HPE Digital Learner
OpenStack® Content Pack

This 20-hour self-paced eLearning course offers a high-value, high-quality and interactive experience for students that is similar in scope and content to our traditional instructor-led training deliveries by our professional instructors. This course will provide baseline fundamentals and hands-on training across various operational roles, such as administrators, users and integrators that need to install, configure and manage the OpenStack® cloud services platform. This course includes enhanced on-demand capabilities, such as simulated labs, bookmarking and access to reference videos, blogs and other information to help students understand the critical operational elements required to stand up and operate a typical OpenStack® environment. Also covered are all relevant architectural overviews and an understanding of various OpenStack® projects and their functions. The hands-on, video demonstrations and simulations provide configuration and operation experience within major aspects of the OpenStack® environment. This course content and examples are based around the OpenStack® Pike release.

**Why HPE Education Services?**
- IDC MarketScape leader 5 years running for IT education and training*
- Recognized by IDC for leading with global coverage, unmatched technical expertise, and targeted education consulting services*
- Key partnerships with industry leaders OpenStack®, VMware®, Linux®, Microsoft®, ITIL, PMI, CSA, and SUSE
- Complete continuum of training delivery options—self-paced eLearning, custom education consulting, traditional classroom, video on-demand instruction, live virtual instructor-led with hands-on lab, dedicated onsite training
- Simplified purchase option with HPE Training Credits

**Audience**
System Administrators, engineers and consultants who will plan and manage OpenStack®-based environments

**Recommended learning**
HPE recommends that students possess Linux and Cloud computing fundamentals knowledge prior to beginning this training.

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*Realize Technology Value with Training, IDC Infographic 2037, Sponsored by HPE, October 2017*
Content Pack objectives

This course is presented in three modules:

**Using OpenStack®**
Use the OpenStack® software to quickly create and attach storage volumes to virtual machines. Learn how to create private networks for a multi-tier environment and launch a stack using the orchestration component of OpenStack®.

• Identify steps to deploy a server in OpenStack®
• Describe how to use OpenStack® to deploy a server that uses secure access
• List the steps to create a volume and attach it to a server
• Show the steps to create a bootable storage volume
• Describe how to create and access objects using the OpenStack® object storage service
• Show how to create networks and servers for a multtier environment
• Demonstrate how to deploy multiple servers using OpenStack® orchestration

**Administering OpenStack®**
This is for students who want to progress towards understanding how to administer an OpenStack® cloud. It covers the architecture and mechanisms that make it work.

• Describe the features of a cloud environment
• Identify the definition of OpenStack® and its function
• Identify primary types of cloud services
• Identify the projects that together make up OpenStack®
• Be able to set up projects, users, and security
• Monitor cloud health
• Differentiate between core OpenStack® projects, their architecture, and how to troubleshoot them

**Installing DevStack**
DevStack is a developers environment within which OpenStack® is installed. DevStack provides an ideal OpenStack® learning environment that can be installed on a single virtual machine. You will learn about general OpenStack® installation principals and then learn through demonstrations and a simulation how to install and configure DevStack.

• Identify considerations when planning an OpenStack® installation
• Describe various types of cloud deployments
• Describe how to deploy DevStack
• List configuration options you can apply to a DevStack environment
## Detailed Content Pack outline

### Module 1: Using OpenStack®

**Lesson 1: Introduction to OpenStack®**
- Welcome and objectives
- What is OpenStack®
- Tour of the OpenStack® dashboard
- Key takeaways

**Lesson 2: Starting with OpenStack®**
- Working with images and instances
- Using the DevStack environment
- Touring the OpenStack® dashboard
- Signing in to OpenStack®
- Creating a server instance in OpenStack®

**Lesson 3: Creating an instance with secure access**
- Understanding OpenStack® identity objects
- Securing an instance
- Leveraging OpenStack® network resources
- Managing the instance lifecycle
- Taking a snapshot of an instance

**Lesson 4: Adding a block storage volume to an instance**
- Understanding ephemeral and persistent storage
- Attaching and mounting a storage volume to an instance
- Creating a volume snapshot
- Creating a consistency group

**Lesson 5: Creating a bootable storage volume**
- Defining ephemeral storage
- Defining persistent storage
- Launching a bootable volume
- Considerations for creating a bootable volume

**Lesson 6: Working with storage objects**
- Summary of the object storage service
- Examining the project

**Lesson 7: Creating a multitier environment**
- Creating a multitier environment
- OpenStack® network resources

**Lesson 8: Creating a stack using orchestration**
- Overview of the orchestration service
- What you can do with orchestration
- How orchestration works

### Module 2: Administering OpenStack®

**Lesson 1: Introduction to OpenStack®**
- Cloud computing concepts
- Cloud services overview
- Features of OpenStack®
- Benefits of OpenStack®
- Evolution of OpenStack®
- Foundation and release history
- History in the open source community

**Lesson 2: Exploring the OpenStack® architecture**
- Reviewing the high-level architecture
- Examining a typical deployment
- Overview of OpenStack® services & projects
- OpenStack® service interaction
- OpenStack® project pages
- Core projects in this training
- Communicating with OpenStack® projects
- Logical architecture
- REST API request format
- Constructing an URL for an API call
- Firefox RESTED plug-in
- Troubleshooting

**Lesson 3: Managing OpenStack® health**
- Checking the status of OpenStack® services
- OpenStack® Telemetry service
- Telemetry service components
- Ceilometer data collection
- Transformation in the publishing pipeline
- Publishing the collected data
- Telemetry alarms
- Locating configuration files
- Ceilometer troubleshooting
- Ceilometer logging
- Telemetry logging in DevStack
- Verifying telemetry operations

**Lesson 4: Managing projects, users, and security**
- Keystone identity and service management
- Keystone identity object relationships
- Keystone service components
- Keystone identity process
- OpenStack® federated identity services
- Keystone troubleshooting
Lesson 5: Exploring OpenStack® networking
- Neutron overview
- OpenStack® networking provided by Neutron
- Neutron service architecture
- Configuration example
- Neutron modular layer 2 plugin
- Virtual networking concepts
- Neutron network resources
- Network configuration example
- Troubleshooting Neutron
- Neutron log files
- Checking Neutron services
- Neutron troubleshooting tips

Lesson 6: Managing images and flavors
- Glance overview
- Glance architecture
- Glance images
- Guest image introduction
- Container formats
- Create a Linux guest image
- Instance initialization with cloud-init
- Sources of metadata
- Common Glance management tasks
- Glance-related configuration files
- Managing images using the OpenStack® dashboard
- Common image-related CLI commands
- Troubleshooting the image service
- Troubleshooting overview
- Checking image information
- Checking VMDK headers

Lesson 7: Managing instances
- Nova overview
- Cloud computing fabric controller
- Nova system architecture
- Nova Cells v2
- Regions, availability zones, and host aggregates
- Nova scheduling
- Nova hypervisors
- VM instance creation begin and end states
- Nova scheduler overview
- Filter scheduler
- Common Nova management tasks
- Nova configuration files
- Managing Flavors
- Showing host usage statistics
- Gathering instance information
- Getting summary statistics
- Nova troubleshooting
- Verifying Nova installation
- Scenarios
- Nova service log files
- Tracing a request ID

Lesson 8: Managing the volume service
- Cinder overview
- OpenStack® block storage
- Block storage use cases
- OpenStack® storage overview
- Cinder architecture
- Cinder volume creation workflow
- Common Cinder management tasks
- Common management tasks
- Cinder snapshots and backups
- Creating a consistent snapshot
- Consistency groups
- Transferring Cinder volumes
- Cinder troubleshooting
- Troubleshooting Cinder
- Viewing the status of Cinder services

Lesson 9: Managing the object storage service
- Object storage service overview
- Logical organization
- Swift architecture
- Swift rings
- Swift ring partition
- Swift ring lookup
- Swift regions and zones
- Swift storage policies
- Swift consistency processes
- Common Swift management tasks
- Swift management operations
- Adding storage in a ring
- Swift CRUD operations
- Swift troubleshooting
- Diagnosing Swift issues
- Troubleshooting with Swift log files
- Hardware issues
**Lesson 10: Managing the orchestration service**
- Heat overview
- Heat components
- How Heat works
- Heat Orchestration Template (HOT)
- Heat template components
- Troubleshooting Heat

**Module 3: Installing and Configuring DevStack**

**Lesson 1: Understanding how OpenStack® is installed**
- OpenStack® configuration options
- Understanding cloud requirements
- Primary OpenStack® installation methods
- Installing OpenStack® manually
- OpenStack® development environment (DevStack)

**Lesson 2: Installing DevStack**
- Scripted DevStack installation process
- Minimal local.conf file for devstack installation
- Testing the installation

**Lesson 3: Configuring DevStack**
- Restarting DevStack
- Troubleshooting tools
- Local.conf sections
- local.conf with core projects

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