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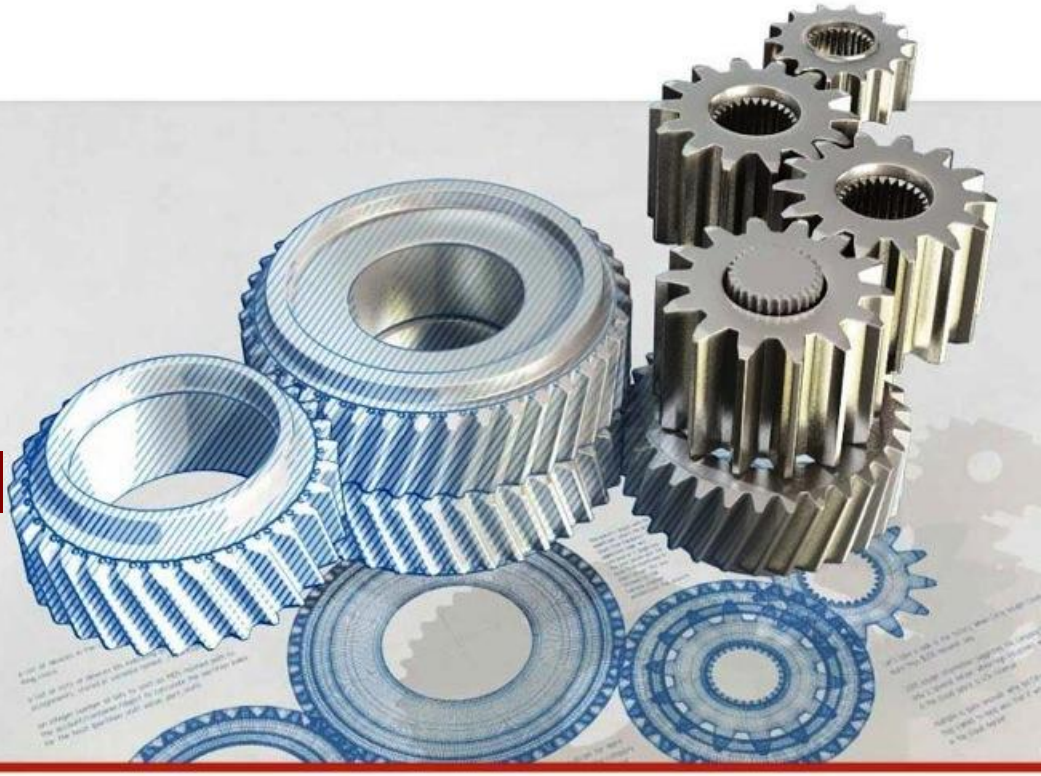
Neutron Network Namespaces and IPtables: Technical deep dive



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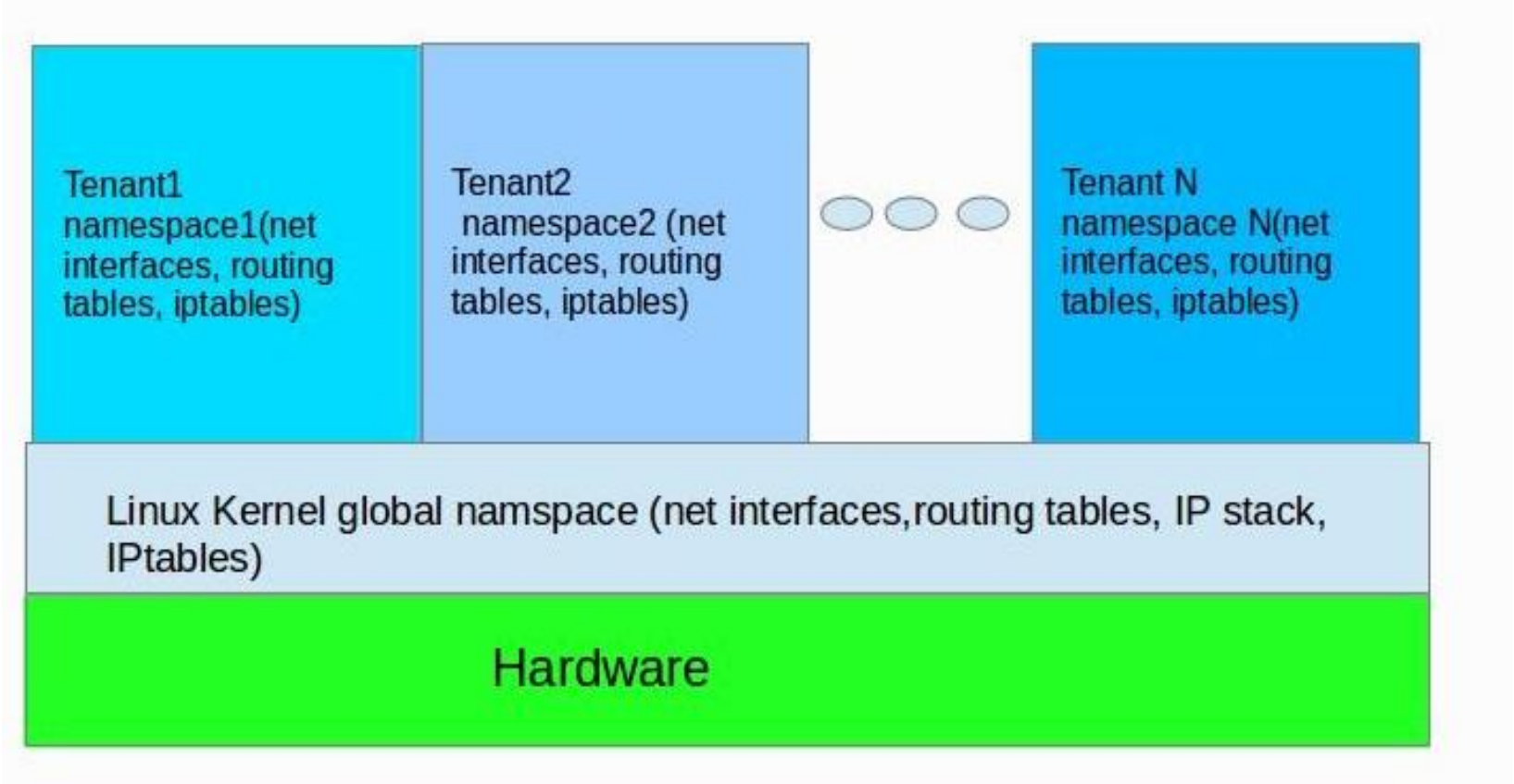
Presentation Outline

- Introduction to Neutron & Neutron Namespaces
- Deep Dive
- Conclusions

What are Namespaces

- Namespaces enables multiple instances of a routing table to co-exist within the same Linux box
- Network namespaces make it possible to separate network domains (network interfaces, routing tables, iptables) into completely separate and independent domains.

Namespaces Diagram



Namespaces Advantages

- Overlapping IPs: A big advantage of namespaces implementation in neutron is that tenants can create overlapping IP addresses, a situation that gives freedom to cloud users because they are free to create any subnet of choice without fear of conflicting with that of another tenant. *Linux network namespace is required on nodes running neutron-l3-agent or neutron-dhcp-agent if overlapping IPs is in use. Hence* the hosts running these processes must support network namespaces.

Namespaces Advantages

L3 Agent: The neutron-l3-agent is designed to use network namespaces to provide multiple independent virtual routers per node, that do not interfere with each other or with routing of the compute node on which they are hosted

What if Namespaces NOT supported?

If the kernel does not support namespaces, the following limitations should be noted with Neutron:

• Neutron-l3-agent is limited to providing a single virtual router per compute node. If namespaces is supported, a single deployed neutron-l3-agent should be able to host multiple virtual routers.

• It is necessary to configure each neutron-l3-agent with the Universally Unique ID (UUID) identifying the router instance that it hosts. This complicates deployment, makes self-service provisioning of routers by tenants impractical. If namespaces is supported, the configuration with the UUID(s) of the router(s) it hosts is not required.

•If the host does not support namespaces then the neutron-l3-agent and neutron-dhcp-agent should be run on different hosts. This is due to the fact that there is no isolation between the IP addresses created by the L3 agent and by the DHCP agent. A downside to this is that by manipulating the routing tables the user can ensure that these networks have access to one another.

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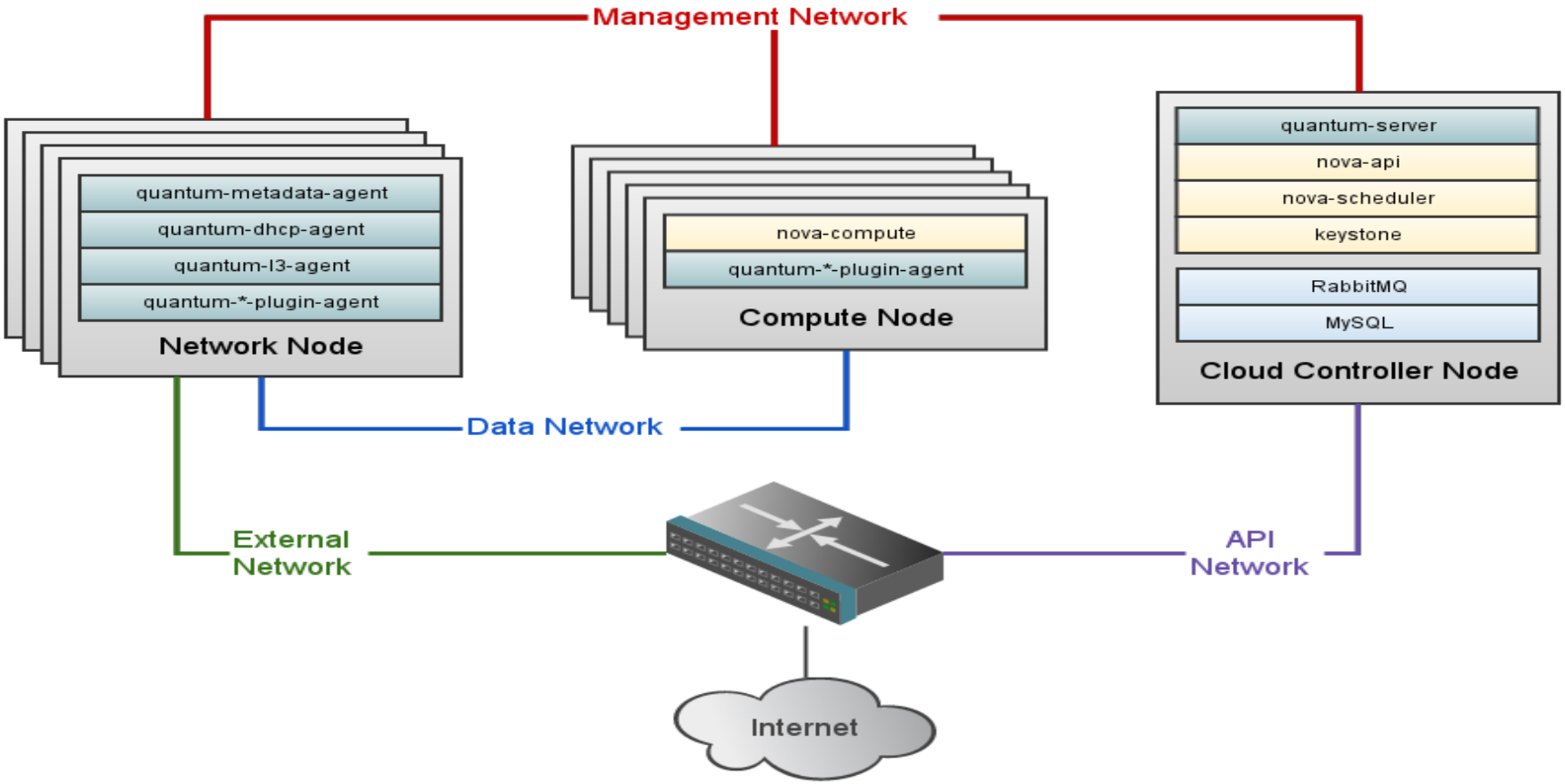
Recognizing Namespaces

- Every l2-agent/private network has an associated *dhcp namespace* and

- Every l3-agent/router has an associated *router namespace*.

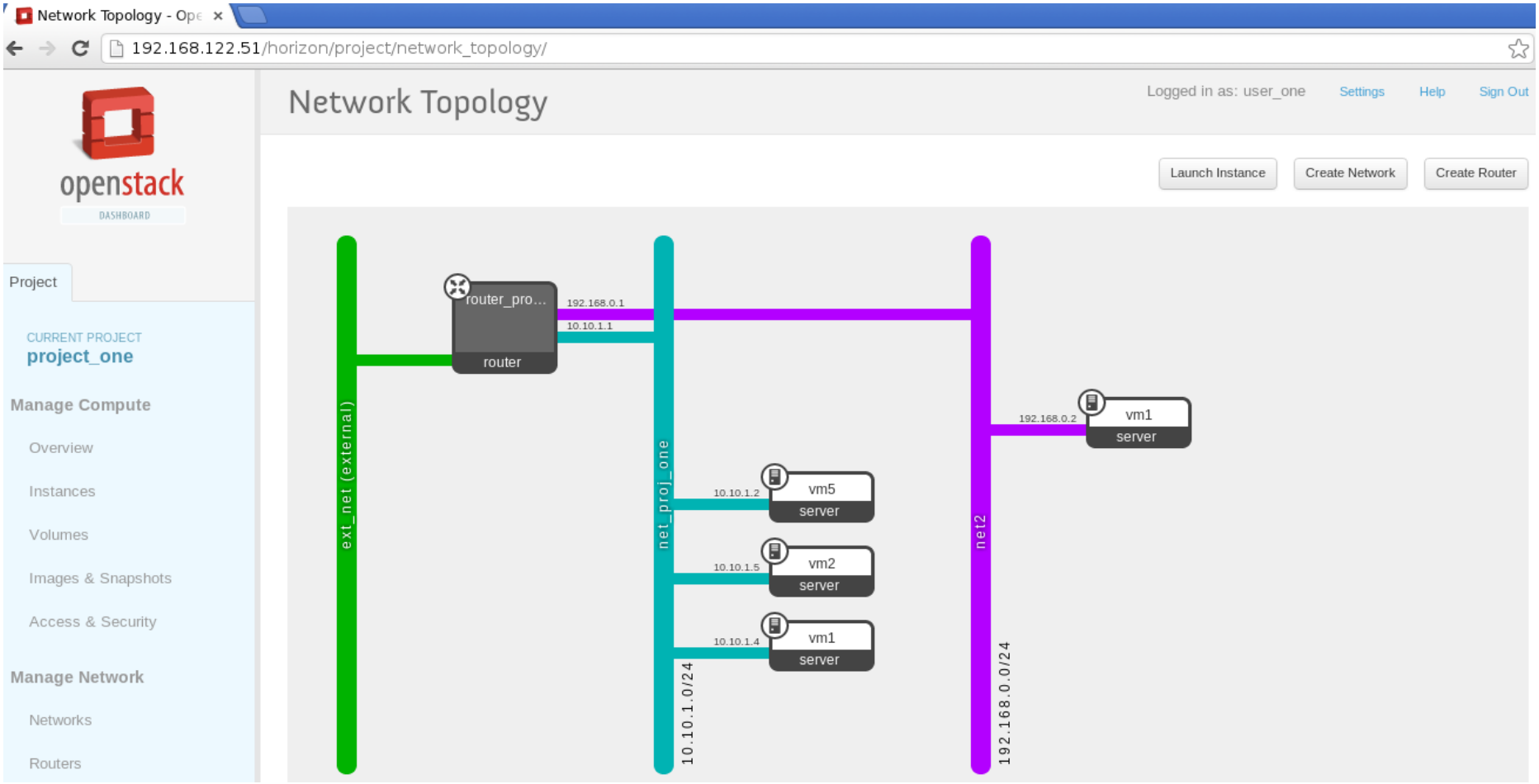
Multinode Network Topology



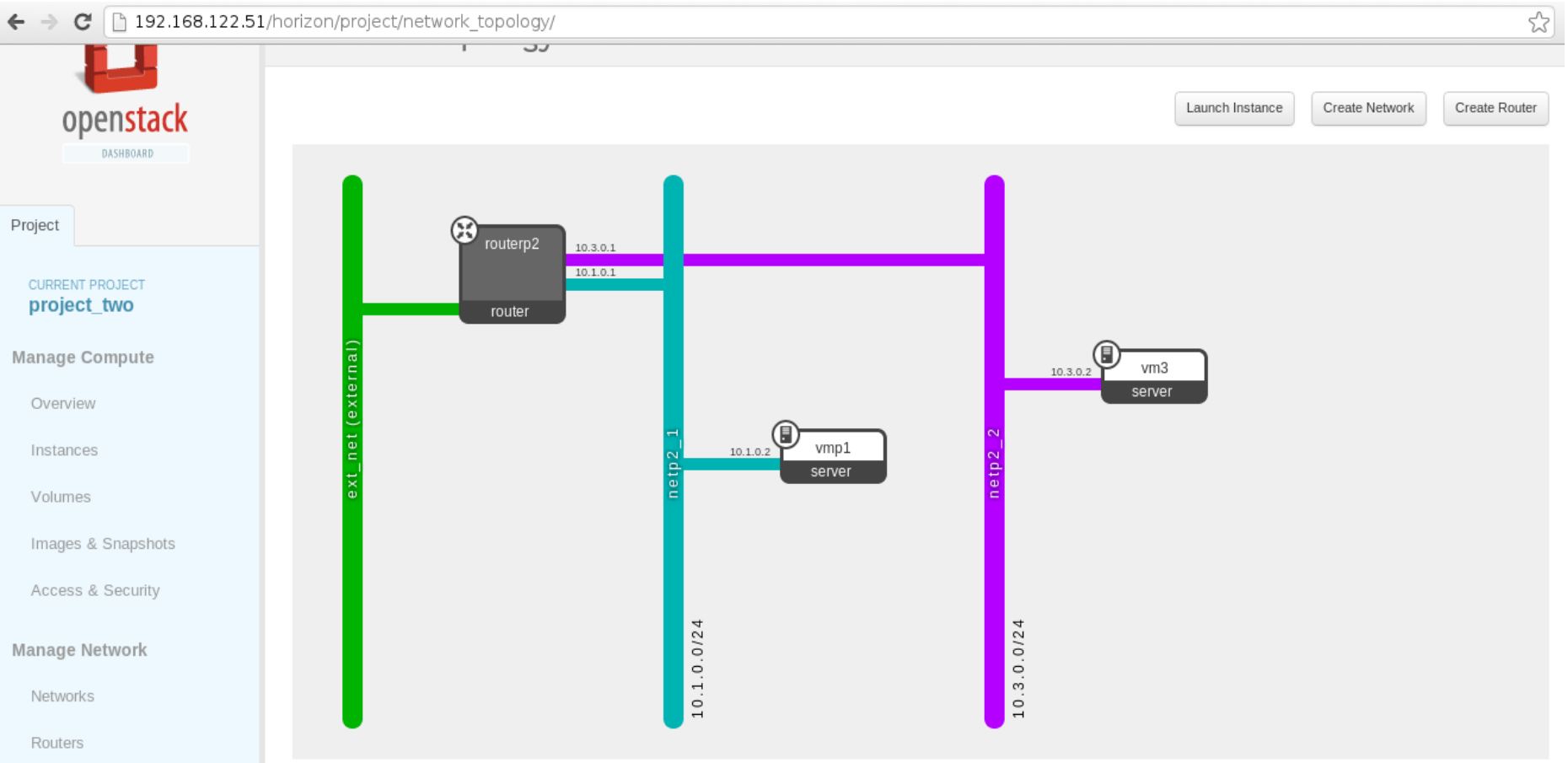
Ref. Architecture

- Multinode Grizzy on Ubuntu 12.04
- libvirt/QEMU,
- LibvirtHybridOVSBridgeDriver vif driver,
- Quantum security groups,
- Open vSwitch Neutron/Quantum plugin using
  - GRE
  - dnsmasq
  - IP namespaces enabled

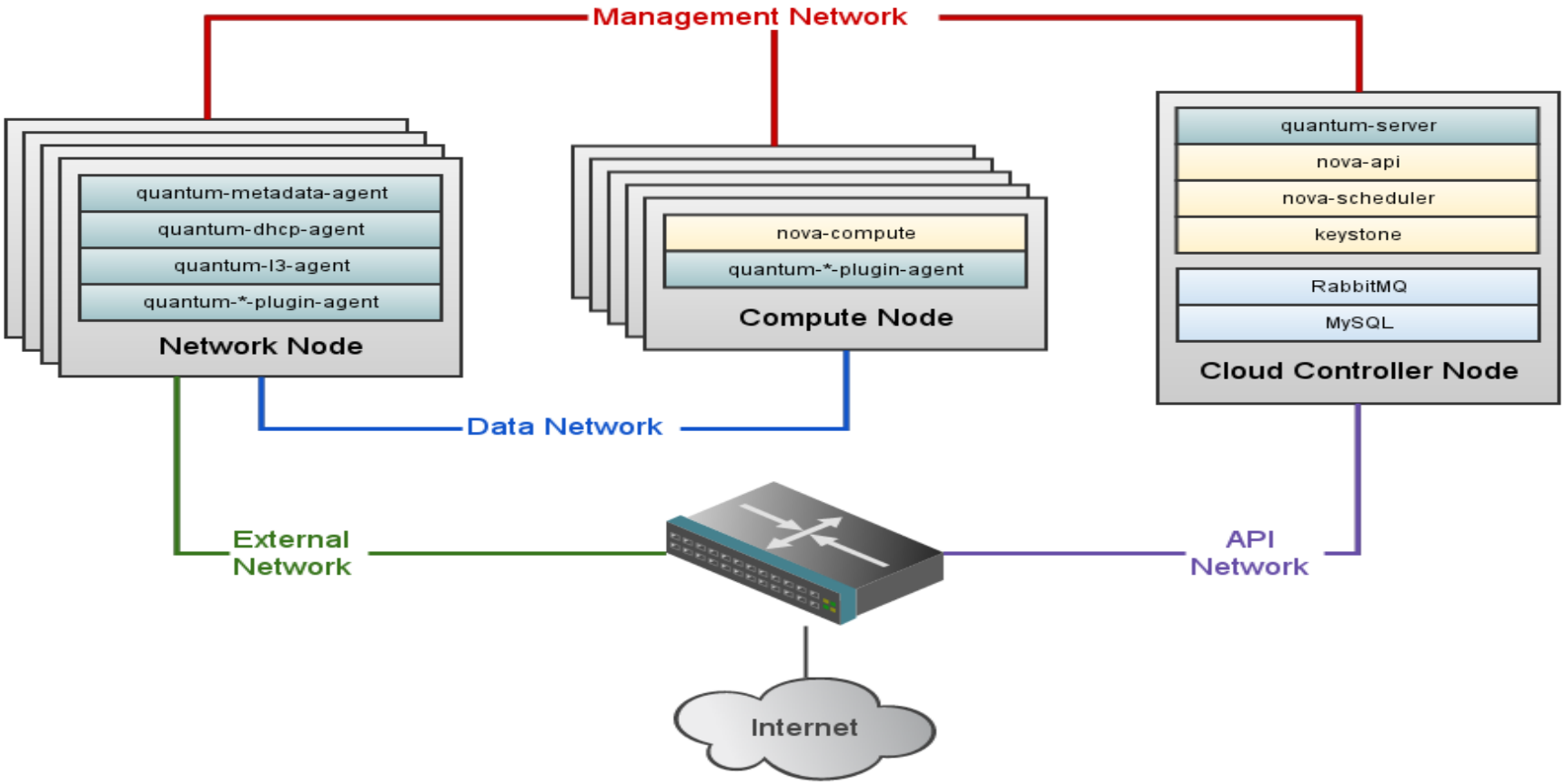
Tenant 1 Network



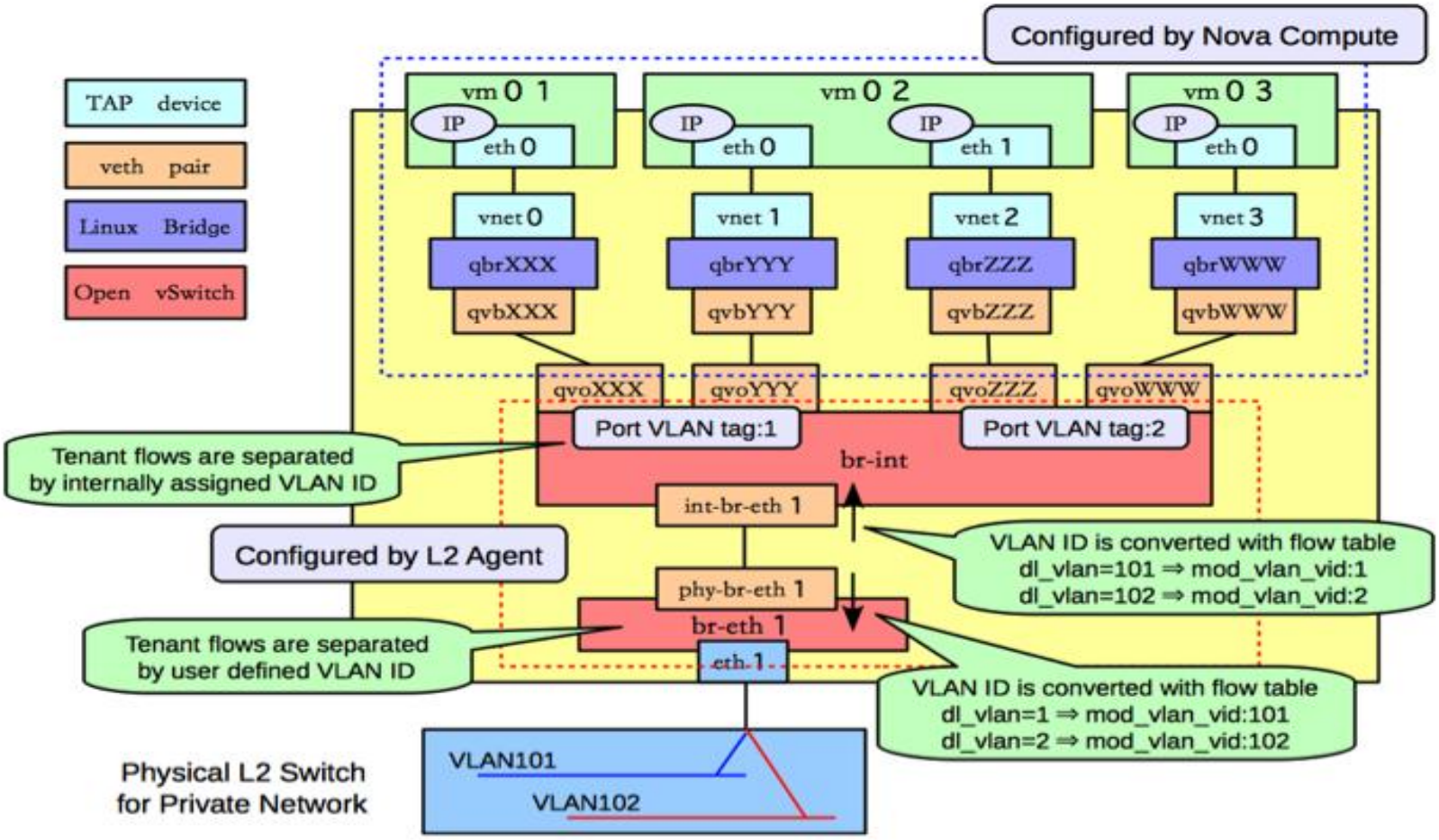
Tenant 2 Network



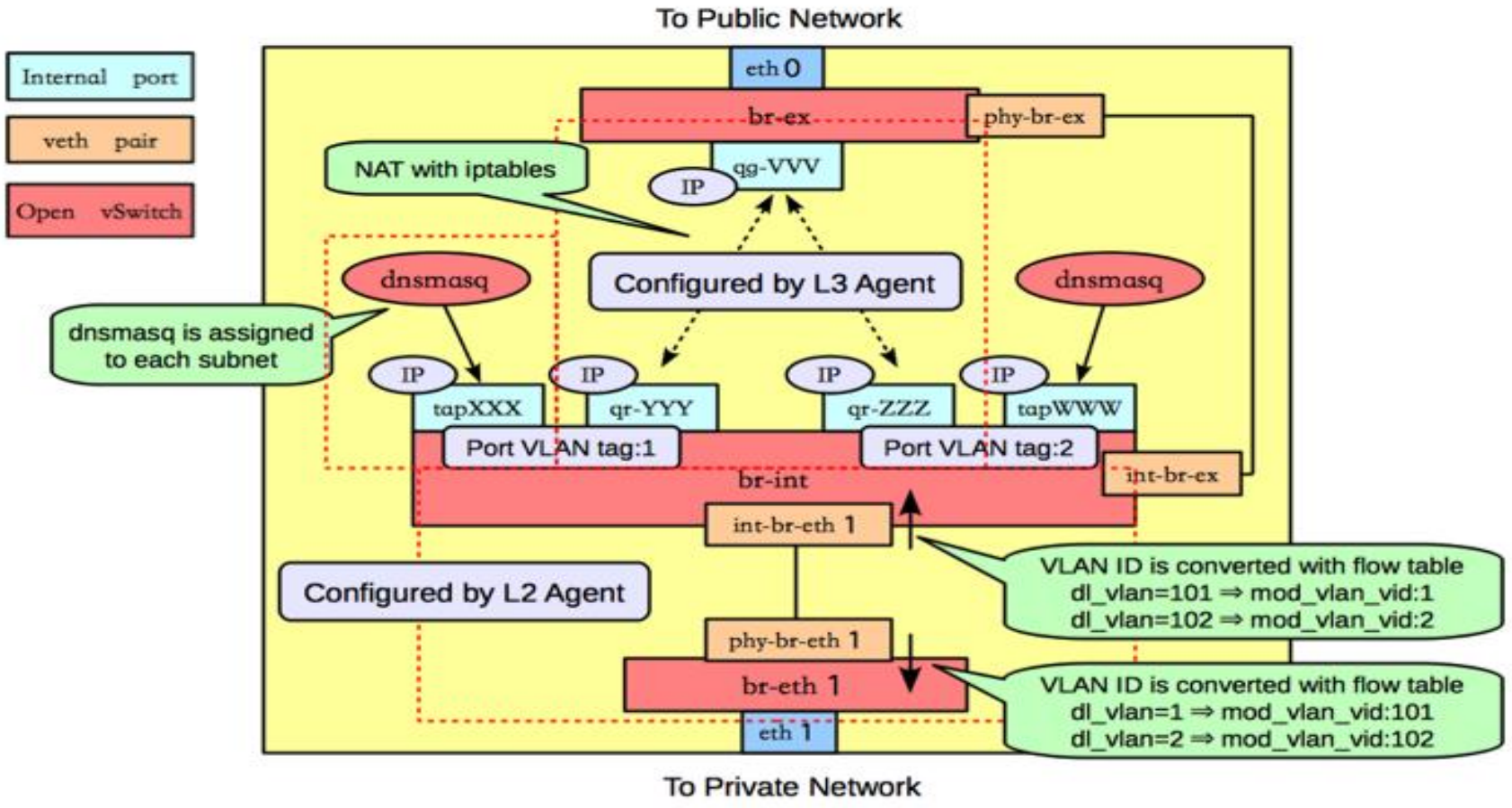
Multinode Network Topology



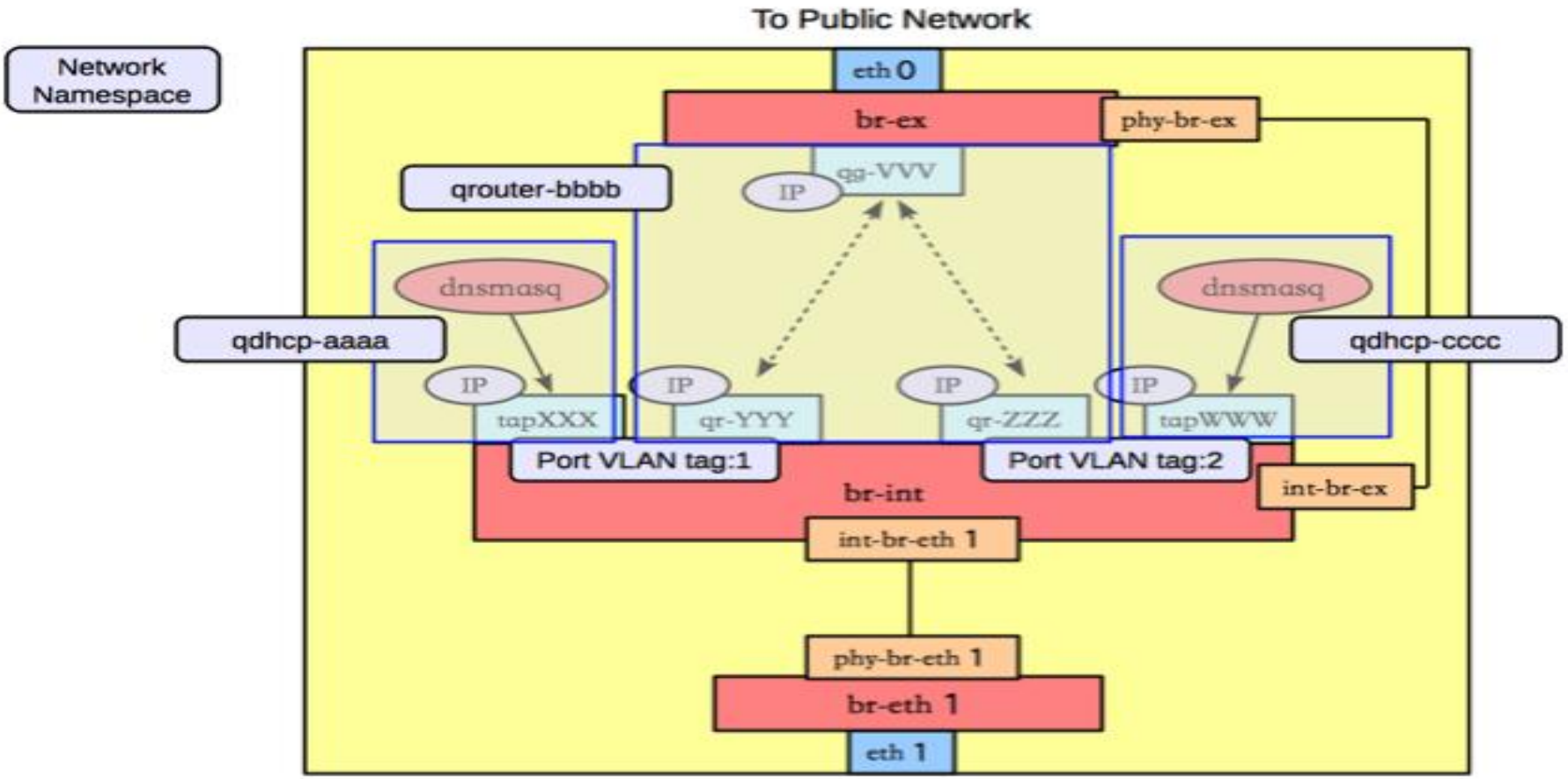
On The Compute Node



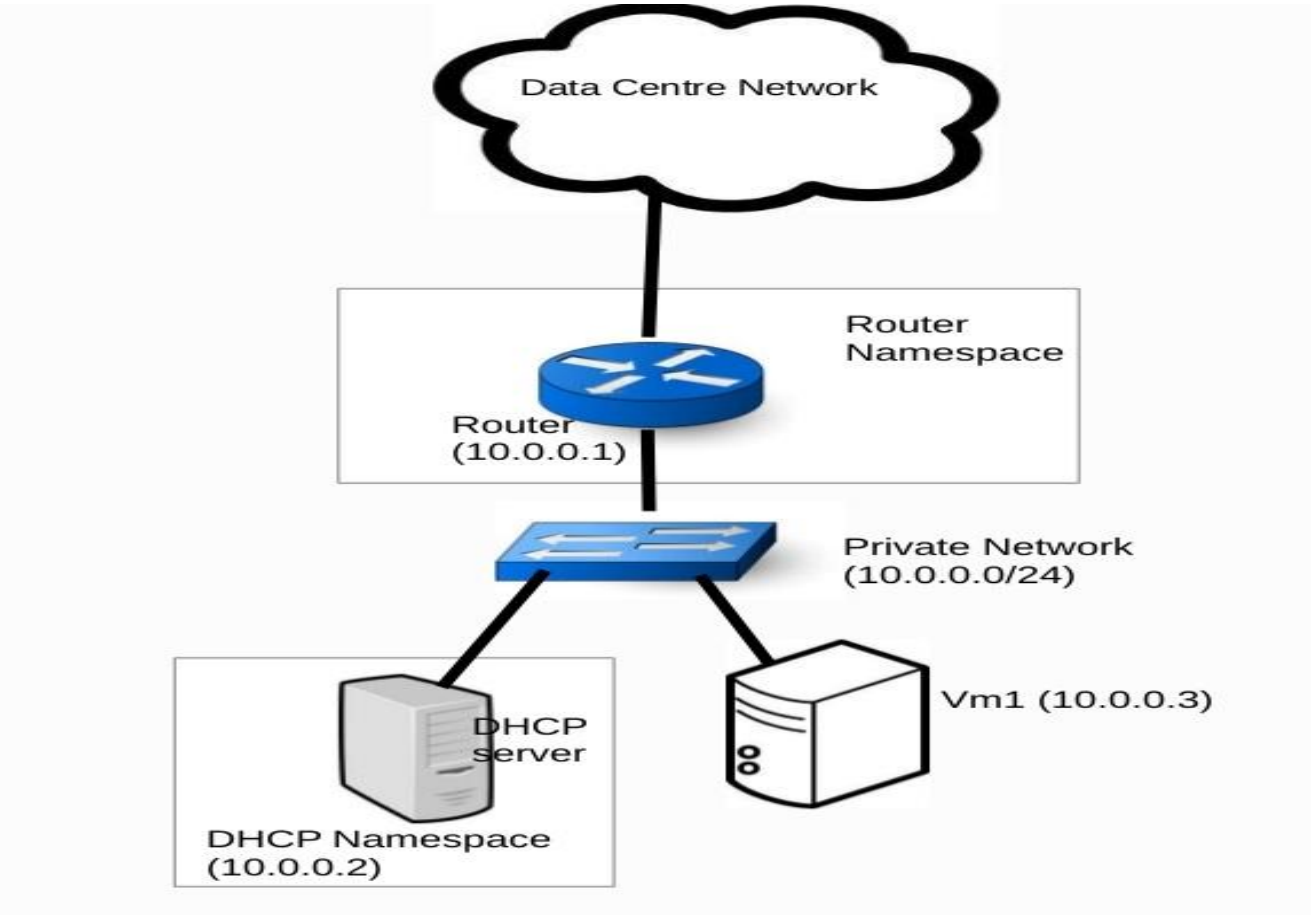
On The Net Node



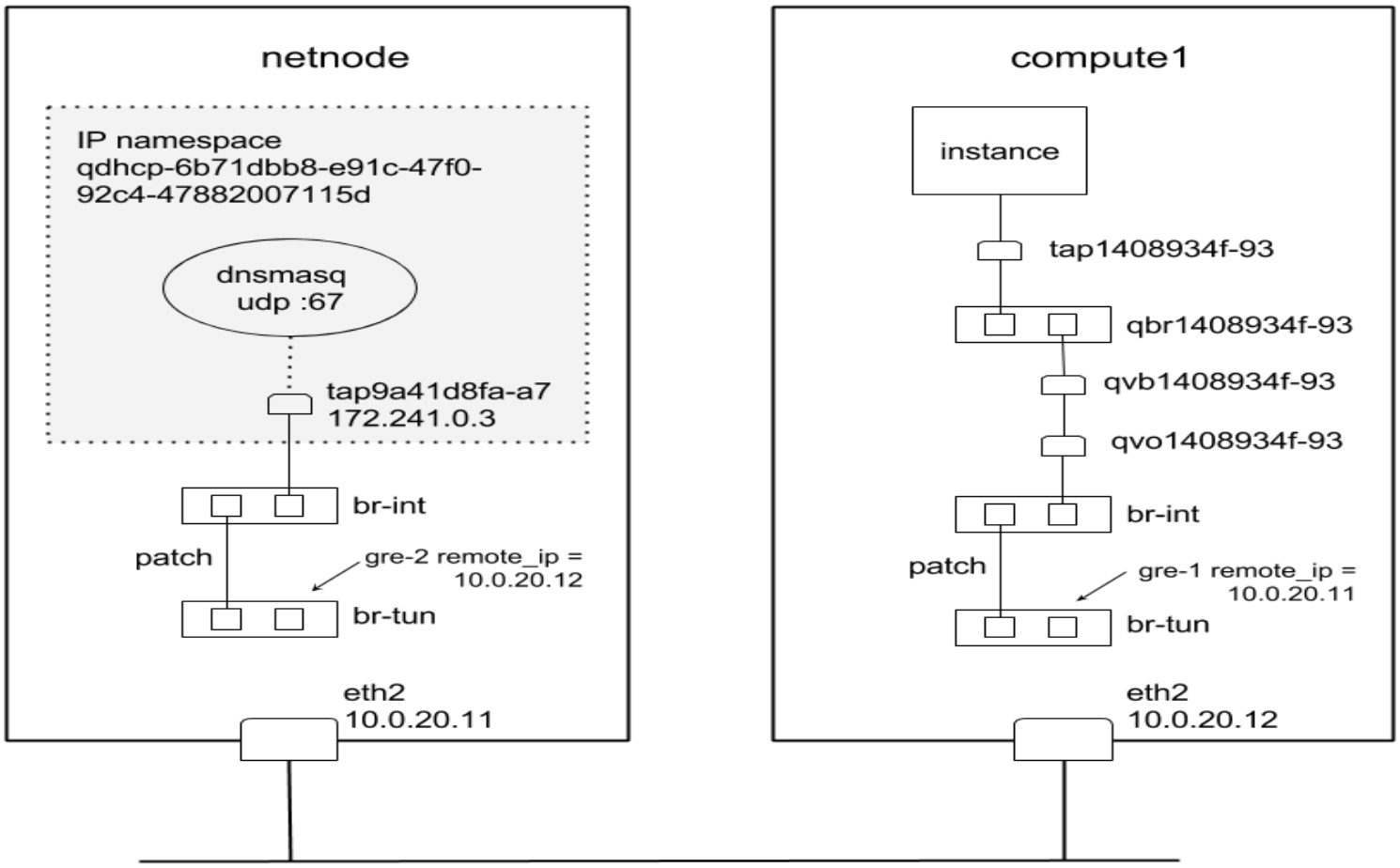
Net Namespaces



Illustration



Showing Net & Compute Node



Troubleshooting

Let us summarize the troubleshooting steps into 2:

STEP1: Identify the correct namespace

STEP2: Perform general troubleshooting around the identified namespace

Problem

Have spin off an instance and it has an IP address from Horizon but cannot ssh (probabely because the interface has no assigned IP) to it so can only view from VNC

Detailed Troubleshooting steps for this Problem

•Ensure that dnsmasq process is running:
pgrep -fl dnsmasq (restart the quantum-dhcp-agent if not).
• verify the IP address in the namespace, if dnsmasq is running:
ip netns [list].
•Identify the qdhcp-network *<networkUUID>* namespace:
ip netns exec qdhcp-*<networkUUID>* ip
From the output, ensure that the IP on the interface is present and matches the one present for dnsmasq. To verify what the expected IP address is, use quantum-port-list and quantum port-show *<portUUID>*.
•Determine the leases
/var/lib/quantum/dhcp/<networkUUID>/host
Note:

- •If the dnsmasq configuration is correct, but dnsmasq is not responding with leases and the bridge/interface is created and running, pkill dnsmasq and restart quantum-dhcp-agent.
- •If dnsmasq does not include the correct leases, verify that quantum-server is running correctly and that it can communicate with dhcp-agent. If it is running correctly, and the bridge/interface is created and running, restart quantum-dhcp-agent.

Network Node:

- root@vmnet-mn:~# ovs-vsctl show
- root@vmnet-mn:/# ovs-ofctl dump-flows br-tun

The DHCP agent

- The DHCP agent is configured to use OVS and dnsmasq:

  root@vmnet-mn:/# grep -v '^#\|^\s*$' /etc/quantum/dhcp_agent.ini

Network Node Cont.

- root@vmnet-mn:~#pgrep –fl dnsmasq
- root@vmnet-mn:/# ip netns | grep dhcp
  root@vmnet-mn:/# ip netns exec qdhcp-eeeee ifconfig
- root@vmnet-mn:/# ip netns exec qdhcp-6b71dbb8-e91c-47f0-92c4-47882007115d ping ip

Network Node

- root@vmnet-mn:/# cat /var/lib/quantum/dhcp/e0fe9037-790a-4cb-9bf4-4b06f0cfcf5c/host

Note that:

- Dnsmasq logs to /var/log/syslog in this Ubuntu installation.

Compute Node

- root@vmcom1-mn :/# ip link
- root@vmcom1-mn :/# brctl show
- root@vmcom1-mn :/# ovs-vsctl show
- root@vmcom1-mn :/# ovs-ofctl dump-flows br-tun
- root@vmcom1-mn :/# iptables-save

Compute Node

- root@vmcom1-mn :/# tcpdump -n -i eth2

Controller Node

- damian@vmcon-mn:/$ quantum net-show net1
- damian@vmcon-mn:/$ quantum subnet-show ad970f3f-4ceb-4565-b897-1cd0fe34cd5b
- damian@vmcon-mn:/$ nova boot --flavor micro --image cirros-030-x86_64 \ --nic net-id=6b71dbb8-e91c-47f0-92c4-47882007115d \ --security-groups test-vms test-instance1
- damian@vmcon-mn:/$ nova list

Controller Node

- damian@vmcon-mn:/$ quantum port-list --device_id=44e362ba-e8a4-4bae-b0ea-5477666632c9
- damian@vmcon-mn:/$ quantum port-show 9a41d8fa-a745-4411-b9f8-daa182f38527

CONCLUSIONS

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QUESTIONS

AND

ANSWERS

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Note

- When a router or network is created, the namespaces don’t get created immediately. For network, the DHCP namespaces get created only when a vm is attached and for router the namespace is created when a gateway is set. It means that an activity must take place before the namespaces get created.
- When a router or network is deleted, the associated namespaces are not deleted. They need to be manually deleted.