

CI/CD with Docker and Kubernetes

Learn to containerise applications with Docker, orchestrate them with Kubernetes, and automate delivery pipelines using Jenkins, Git and GitOps.

9 Days

DURATION

19

MODULES

86

TOPICS

COURSE OVERVIEW

This course covers Docker administration, including building, storing and networking container images, before introducing container orchestration concepts and Kubernetes architecture. It then addresses installing and validating Kubernetes clusters, managing resources such as pods, replication controllers and services, scheduling, application lifecycle management, environment variables, storage, security, cluster maintenance, logging and monitoring, networking and troubleshooting. The later modules introduce Jenkins and Git, integrating Jenkins with Docker for automated image builds, GitOps deployment with ArgoCD, email notifications, and logging and monitoring for Jenkins using EFK, Prometheus and Grafana.

WHO THIS COURSE IS FOR

DevOps Engineers

System Administrators

Cloud Engineers

Release Engineers

Software Developers

Infrastructure Engineers

TOOLS AND REQUIREMENTS

Lab

- Koenig DC

LEARNING OBJECTIVES

- Build and manage Docker images and containers
- Configure Docker networking and data persistence with volumes
- Explain Kubernetes architecture and core orchestration concepts
- Install, configure and validate a Kubernetes cluster
- Manage Kubernetes resources such as pods, services and DaemonSets
- Configure security, storage and networking within Kubernetes
- Troubleshoot common Kubernetes component failures
- Implement CI/CD pipelines with Jenkins, Git and GitOps

How the Course Is Taught

This hands-on class is approximately 80/20 lab to lecture ratio, combining engaging lecture, demos, group activities and discussions with comprehensive machine-based practical programming labs and project work.

COURSE SYLLABUS

19 Modules, 86 Topics

01

Docker Administration

TOPICS

- Introduction to Containers
- Introduction to Docker
- Downloading and Installing Docker
- Docker Essential Commands
- Docker Engine
- Understanding Docker Images
- Building Docker Images
- Storing and Retrieving Docker Images from Docker Hub
- Private Registry
- Building Containers from Images
- Understand Storage Methods
- Networking Docker Containers
- Data Persistence with Volumes
- Linux Capabilities

02

Core Concepts

TOPICS

Overview of Container Orchestration · Introduction to Kubernetes · Kubernetes Architecture

03

Installation, Configuration & Validation

TOPICS

Design a Kubernetes Cluster · Installation of Kubernetes Master and Nodes · Choose a Network Solution · Verify Installation

04

Managing Resources

TOPICS

Managing Pods · Managing Labels & Selector · Managing Replication Controller & Replica Set · Managing Service · Managing DaemonSets

05

Scheduling

TOPICS

Manual Scheduling · Taint and Tolerations

06

Application Lifecycle Management

TOPICS

Overview of Deployment · Deployment Strategies · Managing Deployment

07

Environment Variable

TOPICS

Plain Key · Config Map · Secret · Mount Variable as Volume

08

Storage

TOPICS

Volumes · Persistent Volumes · Persistent Volume Claim

09

Security

TOPICS

- Kubernetes Authentication
- Managing Users in Kubernetes
- Service Account
- Managing Roles and Role Binding
- Managing Cluster Role and Cluster Role Binding
- Security Context

10

Cluster Maintenance

TOPICS

OS Upgrade · Upgrade Cluster Version · Static Pod · ETCD Backup · Cron Job

11

Logging and Monitoring

TOPICS

- Understand how to Monitor all Cluster Components
- Understand how to Monitor Applications
- Manage Cluster Components Logs
- Manage Application Logs
- Prometheus Tool

12

Networking in Kubernetes

TOPICS

Kubernetes Networking · Understand CNI · Understand Pod Networking Concepts · Configure DNS · Configure and Manage Ingress Rule · Namespace · Metal Load Balancer

13

Troubleshooting

TOPICS

Troubleshoot ETCD Failure · Troubleshoot Kubelet Failure · Troubleshoot Container Runtime Failure · Troubleshoot Scheduler Failure

14

Introduction to Jenkins

TOPICS

Introduction to Jenkins · Jenkins Installation

15

Git

TOPICS

- Introduction to Version Control System
- History of Git
- Git Basics
- States in Git
- Installing Git
- Configuration of Git
- Working with Repositories
- Basics Git Commands
- Working with Remotes
- Tagging
- Git Branching

16

Integrate Jenkins with Docker

TOPICS

- Connect Registry with Jenkins
- Automatically Build and Push Image to Docker Hub Whenever Developer Changes Application Code

17

GitOps

TOPICS

- Install ArgoCD in Kubernetes
- Configure ArgoCD to Fetch Updates from GitHub and Deploy Application to Kubernetes

18

Email Integration

TOPICS

- Install Mailer Plugin in Jenkins
- Integrate Gmail with Jenkins to Send Report Email

19

Jenkins Logging and Monitoring

TOPICS

- Integrate EFK with Jenkins to Store Logs
- Integrate Prometheus and Grafana to Monitor Jenkins

WHAT IS INCLUDED

Everything You Need to Succeed

- Koenig course material for every module
- Delivery by certified instructors and subject matter experts
- Hands-on exercises throughout the course
- Course completion certificate from Koenig

ABOUT KOENIG

Who We Are

Established in 1993, Koenig Solutions is a globally recognised training provider with 35+ technology partnerships, 5,000+ training programmes and a network of certified instructors and subject matter experts, supporting individuals and enterprise teams worldwide.

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Live Online Classes (ILO)

Fly-Me-A-Trainer (FMAT)

Flexi (Self-Paced)

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