Course Outline

Module 1: Kubernetes Core Concepts and Networking

Learning Objective: Learn the basic concepts of Kubernetes and configure your Kubernetes network using calico.

Topics

- Kubernetes Core Concepts
- Kubectl common commands
- Understanding Pods
- Configure network on cluster nodes
- Pod Networking Concepts
- Setting up a cluster - Kubernetes Certificates

Hands-On

- Perform basic kubectl commands
- Deploy pods and use init containers to pre-set an environment
- Configure Kubernetes network using Calico
- Use certificates to authenticate resources

Skills You Will Learn

- Basics of Kubernetes
- Configure Kubernetes network using calico
- Deploy Pods
- Configure network on cluster nodes

Module 2: Kubernetes Services and Scheduling

Learning Objective: Learn to expose your application using different kinds of Services and understand the ins and outs of Pod Scheduling in your cluster**.**

Topics

- Services and Controllers
- Service Networking
- Deploy and configure network Load Balancer
- Primitives necessary for self-healing apps
- Effects of resource limiting on pod scheduling
- Configure Kubernetes Scheduler
- Running multiple Schedulers

Hands-On

- Deploy different kinds of services
- Deploy and configure a network load balancer
- Configure the Kubernetes scheduler
- Run multiple schedulers

Skills You Will Learn

- Deploy different kinds of services
- Deploy and configure network Load Balancer
- Working with Kubernetes Scheduler

Module 3: Kubernetes Controllers

Learning Objective: Learn the use of different Kubernetes controllers and set up traffic routing rules using Ingress.

Topics

- ReplicaSet and ReplicationController
- DaemonSets
- Deployments
- Rolling updates and Rollbacks
- Scaling applications

- Ingress

Hands-On

- Deploy different ReplicationControllers
- Use DaemonSets on nodes
- Manage pod updates using Deployments
- Use HPA for dynamic work-load management
- Use Ingress controller and rules to manage network traffic

Skills You Will Learn

- Working with different Kubernetes controllers
- Set up traffic routing rules using Ingress
- Rolling updates and Rollbacks
- Scaling applications

Module 4: Persistent Storage in Kubernetes

Learning Objective: Learn to use persistent storage methods for stateful applications and hide sensitive information using ConfigMaps and Secrets.

Topics

- PersistentVolume and PersistentVolumeClaim
- Access modes for volumes
- Primitives for PersistentVolumeClaim
- Secrets and ConfigMaps in your pods
- Storage classes
- Headless services
- StatefulSets

Hands-On

- Deploy PersistentVolume and PersistentVolumeClaim
- Use Secrets and ConfigMaps in your applications

- Use StorageClass for dynamic storage allocation
- Use stateful applications for sticky identities for pods
- Deploy a highly available replicated MariaDB cluster

Skills You Will Learn

- Use persistent storage methods for stateful applications
- Hide sensitive information using ConfigMaps and Secrets
- Access modes for volumes

Module 5: Securing the Cluster

Learning Objective: Learn how to secure the cluster using role-based access control (RBAC) and configure custom network policies for your pods.

Topics

- Authentication
- Authorization
- Kubernetes security primitives
- Configure Network Policies
- Security Contexts

Hands-On

- Create and use Roles and RoleBindings
- Define custom Egress and Ingress policies
- Use probes and configure a restart policy for pods
- Define privilege and access control using security contexts

Skills You Will Learn

- Configure role-based access control (RBAC)
- Configure custom network policies for pods
- Authentication and Authorization
- Kubernetes security primitives
- Working with Network Policies

Module 6: Logging and Monitoring the Cluster

Learning Objective: Monitor cluster and visualize cluster logs using Prometheus and EFK stack. Deploy jobs, manage the etcd cluster, and use Helm Charts to deploy applications.

Topics

- Monitoring the cluster using Prometheus
- Visualizing cluster logs using EFK stack
- Jobs
- ETCD operations
- Helm Charts

Hands-On

- Monitor cluster using Prometheus
- Visualize logs using EFK stack
- Deploy jobs to run tasks to completion
- Manage etcd cluster
- Use Helm Charts

Skills You Will Learn

- Cluster maintenance
- Use Helm Charts to deploy applications.
- Visualizing cluster logs using EFK stack
- Deploying Jobs

Module 7: Troubleshooting the Cluster

Learning Objective: Learn how to handle and troubleshoot common cluster failures.

Topics

- Troubleshooting application failures
- Troubleshooting cluster failures

Skills You Will Learn

- Handling and troubleshooting common cluster failures