Koenig Crafted – Kubernetes for Administrator and Developer (CKA + CKAD)

Duration: 7days (8hrs/day)

Prerequisites:

- Basic knowledge of Linux Server Administration.
- Basic knowledge of Containers

Course Objective: This comprehensive course equips you with the knowledge and skills to confidently manage and orchestrate containerized applications using Kubernetes. Through hands-on experience, you will gain mastery over core concepts, navigate the architecture, perform installation and configuration, manage resources and deployments, secure your environment, and monitor your Kubernetes cluster effectively. By the end, you'll be prepared to architect, implement, and maintain reliable and scalable containerized applications in production environments.

Kubernetes Version: Latest

Lab Requirement: Koenig-DC (CentOS 9)

Module 1 – Core Concepts

Overview of Container Orchestration

Introduction to Kubernetes

Understanding Kubernetes Architecture

Module 2 – Installation, Configuration & Validation

Design a Kubernetes Cluster

Lab: Installation of Kubernetes 1-Master and 2-Nodes Cluster

Lab: Choose a Network Solution and Configure

Lab: Verify Installation with Kubectl command

Module 3 – Managing Resources

Understanding Pods, Labels & Selectors

Lab: Deploying Applications as a Pod

Lab: Managing Labels & Selector

Understanding Replication Controller & Replica Set

Lab: Deploying Replication Controller & Replica Set

Understanding Services – ClusterIP, NodePort & LoadBalancer

Lab: Creating & Managing Service

Understanding Daemon Sets

Lab: Deploying Applications as Daemon Sets

Module 4 - Scheduling

Manual Scheduling of Pods

Taint and Tolerations

Lab: Using Manual Scheduling or Taints and Tolerations

Module 5 - Application Lifecycle Management

Overview of Deployment

Deployment Strategies – Blue/Green & Canary

Lab: Deploying Applications as Deployment

Lab: Implementing Deployment Strategies on Deployments

Module 6 - Environment Variable

Plain Key

Config Map

Secret

Lab: Using Plain Keys, Config Map & Generic Secret as Environment Variables

Lab: Mount Environment Variable as Volumes

Module 7 – Storage

Understanding Volume Management in K8s

Types of Volumes Provisioning

Persistent Volumes

Persistent Volume Claim

Lab: Using PV & PVC to attach Persistent Volume to a Pod as HostPath

Understanding Storage Class

Module 8 – StatefulSet

Introduction to StatefulSet

Use cases of StatefulSet

Manage StatefulSet

Storage in StatefulSet

Lab: Deploying and Managing Stateful Sets

Lab: Creating Persistent Storage in Stateful Sets

Headless Service

Module 9 – Security

Understanding Kubernetes Authentication

Lab: Creating and Managing Users in Kubernetes

Lab: Creating Service Accounts

Understanding Role, ClusterRole, RoleBinding & ClusterRoleBinding

Lab: Managing Roles and Role Binding

Lab: Managing Cluster Role and Cluster Role Binding

Understanding Security Context

Lab: Adding Security Context to Pod to enable ping

Module 10 – Cluster Maintenance

Understanding OS Upgrade

Lab: Upgrade a Kubernetes Cluster Version

Static Pod

Lab: Deploying Pods as Static Pod

Lab: ETCD Backup

CronJob

Lab: Deploying Pod as CronJob

Module 11 – Logging and Monitoring

Understand how to Monitor Application and Cluster Components

Lab: Understand how to Read Application & Cluster Component Logs

Lab: Deploying Prometheus & Grafana to Monitor K8s Cluster

Module 12 – Networking in Kubernetes

Understand Basics of Kubernetes Networking

Understand CNI overview

Understand Pod Networking Concepts

CoreDNS overview of K8s

Understanding Ingress

Lab: Configure and Manage Ingress Rule Understanding Namespace & Use-Cases

Lab: Creating Namespace & Deploying K8s resources in Different Namespace

Metal Load Balancer

Lab: Deploying Metal Load Balancer

Module 13 – Multi Container Pod Design

Understanding Multi-Container Pods

Creating Multi-Container Pods

Lab: Sidecar Pattern

Lab: Deploying Init Container

Lab: Ambassador Pattern

Lab: Adapter Pattern

Module 14 – Helm Package Manager

Introduction to Helm

Work with Helm Charts

Create Helm Charts

Lab: Installing Helm Package Manager

Upgrade and Downgrade Helm Charts

Lab: Deploying Kubernetes Resources using Helm Package Manager

Module 15 – Building Docker Images

Introduction to Dockerfile

Dockerfile Instructions

Lab: Building Container images using Dockerfile

Build Image Push Image to Centralized Registry

Lab: Pushing Container Image to a Public & Private Registry

Module 16 – Readiness and Liveness Probe

Introduction to Readiness and Liveness Probe

Implement Readiness and Liveness in Pod

Lab: Creating Liveness and Readiness Probe for Pod

Module 17 – Troubleshooting

Ways to Troubleshoot ETCD Failure

Ways to Troubleshoot Kubelet Failure

Ways to Troubleshoot Container Runtime Failure

Ways to Troubleshoot Scheduler Failure