

Introduction to Cloud Infrastructure Technologies (LFS151x)

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

Introduction to Cloud Infrastructure Technologies (LFS151x) 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
- Red Hat 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

- BusyBox
- Fedora CoreOS
- Flatcar Container Linux
- RancherOS and k3OS
- Ubuntu Core
- VMWare Photon OS
- Knowledge Check

Chapter 6. Containers: Container Orchestration

- Introduction and Learning Objectives
- Kubernetes
- Kubernetes Hosted Solutions and Platforms
- Docker Swarm
- Nomad by HashiCorp
- 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 Networking
- Podman Networking
- 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
- Docker Volumes
- Podman Volumes
- Kubernetes Volumes
- Cloud Foundry Volume Service
- Container Storage Interface (CSI)
- Knowledge Check

Chapter 11. DevOps and CI/CD

- Introduction and Learning Objectives
- CI/CD: Jenkins
- CI/CD: Travis CI
- 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
- 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 KV
- ZooKeeper
- Knowledge Check

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

- Introduction and Learning Objectives
- Building Images with Docker
- Building Container Images with Podman
- Building Container Images with Buildah
- Packer
- Image Registries
- Knowledge Check

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

- Introduction and Learning Objectives
- Sysdig
- cAdvisor
- Elasticsearch
- Fluentd
- Datadog
- Prometheus
- Splunk
- OpenTelemetry
- Dynatrace
- Knowledge Check

Chapter 17. Service Mesh

- Introduction and Learning Objectives
- Features and Implementation of Service Mesh
- Consul
- Envoy
- Istio
- Kuma
- Linkerd
- Traefik Mesh
- Tanzu Service Mesh
- 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 Feedback

Final Exam (Verified Track Only)

edX Platform

If you are using edX for the first time, we strongly encourage you to start by taking a free 'how to use edX' course that the team at edX has made available. In this course, you will learn how to navigate the edX platform, how to connect with other edX learners, how to answer problems on the edX platform, how grades work in edX courses, and how to complete your first course.

Click [here](#) to register for “*DemoX*” and you will be on your way. You will find the edX platform simple and intuitive.

Getting Help

For any **technical issues** with the edX platform (including login problems and issues with the Verified Certificate), please use the **Help** icon located on the upper right side of your screen.

One great way to interact with peers taking this course and resolving any **content-related issues** is via the **Discussion Forums**. These forums can be used in the following ways:

- To discuss concepts, tools, and technologies presented in this course, or related to the topics discussed in the course material.
- To ask questions about course content.
- To share resources and ideas related to cloud native technologies.

We strongly encourage you not only to ask questions, but to share with your peers opinions about the course content, as well as valuable related resources. The Discussion Forums will be reviewed periodically by The Linux Foundation staff, but it is primarily a community resource, not an 'ask the instructor' service.

To learn more tips on how to use them, read the following article: "[Getting the Most Out of the edX Discussion Forums](#)".

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.

Learning Aids

Besides simple exposition through text and figures, this course uses several additional methods to present and solidify the learning material, including videos, scenarios, external resources, and knowledge check questions (Verified Certificate track only).

Audit and Verified Tracks

You can enroll into an audit or a verified track. In an audit track, you will have access to all ungraded course content: course readings, videos, and learning aids, but no certificates are awarded when auditing. You will not be able to access any graded content (knowledge check questions at the end of each chapter, and the final exam).

In order to receive a certificate, you will need to obtain a passing grade (please refer to the “Grading” section below), verify your identity with edX, and pay a fee. Once all edX requirements have been met, you can download your certificate from the Progress tab.

To learn more about audit and verified tracks, visit [edX Help Center > Certificates](#).

Grading (Verified Certificate track only)

At the end of each chapter, you will have a set of graded **knowledge check questions**, that are meant to further check your understanding of the material presented. The grades obtained by answering these knowledge check questions will represent **20%** of your final grade.

The remaining **80%** of your final grade is represented by the score obtained in the **final exam**. The final exam is located at the end of the course and it consists of 30 questions.

You will have a maximum of two attempts to answer each knowledge check and final exam question (other than True/False questions, in which case, you have only one attempt). You are free to reference your notes, screens from the course, etc., and there is no time limit on how long you can spend on a question. You can always skip a question and come back to it later.

In order to complete this course with a passing grade, you must obtain a passing score (knowledge check and final exam) of minimum 70%.

Course Progress and Completion (Verified Certificate track only)

Once you complete the course (including knowledge check questions and final exam), you will want to know if you have passed. You will be able to see your completion status using the **Progress** tab at the top of your screen, which will clearly indicate whether or not you have achieved a passing score.

About The Linux Foundation

[The Linux Foundation](#) provides a neutral, trusted hub for developers to code, manage, and scale open technology projects. Founded in 2000, The Linux Foundation is supported by more than 1,000 members and is the world’s leading home for collaboration on open source software, open standards, open data and open hardware. The Linux Foundation’s methodology focuses on leveraging best practices and addressing the needs of contributors, users and solution providers to create sustainable models for open collaboration.

The Linux Foundation hosts Linux, the world's largest and most pervasive open source software project in history. It is also home to Linux creator Linus Torvalds and lead maintainer Greg Kroah-Hartman. 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.

As a result, the Linux Foundation today hosts far more than Linux; it is the umbrella for many critical open source projects that power corporations today, spanning virtually all industry sectors. Some of the technologies we focus on include big data and analytics, networking, embedded systems and IoT, web tools, cloud computing, edge computing, automotive, security, blockchain, and many more.

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 either performance-based or multiple choice
- The exams are distribution-flexible
- The exams are up-to-date, testing knowledge and skills that actually matter in today's IT environment.

For a list of currently offered certifications, click [here](#).

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