KOENIG
step forward

KOENIG SOLUTIONS · COURSE OUTLINE

Kubernetes Administration with Additional Security (Cloud Native Computing Foundation (CNCF))

Learn to install, secure and maintain Kubernetes clusters, covering storage, networking, Helm, Istio and advanced security hardening.

5 Days	12	46	42
DURATION	MODULES	TOPICS	HANDS-ON LABS

COURSE OVERVIEW

This course covers designing and installing a Kubernetes cluster with kubeadm, then revisiting core resources such as pods, labels, replication controllers, services and deployments. It addresses storage classes, persistent volumes, StatefulSets, logging and monitoring with Prometheus and the Elastic Stack, cluster networking with CoreDNS and Ingress, and application packaging with Helm. It also covers Istio service mesh configuration, Kubernetes security including roles, role bindings and security contexts, cluster maintenance tasks, troubleshooting common errors, and extra security practices such as CIS benchmarking, gVisor and image vulnerability scanning.

WHO THIS COURSE IS FOR

- **Kubernetes Administrators**
- **System Administrators**
- **DevOps Engineers**
- **Cloud Engineers**
- **Security Engineers**

PREREQUISITES

- Kubernetes Admin Knowledge

LEARNING OBJECTIVES

- Design and install a Kubernetes cluster using kubeadm
- Manage pods, labels, replica sets, services and deployments
- Configure persistent storage using volumes and storage classes
- Manage StatefulSets and headless services for stateful workloads
- Monitor clusters using Prometheus, Elasticsearch and Kibana
- Configure cluster networking, DNS and Ingress resources
- Package and deploy applications using Helm charts
- Implement Kubernetes security with roles and security contexts

TRAINING APPROACH

How the Course Is Taught

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.

COURSE SYLLABUS

12 Modules, 46 Topics

01

2 Labs

Installation, Configuration and Validation

TOPICS

Design a Kubernetes Cluster

02

5 Labs

Revise Managing Resources (Overview Level Considering Participant Already Have Knowledge)

TOPICS

- Managing Pods
- Managing Labels and Selectors
- Managing Replication Controller and Replica Set
- Managing Service
- Managing Deployments

03

2 Labs

Storage

TOPICS

- Understand storage classes
- Persistent Volume - HostPath
- Persistent Volume - NFS
- Understand volume mode, access modes and reclaim policies for volumes
- Understand persistent volume claims primitive
- Know how to configure applications with persistent storage

04

3 Labs

Managing Statefulset

TOPICS

What is StatefulSet · Why StatefulSet · Manage StatefulSet · Managing Headless Service · Storage with StatefulSet

05

2 Labs

Logging and Monitoring

TOPICS

- Understand how to monitor all cluster components
- Prometheus Tool
- Integration of Elastic Search and Kibana with Kubernetes

06

4 Labs

Networking in Kubernetes

TOPICS

Understand CoreDNS · Configure Custom DNS for Pod · Ingress - Host Based · Ingress - Path Based · Ingress with TLS · Metal Load Balancer

07

5 Labs

Helm

TOPICS

- Understand Helm and Helm Charts
- Helm Commands
- Deploy Kubernetes Dashboard using Helm
- Create Helm Chart and Deploy Applications using Helm Chart

08

5 Labs

Istio

TOPICS

- Istio Installation
- Understand Istio Architecture
- Understand Destination Rule and Virtual Service

09

5 Labs

Security

TOPICS

- Understanding Kubernetes Security
- Understanding Role and RoleBindings
- Understanding ClusterRole and ClusterRoleBinding
- Understanding Security Context

10

4 Labs

Cluster Maintenance

TOPICS

Understanding OS Upgrade · Static Pod · CronJob

11

Troubleshooting

TOPICS

- Ways to Troubleshoot CrashLoopBack Errors
- Ways to Troubleshoot Service Errors
- Ways to Troubleshoot Kubernetes Components - ETCD, Scheduler, Kubelet, Container Runtime

12

5 Labs

Extra Security Topics

TOPICS

- Use CIS Benchmark to Review the Security Configuration of Kubernetes Components
- Use GVisor
- Scan Images for Known Vulnerabilities

HANDS-ON LABS

Practise What You Learn

#	MODULE	ACTIVITY
01	**Installation, Configuration and Validation**	■ Installing 1 Master and 2 Worker Nodes Cluster using Kubeadm ■ Verify Installation
02	**Revise Managing Resources (Overview Level Considering Participant Already Have Knowledge)**	■ Managing Pods ■ Managing Labels and Selectors ■ Managing ReplicaSet ■ Managing Service - ClusterIP and NodePort ■ Working with Deployments - Rolling Update, Recreate, Blue Green
03	**Storage**	■ HostPath ■ PV with NFS
04	**Managing Statefulset**	■ Creating StatefulSet ■ Creating Headless Service ■ Storage with StatefulSet
05	**Logging and Monitoring**	■ Integration Prometheus and Grafana with Kubernetes ■ Installing Elasticsearch and Kibana in Kubernetes
06	**Networking in Kubernetes**	■ Configure Custom DNS for Pod ■ Ingress Host Based ■ Ingress Path Based ■ Ingress with TLS
07	**Helm**	■ Helm Commands ■ Create Helm Chart ■ Test Helm Chart ■ Upgrade Application using Helm Chart ■ Downgrade Application using Helm Chart
08	**Istio**	■ Installing Istio ■ Deploy Application and Work with Kiali ■ Create Application with Istio ■ Ingress Host Based and Path Based with Istio ■ Ingress - Subdomain with Istio
09	**Security**	■ Creating and Managing Users in Kubernetes ■ Creating Service Accounts ■ Role and Rolebindings ■ ClusterRole and ClusterRoleBinding ■ Adding Security Context to Pod to Enable Ping

#	MODULE	ACTIVITY
10	**Cluster Maintenance**	■ Upgrade a Kubernetes Cluster Version ■ Deploying Pods as a Static Pod ■ ETCD Backup ■ Deploying Pod as CronJob
12	**Extra Security Topics**	■ CIS Benchmark for Kubernetes ■ Encrypting Secrets in ETCD ■ Implementing Gvisor on Pods ■ Custom Security Policies using OPA ■ Checking Image Vulnerability with Trivy

WHAT IS INCLUDED

Everything You Need to Succeed

- Koenig course material for every module
- Delivery by certified instructors and subject matter experts
- Hands-on exercises throughout the course
- Course completion certificate from Koenig

ABOUT KOENIG

Who We Are

Established in 1993, Koenig Solutions is a globally recognised training provider with 35+ technology partnerships, 5,000+ training programmes and a network of certified instructors and subject matter experts, supporting individuals and enterprise teams worldwide.

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