



[OpenStack Training Agenda](#)

[\( Unlimited Labs on “KILO” \)](#)

## Cloud Basics

### Cloud Foundation

Data Center Standards (Power, Cooling, Scalability, Security)

#### **Enterprise H/w Core**

Enterprise x86 Server Architecture

Blade Chassis, IEEE DCB Standards

#### **Server Virtualization**

Hypervisors in Market, VM's (P2V, V2P, V2V, P2P)

Multi Hypervisor Management with various s/w

#### **Storage Virtualization**

ATA, PATA, SATA, SCSI, SAS

DAS vs NAS vs SAN

Fibre Channel Architecture

iSCSI Architecture

SAN - Storage Area Networking

“Scale Out” vs “Scale UP” Architecture

#### **Network Virtualization**

Physical Networks vs Virtual Networks

NFV & SDN Evolution in Market

7 Layers of OSI & TCP/IP Layers

Connection Less & Connection Oriented

Routers, Switches, Hubs

VLANS, VXLAN, GRE Tunneling, Load Balancers & VPN

## Cloud Basics Labs

### **Data Center** (HP / Dell / x86 vendor Rack / Power Planning Tools)

Data Center requirements  
Cooling, Power and Security

### **KVM Lab**

Create VM using Image  
Create VM using ISO  
Create Windows VM using CD

### **ISCSI Lab**

Volumes  
Physical Volume  
ISCSI Target  
ISCSI Initiator  
Mounting and Creating File System

## Cloud Technology Introduction

### Introduction to Cloud

**Infrastructure as a Service (IaaS)**  
**Platform as a Service (PaaS)**  
**Software as a Service (SaaS)**  
**Private Clouds Public Cloud & Hybrid Cloud**

### Other Players in Market

**RackSpace**  
**Microsoft Azure**  
**VMware vAir**  
**Ali Cloud**

### **Amazon Web Services (AWS)**

Introduction to AWS, and Concepts  
Amazon EC2, Amazon EBS, Amazon S3  
Introduction to VPC

## Public Cloud Labs

### **Amazon Web Services Labs**

Understand various Amazon AWS components  
AWS VPC (Virtual Private Cloud)  
Launching an Instance  
Creating and Attaching Volumes (Block Storage)  
Amazon S3 Buckets (Object Storage)

## OpenStack Modules

### **OpenStack Architecture**

OpenStack Background  
Cloud Infrastructure Segregation  
(Regions / Cells, Availability Zones, Host Aggregation)  
OpenStack Components on Physical Servers

### **Install & Configure OpenStack**

Single Node Configuration  
Multi Node Configuration  
VM Based Configuration  
Cloud Based Install Simulation  
DevStack Based Installation  
Mirantis FUEL, Redhat RDO

### **OpenStack Components**

#### **Keystone**

Users, Roles, Projects, domains  
Services, Endpoints

#### **Glance**

Images  
Image Storage

## **Nova**

Nova Compute

Nova Scheduler

Nova API

Nova Availability Zones

Nova Aggregates

Instance Creation Deep Dive

(Step by Step across various OpenStack Components)

## **Neutron**

Routers, Networks

Security Groups, Key pairs

Floating IPs

SNAT

DNAT

Networking Use Cases

Neutron behind Scenes – Compute Node

Neutron behind Scenes – Network Node

Networking – End-to-End (Trace Packet Flow)

Distributed Virtual Router (DVR)

## **Cinder**

Volumes

Snapshots

Storage Backend, Multi Storage

Software Defined Storage

Using Traditional Storage as Backend for Cinder

# OpenStack Labs (On Live International Data Centers)

## Lab Configuration Overview & Data Center Physical Hosts

### 1. Horizon (Dashboard)

#### 1.1. Horizon Project Tab (Tenant User's View)

- 1.1.1. Horizon Project – Log In
- 1.1.2. Horizon Project – Create a VM
- 1.1.3. Horizon Project – Create and Attach a Volume
- 1.1.4. Horizon Project – View Network Topology
- 1.1.5. Horizon Project – View Logs
- 1.1.6. Horizon Project – Delete

### 2. Identity Service (Keystone)

#### 2.1. Exercise 1: Identity Service Using CLI

- 2.1.1. Credentials
  - 2.1.1.1. Source Your Environment Variables
  - 2.1.1.2. View Credentials (Token)
- 2.1.2. Services
  - 2.1.2.1. List OpenStack Services
  - 2.1.2.2. List OpenStack Endpoints
  - 2.1.2.3. List Service Agents
- 2.1.3. Tenants
  - 2.1.3.1. List Tenants
  - 2.1.3.2. Get Tenant Information
- 2.1.4. Users and Roles
  - 2.1.4.1. List Users
  - 2.1.4.2. Get User information
  - 2.1.4.3. List Roles
  - 2.1.4.4. List a User's Roles for a Given Tenant

#### 2.2. Full Set of Keystone CLI Commands

### 3. Compute Service (Nova)

#### 3.1. Exercise 1: Horizon Flavor Management

- 3.1.1.1. Create Flavor
- 3.1.1.2. Modify Flavor
- 3.1.1.3. Delete Flavor
- 3.1.1.4. Log Out

- 3.2. Exercise 2: Horizon - VM Management and Quotas
  - 3.2.1.1. Log in to Horizon
  - 3.2.1.2. Create CorpNetA
  - 3.2.2. VM Management
    - 3.2.2.1. Launch a VM
    - 3.2.2.2. View Topology
    - 3.2.2.3. Tenant Quota Summary - Overview
    - 3.2.2.4. Pause and Resume
    - 3.2.2.5. Suspend and Resume
    - 3.2.2.6. Soft Reboot
    - 3.2.2.7. Hard Reboot
    - 3.2.2.8. Terminate the VM
- 3.3. Exercise 3: CLI VM Management
  - 3.3.1.1. Source Credentials (Environmental Variables)
  - 3.3.1.2. List Flavors
  - 3.3.1.3. Flavor: Detailed Information
  - 3.3.1.4. List Images
  - 3.3.1.5. List Networks
  - 3.3.1.6. Launch VM "Sales"
  - 3.3.1.7. Launch VM "Prod"
  - 3.3.1.8. Launch VM "Mkt"
  - 3.3.1.9. List Images
  - 3.3.1.10. Get Details About VM "Sales"
  - 3.3.1.11. Start, Stop, Pause, Suspend, Resume, Soft and
  - 3.3.1.12. Display VM Console Log
  - 3.3.1.13. Acquire URL for VM Console
- 3.4. Exercise 4: CLI - Quotas and Usage Statistics
  - 3.4.1.1. Display Default Quotas
  - 3.4.1.2. Display a Tenant's Quota Information
  - 3.4.2. Host and VM Usage Statistics
    - 3.4.2.1. List Host and Services
    - 3.4.2.2. Host Description
    - 3.4.2.3. Display Diagnostic Information for VM "Mkt"
    - 3.4.2.4. Display Tenant Usage Stats
- 3.5. Exercise 5: Availability Zones and Host Aggregates
  - 3.5.1.1. List Availability Zones
  - 3.5.1.2. Host Aggregates

### 3.6. Exercise 6: Scheduler Filter with Hints

#### 3.6.1. Server Group

##### 3.6.1.1. ServerGroupAffinity

##### 3.6.1.2. ServerGroupAntiAffinity

### 3.7. Full Set of Nova CLI Commands

## 4. Image Service (Glance)

### 4.1. Exercise 1: Glance using Horizon

#### 4.1.1.1. Log In to Horizon

#### 4.1.1.2. Create an Image and Mark it Public

### 4.1.2. Snapshot Management

#### 4.1.2.1. Create a Snapshot of a Running VM

#### 4.1.2.2. Launch VM from Snapshot

#### 4.1.2.3. Delete Snapshot

### 4.2. Exercise 2: Glance using CLI

#### 4.2.1.1. Source Credentials (Environmental Variables)

#### 4.2.1.2. List the Available Images

#### 4.2.1.3. Get Image Details

#### 4.2.1.4. Download Image

#### 4.2.1.5. Import the Image

#### 4.2.1.6. Delete Image

#### 4.2.1.7. Create Snapshot

#### 4.2.1.8. Launch VM from Snapshot

### 4.3. Chapter Cleanup

### 4.4. Full Set of Glance Commands

## 5. Network Service (Neutron)

### 5.1. Exercise 1: Build the ABC, Inc. Enterprise Network

#### 5.1.1. Tenant Network Creation

##### 5.1.1.1. Build Private Network/Subnet: CorpNetA\_and

##### 5.1.1.2. Add Virtual Machines

##### 5.1.1.3. Create Tenant Router01

##### 5.1.1.4. Connect CorpNetA and CorpNetB to

##### 5.1.1.5. Build Private Network CorpNetC\_Sub3

##### 5.1.1.6. Create Router02

##### 5.1.1.7. Boot Web server and DB-1, DB-2, DB-3

##### 5.1.1.8. Ping Test 1 (VM within a Network)

##### 5.1.1.9. Ping Test 2 (VM across Networks via

##### 5.1.1.10. Ping Test 3 (outside of the Cloud)

- 5.1.1.11. Assign Floating IP
- 5.1.1.12. Ping Test 4 (External into Internal)
- 5.1.2. Network from CLI
  - 5.1.2.1. Source Credentials
  - 5.1.2.2. List VM Dispositions and Networking
  - 5.1.2.3. List Floating IPs
  - 5.1.2.4. List Routers and Interfaces
- 5.2. Exercise 2: LBaaS
  - 5.2.1.1. Navigate to Load Balancer Window
  - 5.2.1.2. Create a Load Balancer Pool
  - 5.2.1.3. Add a VIP
  - 5.2.1.4. Associate the VIP with a Floating IP
  - 5.2.1.5. Add a Monitor
  - 5.2.1.6. Associate Monitor with Pool
  - 5.2.1.7. Add Members to the Pool
  - 5.2.1.8. Test the Load Balancer Monitor
  - 5.2.1.9. Test the Load Balancer
- 5.3. Exercise 3: Access and Security
  - 5.3.1. Security Groups
    - 5.3.1.1. Create a Security Group
    - 5.3.1.2. Manage Security Rules
    - 5.3.1.3. Manage Security Groups via CLI
- 5.4. Exercise 4: Keypairs
  - 5.4.1.1. Manage Keypairs
- 5.5. Full Set of Commands (for Neutron)

## **6. Block Storage Service (Cinder)**

- 6.1. Exercise 1: Manage Volumes using Horizon
  - 6.1.1. Log in to Horizon as Admin
    - 6.1.1.1. Create a Volume Type
  - 6.1.2. Create Volume Using the Volume Type Just
    - 6.1.2.1. Attach Volume
  - 6.1.3. Advanced Optional Exercise: Format and Use New
    - 6.1.3.1. Detach Volume
    - 6.1.3.2. Advanced Optional Exercise: Move the Volume
    - 6.1.3.3. Delete Volume
- 6.2. Exercise 2: Manage Volumes Using CLI
  - 6.2.1. Cinder Configuration
    - 6.2.1.1. Source Credentials



- 6.2.1.2. Show Quotas for This User
- 6.2.1.3. Show Volume Type and Extras
- 6.2.1.4. Create Cinder Volume
- 6.2.1.5. Attach Volume
- 6.2.1.6. Detach Volume
- 6.2.1.7. Delete Volume
- 6.2.1.8. Clean Up and Remove All Configuration
- 6.3. Full Set of Commands

## **7. Object Service (Swift)**

- 7.1. Introduction
- 7.2. Exercise 1: Swift Object Service Using Horizon
  - 7.2.1. Log in to Horizon
  - 7.2.2. Container Management
    - 7.2.2.1. Create a Swift Container
    - 7.2.2.2. Upload an Object
    - 7.2.2.3. Copy Object
    - 7.2.2.4. Delete Object
    - 7.2.2.5. Delete Container
- 7.3. Exercise 2: Swift Object Services via CLI
  - 7.3.1.1. Create a Container and Upload Objects
  - 7.3.1.2. List Objects
  - 7.3.1.3. Show the Status of a Container
  - 7.3.1.4. Delete Objects
  - 7.3.1.5. Delete Container
- 7.4. Full Set of Swift Commands
- 7.5. Full Set of Swift-Related OpenStack Commands

## **8. Telemetry Service (Ceilometer)**

- 8.1. Introduction
- 8.2. Exercise 1: Using Horizon
  - 8.2.1. Log in to Horizon and Preview Services
  - 8.2.2. Resource Usage (Admin View)
  - 8.2.3. Resource Usage (User View)

## **9. Orchestration Service (Heat)**

### **9.1. Introduction**

### **9.2. Exercise 1: Stack Management via Horizon**

#### **9.2.1. Log in to Horizon**

#### **9.2.2. View Heat Orchestration Resource Types**

#### **9.2.3. Launch a Stack Template**

##### **9.2.3.1. Launch Stack**

#### **9.2.4. View Stack Details**

#### **9.2.5. Delete Stack**

## **10. Open Discussion & Questions**

### **10.1. Work with Class**