Amirkabir University of Technology

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Cloud Computing

OpenStack Neutron Architecture

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https://www.slideshare.net/HaimAteya/an-intrudction-to-openstack-2017

https://docs.openstack.org/security-guide/introduction/introduction-to-openstack.html

RabbitMQ overview

➢ RabbitMQ is the most widely deployed open source message

broker.

▪ https://www.rabbitmq.com/

➢ Watch YouTube Video

▪ https://www.youtube.com/watch?v=7rkeORD4jSw&list=RDCMUCKWaEZ-_VweaEx1j62do_vQ&index=2

Neutron

➢ Network as a Service (NaaS)

https://www.cisco.com/c/en/us/solutions/enterprise-networks/network-as-service-naas.html
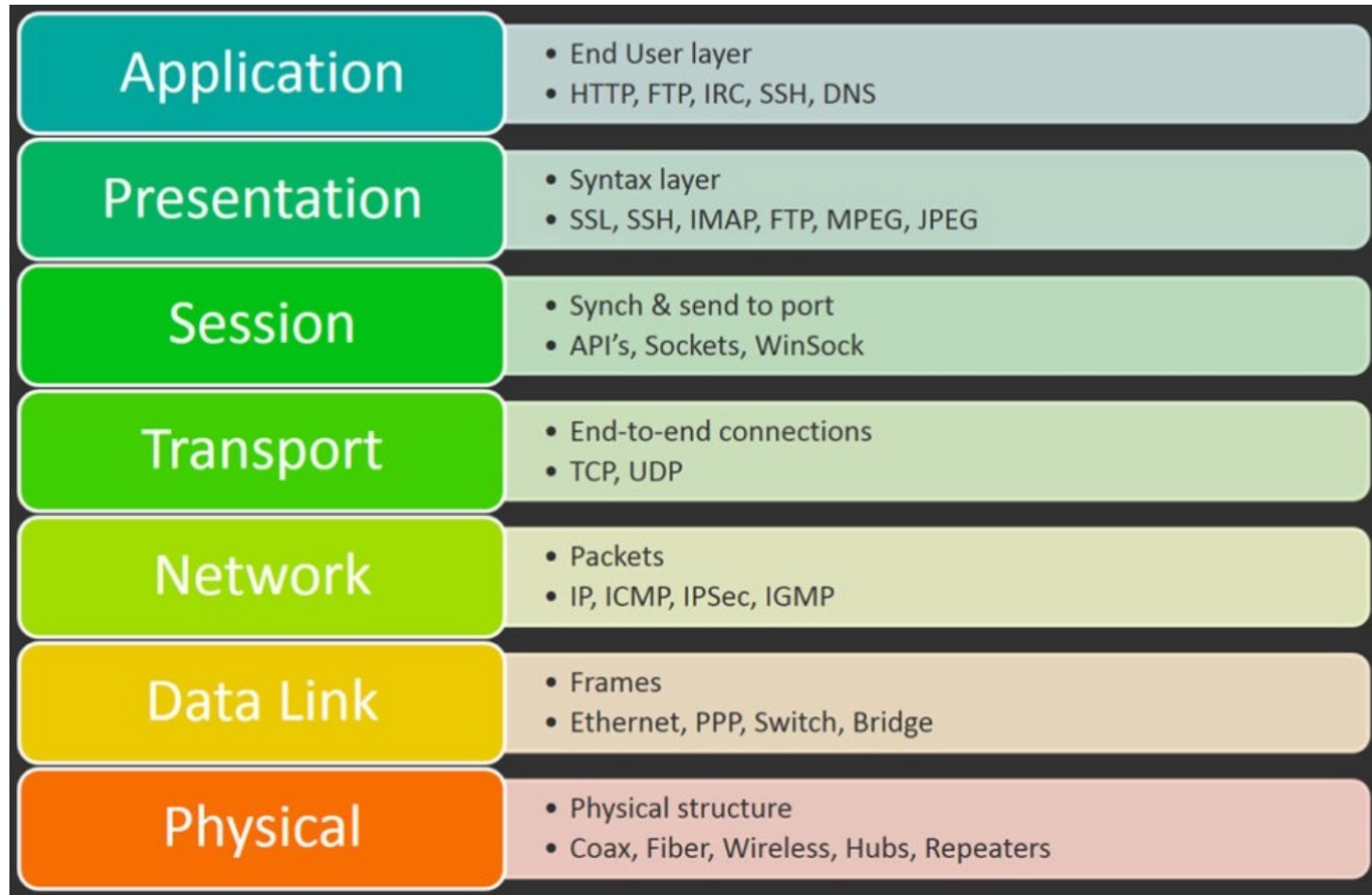
Neutron (cont.)

➢ Provides REST APIs to manage network connections for the resource managed by other OpenStack services.

➢ Complete control over the network resources in OpenStack:

  ▪ networks, ports, subnets.
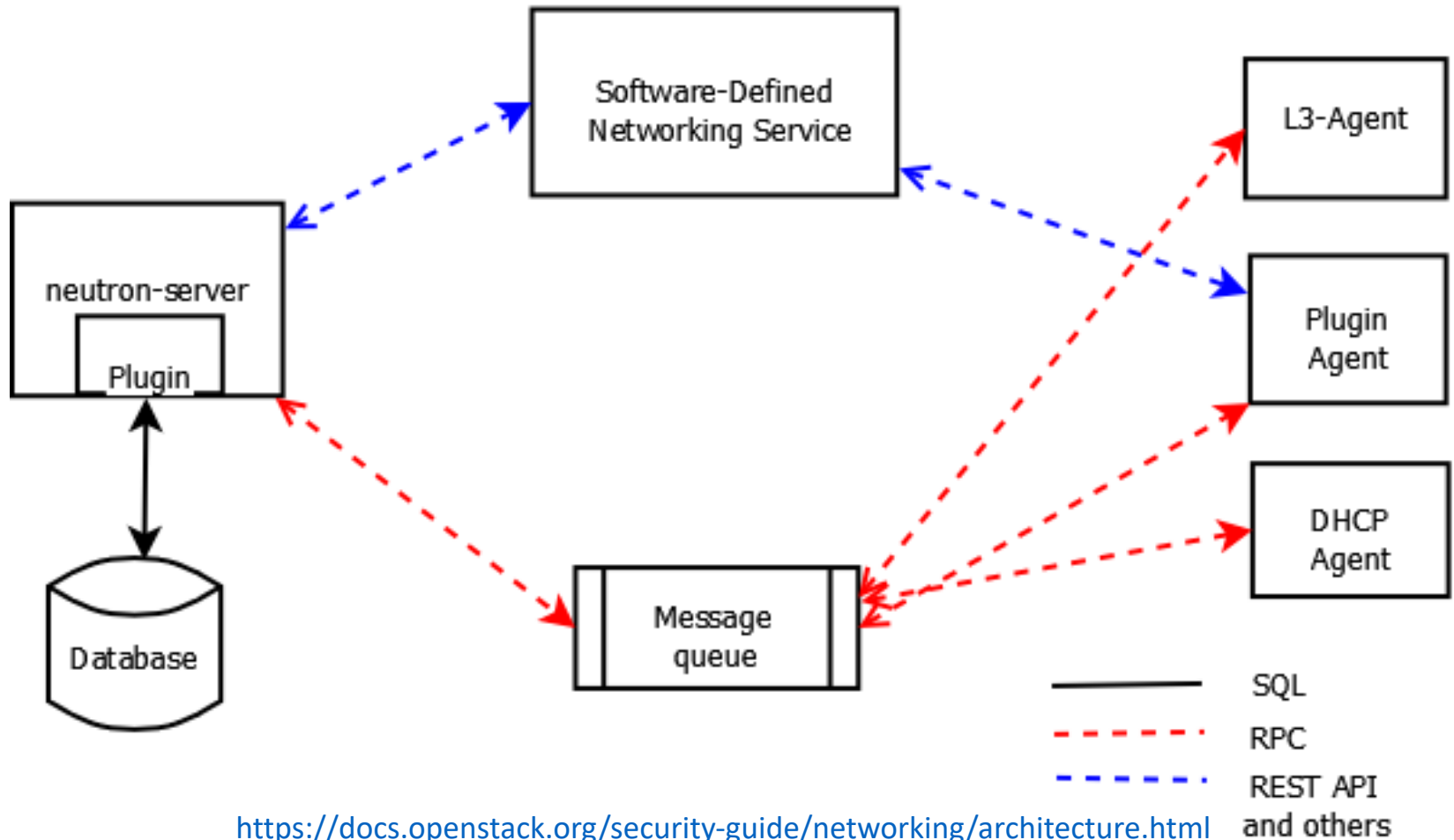
➢ Build complex network topologies.

OSI Layers

7	Application Layer	Human-computer interaction layer, where applications can access the network services
6	Presentation Layer	Ensures that data is in a usable format and is where data encryption occurs
5	Session Layer	Maintains connections and is responsible for controlling ports and sessions
4	Transport Layer	Transmits data using transmission protocols including TCP and UDP
3	Network Layer	Decides which physical path the data will take
2	Data Link Layer	Defines the format of data on the network
1	Physical Layer	Transmits raw bit stream over the physical medium

7 Layers of the OSI Model

Application	• End User layer • HTTP, FTP, IRC, SSH, DNS
Presentation	• Syntax layer • SSL, SSH, IMAP, FTP, MPEG, JPEG
Session	• Synch & send to port • API's, Sockets, WinSock
Transport	• End-to-end connections • TCP, UDP
Network	• Packets • IP, ICMP, IPSec, IGMP
Data Link	• Frames • Ethernet, PPP, Switch, Bridge
Physical	• Physical structure • Coax, Fiber, Wireless, Hubs, Repeaters

Architectural and Networking Flow Diagram

https://docs.openstack.org/security-guide/networking/architecture.html
https://access.redhat.com/documentation/en-us/red_hat_openstack_platform/16.0/html/networking_guide/sec-networking-concepts - l3-agent
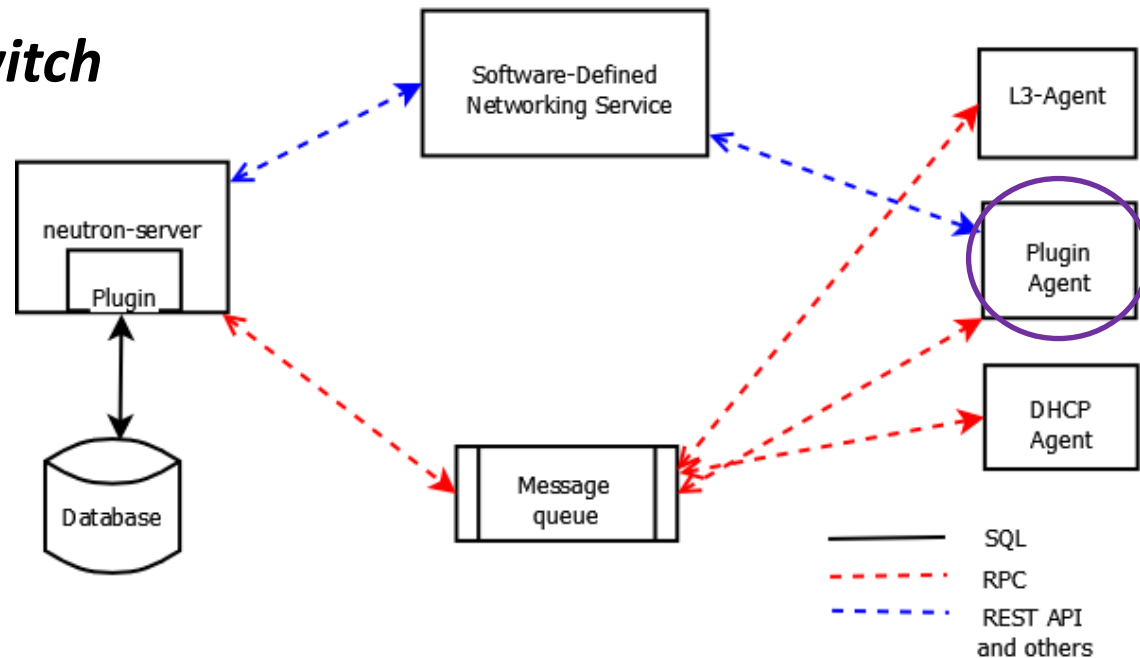
neutron server

➤ Runs on the **network node** to service the Networking API and its extensions.
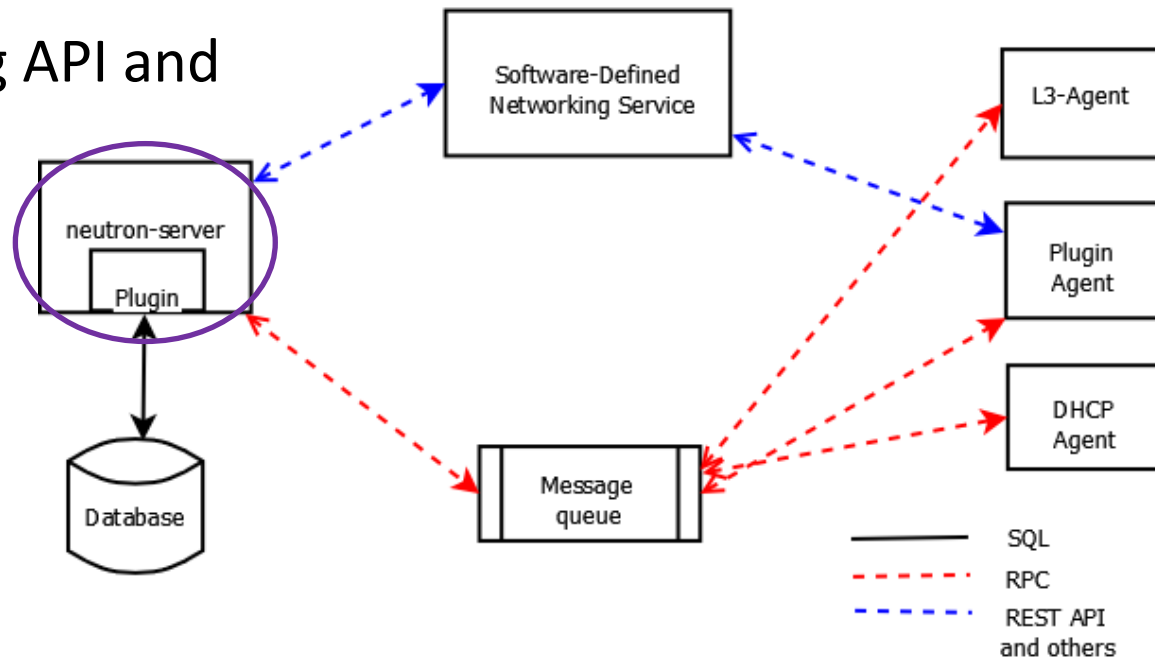
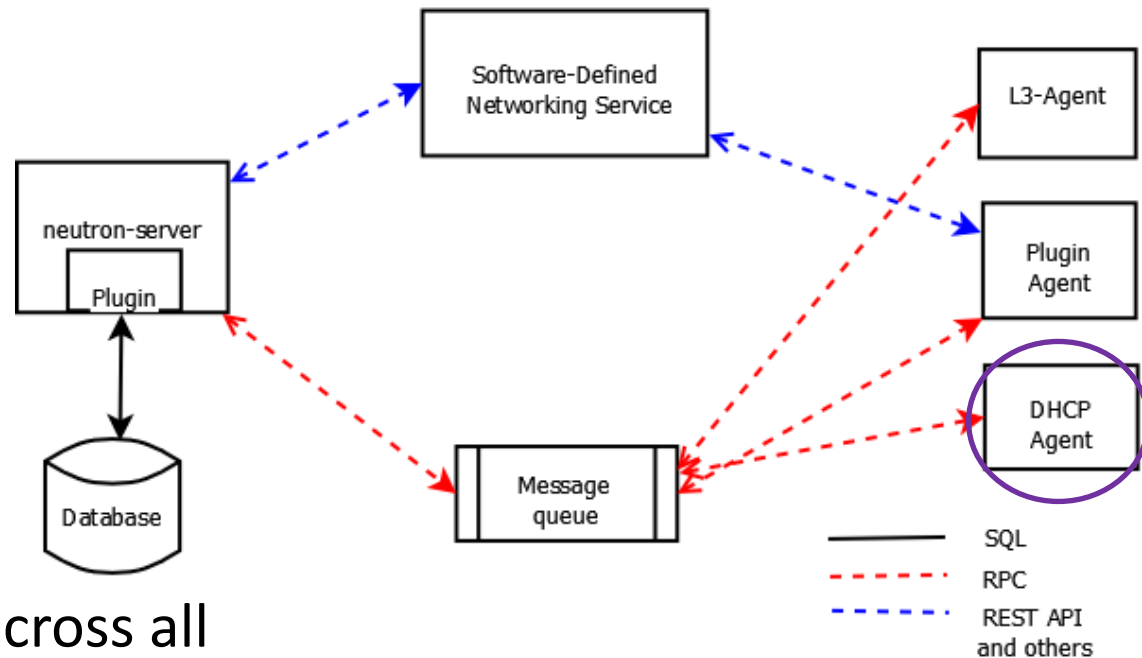➤ Enforces the network model and IP addressing of each port.

plugin agent

➢ Runs on **each compute node** to manage **local virtual switch** (vswitch) configuration.
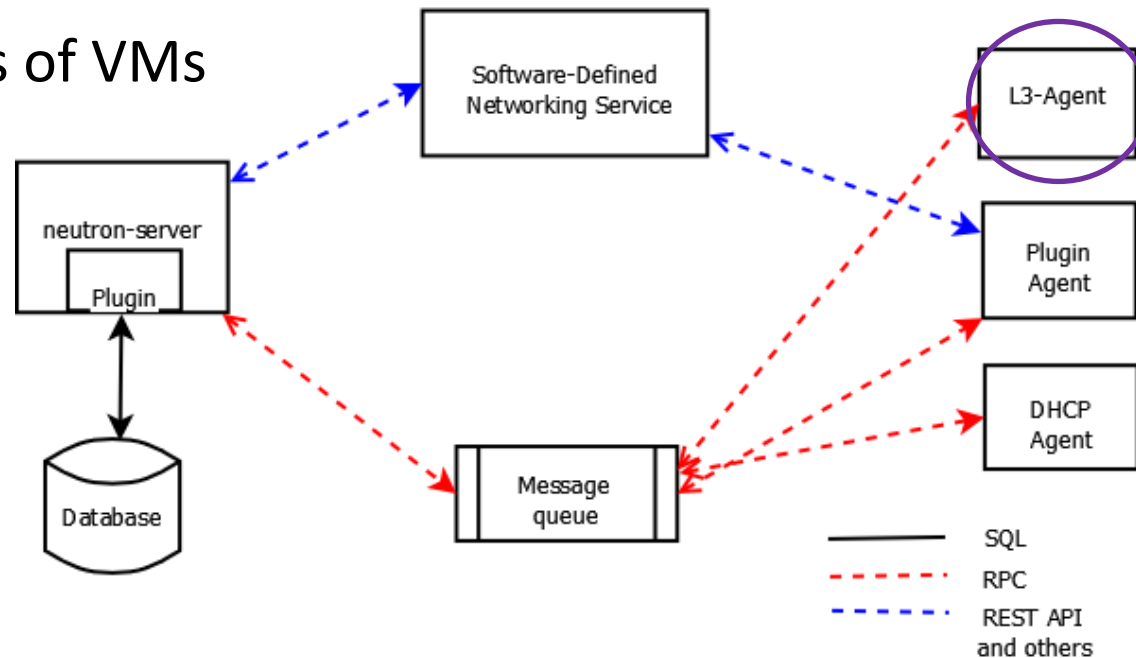
DHCP agent

➢Provides DHCP services to tenant

networks.

➢This agent is the same across all

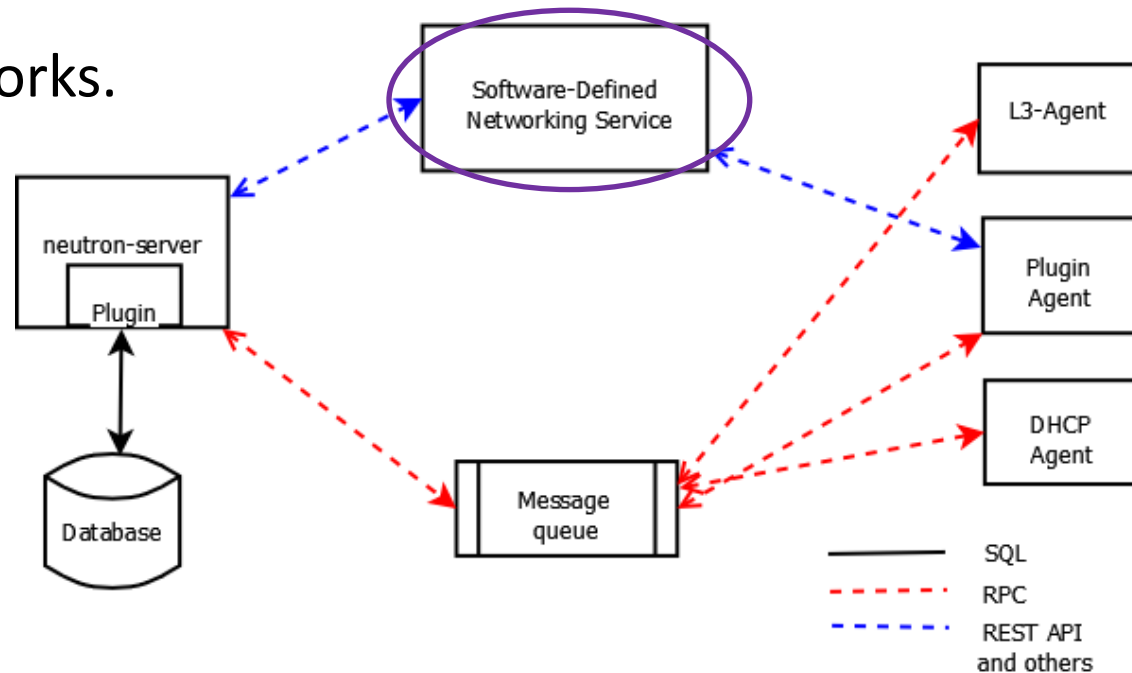plug-ins and is responsible for

maintaining DHCP configuration.

L3 agent

➢ Provides L3/NAT forwarding for
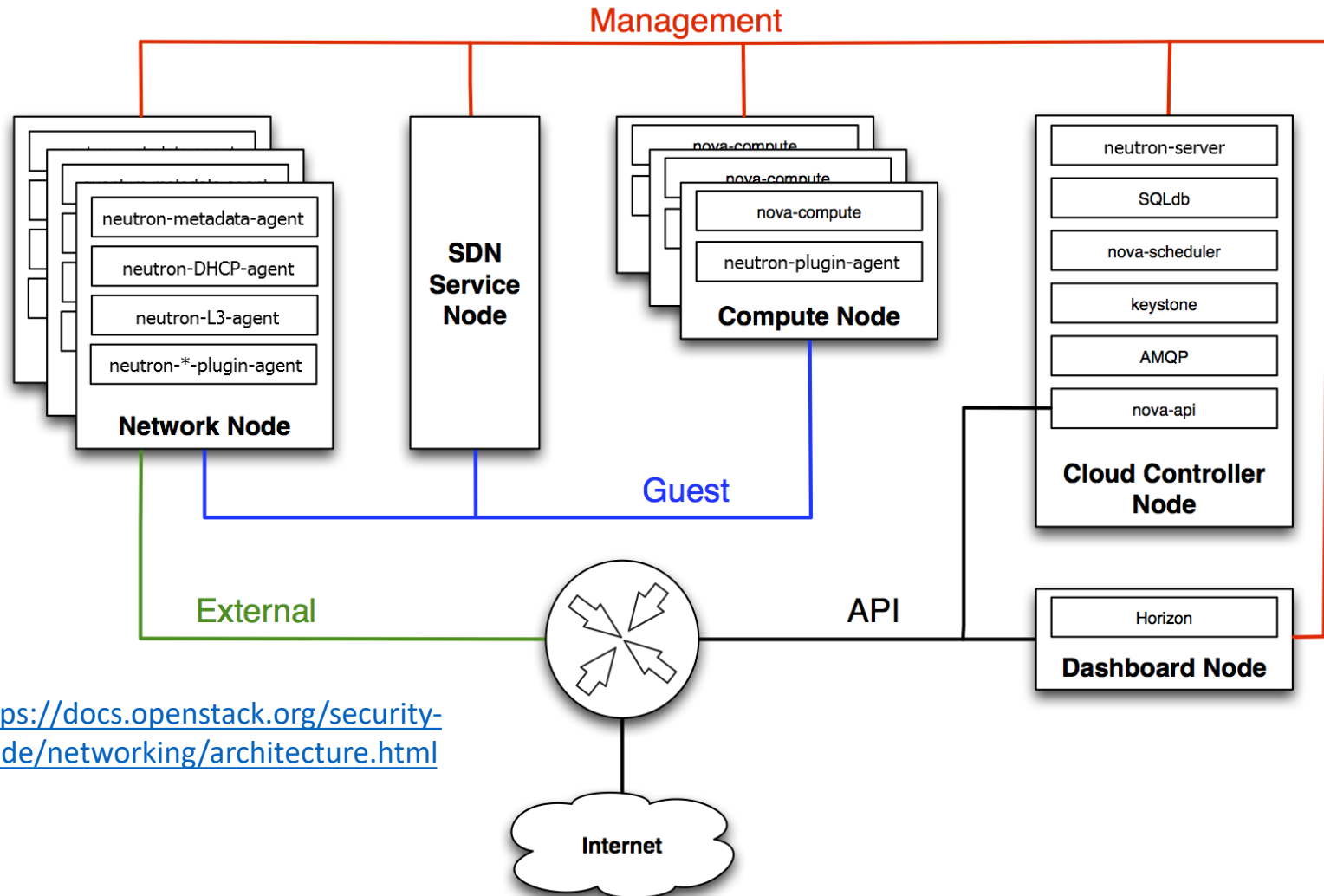
external network access of VMs

on tenant networks.

network provider services (SDN server)

➢ Provides additional networking services to tenant networks.

Network connectivity of physical servers¶

Management

| neutron-metadata-agent |
| neutron-DHCP-agent |
| neutron-L3-agent |
| neutron-*-plugin-agent |

Network Node

SDN Service Node

| nova-compute |
| neutron-plugin-agent |

Compute Node

| neutron-server |
| SQLdb |
| nova-scheduler |
| keystone |
| AMQP |
| nova-api |

Cloud Controller Node

Guest

External

API

| Horizon |

Dashboard Node

Internet

https://docs.openstack.org/security-guide/networking/architecture.html

Management Network

➢ Used for internal communication between OpenStack Components.

➢ The IP addresses on this network should be reachable only within the data center and is considered the Management Security Domain.
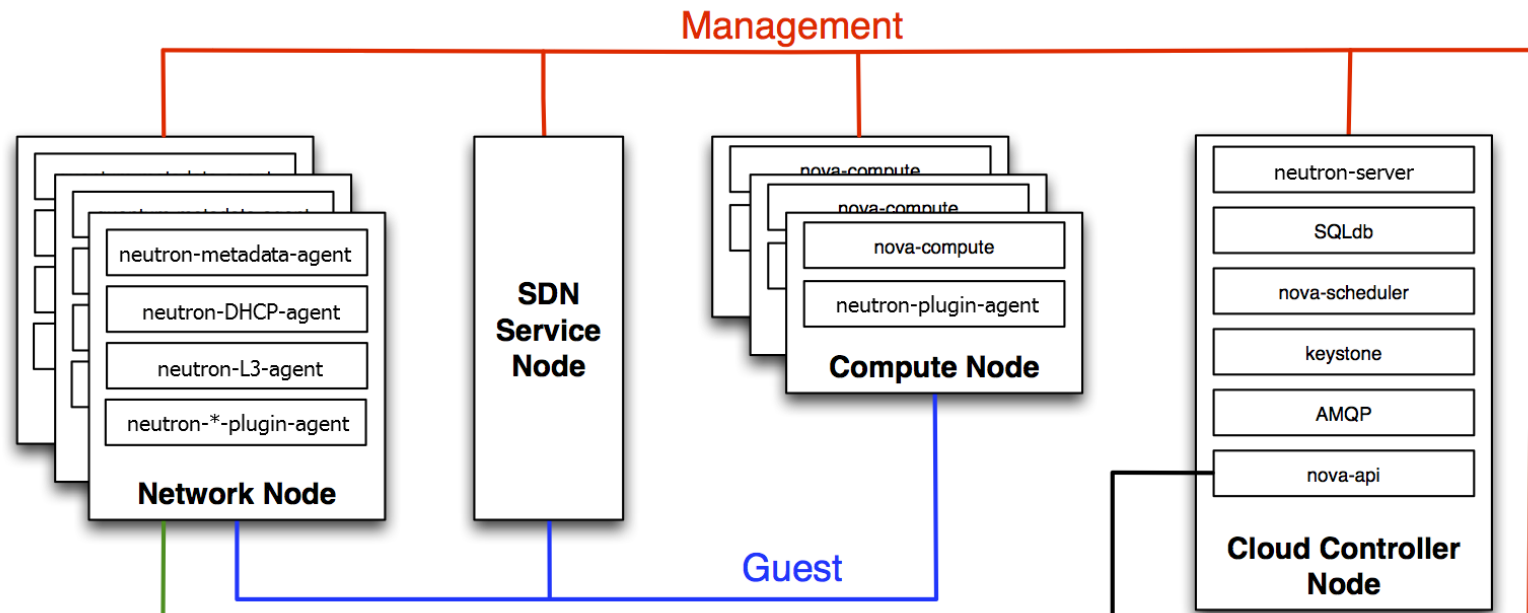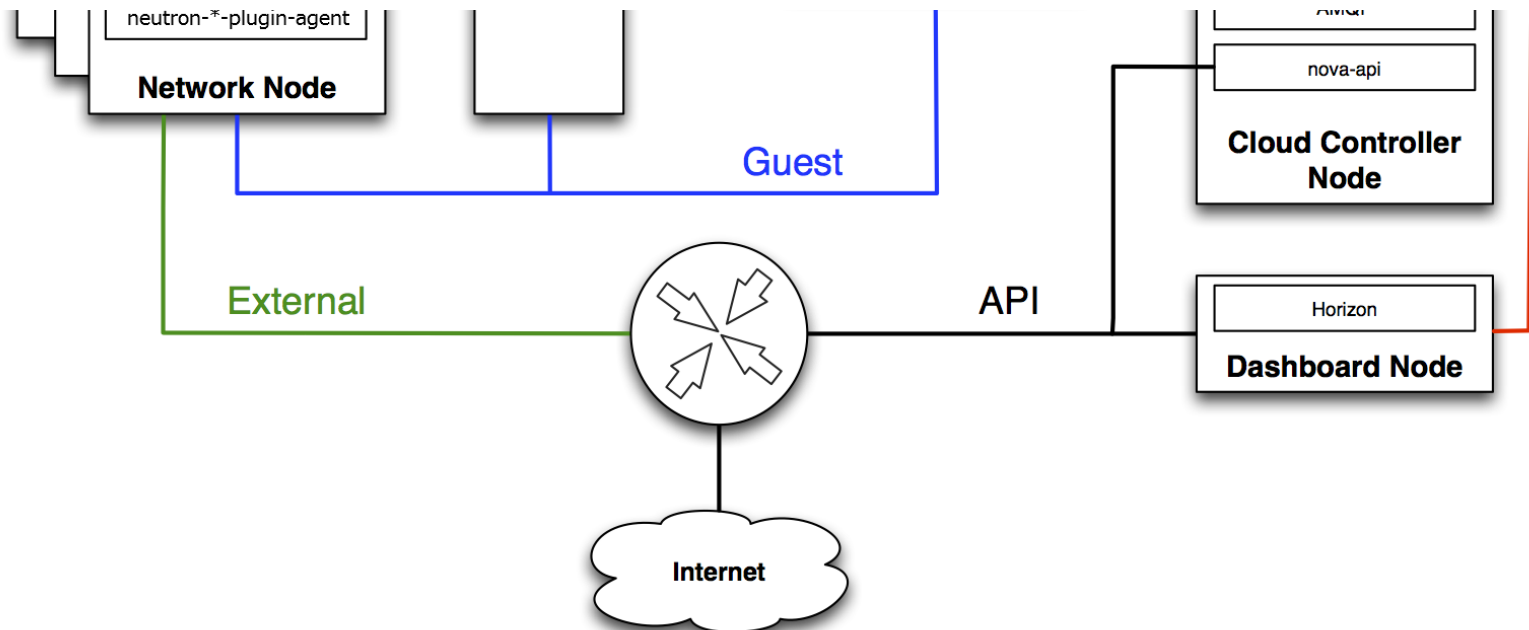
Guest network

➢ Used for VM data communication within the cloud deployment.

➢ This network is considered the Guest Security Domain.
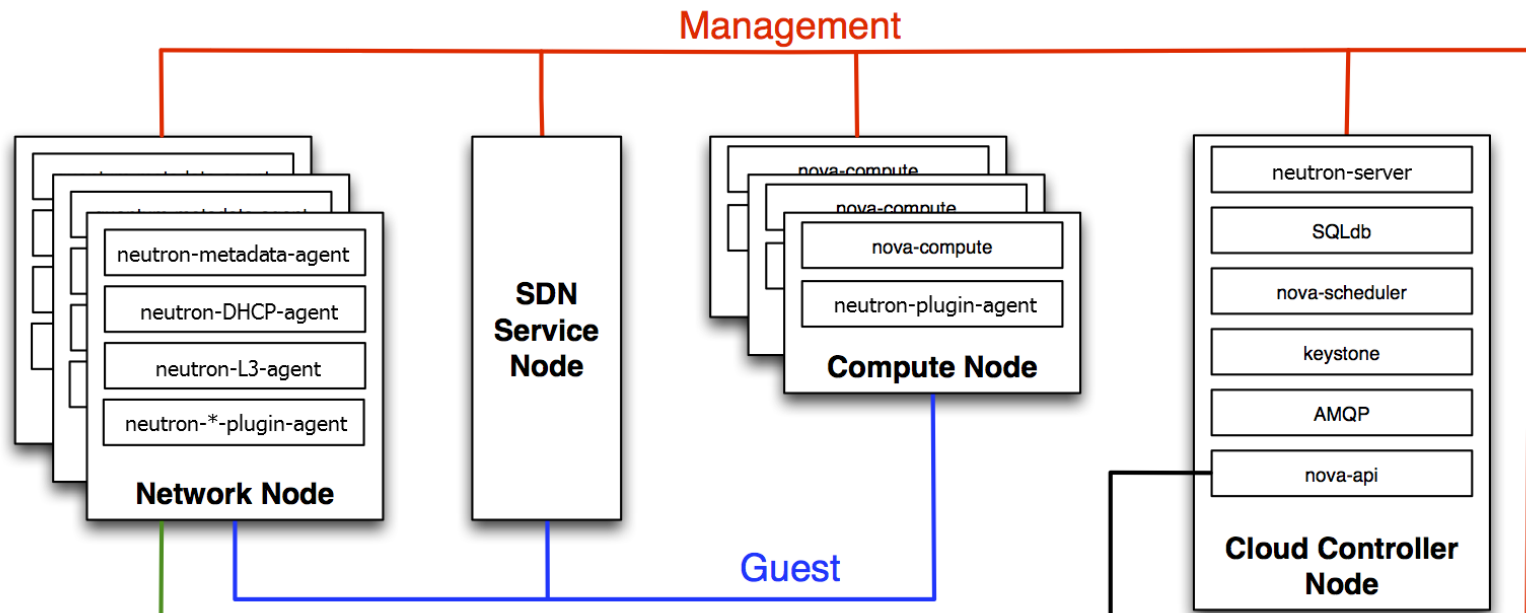
External network

➤ Used to provide VMs with Internet access in some deployment scenarios.

➤ IP addresses on this network should be reachable by anyone on the Internet.

➤ This network is considered to be in the Public Security Domain.

API network

➢ Exposes all OpenStack APIs (e.g., OpenStack Networking API), to tenants.

➢ IP addresses on this network should be reachable by anyone on the Internet.

➢ This may be the same network as the external network

➢ This network is considered the Public Security Domain.
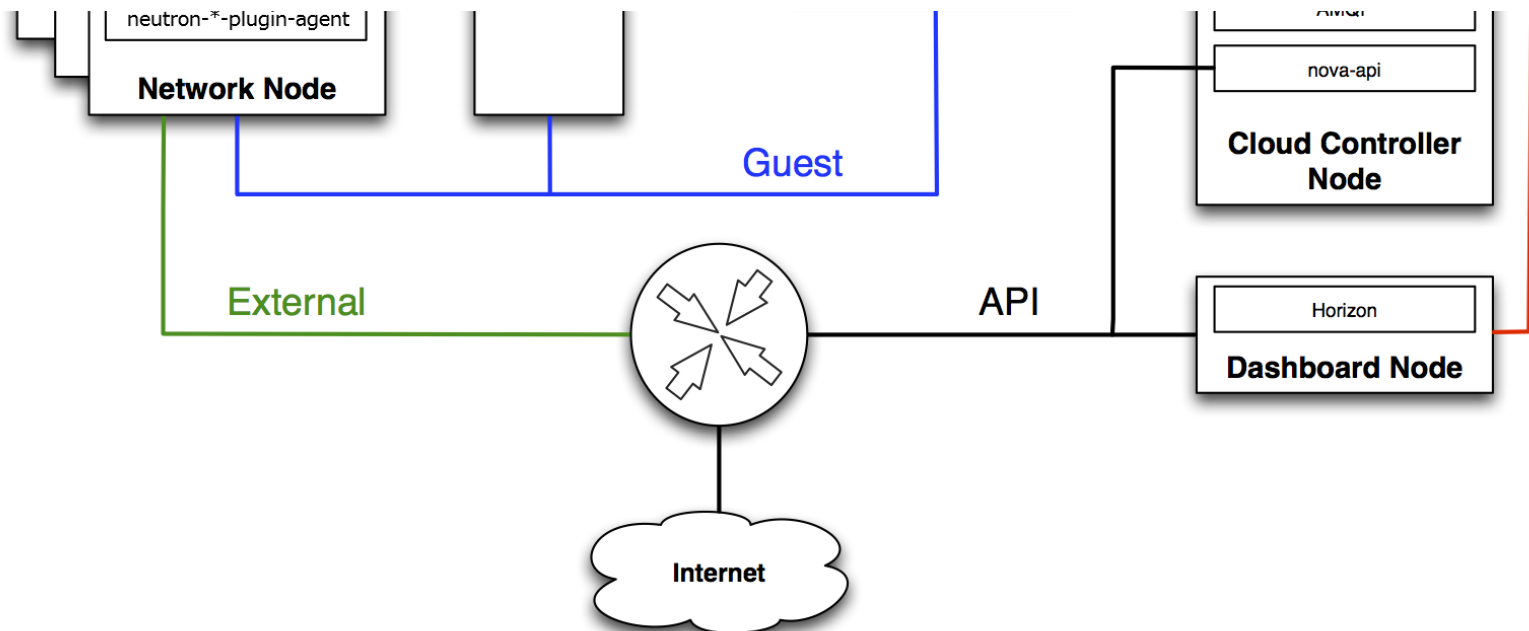
Neutron Services

➤ Load Balancer as a Service (LBaaS)

➤ Virtual Private Network as a Service (VPNaaS)

➤ Firewall as a Service (FWaaS)

Neutron Components
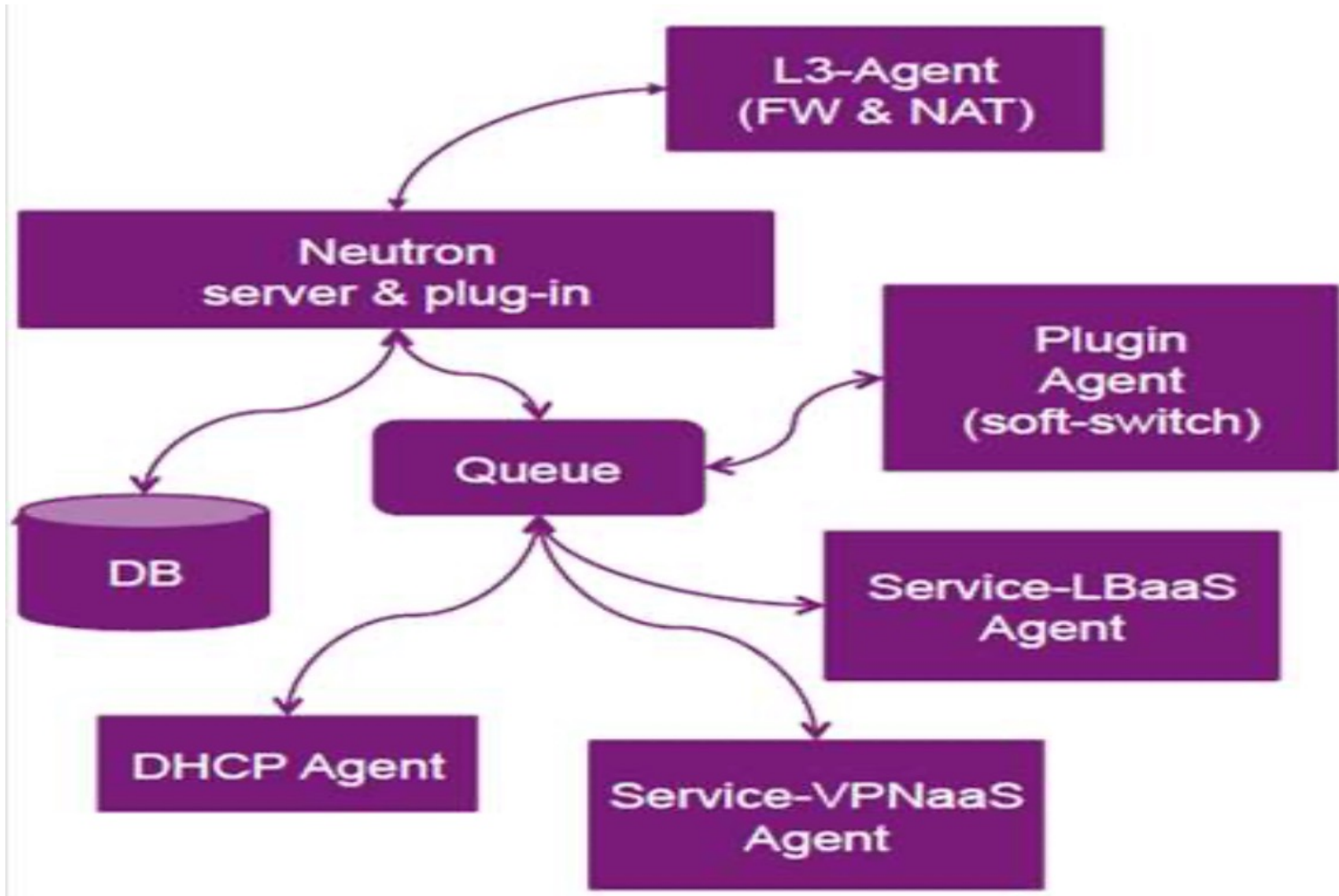
Neutron Components (cont.)

➢Neutron Server

- Implement REST APIs

- Enforce network model

- Network, subnet, and port

- IP addressing to each port (IPAM)

➢Plugin agent

- Run on each compute node

- Connect instances to network port

Neutron Components (cont.)

➢Queue
- ▪ Enhanced communication between each components of neutron

➢Database
- ▪ Persistent network model

➢DHCP agent
- ▪ In multi-host mode, run on each compute node
- ▪ Maintain dhcp configuration

➢L3 agent
- ▪ To implement floating IPs and other L3 features, such as NAT