

Fundamentals of OpenStack® Technology H6C68S

HPE course number	H6C68S
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This course teaches administrators and users to configure, manage and use the OpenStack® cloud services platform. An architectural overview ensures understanding of various OpenStack projects and their functions. Hands-on labs provide configuration and operations experience with major aspects of the OpenStack environment. Course content and labs are based on the OpenStack Xena release.

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Audience

System administrators, engineers and consultants who plan and manage OpenStack-based environments

Prerequisites

Because learners should have entry-level Linux system administration skills to get the most out of practical exercises, HPE recommends that students complete the HPE Linux Fundamentals (HJ7M0S) and Linux for Unix Administrators (GL615) (U2794S) courses, or have an equivalent level of experience, before taking this course.

Course Objectives

After completing this course, students should be able to:

- Describe the purpose and features of OpenStack
- Describe OpenStack high level architecture and list its major components
- Describe methods of access to OpenStack services
- Manage identities in an OpenStack cloud
- Launch and manage instances
- Create and manage images, volumes, networks and use the Object Store

Detailed course outline

Module 1: OpenStack Technology Overview	<ul style="list-style-type: none"> • What is a cloud; what is OpenStack • OpenStack architecture 	<ul style="list-style-type: none"> • Your lab system
Module 2: Accessing OpenStack	<ul style="list-style-type: none"> • OpenStack API, endpoints and WSGI • Authentication and tokens 	<ul style="list-style-type: none"> • The OpenStack command line and dashboard
Module 3: Keystone (Identity)	<ul style="list-style-type: none"> • Keystone concepts • Keystone API versions 	<ul style="list-style-type: none"> • Keystone command line • Authentication, authorization and policies
Module 4: Nova (Servers)	<ul style="list-style-type: none"> • Nova concepts; how a user sees Nova instances • Instances, keypairs, console, IP addresses, security groups, instance-specific data • Launch instances and make them available on the network • Customize an instance with user data 	<ul style="list-style-type: none"> • Nova implementation; Nova microversions • Nova architecture • What happens when an instance is launched • Nova scheduler and placement service • Managing compute nodes: regions, cells, aggregates, availability zones • Nova troubleshooting
Module 5: Glance (Images)	<ul style="list-style-type: none"> • Glance concepts; where to get images • Disk and container formats 	<ul style="list-style-type: none"> • Uploading images • Where images are stored
Module 6: Cinder (Block Storage – LUNs)	<ul style="list-style-type: none"> • Basic concepts and commands; OpenStack storage overview • What cloud operators and users want from storage • Storage drivers • Creating, deleting, attaching, detaching, listing volumes 	<ul style="list-style-type: none"> • Cinder implementation • Advanced concepts; backends, volume types and extra specs • Snapshots • Backups • Multi-attach • Using volumes as boot disks
Module 7: Neutron (Networks)	<ul style="list-style-type: none"> • Neutron resource abstractions; networks, subnets, ports, routers • Provider networks, external networks, tenant networks • Floating IPs and address translation 	<ul style="list-style-type: none"> • Network implementation; network separation and access • Routing • Plugins and agents • The ML2 plugin • Command examples
Module 8: Swift (Object Storage)	<ul style="list-style-type: none"> • Why object storage • Swift concepts: accounts, containers, objects, replication • Using Swift; uploading and downloading objects 	<ul style="list-style-type: none"> • Access control with ACLs • TempURL • Object versioning • Large objects • Swift architecture

Detailed lab outline

Lab 1: OpenStack Overview	<ul style="list-style-type: none"> • Lab 1a: Access your lab environment 	<ul style="list-style-type: none"> • Lab 1b: Obtaining OpenStack® documentation
Lab 2: Accessing OpenStack	<ul style="list-style-type: none"> • Lab 2a: The dashboard • Lab 2b: Discovery 	<ul style="list-style-type: none"> • Lab 2c: The command line <ul style="list-style-type: none"> – Task 1: A few CLI commands – Task 2: Command completion • Lab 2d: The OpenStack shell
Lab 3: Keystone	<ul style="list-style-type: none"> • Lab 3a: Keystone configuration • Lab 3b: Keystone access using the command line <ul style="list-style-type: none"> – Task 1: Explore Keystone endpoints and API versions – Task 2: List identity resources and explore their details – Task 3: Create domains and projects 	<ul style="list-style-type: none"> • Lab 3c: Roles, authentication and scopes <ul style="list-style-type: none"> – Task 1: Explore roles and associated privileges – Task 2: Use the GUI's RC file to set your identity – Task 3: Explore the system scope • Lab 3d: Using Horizon for identity administration
Lab 4: Nova	<ul style="list-style-type: none"> • Lab 4a: Discover the Nova implementation <ul style="list-style-type: none"> – Task 1: Configuration files and policy – Task 2: Nova processes and services • Lab 4b: Create an instance using the GUI <ul style="list-style-type: none"> – Task 1: Enter essential instance details – Task 2: Check networks and add a keypair • Lab 4c: Create an instance from the command line <ul style="list-style-type: none"> – Task 1: Verify Nova services – Task 2: Gather necessary information – Task 3: Create a key pair – Task 4: Launch the instance • Lab 4d: Access instances through their consoles <ul style="list-style-type: none"> – Task 1: View instance console content – Task 2: Use two methods to open interactive instance consoles – Task 3: Confirm that the two instances have network connectivity to each other 	<ul style="list-style-type: none"> • Lab 4e: Enable network access to an instance <ul style="list-style-type: none"> – Task 1: Add floating IP addresses to the instances – Task 2: Explore the default security group – Task 3: From the GUI, create a security group that permits ICMP traffic – Task 4: From the command line, add an SSH rule to the security group – Task 5: Test ssh access • Lab 4f: Instance metadata <ul style="list-style-type: none"> – Task 1: Simple metadata – Task 2: Use cloud-init to personalize an instance • Lab 4g: Nova policy <ul style="list-style-type: none"> – Task 1: Enforce the system scope – Task 2: Enforce the correct meaning of the reader role • Lab 4h: Other instance actions <ul style="list-style-type: none"> – Task 1: Create a snapshot – Task 2 (optional): Pause an instance and explore its implementation – Task 3 (optional): Suspend an instance • Lab 4i (optional): Create an instance that can't be scheduled <ul style="list-style-type: none"> – Task 1: Look into a failed instance launch – Task 2: Explore the placement service
Lab 5: Glance	<ul style="list-style-type: none"> • Lab 5a: Discover your Glance implementation 	<ul style="list-style-type: none"> • Lab 5b: Use Glance <ul style="list-style-type: none"> – Task 1: Create a Glance image in Horizon – Task 2: The Glance command line: classic image upload and other tasks

Lab 6: Cinder

- Lab 6a: Cinder configuration discovery
- Lab 6b: Create and attach volumes
 - Task 1: Create a multi-attach volume
 - Task 2: Explore how the volume is implemented
 - Task 3: Attach the volume
 - Task 4: Explore how volume attachment is implemented
 - Task 5: Access the volume from the instances
 - Task 6: Move the multi-attach volume to a third Instance
 - Task 7 (optional): Automatic volume deletion
- Lab 6c: Launch an instance from a volume
 - Task 1: Launch the instance
 - Task 2 (optional): Compare with an instance with ephemeral storage
- Lab 6d: Snapshots and backups
 - Task 1: Take a volume snapshot
 - Task 2: Remove a file and recover it from the snapshot
 - Task 3: Create a full backup and explore it
 - Task 4: Take incremental backups
 - Task 5: Restore backups
 - Task 6: Export backup metadata
 - Task 7 (optional): Simulate database failure and import backup metadata
- Lab 6e: Add a Cinder backend
 - Task 1: Explore the current configuration
 - Task 2: Add a volume backend
 - Task 3: Create a volume type for the new backend and make it the default
 - Task 4: Use the new volume type

Lab 7: Neutron

- Lab 7a: Discover Neutron configuration settings
 - Task 1: Explore configuration files
 - Task 2: Explore the running system
- Lab 7b: Explore your networks
 - Task 1: Explore your networks using the GUI
 - Task 2: Explore your networks from the command line
 - Task 3: Delete unneeded networks
- Lab 7c: Create a network and connect VMs
 - Task 1: Use the CLI to create a new network and router
 - Task 2: Find out why the router was not connected to private
 - Task 3: Solve this problem with the CLI
 - Task 4: Launch the second-tier instance
 - Task 5: Launch the first-tier instance
 - Task 6: Create a route between the instances
- Lab 7d (optional): Role-base access control
 - Task 1: Share a network
 - Task 2: Share a security group

Lab 8: Swift

- Lab 8a: Using the OpenStack object storage service GUI
 - Task 1: Where does Glance keep its images?
 - Task 2: Manage objects using the GUI
 - Lab 8b: Command line
 - Task 1: Explore the Cinder backups stored in Swift
 - Task 2: Upload a file, explore object details and set metadata on an object
 - Task 3: ACLs and anonymous object access
 - Lab 8c (optional): Object versioning
 - Lab 8d (optional): TempURL
 - Lab 8e (optional): Large objects
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