

# Tytuł szkolenia: Fundamentals of OpenStack® Technology

Kod szkolenia: H6C68S

## Wprowadzenie

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 Ussuri release.

## Adresaci szkolenia

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

### Prerequisites

HPE recommends that students attain the following credentials or levels of experience before taking this course:

- Completion of HPE Linux Fundamentals (HJ7M0S)
- Completion of Linux for Unix Administrators (GL615) (U2794S)

## Cel szkolenia

After completing this course, students should be able to:

- Describe the purpose and features of OpenStack
- Describe its 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 store objects
- Create, launch and monitor simple autoscaling stacks

### Certifications and related examinations

- Certified OpenStack Administrator (COA)
- EXIN Foundation Certificate in OpenStack Software Additional study and preparation may be required to pass the exams

## Czas i forma szkolenia

- 21 godzin (3 dni x 7 godzin), w tym wykłady i warsztaty praktyczne.

## Plan szkolenia

### Module 1: OpenStack Technology Overview

- What is a cloud; what is OpenStack
- OpenStack architecture
- Your lab system

### Module 2: Accessing OpenStack

- OpenStack API, endpoints and WSGI
- Authentication and tokens
- The OpenStack command line and dashboard

### **Module 3: Keystone (Identity)**

- Keystone concepts
- Keystone API versions
- Keystone command line
- Authentication, authorization and policies

### **Module 4: Nova (Servers)**

- 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
- 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)**

- Glance concepts
  - Where to get images
  - Disk and container formats
  - Uploading images
  - Where images are stored

### **Module 6: Neutron (Networks)**

- Neutron resource abstractions
  - Networks, subnets, ports, routers
  - Provider networks, external networks, tenant networks
  - Floating IPs and address translation
- Network implementation
  - Network separation and access
  - Routing
  - Plugins and agents
  - The ML2 plugin
- Command examples

### **Module 7: Cinder (Block Storage – LUNs)**

- Basic concepts and commands
  - OpenStack storage overview
  - What cloud operators and users want from storage
  - Storage drivers
  - Creating, deleting, attaching, detaching, listing volumes
  - Using volumes as boot disks
  - Multi-attach
- Cinder implementation
- Advanced concepts
  - Backends, volume types and extra specs
  - Snapshots
  - Backups
- HPE storage and Cinder

### **Module 8: Swift (Object Storage)**

- Swift concepts
  - Why object storage

- Accounts, containers, objects, replication
- Using Swift
  - Uploading and downloading objects
  - Access control with ACLs
  - TempURL
  - Large objects
- Swift architecture

#### **Module 9: Ceilometer (Metering) and Heat (Orchestration)**

- Ceilometer and the telemetry family
  - Telemetry architecture and dataflow
  - Ceilometer sampling and publishing to Gnocchi
  - Alarms
- Heat: orchestrating a cloud application
  - Heat architecture, templates and stacks
  - Example template
    - Heat and autoscaling
  - Launching and viewing a stack

#### **Lab 1: OpenStack Overview**

- Lab 1a: Accessing and setting up your lab environment
- Lab 1b: Obtaining OpenStack documentation

#### **Lab 2: Accessing OpenStack**

- Lab 2a: The dashboard
- Lab 2b: Discovery
- Lab 2c: The command line
  - Task 1: Command line completion
  - Task 2: A few CLI commands
- Lab 2d: The OpenStack shell

#### **Lab 3: Keystone**

- Lab 3a: Keystone configuration
- Lab 3b: Keystone access using the command line
  - Task 1: Explore Keystone endpoints and API versions
  - Task 2: List identity resources and explore their details
  - Task 3: Create domains and projects
  - Task 4: Explore roles and associated privilege
  - Task 5: Use the GUI's RC file to set your identity
  - Task 6: Explore the system scope
- Lab 3c: Using Horizon for identity administration

#### **Lab 4: Nova**

- Lab 4a: Discover the Nova implementation
  - Task 1: Configuration files
  - Task 2: Nova processes and services
- Lab 4b: Create an instance using the GUI
  - Task 1: Enter essential instance details
  - Task 2: Check networks and add a keypair
- Lab 4c: Create an instance from the command line
  - 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

- 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
- Lab 4e: Enable instance access from the network
  - 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
  - Task 1: Simple metadata
  - Task 2: Use cloud-init to personalize an instance
- Lab 4g: Other instance actions
  - Task 1: Create a snapshot
  - Task 2 (optional): Pause an instance
  - Task 3 (optional): Suspend an instance
- Lab 4h (optional): Create an instance that can't be scheduled
  - Task 1: Look into a failed instance launch
  - Task 2: Explore the placement service

#### **Lab 5: Glance**

- Lab 5a: Discover your Glance implementation
- Lab 5b: Use Glance
  - Task 1: Create a Glance image in Horizon
  - Task 2: The Glance command line - classic image upload and other tasks

#### **Lab 6: Neutron**

- Lab 6a: Discover Neutron configuration settings
  - Task 1: Explore configuration files
  - Task 2: Explore the running system
- Lab 6b: 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 6c: 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 the private network
  - 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 6d (optional): Role-based access control
  - Task 1: Share a network
  - Task 2: Share a security group

#### **Lab 7: Volume Management (Cinder)**

- Lab 7a: Cinder configuration discovery
- Lab 7b: 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
- Task 8 (optional): Volume attachment tags
- Lab 7c: Launching an instance from a volume
  - Task 1: Launch the instance
  - Task 2 (optional): Compare an instance with ephemeral storage
- Lab 7d: Snapshots and backups
  - Task 1: Recover file from snapshot
  - Task 2: Backups
- Lab 7e (optional): 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 7f (optional): Specify volume type when root filesystem is a volume

#### **Lab 8: OpenStack Object Storage (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
- Lab 8c (optional): Object versioning
- Lab 8d (optional): TempURL
- Lab 8e (optional): Large objects

#### **Lab 9: OpenStack Metering (Ceilometer) and Orchestration (Heat)**

- Lab 9a: Ceilometer alarms
  - Task 1: Ceilometer and Gnocchi configuration
  - Task 2: Generate and measure load
  - Task 3: Set up and process alarms
  - Task 4: Measuring groups of servers
  - Task 5: Alarms on a group of instances
- Lab 9b: Orchestrating stacks
  - Task 1: Create a simple stack
  - Task 2: Create a stack with an autoscaling group
  - Task 3: Create an autoscaling stack
  - Task 4: Add parameters and output to the template
  - Task 5: Explore autoscaling
  - Task 6: Explore the orchestration section of Horizon