Kubernetes

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Course Content

o **Module:1**

- Understanding Container Runtime Environments.
- Working with YAML files for creating manifests.
- Deploying Docker and understanding Docker components like Engine, Networks, Images & Registries.
- Creating custom container images with Dockerfile
- Why Kubernetes & Understanding Kubernetes architecture and Components.
- Understanding the Kubernetes Component Connectivity.
- Studying significance of API-Server, ETCD, Kube-Scheduler, Controllers, Kubelet & Kube-Proxy.
- Understanding Kubernetes High Availability.
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o **Module:2**

- What is Kubernetes Operations (KOPS)?
- Deploying Kubernetes Production Grade Kubernetes Cluster with on AWS with KOPS.
- Understanding components of KOPS.
- Scaling the Kubernetes Cluster using KOPS.
- Manipulating KOPS configuration for reducing the bill.
- Accessing Kubernetes cluster with Kubeconfig
- Running Kubernetes basic cluster commands.

o **Module:3**

- Running Kubectl Commands vs. Deploying Manifests
- Overview about POD, Deployment, ReplicaSet, Service & Namespaces.
- Deploying, Managing & Troubleshooting PODs.
- Deep dive through POD, POD Components, POD-Sidecar, kube-scheduler life cycle.
- Managing PODs with EXEC, port-forwarding, POD Metadata & POD Environment variables.
- Disadvantages of running PODS and Intro to Deployments.
- Deep dive with Deployments, Replica Set & Replication Controller.
- Differences and use cases of Replica Set & Daemonset

o **Module:4**

- Understating Kubernetes Service and its importance.

- Deep dive on Kubernetes Services and understanding Traffic Flow.
- Creating ClusterIP, NodePort, LoadBalancer & Headless Service.
- Understanding & Creating Liveness & Readiness Probes.
- Understanding and Creating Ingress Controllers and Ingress Services.
- Configure AWS LoadBalancer with Ingress controllers.

o **Module:5**

- Understanding Labels & Annotations
- Configuring Labels & Annotations at Node & PODs.
- Understanding how Taints and Tolerations work.
- Configuring Node Taints and POD Tolerations.
- Understanding and Configuring Node Affinity.
- Understanding and Configuring POD Affinity.

o **Module:6**

- Understanding Kubernetes Persistence and Non-Persistent Storage.
- Creating non-persistent volumes - emptydir, gitrepo & host-path.
- Deep dive into Kubernetes Persistence Volumes (PV).
- Creating Persistent Volume Claims (PVC) with Persistence Volumes.
- Understanding Kubernetes Storage Classes and Dynamic Volume Provisioning.

o **Module:7**

- Passing command-line variables containers.
- Setting environment variables for containers.
- Intro to ConfigMaps.
- Decoupling configuration with ConfigMap
- Working with sensitive data in Kubernetes.
- Creating and using Secrets in Kubernetes.

o **Module:8**

- How authentication works in Kubernetes.
- Deep dive into Kubernetes Namespaces.
- Configuring user access to the cluster.
- Creating and working with service accounts.
- Understanding RBAC in Kubernetes.
- Creating Role and Role Bindings.
- Creating Cluster Roles and ClusterRoleBindings.
- Understanding Blue-Green Deployments & Rolling Updates.

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- o **Module:9**

  - Working with logs in Kubernetes.
  - Working with Master and Worker Node Failure.
  - Find and retrieve information about the cluster components.
  - Performing Rolling Update with KUBECTL with no downtime & challenges with KUBECTL rolling updates.
  - Running KUBECTL cheat sheet commands.

- o **Module:10**

  - Understanding differences between Job & Cronjobs
  - Creating a Job and understanding the attributes.
  - Use cases for Jobs.
  - Scheduling with Cron Jobs.
  - Use cases for Cron Jobs.

- o **Module:11**

  - Understanding Rancher & Components
  - Deploying Racher and access dashboards.
  - Deploy On-Prem Kubernetes Cluster with Rancher
  - What is K3S?
  - Deploying Kubernetes Cluster with K3S application.
  - Advantages of K3S.

- o **Module:12**

  - Understanding Kubernetes Network Policies.
  - Restricting and Allow Traffic between Pods.
  - Allow & Restrict traffic between Namespaces.
  - Restricting & Allow traffic based on Application Ports.

- o **Module:13**

  - What is Istio & What is the purpose?
  - Understanding Istio Architecture.
  - Deploy Istio on Kubernetes Cluster.
  - Enable Istio on namespace and deploy application
  - Checking Sidecars, Kiali, Jaeger
  - Deploying VirtualService & Gateways

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- o **Module:14**

  - Monitoring Cluster Components.
  - Working with Logs and application logs.
  - Performing cluster upgrade.
  - Backup and Restore of Cluster.
  - Overview about Prometheus monitoring.
  - Deploying Prometheus and Grafana on Kubernetes.
  - Creating dashboards for monitoring.
  - Understanding Alert Manager.

- o **Module:15**

  - Understanding Azure AKS Architecture
  - Deploying Azure AKS Cluster
  - Understanding Node Pools, Scaling and Upgrading.
  - AKS Cluster Access and Azure RBAC
  - CI & CD Deployment with Azure DevOps.
  - Kubenet vs Azure CNI
  - Integrating with Application Gateway & Azure Firewall

- o **Module:16**

  - Understanding AWS EKS Architecture
  - Deploying workloads on EKS Cluster.
  - Adding & Removing resources to the cluster.
  - RBAC on AWS EKS.

- o **Module:17**

  - Understanding & Installing Helm 3
  - Creating Helm Chart and understanding folder structure.
  - Working with Values.yaml file.
  - Creating custom charts for Nginx & EFS Provisioner.
  - Creating & linting Helm Packages.
  - Understanding Helm Chart Repositories.
  - Downloading & Installing applications for Helm Repositories

- o **Module:18**

  - Jenkins & Azure DevOps Overview
  - Installing Jenkins and installing necessary plugins.
  - Integrating Jenkins with Kubernetes Cluster.
  - CI/CD with Jenkins Pipelines.

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- Overview on GitOps.
- Understanding and Deploying ArgoCD application.
- Deploying & Updating application using ArgoCD GitOps way.

  o **Module:19**

- Understanding CKA vs CKAD vs CKS.
- CKA/CKAD Exam overview and registration.
- Understanding the exam lab environment.
- CKA/CKAD sample example questions.
- Resume & Profile Creation.
- Attending interviews tips & tricks.