

# 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