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
Chapter 4. Platform as a Service (PaaS)
Introduction and Learning Objectives

Cloud Foundry

OpenShift

Knowledge Check
Learning Objectives (Review)
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
Chapter 7. Containers: Container Orchestration

Introduction and Learning Objectives
- Container Orchestration
- Learning Objectives

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

Introduction and Learning Objectives

- Tools for Cloud Infrastructure: Configuration Management
- Learning Objectives

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

Knowledge Check

Learning Objectives (Review)

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

Introduction and Learning Objectives

- Tools for Cloud Infrastructure: Build & Release
- Learning Objectives
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
etcdd
- 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
Chapter 18. Tools for Cloud Infrastructure V (Debugging, Logging, and Monitoring for Containerized Applications)

Introduction and Learning Objectives
- Tools for Cloud Infrastructure: Debugging, Logging, and Monitoring for Containerized Applications
- Native Docker Features for Debugging
- Learning Objectives

Sysdig
- Introduction to Sysdig
- What Sysdig Can Do from the Command Line (Examples)
- Features
- Benefits of Sysdig
- References

cAdvisor & Heapster
- Introduction to cAdvisor
- Using cAdvisor
- Introduction to Heapster
- Host System Usage with cAdvisor
- Docker Host Specific Details with cAdvisor
- References

Fluentd
- Introduction to Fluentd
- Docker Support for Fluentd
- Benefits of Using Fluentd
- References

Datadog
- Introduction to Datadog
- Docker Containers: Kubernetes Monitoring with Datadog
- Benefits of Using Datadog
- References

Knowledge Check
Learning Objectives (Review)

Chapter 19. How to Be Successful in the Cloud

Introduction and Learning Objectives
- Think Like a Startup, Act Like an Enterprise
- Learning Objectives

Developing Skills
- Where Do We Go?
- Developing the Necessary Skills Set

Challenges
- About Challenges
- Choosing the Right Cloud Provider
- Choosing the Right Technology Stack
- Security Concerns
- Cloud Cost Management
- Vendor Lock-In
- Resistance from Existing Employees

Knowledge Check
Learning Objectives (Review)