

Updated 05/17/2024

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OpenStack Training

3 days (21 hours)

Presentation

OpenStack® is an open-source virtualization management platform that monitors virtualized resources, automatically detects infrastructure changes, creates reports and automates processes in environments based on different Cloud Providers.

In 2014, the Linux Foundation ranked OpenStack as one of the most popular open source projects of the year. Today, the maturity offered by OpenStack technologies makes it one of the most attractive products on the private cloud market, and also serves as a foundation for public clouds. Large IT companies and small start-ups alike are adopting OpenStack, which is why it has grown so rapidly in recent years.

In 2018, an official survey proposed by the firm notes 3 major market trends among users who have adopted this cloud technology:

- Kubernetes remains the #1 container orchestration framework on OpenStack. In fact, Kubernetes is the leading framework among PaaS and container tools used to manage OpenStack applications. OpenStack and Kubernetes are increasingly used as complementary technologies, particularly in multi-cloud scenarios.
- OpenStack: use of dedicated Bare-Metal servers on the rise, thanks to productivity gains by Kubernetes. Adoption of Ironic, the OpenStack cloud service in Bare-Metal, has grown rapidly, with 24% of production deployments now relying on the service, up from just 9% in 2016. Among users running Kubernetes on OpenStack, Ironic adoption is even higher at 37%. Magnum, the CNCF-certified installer for Kubernetes on OpenStack, is also widely used in this population, with 16% of users.
- OpenStack multi-cloud users trust OpenStack. Although users of OpenStack often rely on proprietary public clouds such as Amazon Web Services (AWS) (44%), Microsoft Azure (28%) or Google Compute Engine (GCP) (24%), the survey showed that 58% of infrastructures were powered by OpenStack.

Europe is one of the leaders in this highly competitive sector. In fact, in

In terms of worldwide deployment of OpenStack solutions, [several statistics](#) show that Asia accounts for 49% of physical deployment, followed by the European continent with 36%, and in third place the USA with 26%.

The entire open-source cloud market is mainly focused on products and services revolving around the technologies offered by OpenStack. Indeed, as mentioned in a [TechCrunch article](#), a report by 451 Research estimates that by 2023 there will be a combined market for Kubernetes and OpenStack solutions of around \$11 billion, of which \$7.7 billion is dedicated to OpenStack.

OpenStack is a powerful technology that brings together a set of scripts in several packages (commonly called Projects), executing the tasks required to create cloud environments. The OpenStack architecture relies on two types of software to create these environments:

- Virtualization software that creates a layer of virtual resources from hardware.
- A basic operating system that executes the commands transmitted by OpenStack scripts.

6 main projects make up the core of OpenStack:

- Nova: tool for managing calculation resources (creation, deletion, scheduling).
- Neutron: network connector for all OpenStack services.
- Swift: resilient object-mode storage service (fault tolerance & RESTful API).
- Cinder: block storage service.
- Keystone: authentication and authorization management for all OpenStack services.
- Glance: virtual machine disk image manager.

OpenStack is a high-level open source software package for cloud management. It supports a wide range of compute, network and storage virtualization technologies, and offers numerous configuration options. OpenStack is a free, open-source software platform for cloud computing, mainly deployed as infrastructure-as-a-service (IaaS). The software platform consists of interrelated components that control various multi-vendor hardware pools of processing, storage and networking resources in a data center.

In this training course, you'll discover OpenStack's architecture as a whole: the basic components needed to build and autonomously manage a public or private cloud environment. You'll learn why OpenStack is so unique as a cloud architecture, and how it differs from traditional virtualization. You'll be able to master the deployment of this solution on your own infrastructure, as well as tackling other Cloud Computing solutions on the market, such as Microsoft Azure, AWS and others.

Like all our training courses, this one will introduce you to the latest stable version and its new features (the [Caracal version](#) released on April 3, 2024).

Objectives

- Be able to deploy a cloud (IaaS, PaaS, SaaS) with OpenStack
- How to manually deploy an OpenStack cloud to provide IaaS
- Manage your OpenStack cluster from the graphical interface and the Horizon CLI
- Configuring and putting Private Cloud into production with OpenStack

Target audience

- System & network administrator
- System architect
- Cloud and storage engineer
- IT Leaders

Prerequisites

- Know the basic command lines on Linux
- Good understanding of virtualization concepts
- Understanding computer network concepts

Further information

OpenStack: Infrastructure & Advanced Administration training program

Installing OpenStack

- About PackStack & HW Requirement
- Installing OpenStack packages
- Installing CentOS on VirtualBox

OpenStack infrastructure and components

- Horizon & Horizon Dashboard
- CLI Customer
- Keystone
- Nova to calculate
- Neutron for the network
- Imaging overview
- Swift for object storage
- Cinder for block storage
- Using components via CLI interface

Network

- Networking KVM with Linux bridges
- Comparison of single and multi-host networking
- The role of the Network Manager in the nova-network component
- How to access a virtual machine
 - Via a floating IP address
 - Security group management
- Network traffic management
- vNIC architecture with Neutron plugin
 - OpenVswitch
- Neutron L3 and DHCP agents
- Setting up a load balancer
 - Configuring a load balancer as a service
 - Create and manage
- The networks
 - The users
 - The projects
 - Quotas
- User administration and permissions

Implementation of the 6 main components

- Using cluster computing with Nova
- Authenticate and authorize with Keystone help
- Managing virtual machine disk images with Glance
- Connect your services with Neutron
- Using block mass storage with Cinder
- Fault-tolerant object storage with Swift

Presentation of Other Components

- Managing the web dashboard with Horizon
- Using metrics with Ceilometer
- Orchestrate your resources with Heat
- DNS-as-a-service: Set up your DNS as a service with Designate
- Databases as a service with Trove

Heat orchestration service

- Heat architecture
- The models
- Creating a model stack
- Creating stacks from CLI

As-a-Service

- Ceilometer
- Trove
- Magnum
- Murano
- Sahara: OpenStack's Big Data component with Hadoop
- Other OpenStack services

OpenStack API

- API requests
- Workflow and authentication

Keystone: IdM integration

- Authentication
- Authorization in OpenStack

Troubleshooting

- Deployment problems
- Register location
- Using APIs to check component status in OpenStack
- MySQL management in OpenStack
- Troubleshooting problems before/after start-up

Multi-node design and installation

- Multi-Node design and minimum requirements for the Node.
- Installing OpenStack MultiNode

Setting up a private cloud within a Microsoft Azure public cloud

- What is Microsoft Azure?
- Creating a Centos virtual machine in Azure
- Getting to grips with OpenStack's Horizon interface with Azure Cloud's Private IP
- Getting to grips with OpenStack's Horizon interface with IP Public

There are also several [certifications available](#) as well as [free resources](#) around this topic:

- Red Hat OpenStack Technical Overview (CL010) [This free online video series details the basics](#) of cloud computing and the Red Hat OpenStack platform. Through a number of demonstrations and use cases, you will develop a high level of understanding of the capabilities of the Red Hat OpenStack platform.
- Red Hat OpenStack Administration I (CL110) [This course teaches students how to install](#) a proof-of-concept, configure, use and maintain the Red Hat OpenStack platform. This course covers the basic services: identity (Keystone), block storage (Cinder), image (Glance), network (Neutron), compute and controller (Nova), and dashboard (Horizon).
- Red Hat OpenStack Administration II (CL210) [This course teaches system administrators to](#) how to implement a cloud computing environment using Red Hat OpenStack Platform, including installation, configuration and maintenance. It contains content for Red Hat OpenStack Administration I and II. The course can also help prepare students for the Red Hat Certified OpenStack Administrator (EX210) exam.
- Red Hat OpenStack Administration III: Networking and NFV fundamentals (CL310) [This course offers in-depth hands-on training](#) for experienced system administrators on how to use the distributed storage features of Red Hat Ceph Storage and the networking capabilities of OpenStack Neutron. The course can also help students prepare for the Red Hat Certified Engineer in Red Hat OpenStack (EX310) exam.

Companies concerned

This training course is aimed at both individuals and companies, large or small, wishing to train their teams in a new advanced computer technology, or to acquire specific business knowledge or modern methods.

Positioning on entry to training

Positioning at the start of training complies with Qualiopi quality criteria. As soon as registration is finalized, the learner receives a self-assessment questionnaire which enables us to assess his or her estimated level of proficiency in different types of technology, as well as his or her expectations and personal objectives for the training to come, within the limits imposed by the selected format. This questionnaire also enables us to anticipate any connection or security difficulties within the company (intra-company or virtual classroom) which could be problematic for the follow-up and smooth running of the training session.

Teaching methods

Practical course: 60% Practical, 40% Theory. Training material distributed in digital format to all participants.

Organization

The course alternates theoretical input from the trainer, supported by examples, with brainstorming sessions and group work.

Validation

At the end of the session, a multiple-choice questionnaire verifies the correct acquisition of skills.

Sanction

A certificate will be issued to each trainee who completes the course.