OpenStack for Network Engineers (OSNE)

COURSE OVERVIEW:

This course is designed for experienced Network Engineers that are interested in learning how OpenStack works with a specific focus on the networking aspects of how traffic flows across the environment. The course begins with a quick introduction to OpenStack via the web UI and progresses to networking concepts and configurations. Several traffic flow analysis scenarios are then discussed, each with a unique physical and logical layout. Comprehensive lab exercises are presented at the end of each unit for the students to work through. At the end of the course, the students will have a depth of knowledge about how to analyze existing OpenStack environments and configure new OpenStack environments with regards to existing data center network infrastructures.

WHO WILL BENEFIT FROM THIS COURSE?

Experienced Network Engineers with a desire to learn OpenStack Networking.

PREREQUISITES:

A thorough understanding of Linux, Virtualization, routing, subnetting, and TCP/IP are required for this course. Further experience in using the Linux command line, REST APIs, and command line editors are highly beneficial.

COURSE OUTLINE:

Module 1: OpenStack, Cloud and Terminology

- What is OpenStack?
- Cloud Services Defined
- What are the benefits?
- Use cases
- Review – What is OpenStack Quiz
- Solution – What is OpenStack Quiz
- Lab
- Unit 1 Summary

Module 2: Intro to Horizon

- Let's dip our toe into the water
- Creating a New Project
- Uploading Images
- Creating Networks
- Public IP Address
- Creating Block Storage
- Launching an Instance
- Review Quiz – Intro to Horizon
- Solutions
- Lab
- Summary

Module 3: OpenStack Component Overview

- Components
- Dashboard (Horizon – Management UI, Web)
- Identity (Keystone – Authentication)
- Compute (Nova – Hypervisor, runs Virtual Machines)
- Networking (Neutron – Configures network)
- Storage (Swift – Object store, eg., simple file repo)
- Storage (Glance – Image store, for firing up new VMs)
- Cinder (Block Storage, typically virtual hard drives)
- Heat (Orchestration, coordinating VMs)
- Ceilometer (Telemetry, Usage data)
- Review Quiz – OpenStack Components
- Solution
- Lab
- Summary

Module 4: OpenStack Networking (Neutron) – Basics

- Neutron Introduction
- Neutron Architecture
- Layer 2 Config
- VLANs
- L2 tunneling
- Layer 3 Config
- Tenant Networks
- Provider Networks
- LBaaS
- FWaaS
- VPNaaS
- Plugins
- API
- Review Quiz – Neutron Basics
- Solutions – Neutron Basics
- Lab
- Summary

Module 5: Neutron Configuration and Command Line

- Neutron Processes
- Neutron Configuration
- Example Configuration File
- Plugin and Agent Configuration Files
- Neutron Command Line Interface utility
- Examples of CLI usage
- Neutron API
- Linux Network Tools Review
- Review Quiz – Neutron Config and CLI
- Solutions – Neutron Config and CLI
- Lab
- Summary

Module 6: Provider Network using Open vSwitch

- Provider networks with Open vSwitch
- Hardware Infrastructure
- OpenStack services – controller node
- OpenStack services – compute nodes
- Architecture
- Controller Node
- Compute Node
- Packet flow
- Case 1: North-south
- Case 2: East-west for instances on different networks
- Case 3: East-west for instances on the same network
- Review Quiz – Provider Network using Open vSwitch
- Solutions – Provider Network using Open vSwitch
- Lab
- Summary

Module 7: Tenant Networks using Open vSwitch

- Basic Implementation with Open vSwitch
- Requirements
- Architecture
- General
- Components
- Packet flow
- Case 1: North-south for instances without a floating IP address
- Example environment configuration
- Packet flow
- Case 2: North-south for instances with a floating IP address
- Example environment configuration
- Packet flow
- Case 3: East-west for instances with or without a floating IP address
- Example environment configuration
- Packet flow
- Review Quiz
- Quiz Solutions
- Lab
- Controller node (controller)
- Network node (network1)
- Compute nodes (compute1 and compute2)
- Verify service operation
- Create initial networks
- External (flat) network
- Tenant (VXLAN) network
- Verify operation
- Summary

Module 8: Distributed Virtual Router (DVR)

- High Availability using Distributed Virtual Routing (DVR)
- Infrastructure
- OpenStack services – controller node
- OpenStack services – network node
- OpenStack services – compute nodes
- Architecture
- Packet flow
- Case 1: North/south for instances with a fixed IP address
- Case 2: North/south for instances with a floating IP address
- Case 3: East/west for instances using different networks on the same router
- Review Quiz
- Quiz Solutions
- Lab
- Summary

Module 9: Running Applications in OpenStack

- Deploying Applications/Services
- What is Heat?
- Features
- Heat Components
- Heat Services
- Demo
- Sahara
- Trove
- Configuration Management and Orchestration
- Review/Quiz
- Solutions
- Lab

Module 10: Installing OpenStack

- Development
- Packaged installations
- Manual configuration
- Lab

Module 11: Monitoring

- Monitoring
- System Health
- Ceilometer
- Lab

Module 12: Network Review

- OpenStack Networking Review
- Physical Network
- Network Overlay
- Layer 2
- Layer 3
- Networking Functions as a Service
- Other SDN Solutions
- Lab

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