Advanced CI/CD with Docker and Kubernetes

Duration: 5 Days

Note:

- The first 3 days will include both theory and practical lab sessions for participants.
- The last 2 days will consist of theory only, with the trainer providing demonstrations. There will be no hands-on lab practice by participants during these sessions.

Prerequisites: Basic Linux Administration Knowledge

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

Day 1

Module 1 - Docker Administration

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

Module 2 – Core Concepts

Overview of Container Orchestration
Introduction to Kubernetes
Kubernetes Architecture

Day 2

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

Creating Pods
Managing Pods
Managing Labels & Selector
Managing Replication Controller & Replica Set
Managing Service

Managing DaemonSets

Day 3

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

Day 4

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

Day 5

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\

Day 6

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

Day 8

Module 14 – Integrate Jenkins with Docker

Connect Registry with Jenkins
Automatically Build and Push Image to Docker Hub Integrating Jenkins with GiHub

Module 15 – GitOps

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