DO 280 Openshift # From Application Deployment to Security

Day 1: Containers, Kubernetes & OpenShift Fundamentals

Module 1: Containerization Basics

- Building, testing, and pushing container images using Docker/Podman
- Best practices for base image selection, tagging, and multi-stage builds
- Image registries and OpenShift internal registry overview

Module 2: Kubernetes Core Concepts

- Kubernetes architecture: Master & Worker nodes, Kubelet, Scheduler, Controller
- Key resources: Pods, ReplicaSets, Deployments, Services, ConfigMaps, Secrets
- kubectl basics: creating, querying, modifying resources
- Kubernetes vs OpenShift – key differences

Module 3: OpenShift Overview

- OpenShift Architecture & Components
- Introduction to oc CLI & OpenShift Web Console
- Working with projects and namespaces
- Navigating the OpenShift Dashboard

Day 2: Deploying & Managing Applications in OpenShift

Module 4: Application Deployment Techniques

- Deploy from images, templates, manifests, and Helm charts
- Working with Deployments, ReplicaSets, Jobs, and CronJobs
- Using Kustomize overlays to manage environments
- Managing logs, events, and cluster resource usage

Module 5: Application Networking

- Configuring Services: ClusterIP, NodePort, LoadBalancer
- Exposing apps via Routes
- Introduction to MetalLB and Multus
- External access to HTTP and non-HTTP apps

Module 6: Storage Management for Apps

- PersistentVolumeClaims (PVCs) and Storage Classes
- Secrets & ConfigMaps for configuration management
- StatefulSets for stateful apps
- Non-shared storage options

Day 3: Reliability, Scaling, and Updates

Module 7: Application Resilience

- Readiness and Liveness Probes
- Resource limits and reservations (CPU/memory)
- Autoscaling: HPA overview (manual and automatic scaling)

Module 8: Application Lifecycle Management

- Managing image streams and triggers
- Tagging vs digest-based image identification
- Rolling updates, rollbacks, and deployment strategies
- Troubleshooting failed deployments

Module 9: OpenShift Operator Management

- OperatorHub and installing Operators
- Custom Resource Definitions (CRDs) overview
- Managing, updating, and deleting Operators

Day 4: Security, RBAC, and Self-Service

Module 10: Authentication & Authorization

- Identity providers (HTPasswd setup & user management)
- Role-Based Access Control (RBAC) concepts
- Users, Groups, Roles, and RoleBindings
- Managing user permissions and access control

Module 11: Application and Network Security

- Service Accounts & Security Context Constraints (SCCs)
- Managing Secrets for sensitive data
- TLS/SSL configuration for securing Routes
- Ingress & egress control using Network Policies
- Troubleshooting SDN issues and DNS resolution

Module 12: Developer Self-Service

- Resource quotas and limit ranges
- Project templates for standardization
- Enabling team autonomy with safe resource boundaries
- Using gitops / github actions to automate app dev to deployment

Day 5: Advanced Integration, Platform Upgrades & Istio

Module 13: OpenShift Cluster Administration

- Assessing cluster health and performance
- Monitoring tools and built-in alerts
- Using oc CLI for advanced troubleshooting
- Exporting, modifying, and re-importing Kubernetes resources

Module 14: OpenShift Cluster Updates

- Installing openshift cluster installation on bare-metal server
- Upgrading OpenShift using web console and CLI
- Updating Operators safely
- Identifying deprecated APIs before upgrade

Module 15: Service Mesh with Istio (Introduction + Demo)

- What is Istio? Why use a service mesh?
- Installing Istio on OpenShift using OperatorHub
- Traffic management, mTLS, observability, and policy enforcement basics
- Demo: Deploy two microservices and control traffic via Istio