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Advanced Kubernetes

Duration: 32 Hours (4 Days)

Overview

The Advanced Kubernetes course is designed to deepen learners' expertise in Orchestrating containerized applications using Kubernetes, focusing on advanced concepts and best practices. Throughout the course, participants will gain hands-on experience with complex Kubernetes features and tools.Module 1 lays the foundation with the installation and configuration of a Kubernetes cluster, including the setup of ETCD clusters, Control plane components, Worker nodes, and kubectl configuration. This is critical for understanding the underlying architecture of a highly available Kubernetes setup.Module 2 revisits the essentials of managing resources such as Pods, Services, and Deployments, essential for maintaining applications in a Kubernetes cluster.In Module 3, storage solutions are explored, including Storage classes and Persistent volumes, which are crucial for stateful applications.Module 4 focuses on managing stateful applications using StatefulSets, which is a key component of Kubernetes' advanced concepts.Module 5 covers Logging and monitoring, essential for maintaining the reliability and efficiency of a Kubernetes cluster.Module 6 delves into the networking aspect of Kubernetes, including DNS management, Ingress, and Load balancing, which are fundamental for application accessibility.Module 7 introduces Helm, a package manager that simplifies the deployment of applications on Kubernetes.Finally, Module 8 educates learners on Istio service mesh, which provides advanced Traffic management capabilities and observability into microservices.This course is instrumental for professionals aiming to master advanced Kubernetes techniques, ensuring they are equipped to design, deploy, and manage complex Kubernetes ecosystems efficiently.

Audience Profile

The Advanced Kubernetes course by Koenig Solutions is tailored for IT professionals aiming to master orchestration and management of containerized applications.

- DevOps Engineers
- System Administrators
- Cloud Engineers
- Software Developers with a focus on microservices architecture
- IT Project Managers overseeing containerization projects
- Site Reliability Engineers (SREs)
- Technical Leads responsible for maintaining high-availability systems
- Infrastructure Architects designing scalable cloud solutions
- Application Developers looking to understand the deployment environment
- Security Professionals involved in container security
- Network Engineers interested in Kubernetes networking aspects
- Technical Support Specialists seeking to enhance their troubleshooting skills
- IT Professionals preparing for Kubernetes certification exams

Course Syllabus

Module 1 – Installation, Configuration and Validation

- Design a Kubernetes Cluster

- Installation of Kubernetes Master and Nodes using Hard Way Method
- Bootstrapping the ETCD Cluster
- Bootstrapping the Kubernetes Control Plane
- Configure API Server
- Configure Scheduler
- Configure Controller Manager
- Bootstrapping the Kubernetes Worker Nodes
- Configure Container Runtime
- Configure Kubelet
- Configure Kube Proxy
- Configure CNI Networking
- Configure kubectl
- Verify Installation

Module 2 – Revise Managing Resources

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

Module 3 – Storage

- 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

Module 4 – Managing Statefulset

- What is StatefulSet
- Why StatefulSet
- Manage StatefulSet
- Managing Headless Service
- StatefulSet DNS Entry
- Storage with StatefulSet

Module 5 – Logging and Monitoring

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

Module 6 – Networking in Kubernetes

- Understand CoreDNS

- Configure Custom DNS for Pod
- Ingress – Host Based
- Ingress – Path Based
- Ingress with TLS
- Metal Load Balancer

Module 7 – Helm

- Understand Helm and Helm Charts
- Helm Commands
- Deploy Kubernetes Dashboard using Helm
- Create Helm Chart and Deploy Applications using Helm Chart
- Test Helm Chart
- Upgrade Application using Helm Chart
- Downgrade Application using Helm Chart

Module 8 – Istio

- Istio Installation
- Understand Istio Architecture
- Deploy Application and Work with Kiali
- Understand Destination Rule and Virtual Service
- Create Application with Istio
- Microservices Tracing
- Ingress Host Based and Path Based with Istio
- Ingress – Subdomain with Istio