

Nehra Classes Kubernetes Syllabus

Kubernetes Course Syllabus, covering both beginner and advanced topics.

Module 1: Introduction to Kubernetes

- What is Kubernetes?
- Kubernetes Architecture Overview
- Key Components: Pods, Nodes, Deployments, Services
- Kubernetes vs. Docker Swarm vs. OpenShift
- Setting Up Kubernetes Cluster (Minikube, K3s, or Kind)

Module 2: Core Kubernetes Concepts

- Pods and Multi-Container Pods
- ReplicaSets and Deployments
- Labels, Selectors, and Annotations
- Namespaces and Resource Quotas
- Kubernetes API and CLI (kubectl)

Module 3: Networking in Kubernetes

- Cluster Networking Basics
- Service Types: ClusterIP, NodePort, LoadBalancer, ExternalName
- Ingress Controllers and Ingress Resources
- DNS in Kubernetes
- Network Policies

Module 4: Storage in Kubernetes

- Persistent Volumes (PV) and Persistent Volume Claims (PVC)
- Storage Classes and Dynamic Provisioning
- StatefulSets vs. Deployments
- ConfigMaps and Secrets

Module 5: Application Deployment & Scaling

- Deploying Applications in Kubernetes
- Rolling Updates and Rollbacks
- Horizontal Pod Autoscaler (HPA)
- Vertical Pod Autoscaler (VPA)
- CronJobs and Jobs

Module 6: Security & RBAC in Kubernetes

- Role-Based Access Control (RBAC)
- Service Accounts and Network Policies
- Security Contexts and Pod Security Standards (PSS)
- TLS/SSL Certificates and Kubernetes Secrets
- Image Security and Scanning

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Module 7: Helm & Kubernetes Package Management

- Introduction to Helm
- Helm Charts and Repositories
- Writing Custom Helm Charts
- Helmfile and Helm Secrets

Module 8: Logging, Monitoring & Troubleshooting

- Kubernetes Logging Basics
- Using Fluentd, ELK Stack, and Loki for Logging
- Monitoring with Prometheus and Grafana
- Debugging with kubectl and Events
- Troubleshooting Kubernetes Issues

Module 9: Kubernetes Advanced Topics

- Operators and Custom Resource Definitions (CRDs)
- Service Mesh (Istio, Linkerd)
- Kubernetes Federation
- Multi-Cluster Kubernetes

Module 10: Kubernetes in Production

- Best Practices for Kubernetes in Production
- Backup & Disaster Recovery
- Kubernetes Upgrades and Maintenance
- Cost Optimization and Resource Efficiency

Module 11: CI/CD with Kubernetes

- CI/CD Overview with Kubernetes
- GitOps with ArgoCD and FluxCD
- Deploying Applications with Jenkins and GitHub Actions
- Blue-Green Deployments and Canary Releases

Module 12: Kubernetes on Cloud Providers

- Kubernetes on AWS (EKS), Azure (AKS), and Google Cloud (GKE)
- Terraform & Kubernetes Deployment
- Kubernetes Cluster Autoscaler
- Serverless Kubernetes with Knative

Module 13: Kubernetes Certification Preparation (CKA, CKAD, CKS)

- Overview of Kubernetes Certifications
 - Exam Domains & Study Materials
 - Hands-on Labs and Practice Tests
 - Time Management & Exam Tips
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