

Kubernetes



e-Learning Course



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COURSE MODULES

Module 1: Introduction to Kubernetes

- *What is Kubernetes?*
- *Why use Kubernetes?*
- *Key benefits and features*
- *Comparison with traditional deployment methods*
- *Kubernetes architecture overview*

Module 2: Kubernetes Architecture & Components

- *Master Node Components*
 - *API Server*
 - *Controller Manager*
 - *Scheduler*
 - *etcd (Cluster Store)*
- *Worker Node Components*
 - *Kubelet*
 - *Kube Proxy*
 - *Container Runtime (Docker, containerd)*
- *Pod and Node communication*

Module 3: Setting Up a Kubernetes Cluster

- *Installing Kubernetes (Minikube, Kubeadm, Kind)*
- *Cluster setup on cloud providers (AWS, GCP, Azure)*
- *Understanding kubeconfig*
- *Interacting with Kubernetes using kubectl*

Module 4: Understanding Kubernetes Objects

- Pods
- ReplicaSets
- Deployments
- Namespaces
- Labels & Selectors



Module 5: Kubernetes Networking

- Service types: ClusterIP, NodePort, LoadBalancer, ExternalName
- Ingress controllers and Ingress rules
- DNS in Kubernetes
- Network Policies

Module 6: Managing Applications in Kubernetes

- ConfigMaps and Secrets
- Environment Variables in Pods
- Persistent Storage (PVs and PVCs)
- StatefulSets vs Deployments
- Init Containers

Module 7: Scaling & Auto-healing

- Horizontal Pod Autoscaler (HPA)
- Vertical Pod Autoscaler (VPA)
- Cluster Autoscaler
- Liveness and Readiness Probes

Module 9: Logging, Monitoring, and Troubleshooting

- Monitoring with Prometheus & Grafana
- Logging with Fluentd, EFK (Elasticsearch, Fluentd, Kibana) stack
- Debugging failed Pods
- Troubleshooting common issues

Module 10: Kubernetes CI/CD and GitOps

- Deploying applications using Helm
- Helm Charts and Templating
- ArgoCD for GitOps workflows
- Continuous Deployment with Kubernetes

Module 11: Kubernetes Advanced Topics

- Service Mesh (Istio, Linkerd)
- Kubernetes Operators
- Custom Resource Definitions (CRDs)
- Multi-cluster Kubernetes
- Serverless Kubernetes (Knative)

Module 12: Kubernetes on Cloud & Certification Prep

- Kubernetes on AWS (EKS), Azure (AKS), GCP (GKE)
- Best practices for production deployments
- Preparing for Certified Kubernetes Administrator (CKA) & (CKAD)