

Koenig Crafted – Kubernetes Boot Camp (CKA + CKAD + CKS)

Duration: 10 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.

Module 1 – Core Concepts

Overview of Container Orchestration
Introduction to Kubernetes
Kubernetes Architecture

Module 2 – Installation, Configuration & Validation

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

Module 3 – Managing Resources

Managing Pods
Managing Labels & Selector
Managing Replication Controller & Replica Set
Managing Service – ClusterIP, NodePort, LoadBalancer

Module 4 – Scheduling

Manual Scheduling
Taint and Tolerations
Node Selector
Node Affinity

Module 5 – Application Lifecycle Management

Overview of Deployment
Deployment Strategies
Managing Deployment
Canary Deployment
Blue-Green Deployment

Module 6 – Environment Variable

Plain Key
Config Map
Secret
Mount Variable as Volume

Module 7 – Storage

Volumes
Persistent Volumes
Persistent Volume Claim

Module 8 – StatefulSet

Introduction to StatefulSET
Use cases of StatefulSet
Manage StatefulSet
Storage in StatefulSet
Headless Service

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
Network Policies

Module 10 – Cluster Maintenance

OS Upgrade
Upgrade Cluster Version
Static Pod
ETCD Backup
Jobs and 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 and Manage Ingress Rule
Configure Ingress with TLS
Namespace
Metal Load Balancer

Module 13 – Multi Container Pod Design

Init Container
Side Car Container
Adaptor Container
Ambassador Container

Module 14 – Helm Package Manager

Introduction to Helm
Work with Helm Charts
Create Helm Charts
Upgrade and Downgrade Helm Charts

Module 15 – Building Docker Images

Introduction to Dockerfile
Dockerfile Instructions
Build Image
Push Image to Centralized Registry

Module 16 – Readiness and Liveness Probe

Introduction to Readiness and Liveness Probe
Implement Readiness and Liveness in Pod

Module 17 – Troubleshooting

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

Module 18 – Cluster Hardening

Use CIS Benchmark to Review the Security Configuration of Kubernetes Components
Minimize Use of, and Access to, GUI Elements
Exercise Caution in Using Service Accounts e.g., Disable Defaults, Minimize Permissions on Newly Created Ones

Module 19 – System Hardening

Minimize Host OS Footprint (Reduce Attack Surface)
Minimize IAM Roles
Minimize External Access to the Network
Appropriately Use Kernel Hardening Tools Such as App Armor, Seccomp

Module 20 – Minimize Microservice Vulnerabilities and Supply Chain Security

Setup Appropriate OS Level Security Domains e.g. Using PSP, OPA, Security Contexts
Use GVisor
Minimize Base Image Footprint
Use Static Analysis of User Workloads (e.g. Kubernetes Resources, Docker Files) Scan Images for Known Vulnerabilities

Module 21 – Monitoring, Logging and Runtime Security

Perform Behavioral Analytics of Syscall Process and File Activities at the Host and Container Level to Detect Malicious Activities
Detect Threats within Physical Infrastructure, Apps, Networks, Data, Users and Workloads
Detect All Phases of Attack Regardless Where It Occurs and How It Works
Perform Deep Analytical Investigation and Identification of Bad Actors within Environment Ensure Immutability of Containers at Runtime
Use Audit Logs to Monitor Access