LFS151x - Introduction to Cloud Infrastructure Technologies

Course Overview

New to the cloud and not sure where to begin? This introductory course, taught by cloud experts from The Linux Foundation, will help you grasp the basics of cloud computing and comprehend the terminology, tools and technologies associated with today's top cloud platforms.

Understanding cloud technologies tops the list of most important skills for any developer, system administrator or network computing professional seeking a lucrative career in technology. However, getting started and researching all things related to cloud infrastructure technologies can be complicated and time-consuming. This course maps out the entire cloud landscape and explains how various tools and platforms fit together.

Experts from The Linux Foundation can help guide you step-by-step as you begin to navigate the cloud. They host some of the world's leading open source cloud projects and provide training and networking opportunities to educate a talent pool to support those projects, and is a respected, neutral, non-profit education source to provide training for anyone learning how to build and manage cloud infrastructure.

This course gives you a primer on cloud computing and the use of open source software to maximize development and operations. Topics covered include:

- *Next-generation cloud technologies*
  Learn about cloud and container technologies like Docker, Cloud Foundry, Kubernetes and OpenStack, as well as the tooling around them.
- *Scalable and performant compute, storage and network solutions*
  Get an overview of software-defined storage and software-defined networking solutions.
- *Solutions employed by companies to meet their business demands*
  Study up on DevOps and Continuous Integration practices, as well as the deployment tools available to architects to meet and exceed their business goals.

Course Instructors

Chris Pokorni is the founder of NQB8 Cloud Tech Consulting and an independent instructor for The Linux Foundation. Chris holds both CKA and CKAD certificates and teaches Kubernetes courses for Administrators and Application Developers. As a consultant for small and global enterprises alike, Chris has lead workshops and designed HA Middleware/ESB, Datacenter Monitoring and Hybrid Cloud Architecture solutions.

Neependra Khare is the Founder and Principal Consultant at CloudYuga Technologies, offering training and consulting services around container technologies such as Docker, Kubernetes, CoreOS, etc. With more than a decade of experience in the IT industry, he has worked as a System Administrator, Support Engineer, File System Developer and Performance Engineer. He has been running the Docker meetup group in Bangalore, India for more than three years and is a [Docker Captain](). Before founding CloudYuga, he worked at Red Hat as Principal Software Engineer. In 2015, he authored a book on Docker, "[*Docker Cookbook*]()". In 2016, along with Chip Childers, he co-authored a course on edX, [LFS151x: Introduction to Cloud Infrastructure]()

[Technologies](#) for The Linux Foundation. In 2017, he authored for The Linux Foundation: [LFD254: Containers for Developers and Quality Assurance](#).

Chip Childers is the Executive Director of Cloud Foundry Foundation. A proven DevOps visionary and leader. He spent more than fifteen years in engineering leadership positions within the service provider industry, including work with CumuLogic, SunGard Availability Services, and Qwest Solutions before joining the Cloud Foundry. He has served on the board of directors for the Distributed Management Task Force and is a member of The Apache Software Foundation.

Audience

LFS151x - Introduction to Cloud Infrastructure Technologies is designed for developers, system administrators and network computing professionals seeking to gain knowledge about cloud infrastructure technologies.

Prerequisites

No previous cloud experience required for this course.

Course Length

30-40 hours.

Course Learning Objectives

By the end of this course, you should be able to:

- Discuss the basics of cloud computing.
- Explain how different components of cloud computing work together.
- Discuss why container technology is becoming mainstream.
- Discuss DevOps and Continuous Integration/Continuous Deployment (CI/CD).
- Deploy applications with just one click.
- Differentiate between and use various tools for cloud infrastructure technology.
- Describe the skill set required to meet business needs with modern cloud computing technologies.

● Discuss the challenges associated with the adoption of the cloud.

Course Outline

Welcome!

● Welcome!

Chapter 1. Virtualization

● Introduction and Learning Objectives
● KVM
● VirtualBox
● Vagrant
● Knowledge Check

Chapter 2. Infrastructure as a Service (IaaS)

● Introduction and Learning Objectives
● Amazon Elastic Compute Cloud
● Azure Virtual Machine
● DigitalOcean Droplet
● Google Compute Engine
● IBM Cloud Virtual Servers
● Oracle Cloud Compute Virtual Machines
● OpenStack
● Knowledge Check

Chapter 3. Platform as a Service (PaaS)

● Introduction and Learning Objectives
● Cloud Foundry
● Openshift
● The Heroku Platform
● Knowledge Check

Chapter 4. Containers

● Introduction and Learning Objectives
● Containers
● Project Moby
● Knowledge Check

Chapter 5. Containers: Micro OSes for Containers

- Introduction and Learning Objectives
- Alpine Linux
- Atomic Host
- Fedora CoreOS
- RancherOS
- Ubuntu Core
- VMWare Photon
- Knowledge Check

Chapter 6. Containers: Container Orchestration

- Introduction and Learning Objectives
- Docker Swarm
- Kubernetes
- Deploying Containers with Apache Mesos
- Nomad by HashiCorp
- Kubernetes Hosted Solutions
- Cloud Container Orchestration Services
- Knowledge Check

Chapter 7. Unikernels

- Introduction and Learning Objectives
- Unikernels
- Knowledge Check

Chapter 8. Microservices

- Introduction and Learning Objectives
- Microservices
- Knowledge Check

Chapter 9. Software-Defined Networking and Networking for Containers

- Introduction and Learning Objectives
- Software-Defined Networking (SDN)
- Networking for Containers
- Docker Single-Host Networking
- Docker Multi-Host Networking
- Docker Network Driver Plugins
- Kubernetes Networking
- Cloud Foundry: Container to Container Networking
- Knowledge Check

Chapter 10. Software-Defined Storage and Storage Management for Containers

- Introduction and Learning Objectives
- Ceph
- GlusterFS
- Storage Management for Containers
- Volume Plugins for Docker
- Volume Management in Kubernetes
- Container Storage Interface (CSI)
- Cloud Foundry Volume Service
- Knowledge Check

Chapter 11. DevOps and CI/CD

- Introduction and Learning Objectives
- CI/CD: Jenkins
- CI/CD: Travis CI
- CI/CD Shippable
- CI/CD: Concourse
- Cloud Native CI/CD
- Knowledge Check

Chapter 12. Tools for Cloud Infrastructure I (Configuration Management)

- Introduction and Learning Objectives
- Ansible
- Puppet
- Chef
- Salt Open
- Knowledge Check

Chapter 13. Tools for Cloud Infrastructure II (Build & Release)

- Introduction and Learning Objectives
- Terraform
- CloudFormation
- BOSH
- Knowledge Check

Chapter 14. Tools for Cloud Infrastructure III (Key-Value Pair Store)

- Introduction and Learning Objectives
- etcd
- Consul

- Knowledge Check

Chapter 15. Tools for Cloud Infrastructure IV (Image Building)

- Introduction and Learning Objectives
- Building Docker Images
- Packer
- Knowledge Check

Chapter 16. Tools for Cloud Infrastructure V (Debugging, Logging, and Monitoring for Containerized Applications)

- Introduction and Learning Objectives
- Sysdig
- cAdvisor and Heapster
- Fluentd
- Datadog
- Prometheus
- Knowledge Check

Chapter 17. Service Mash

- Introduction and Learning Objectives
- Features and Implementation of Service Mash
- Envoy
- Istio
- Linkerd
- Knowledge Check

Chapter 18. Internet of Things (IoT)

- Introduction and Learning Objectives
- Internet of Things
- Knowledge Check

Chapter 19. Serverless Computing

- Introduction and Learning Objectives
- Serverless Computing
- AWS Lambda
- Google Cloud Functions
- Azure Functions
- Serverless and Containers
- Knowledge Check

Chapter 20. OpenTracing

- Introduction and Learning Objectives
- OpenTracing
- Jaeger
- Knowledge Check

Chapter 21. How to Be Successful in the Cloud

- Introduction and Learning Objectives
- Developing Skills
- Challenges
- Knowledge Check

Course Timing

This course is entirely self-paced; there is no fixed schedule for going through the material. You can go through the course at your own pace, and you will always be returned to exactly where you left off when you come back to start a new session. However, we still suggest you avoid long breaks in between periods of work, as learning will be faster and content retention improved.

The chapters in the course have been designed to build on one another. It is probably best to work through them in sequence; if you skip or only skim some chapters quickly, you may find there are topics being discussed you have not been exposed to yet. But this is all self-paced and you can always go back, so you can thread your own path through the material.

About The Linux Foundation

The Linux Foundation partners with the world's leading developers and companies to solve the hardest technology problems and accelerate open technology development and commercial adoption. The Linux Foundation makes it its mission to provide experience and expertise to any initiative working to solve complex problems through open source collaboration, providing the tools to scale open source projects: security best practices, governance, operations and ecosystem development, training and certification, licensing, and promotion.

Linux is the world's largest and most pervasive open source software project in history. The Linux Foundation is home to Linux creator Linus Torvalds and lead maintainer Greg Kroah-Hartman, and provides a neutral home where Linux kernel development can be protected and accelerated for years to come. The success of Linux has catalyzed growth in the open source community, demonstrating the commercial efficacy of open source and inspiring countless new projects across all industries and levels of the technology stack.

The Linux Foundation's work today extends far beyond Linux, fostering innovation at every layer of the software stack. The Linux Foundation is the umbrella organization for many critical open source projects that power corporations today, spanning all industry sectors:

- Big data and analytics (ODPi, R Consortium)
- Networking (OpenDaylight, ONAP, OPNFV)
- Embedded (Dronecode, Zephyr)
- Web tools (JS Foundation, Node.js)
- Cloud computing (Cloud Foundry, Cloud Native Computing Foundation, Open Container Initiative)
- Automotive (Automotive Grade Linux)
- Security (The Core Infrastructure Initiative)
- Blockchain (Hyperledger)
- And many more.

To learn more about The Linux Foundation, click here.

The Linux Foundation Events

The Linux Foundation hosts an increasing number of events each year, including:

- Open Source Summit North America, Europe, Japan and China
- Embedded Linux Conference + OpenIoT Summit North America and Europe
- Open Source Leadership Summit
- Open Networking Summit North America and Europe
- KubeCon + CloudNativeCon North America, Europe and China
- Automotive Linux Summit
- KVM Forum
- Linux Storage Filesystem and Memory Management Summit
- Linux Security Summit North America and Europe
- Cloud Foundry Summit
- Hyperledger Global Forum
- And many more.

To learn more about The Linux Foundation events and to register, click here.

The Linux Foundation Training

The Linux Foundation offers several types of training:

- Classroom
- Online
- On-site

- Events-based.

To get more information about specific courses offered by The Linux Foundation, click here.

The Linux Foundation Certifications

The Linux Foundation certifications give you a way to differentiate yourself in a job market that's hungry for your skills. We've taken a new, innovative approach to open source certification that allows you to showcase your skills in a way that other peers will respect and employers will trust:

- You can take your certification from any computer, anywhere, at any time
- The certification exams are performance-based
- The exams are distribution-flexible
- The exams are up-to-date, testing knowledge and skills that actually matter in today's IT environment.

The Linux Foundation and its collaborative projects currently offer the following certifications:

- Linux Foundation Certified System Administrator (LFCS)
- Linux Foundation Certified Engineer (LFCE)
- Certified Kubernetes Administrator (CKA)
- Certified Kubernetes Application Developer (CKAD)
- Cloud Foundry Certified Developer (CFCD)
- Certified Hyperledger Fabric Administrator (CHFA)
- Certified Hyperledger Fabric Developer (CHFD)
- Certified Hyperledger Sawtooth Administrator (CHSA)
- OpenJS Node.js Application Developer (JSNAD)
- OpenJS Node.js Services Developer (JSNSD).

Open Source Guides for the Enterprise

The Linux Foundation in partnership with the TODO Group developed a set of guides leveraging best practices for:

- Running an open source program office, or
- Managing an open source project in your organization.

To learn more, you can visit the following webpage: "*Open Source Guides for the Enterprise*".

Copyright

This course is licensed under a Creative Commons Attribution 4.0 International License.