OKD Training - Detailed Course Outline

Duration: 80 Hours

1. Introduction to OKD and Containers

• Understanding containerization (Docker, Kubernetes)

• Benefits of using OKD

• Key OKD components (Master, Nodes, etc.)

• OKD architecture overview

• OKD vs. Kubernetes

• Introduction to Red Hat OKD's ecosystem

Lab:

✓ Deploy Docker and Kubernetes on VMware VMs

✓ Setup OKD CLI and Web Console

2. Planning and Pre-requisites (Theoretical)

• Resource Sizing

• Network Planning

• DNS Planning

• Load Balancer Planning

• SSL Certificates

3. Installation and Configuration

• Setting up OKD clusters (single-node, multi-node)

• Preparing infrastructure for OKD (bare metal, virtual machines, cloud environments)

• Installation methods (OC, Ansible, OKD Installer)

• Configuring and managing OKD with `oc` command line tool

• Managing user access (Role-Based Access Control, Identity providers)

• Storage configurations and persistent volumes (OKD Storage)

Lab:

✓ Install OKD using IPI (Installer Provisioned Infrastructure)

✓ Configure a multi-node OKD cluster on VMware

✓ Validate cluster installation

4. OKD Core Concepts

• Projects and Namespaces

• Understanding pods, containers, and services

• Deployments, deployment configurations, and deployment strategies (Rolling, Recreate, etc.)

• OKD networking (Services, Routes, Network Policies)

• Understanding and using Kubernetes concepts (ReplicaSets, Pods, Deployments, StatefulSets)

Lab:

✓ Create and manage namespaces and pods

✓ Configure deployment strategies and replicas

5. Security and Authentication

• OKD security policies

• Managing Users using HTPasswd

• User roles and permissions (RBAC)

• Security in containerized applications (Image security, vulnerability scanning)

• Managing network security with Network Policies

Lab:

✓ Configure Htpasswd Authentication

✓ Define RBAC policies and roles

✓ Apply NetworkPolicies between pods

6. OKD Storage

• Persistent storage concepts in OKD

• Using dynamic provisioning (StorageClass, Persistent Volumes)

• Configuring StatefulSets with persistent storage

• OKD Container Storage (OCS)

• Integrate NFS Storage with OpenShift

Lab:

✓ Configure storage classes

✓ Creating Persistent Volume (PV) Using HostPath, NFS)

✓ Creating PVC and Attach with Pod

✓ Deploy StatefulSets with persistent storage

7. Networking in OKD

• OKD networking overview

• Services, Routes, and Ingress

• DNS and load balancing in OKD

• NetworkPolicy and PodSecurityPolicy

• Managing network traffic and ingress controllers

Lab:

✓ Configure services and routes

✓ Define and apply NetworkPolicies

✓ Setup ingress controllers and load balancing

8. Monitoring and Logging

• Monitoring tools in OKD (Prometheus, Grafana)

• Cluster metrics and alerting

• OKD logging stack (Elasticsearch, Fluentd, Kibana - EFK)

• Centralized logging and troubleshooting logs

• Health checks, probes (Liveness, Readiness)

Lab:

✓ Explore Logging and Monitoring in OKD

✓ Configure probes and health checks

9. High Availability and Scaling

• Configuring and managing high availability in OKD

• Managing clusters with multiple master nodes Methods

• Pod scaling, resource management

• Load balancing and traffic routing

• Cluster maintenance and upgrades (rolling updates)

Lab:

✓ Setup pod autoscaling

✓ Configuring Resources for Pods (CPU, RAM)

10. OKD Operators and Custom Resources

• What are Operators and why they are useful

• Deploying and managing Operators

• Understanding Custom Resource Definitions (CRDs)

Lab:

✓ Install and manage Operators

✓ Deploy and manage CRDs

11. Managing Applications in OKD

• Application deployment (using YAML files, templates, operators)

• Deploying from source code (Source-to-Image, GitOps, CI/CD with Jenkins)

• Managing application scaling (Horizontal Pod Autoscaling, resource requests, and limits)

• Using OKD templates and Helm charts for deployment

• Configuration management with ConfigMaps and Secrets

Lab:

✓ Deploy an application using templates and Helm

✓ Create a CI pipeline for application deployment

12. CI/CD Pipelines

• Introduction to CI/CD with OKD

• Jenkins on OKD (integration, builds, deployment pipelines)

• Automated deployments

• Managing GitOps with OKD

• Integrating with third-party CI/CD tools

Lab:

✓ Configure Jenkins with OKD

✓ Implement a GitOps pipeline for OKD

✓ Deploy an application using GitOps

13. Troubleshooting and Debugging

• Common issues in OKD clusters and their solutions

• Troubleshooting applications, pods, and nodes

• Understanding logs and events

• Using diagnostic tools (`oc adm`, `oc logs`, `oc describe`)

• Debugging using kubectl and OKD CLI tools

14. OKD for Developers

• Introduction to OKD for developers (Web console and CLI)

• Using Source-to-Image (S2I) for application deployment

• Building and pushing container images

• Managing environment variables, configuration, and secrets

• Working with OKD Templates for developers

Lab:

✓ Build and deploy an application using S2I

✓ Customizing S2I Images

✓ Create OKD templates for developers

15. Istio Service Mesh

• Service Mesh with Istio and OKD Service Mesh

Lab:

✓ Configure Istio with OKD

✓ Working with Istio Kiali for Traffic Management

16. Provisioning Workload via IaC Tool Terraform

• Basics of Terraform

• What is required to set up Terraform

• OKD on public cloud platforms (AWS, Azure, Google Cloud & on-prem)

• Pre-requisite for OKD or Kubernetes deployment via Terraform

• Deploy one cluster using Terraform

Lab:

✓ Install and configure Terraform

✓ Creation of ARO Cluster using Terraform

17. Best Practices and Real-World Scenarios

• Cluster scaling strategies

- Securing applications and infrastructure
- Cost optimization for OKD
- Managing disaster recovery and backup strategies
- Performance tuning and optimization