Introduction to Cloud Infrastructure Technologies

Overview

- This online self-paced introductory course gives you a primer on cloud computing and the use of open source software to maximize development and operations. The course will help you grasp the basics of cloud computing and understand the terminology, tools, and technologies associated with today's top cloud platforms.

Audience

- Whether you are a developer, system administrator, or a network computing professional just starting out, having specific cloud skills can help pave the way to a lucrative career in technology. This course maps out the entire cloud landscape and explains how various tools and platforms fit together.

Prerequisites

- No previous cloud experience is required for this course.

Course Outline

Chapter 1. Welcome and Introduction

- Welcome to LFS151.x
- Before You Begin
- Syllabus and Grading
- Course Formatting
- Course Timing
- Course Progress & Completion
- Guidelines to Discussions
- Learning Aids
- Introduction to Cloud Computing and Technologies
- Key Features of Cloud Computing
- Cloud Deployment Models
- The Linux Foundation
- The Linux Foundation Events
- The Linux Foundation Training

Chapter 2. Virtualization

Introduction and Learning Objectives

- Virtualization
- Learning Objectives

KVM

- Introduction to KVM
- Features
- Demo
- Benefits of Using KVM
- References

VirtualBox

- Introduction to VirtualBox
- Demo
- Benefits of Using VirtualBox
- References

Vagrant

- Introduction to Vagrant
- Managing Virtual Machines with Vagrant
- Demo
- Benefits of Using Vagrant
- References

Knowledge Check

Learning Objectives (Review)

Chapter 3. Infrastructure as a Service (IaaS)

Introduction and Learning Objectives

- Infrastructure as a Service
- Learning Objectives

Amazon EC2

- Introduction to Amazon EC2
- Features and Tools

- Demo
- Benefits of Using Amazon EC2
- References

Azure Virtual Machine

- Introduction to Azure Virtual Machine
- Features and Tools
- Demo
- Benefits of Using Azure Virtual Machine
- References

Digital Ocean

- Introduction to Digital Ocean
- Features and Tools
- Demo
- Benefits of Using Digital Ocean
- References

Google Compute Engine

- Introduction to Google Compute Engine
- Features and Tools
- Demo
- Benefits of Using Google Compute Engine
- References

OpenStack

- Introduction to OpenStack
- Components/Features
- Demo
- Benefits of Using OpenStack
- References

Knowledge Check
Learning Objectives (Review)

Chapter 4. Platform as a Service (PaaS)

Introduction and Learning Objectives

- Platform as a Service
- Learning Objectives

Cloud Foundry

- Introduction to Cloud Foundry
- Features
- Cloud Foundry Subsystems
- Buildpacks
- Cloud Foundry Components
- Demo
- Benefits of Using Cloud Foundry
- References

OpenShift

- Introduction to OpenShift
- Features
- Installing OpenShift
- Demo
- Benefits of Using OpenShift
- References

The Heroku Platform
- Introduction to Heroku
- Heroku Core Concepts
- Features
- Demo
- Benefits of Using Heroku
- References

Deis
- Introduction to Deis
- The Underlying Technology
- The System Architecture of Deis
- Features
- Installing Deis
- Deploying an Application
- Example: Deploying an Application
- Demo
- Benefits of Using Deis
- References

Knowledge Check

Learning Objectives (Review)

Chapter 5. Containers

Introduction and Learning Objectives
- Containers
- Learning Objectives

Containers
- Introduction
- Images and Containers
- The Container Technology: Building Blocks
- Container Runtimes
- Containers vs. VMs
- Docker Runtime
- Basic Docker Operations
- Demo
- Benefits of Using Containers
- References

Knowledge Check

References

Chapter 6. Containers: Micro OSes for Containers

Introduction and Learning Objectives
- Micro OSes for Containers
- Learning Objectives

Atomic Host
- Introduction to Atomic Host
- Components of Atomic Host
- Demo
- Benefits of Using Atomic Host
- References

CoreOS
- Introduction to CoreOS
- CoreOS Availability
- CoreOS Partitions
- CoreOS Components
- Support
- Demo
- Benefits of Using CoreOS
- References

VMware Photon
- Introduction to VMware Photon
- Features and Availability
- Demo
- Benefits of Using VMwarePhoton
- References

RancherOS
- Introduction to RancherOS
- Components
- Demo
- Benefits of Using RancherOS
- References

Knowledge Check
Learning Objectives (Review)

Chapter 7. Containers: Container Orchestration

Introduction and Learning Objectives
- Container Orchestration
- LearningObjectives

Docker Swarm
- Introduction to Docker Swarm
- The Swarm Cluster
- Features
- Docker Machine
- Docker Compose
- Demo
- Benefits of Using Docker Swarm
- References

Kubernetes
- Introduction to Kubernetes
- The Kubernetes Architecture
- The Kubernetes Architecture - Key Components (Part I)
- The Kubernetes Architecture - Key Components (Part II)
- Features
- Demo
- Benefits of Using Kubernetes
- References

Deploying Containers on Mesos
- Introduction to Apache Mesos
- Mesos Componensts
- Mesos Features

- Mesosphere DC/OS
- Mesosphere DC/OS Architecture
- Demo
- Benefits of Using Mesos
- References

Nomad by Hashicorp
- Introduction to Nomad
- Features
- Demo
- Benefits of Using Nomad
- References

Amazon ECS
- Introduction to Amazon ECS
- Amazon ECS Components
- Amazon ECS Features
- Demo
- Benefits of Using Amazon ECS
- References

Google Container Engine
- Introduction to Google Container Engine
- GKE Features and Benefits
- References

Azure Container Service
- Introduction to Azure Container Service
- ACS Features and Benefits
- Demo
- References

Knowledge Check
Learning Objectives (Review)

Chapter 8. Unikernels

Introduction and Learning Objectives
- Unikernels
- Learning Objectives

Unikernels
- Creating Specialized VM Images
- Benefits of Unikernels
- Unikernel Implementations
- Unikernels and Docker
- Demo
- References

Knowledge Check
Learning Objectives (Review)

Chapter 9. Microservices

Introduction and Learning Objectives
- Microservices
- Learning Objectives

Microservices
- The Technological Advancement towards Microservices
- Benefits of Microservices
- Challenges and Drawbacks of Microservices
- Demo
- References

Knowledge Check
Learning Objectives (Review)

Chapter 10. Container as a Service (CaaS)

Introduction and Learning Objectives
- Container as a Service
- Learning Objectives

Docker Universal Control Plane
- Introduction to Docker Universal Control Plane
- Features ana Benefits
- Docker Datacenter
- Demo
- References

Project Magnum on OpenStack
- Introduction to Project Magnum
- Magnum Components
- Features and Benefits
- Demo
- References

Knowledge Check

References

Chapter 11. Software Defined Networking and Networking for Containers

Introduction and Learning Objectives
- Software Defined Networking and Networking for Containers
- Learning Objectives

Software Defined Networking (SDN)
- SDN Architecture
- Activities Performed by a Network Device

Networking for Containers
- Introduction to Networking for Containers
- Container Networking Standards
- Service Discovery

Docker Single Host Networking
- Listing the Available Networks
- Bridge
- Inspecting a Bridge Network
- Creating a Bridge Network
- Null
- Host
- Sharing Network Namespaces among Containers

Docker Multi-Host Networking
- Introduction to Docker Multi-Host Networking
- Docker Overlay Driver
- Demo

Docker Networking Plugins
- Docker Networking Plugins
- Demo

Knowledge Check

Learning Objectives (Review)

Chapter 12. Software Defined Storage and Storage Management for Containers

Introduction and Learning Objectives
- Software Defined Storage (SDS) and Storage Management for Containers
- Learning Objectives

Ceph
- Introduction to Ceph

- Ceph Architecture
- Demo
- Benefits of Using Ceph
- References

Gluster
- Introduction to Gluster
- GlusterFS Volumes
- Demo
- Benefits of Using Gluster
- References

Storage Management for Containers
- Introduction to Storage Management for Containers
- Docker Storage Backends
- Docker Volumes
- Creating a Container with Volumes
- Creating a Named Volume
- Mounting a Host Directory Inside the Container
- Creating a Data Volume Container

Volume Plugins for Docker
- Introduction to Volume Plugins for Docker
- Flocker Volume Plugin
- Supported Storage Options for Flocker
- Demo: Flocker Volume Plugin
- Flocker References
- GlusterFS Volume Plugin
- Demo: GlusterFS Volume Plugin

Knowledge Check
Learning Objectives (Review)

Chapter 13. DevOps and CI/CD

Introduction and Learning Objectives
- DevOps and CI/CD
- Learning Objectives

CI/CD: Jenkins
- Introduction to Jenkins
- Jenkins Functionality
- Demo
- Benefits of Using Jenkins
- References

CI/CD: Drone
- Introduction to Drone
- Testing with Drone
- Deploying Applications with Drone
- Demo
- Benefits of Using Drone
- References

CI/CD: Travis CI
- Introduction to Travis CI
- Executing Build with Travis
- Travis Characteristics
- Demo
- Benefits of Using Travis CI
- References

CI/CD: Shippable
- Introduction to Shippable
- Testing with Shippable
- Programming Languages Supported by Shippable
- Deploying Applications with Shippable
- Demo

- Benefits of Using Shippable
- References

KnowledgeCheck

Learning Objectives (Review)

Chapter 14. Tools for Cloud Infrastructure I (Configuration Management)

Introduction and Learning Objectives

- Tools for Cloud Infrastructure: Configuration Management
- LearningObjectives

Ansible

- Introduction to Ansible
- Nodes
- Playbooks
- Demo
- Benefits of Using Ansible
- References

Puppet

- Introduction to Puppet
- Puppet Agent
- Puppet Master
- The Catalog File
- Puppet Tools
- Demo
- Benefits of Using Puppet
- References

Chef

- Introduction to Chef
- Chef Cookbooks
- Supported Platforms
- Demo
- Benefits of Using Chef
- References

Salt

- Introduction to Salt
- Salt Minions
- Salt Masters
- Other Components: Modules, Returners, Grains, Pillar Data
- Demo
- Benefits of Using Salt
- References

KnowledgeCheck

Learning Objectives (Review)

Chapter 15. Tools for Cloud Infrastructure II (Build & Release)

Introduction and Learning Objectives

- Tools for Cloud Infrastructure: Build & Release
- LearningObjectives

Terraform
- Introduction to Terraform
- Terraform Providers
- Features
- Demo
- Benefits of Using Terraform
- References

BOSH
- Introduction to BOSH
- Key Concepts
- Sample Deployment
- Demo
- Benefits of Using BOSH
- References

Knowledge Check
Learning Objectives (Review)

Chapter 16. Tools for Cloud Infrastructure III (Key-Value Pair Store)

Introduction and Learning Objectives
- Tools for Cloud Infrastructure: Key-Value Pair Store
- Learning Objectives

etcd
- Introduction to etcd
- Features
- Use Cases
- Benefits of Using etcd
- References

Consul
- Introduction to Consul
- Use Cases
- Benefits of Using Consul
- References

Knowledge Check
Learning Objectives (Review)

Chapter 17. Tools for Cloud Infrastructure IV (Image Building)

Introduction and Learning Objectives
- Tools for Cloud Infrastructure: Image Building
- Learning Objectives

Building Docker Images
- Dockerfiles
- Demo
- References

Packer
- Introduction to Packer
- Steps to Create Virtual Images
- Demo
- Benefits of Using Packer
- References

Knowledge Check