

CI/CD with Docker and Kubernetes

Duration: 9 Days

Hands-On Format: 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.

Lab: Koenig DC

Module 1 - Docker Administration

- 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

Module 2 – Core Concepts

- Overview of Container Orchestration
- Introduction to Kubernetes
- Kubernetes Architecture

Module 3 – Installation, Configuration & Validation

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

Module 4 – Managing Resources

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

Module 5 – Scheduling

- Manual Scheduling
- Taint and Tolerations

Module 6 – Application Lifecycle Management

Overview of Deployment
Deployment Strategies
Managing Deployment

Module 7 – Environment Variable

Plain Key
Config Map
Secret
Mount Variable as Volume

Module 8 – Storage

Volumes
Persistent Volumes
Persistent Volume Claim

Module 9 – Security

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

Module 10 – Cluster Maintenance

OS Upgrade
Upgrade Cluster Version
Static Pod
ETCD Backup
Cron Job

Module 11 – Logging and Monitoring

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

Module 12 – Networking in Kubernetes

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

Module 13 – Troubleshooting

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

Module 14 – Introduction to Jenkins

Introduction to Jenkins
Jenkins Installation

Module 15 – Git

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

Module 16 – Integrate Jenkins with Docker

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

Module 17 – GitOps

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

Module 18 – Email Integration

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

Module 19 – Jenkins Logging and Monitoring

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