Certified Kubernetes Application Developer (CKAD)

Duration: **5 days (8hrs/day)**

Prerequisites:

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

Course Objective: This comprehensive Kubernetes course, covering container orchestration, cluster design, installation, resource and application management, multi-container pod design, networking, as well as state persistence, is designed to equip learners with the skills needed to successfully clear the Certified Kubernetes Application Developer exam.

Kubernetes Version: Latest

Lab Requirement: Koenig-DC (CentOS)

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

Metal Load Balancer

Lab: Deploying Metal Load Balancer

Module 3 – Creating Kubernetes 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 ClusterIP,Node Port and LoadBalancer

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

Node Selector

Lab: Using Node Selector to Deploy Pods

Node Affinity

Lab: Using Node Affinity to Deploy Pods

Module 5 - Application Lifecycle Management

Overview of Deployment

Deployment Strategies – Blue/Green & Canary

Lab: Deploying Applications as Deployment

Lab: Implementing Blue-Green Deployment Strategy

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 – Security

Understanding Namespace & Use-Cases

Lab: Creating Namespace & Deploying K8s resources in Different Namespace

Lab: Creating Service Accounts

Understanding Role, ClusterRole, RoleBinding & ClusterRoleBinding

Lab: Managing Cluster Role and Cluster Role Binding

Understanding Security Context

Lab: Adding Security Context to Pod to enable ping

Module 9 – Networking in Kubernetes

Understand Basics of Kubernetes Networking

Understand CNI overview

Understand Pod Networking Concepts

Lab: Controlling Pod Communication using Network Policies

CoreDNS overview of K8s

Understanding Ingress

Lab: Configure and Manage Ingress Rule

Module 10 – 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

Lab: Headless Service

Module 11 – 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 12 – 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 13 – Multi Container Pod Design & Jobs

Understanding Multi-Container Pods

Creating Multi-Container Pods

Lab: Sidecar Pattern

Lab: Deploying Init Container

Lab: Ambassador Pattern

Lab: Adapter Pattern

CronJob

Lab: Deploying Pod as a CronJob

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 Overview

Lab: Building Container images using Dockerfile

Build Image Push Image to Centralized Registry

Lab: Pushing Container Image to a Public Registry