralized
- Pluggable Driver Model
- Multi-Process / Multi-Threaded
- Utilizes standard Openstack APIs & Interfaces for Nova, Neutron and Glance

Astara Architecture

Nova

Neutron

Astara Management/ Orchestration



Astara Adv Services: Routing/LB/FW

OpenStack APIs

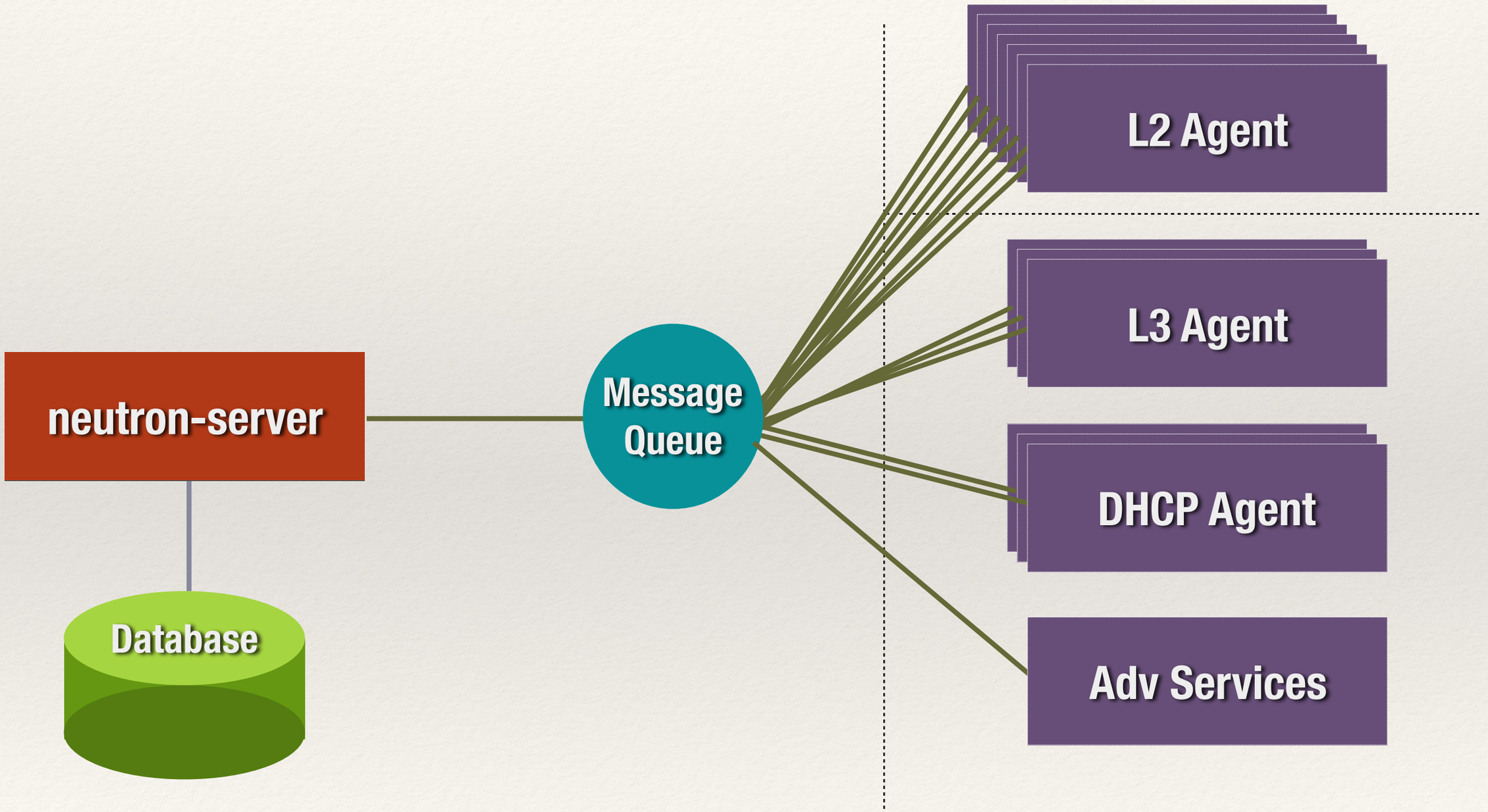
Astara L2 Agnostic Overlay Support

Open:OVS/LinuxBridge

Proprietary

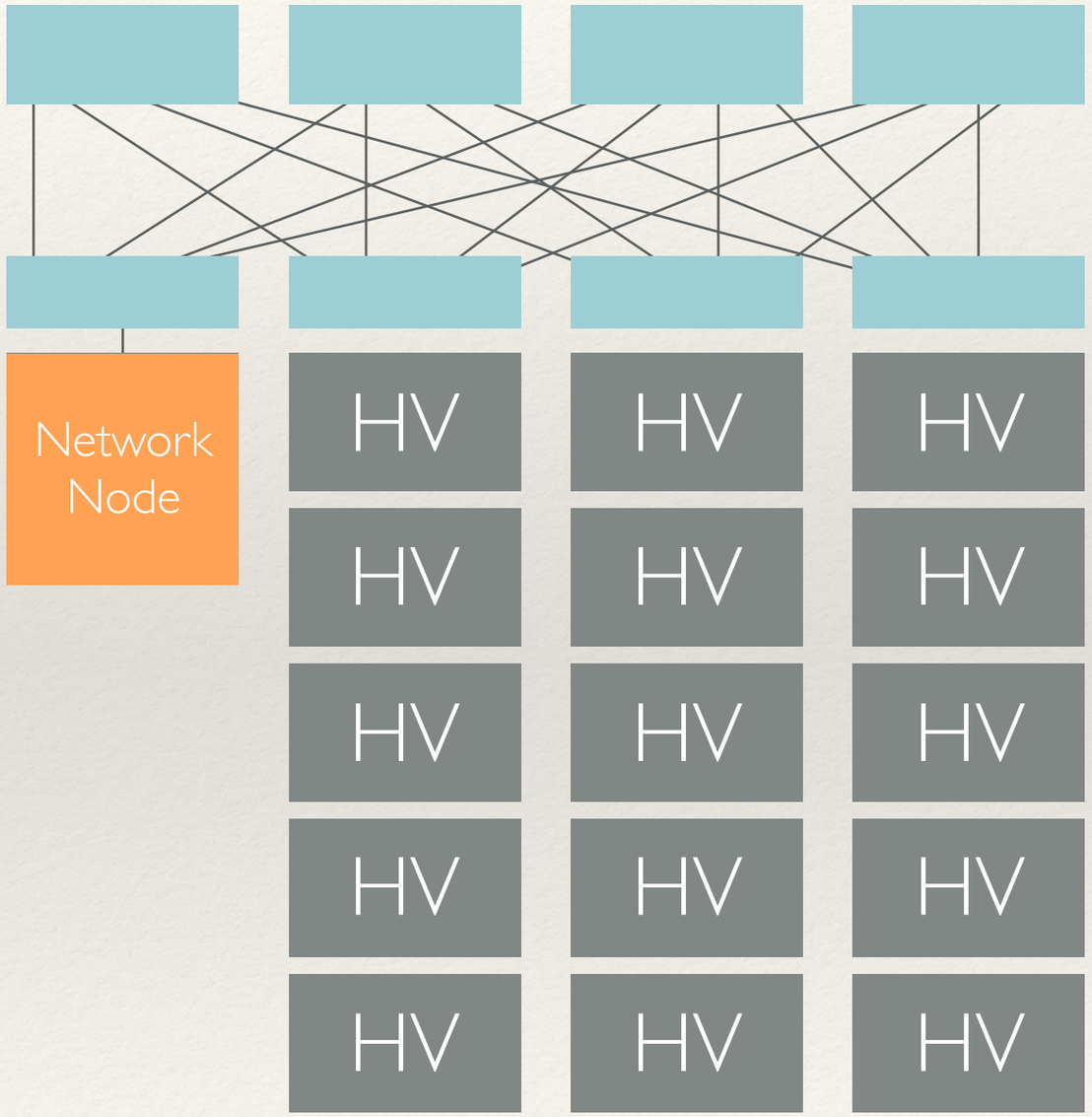
Physical Network (L2)

Neutron Reference Architecture

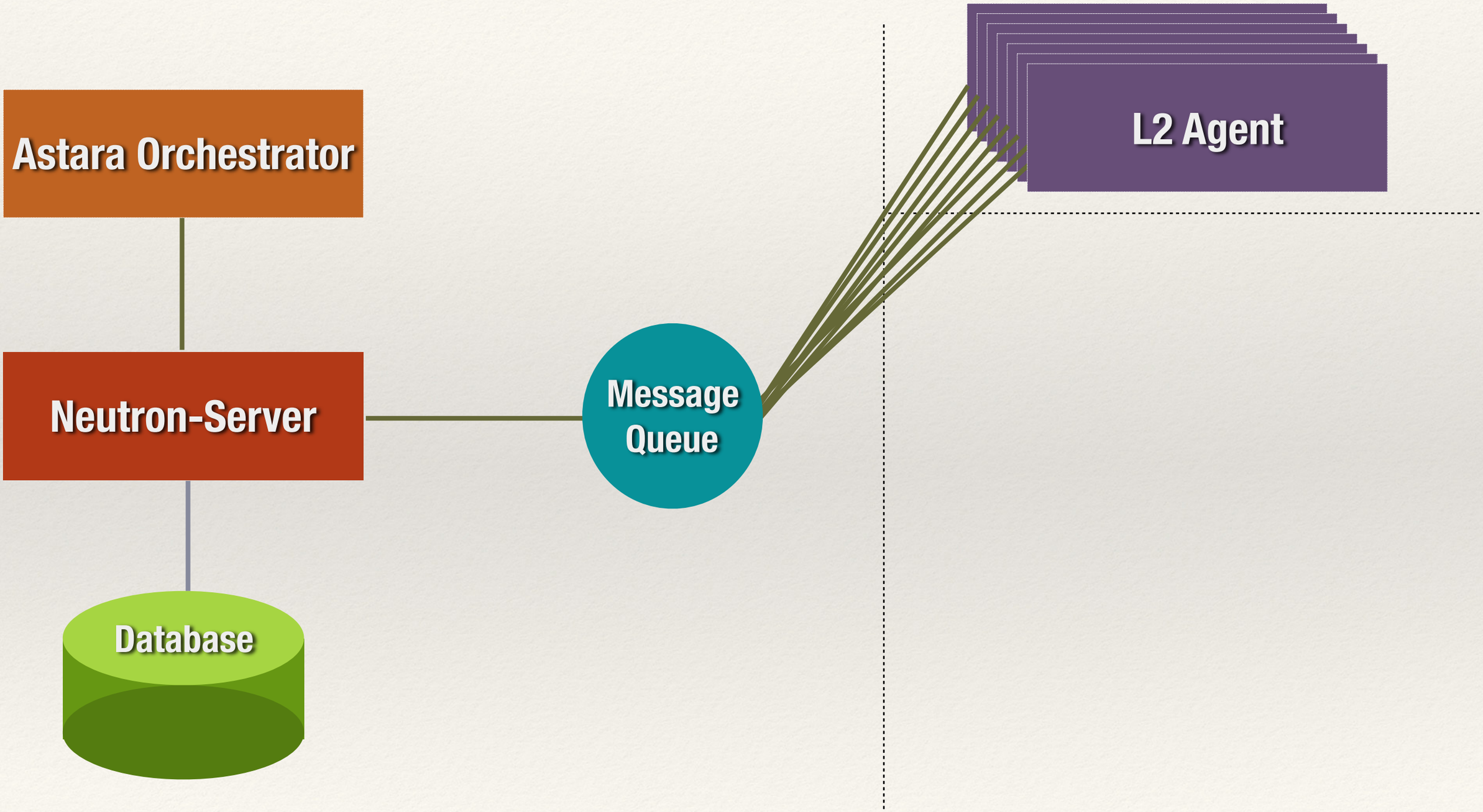


Neutron Reference Architecture - Datapath

- E-W traffic between L2 is through Network Node
- N-S traffic is through Network Node
- Metadata, DHCP, and other Advanced Service via agents located on Network Node

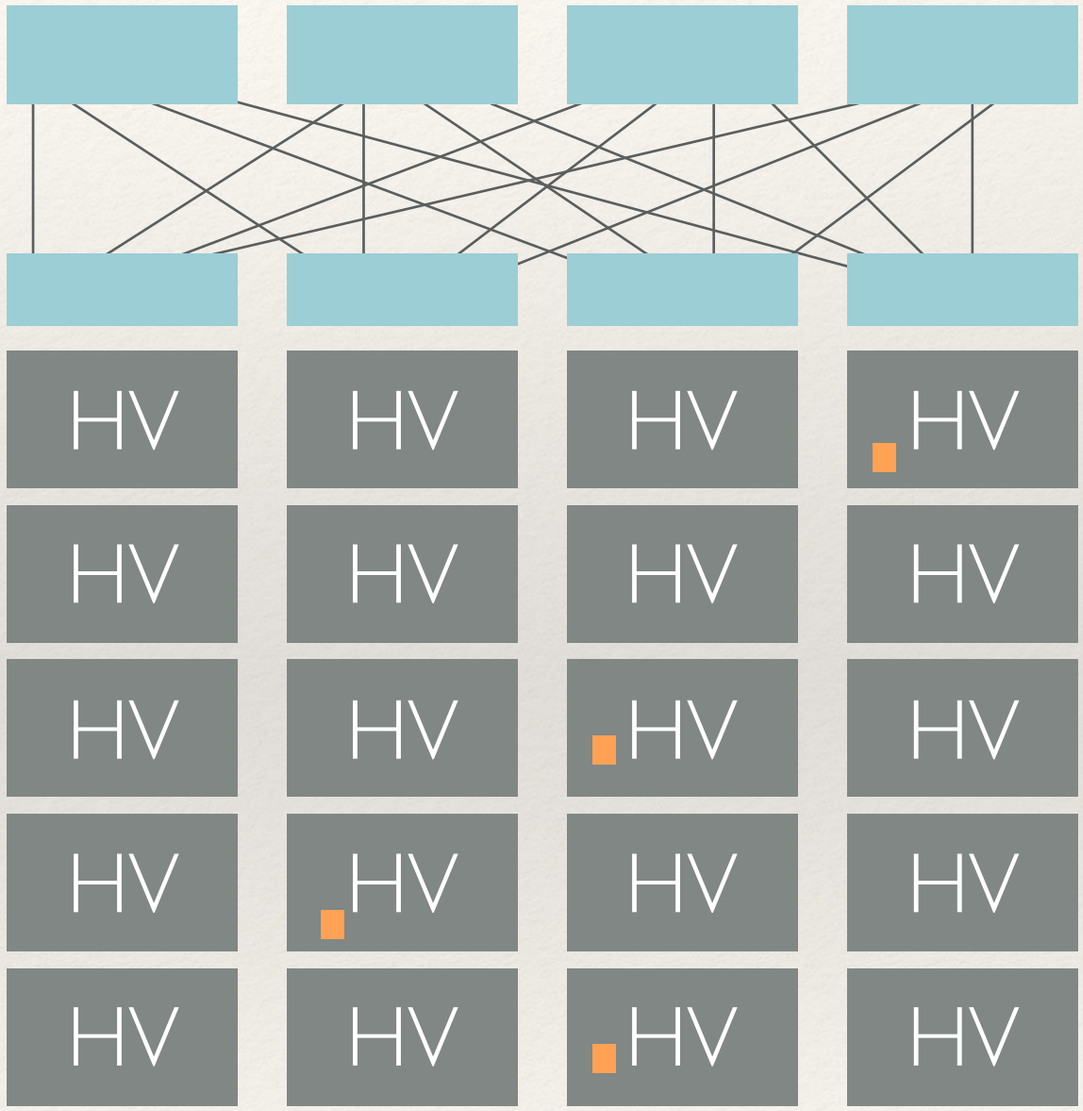


Neutron w/ Astara



Astara Architecture - Datapath

- E-W traffic between L2 is through Astara Service Appliance
- N-S traffic through Astara Service Appliance
- Astara Service Appliance model is a per project resource object
- Astara Service Appliance is white box VM - standard open source Linux Tools



Design for Scale

- 100's of Compute Nodes
- 1000's of Projects
- 10000's of NIC ports
- Clustered Control Plane Orchestration
- HA Neutron Advanced Service Resources

Astara Tutorial

Openstack Lab

- Multinode Openstack Deployment
  - 1 Openstack Controller
    - Nova, Neutron, Keystone, Glance, Horizon
    - 3 NICs in use
      - mgmt 10.0.1.3
      - tunnel 10.0.2.3
      - external 172.16.0.3
  - 1 Openstack Compute Node
    - 3 NICs in use
      - mgmt 10.0.1.4
      - tunnel 10.0.2.4
      - external 172.16.0.4

Access

- SSH to jumphost to access Openstack Deployment
  - **% ssh astara@50.56.12.200 -L 8080:ip_controller:80 -L 6080:ip_controller:6080**
    - Enable Port Forwarding to Horizon UI
    - Enable Port Forwarding to VNC Proxy
- From Jumphost, SSH to OS Controller
  - **% ssh root@<ip_controller>**

Verify Openstack

- Via CLI as demouser (source /root/userrc for credentials)
  - create private network
    - **% neutron net-create demo-net**
    - **% neutron subnet-create --name demo-subnet demo-net 10.2.0.0/24**
  - create router
    - **% neutron router-create demo-router**
  - attach router to networks (private and external)
    - **% neutron router-interface-add demo-router demo-subnet**
  - create instance on private network
    - **% nova boot –image cirros-qcow2 --flavor m1.tiny --nic net_id=<demo-net uuid> demoVM**

Neutron

- Cleanup all existing openstack resources
  - **% nova delete demoVM**
  - **% neutron net-delete demo-net**
  - **% neutron router-interface-delete demo-router demo-subnet**
  - **% neutron router-delete demo-router**
- Disable and Stop neutron agents on controller - dhcp, l3, and metadata
  - **% for service in l3 metadata dhcp**
  - **do**
    - **echo manual > /etc/init/neutron-${service}-agent.conf**
    - **stop neutron-${service}-agent**
  - **done**
- Delete neutron service agents, dhcp, l3, and metadata, from neutron database
  - **% neutron agent-list**
  - **% neutron agent-delete <service_agent_uuid>**

Neutron - Configuration

- Edit /etc/neutron/neutron.conf on controller
  - change core_plugin from reference namespace to astara namespace
    - **`core_plugin = astara_neutron.plugins.ml2_neutron_plugin.Ml2Plugin`**
  - change service_plugin from reference namespace to astara namespace
    - **`service_plugins = astara_neutron.plugins.ml2_neutron_plugin.L3RouterPlugin`**
  - add astara API extension to api_extension_path
    - **`api_extensions_path = /usr/local/lib/python2.7/dist-packages/astara_neutron/extensions/`**
  - enable neutron to emit notification
    - **`notification_driver  = neutron.openstack.common.notifier.rpc_notifier`**
- Edit /etc/neutron/plugin/ml2/ml2_conf.ini
  - enable port_security to extension_driver
    - **`extension_drivers = port_security`**

Neutron - L2 Agent configuration

- On all nodes running L2 agent - Linux Bridge or OVS
  - Edit /etc/neutron/plugin/ml2/linuxbridge_agent.ini
    - Ensure L2 population is enabled in [agent] section
      - **`l2_population = True`**

Nova - Configuration

- Edit /etc/nova/nova.conf on controller node
  - Enable IPv6
    - **`use_ipv6 = true`**
  - Enable service metadata proxy in **[neutron]**
    - **`service_metadata_proxy = true`**
- Edit /etc/nova/policy.json
  - Add service role to allow external network attachment by nova
    - **`"network:attach_external_network": "rule:admin_api or role:service"`**

Restart Openstack Services

- Restart Nova API service
  - **`% restart nova-api`**
- Restart Neutron server service
  - **`% restart neutron-server`**
- Restart ML2 agent
  - **`% restart neutron-plugin-linuxbridge-agent`**

Neutron

- Create Astara Management Network
  - `% neutron net-create astara-mgmt`
  - `% neutron subnet-create --name astara-mgmt-subnet mgt fdca:3ba5:a17a:acda::/64 --ip-version=6 --ipv6_address_mode=slaac --enable_dhcp`
- Create External Network
  - `% neutron net-create --shared --router:external public`
  - `% neutron subnet-create --name public-subnet public 172.16.0.0/24`

Astara - Install

- Clone git repository for astara, astara-neutron, astra-horizon, and astara-appliance
- Create astara user and service directories
  - `% useradd --home-dir "/var/lib/astara" --create-home --system --shell /bin/false astara`
  - `% mkdir -p /var/log/astara /var/lib/astara /etc/astara`
  - `% chown -R astara:astara /var/log/astara /var/lib/astara /etc/astara`
- Install code for astara project
  - `% cd /root/{astara, astara-neutron}`
  - `% pip install .`

Astara - Configuration 1/2

- Edit /etc/astara/orchestrator.ini
  - Enable access to MQ for astara in **[oslo_messaging_rabbit]**
    - **`rabbit_host = 10.0.1.3`**
    - **`rabbit_userid = guest`**
    - **`rabbit_password = secret`**
  - Enable DB access in **`[database]`**
    - **`connection = mysql+pymysql://astara:astara@10.0.1.3/astara?charset=utf8`**
  - Enable keystone auth in **[keystone_authtoken]**
    - **`auth_uri = http://10.0.1.3:5000`**
    - **`project_name = service`**
    - **`password = neutron`**
    - **`username = neutron`**
    - **`auth_url = http://10.0.1.3:35357`**
    - **`auth_plugin = password`**

Astara - Configuration 2/3

- Define Astara Management network, subnet, and IP prefix
  - **`management_prefix = fdca:3ba5:a17a:acda::/64`**
  - **`management_net_id = $management_net_uuid`**
  - **`management_subnet_id = $management_subnet_uuid`**
- Define External network and subnet
  - **`external_network_id = $public_network_uuid`**
  - **`external_subnet_id = $public_subnet_uuid`**
- Define interface_driver for L2 agent used by orchestrator
  - **`interface_driver=astara.common.linux.interface.BridgeInterfaceDriver`**

Astara - Configuration 3/3

- Edit /etc/astara/orchestrator.ini
  - Verify provider rules path
    - **`provider_rules_path=/etc/astara/provider_rules.json`**
  - Configure Metadata
    - **`nova_metadata_ip = 10.0.1.3`**
    - **`neutron_metadata_proxy_shared_secret = openstack`**

Astara - Appliance Configuration

- Create SSH key for appliance access
  - **`% ssh-keygen -f /etc/astara/astara_appliance`**
- Upload astara appliance to glance
  - **`% openstack image create astara --public --container-format=bare --disk-format=qcow2 --file /root/astara-appliance/astara.qcow2`**
- Create nova flavor for astara appliance usage
  - **`% openstack flavor create -id 6 --ram 512 --disk 3 --vcpus 1 --public  m1.astara`**

Astara - Appliance Configuration

- Edit /etc/astara/orchestrator.ini
  - Define ssh_public_key usage for the appliance
    - **`ssh_public_key = /etc/astara/astara_appliance.pub`**
  - Define image_uuid in **[router]** section for appliance
    - **`image_uuid = $glance_appliance_image_uuid`**
  - Define instance_flavor for use by appliance
    - **`instance_flavor = 6`**

Create Astara DB and Service Endpoints

- Create Astara DB in mysql
  - `% mysql -u root -pmysql -e 'CREATE DATABASE astara;'`
- Create Service Access ID and permission for DB
  - `% mysql -u root -pmysql -e "GRANT ALL PRIVILEGES ON astara.* TO 'astara'@'localhost' IDENTIFIED BY 'astara';"`
  - `% mysql -u root -pmysql -e "GRANT ALL PRIVILEGES ON astara.* TO 'astara'@'%' IDENTIFIED BY 'astara';"`
- Create Astara DB Tables
  - `% astara-dbsync --config-file /etc/astara/orchestrator.ini upgrade`

Create Astara Service and Endpoints

- Create Openstack Service for Astara
  - **% openstack service create --name astara --description "OpenStack Network Orchestrator" astara**

- Create Astara Service Endpoints
  - **% openstack endpoint create --region RegionOne astara public http://<ip_controller>:44250**
  - **% openstack endpoint create --region RegionOne astara internal http://<ip_controller>:44250**
  - **% openstack endpoint create --region RegionOne astara admin http://<ip_controller>44250**

Starting Astara

- Add Upstart script for astara orchestrator
  - `% cd /etc/init/`
  - `% wget https://github.com/akanda/astara-summit-tutorial/files/init/astara-orchestrator.conf`
- Add Logrotate script
  - `% cd /etc/logrotate.d/`
  - `% wget https://github.com/akanda/astara-summit-tutorial/files/logrotate.d/astara`
- Add sudoers file for astara user
  - `% cd /etc/sudoers.d/`
  - `% wget https://github.com/akanda/astara-summit-tutorial/files/sudoers.d/astara_sudoers`
- Start Astara Orchestrator process
  - `% start astara-orchestrator`

Verify Network Orchestration

- Create private network and subnet
  - `% neutron net-create private`
  - `% neutron subnet-create --name private-subnet 10.2.0.0.24`
- Create router
  - `% neutron router-create router`
- Add Gateway and Network Interfaces to Router
  - `% neutron router-interface-add router private-subnet`
  - `% neutron router-gateway-set router public`
- Boot Instance
  - `% nova boot --image cirros-qcow2 --flavor m1.tiny --nic net_id=<private net uuid> demoVM`
- Associate Floating IP
  - `% neutron floatingip-create public`
  - `% neutron floatingip-associate <floatingip-uuid> <vm port uuid>`

Under the hood

- Change to openstack admin user credentials
  - **`% source /root/adminrc`**
- Validate Astara Service Appliance
  - **`% nova list –all-tenants`**
- Login to Astara Service Appliance from os-controller
  - **`% ssh astara@<ipv6 of appliance>`**
  - **`% astara-ctl ssh <router-id>`**

Future Tutorials

- Clustering Astara Orchestrator
- Load Balancer Neutron Advanced Services
- VPN Neutron Advanced Services
- Pool Resource Service for Service Appliances

Next Steps

Astara Core Developer Team

- Mark McClain (IRC markmcclain)
  - Co-founder/CTO @ Akanda
  - Openstack Technical Committee Member
  - Former Openstack Networking PTL
- Ryan Petrello (IRC: ryanpetrello)
  - Senior Developer @ Dreamhost
  - Openstack Astara PTL
  - Openstack Contributor since 2012
- Adam Gandelman (IRC: adam_g)
  - Former Openstack Astara PTL
  - Senior Developer @ Akanda
  - Openstack Stable Branch Maintenance Team Member
  - Former Openstack Developer @ Canonical and HP

How to contribute

- Get the source: https://github.com/openstack/astara
- Project Status: https://launchpad.net/astara
- Documentation: http://docs.akanda.io
- Project IRC Weekly Meeting: #openstack-meeting
  - every Monday @ 6pm UTC
- IRC channel: #openstack-astara

Vendor Integration

- Openstack
  - Mirantis: https://github.com/akanda/fuel-plugin-astara
  - Canonical: https://github.com/akanda/astara-juju
    - Ansible: https://github.com/akanda/astara-openstack-ansible
- Hardware
  - Cumulus
  - Arista

User Survey

- Please fill out survey on tutorial
  - http://www.surveymonkey.com/

Openstack Summit Session

- Astara: Extending Neutron Advanced Services with Astara
  - Thursday 9:00 am @ Hilton Austin - MR 406
- A Deep Dive into Project Astara
  - Thursday 11:00 am @ Austin Convention Center Level 4 MR 16 A/B
- Astara Contributor Meetup - Hilton Austin - Boardroom 401
  - Friday 9:00am - 12:30pm & 2:00pm - 5:30pm