

Kubernetes and OpenShift Training

Duration: 3 Days

Description

Kubernetes and OpenShift Training is a hands-on corporate training program designed to teach participants how to deploy, scale and manage containerized applications in production environments with high availability, fault tolerance, automated scaling and minimal manual intervention.

The course begins by examining the limitations and operational challenges of traditional application and cluster management. Modern container orchestration solutions are then introduced through practical examples, alternative approaches and real-world scenarios.

The concepts covered throughout the training are applied using **Kubernetes**, the widely adopted open-source container orchestration platform, and **Red Hat OpenShift**, an enterprise application platform built on Kubernetes. Participants develop a practical understanding of modern cluster management, container orchestration and application lifecycle management across Kubernetes and OpenShift environments.

During the three-day program, participants explore Kubernetes cluster installation, core Kubernetes objects, application deployment, service discovery, networking, role-based access control, high availability, autoscaling, monitoring and troubleshooting. The OpenShift section covers platform architecture, application deployment, storage, networking, metrics and scaling.

Benefits of Kubernetes and OpenShift Training

By the end of this training, participants will be able to:

- Recognize common cluster management problems and operational inefficiencies.
- Understand how containers move from development environments into production.
- Use modern container orchestration and cluster management tools.
- Understand the architecture and core components of Kubernetes.
- Deploy and manage containerized applications on Kubernetes.
- Configure service discovery, Kubernetes services and ingress.
- Apply RBAC, Secrets and essential security configurations.
- Design high-availability and automated scaling scenarios.
- Collect and visualize cluster metrics with Prometheus and Grafana.
- Perform cluster maintenance, logging and troubleshooting operations.

- Understand the relationship and key differences between Kubernetes and OpenShift.
- Evaluate how Kubernetes and OpenShift can be integrated into existing development and operational workflows.

Who Should Attend?

This Kubernetes and OpenShift course is suitable for professionals who want to develop strong technical foundations and practical experience in container orchestration, including:

- Software developers
- System and infrastructure administrators
- DevOps and DevSecOps engineers
- Cloud and platform engineers
- IT operations professionals
- Quality assurance and test engineers
- Site Reliability Engineering teams
- Software, system and solution architects
- Technical teams responsible for containerized applications

Kubernetes and OpenShift Course Topics

Introduction to Container Orchestration

This section examines the technical and operational challenges that create the need for cluster management and container orchestration. Available solutions are evaluated together with their advantages, limitations and common use cases.

Modern Cluster and Application Management

Participants learn how clusters and applications are managed within modern software architectures. Application deployment, service management, workload distribution and scaling processes are explained through practical scenarios.

The concepts and tools introduced in this section provide the foundation needed to understand Kubernetes and OpenShift architecture in the following modules.

Kubernetes Core Concepts

The core Kubernetes resources and their purposes are examined on an active Kubernetes cluster. The course covers:

- Pods
- ReplicaSets and Replication Controllers
- Deployments
- Services

- Labels and selectors
- Namespaces
- Volumes
- ConfigMaps
- Secrets
- StatefulSets
- DaemonSets

Participants become familiar with the Kubernetes command-line tool, **kubectl**, and use a prepared training environment to deploy their first containerized applications to Kubernetes.

Kubernetes Architecture

The course examines the primary components of the Kubernetes platform and explains their functions within the cluster lifecycle. Participants learn about the Control Plane and Worker Node architecture together with components such as kube-apiserver, etcd, kube-scheduler, controller manager, kubelet and kube-proxy.

Understanding these components helps participants identify the causes of cluster problems and use appropriate troubleshooting methods.

Installing Kubernetes Clusters

Participants explore tools used to build Kubernetes clusters for development and testing. The course covers local Kubernetes environments with **Minikube** and **Docker Desktop**, as well as Kubernetes cluster installation on Linux servers with **kubeadm**.

OpenShift Core Concepts and Architecture

After establishing a foundation in Kubernetes, the course introduces the architecture and core concepts of Red Hat OpenShift. Participants learn how OpenShift uses Kubernetes and how responsibilities are shared between the two platforms.

The section also examines the additional developer, security and operational capabilities OpenShift provides for enterprise application environments.

Kubernetes Networking

Kubernetes networking is examined in detail, including communication between Pods, Services, Nodes and external systems. Participants learn how Service Discovery, ClusterIP, NodePort, LoadBalancer and Ingress provide connectivity and access to applications.

Common network and connectivity problems are also discussed to prepare participants for troubleshooting production Kubernetes environments.

Techniques, Tools and Best Practices

Participants are introduced to tools from the Kubernetes and OpenShift ecosystems, including Helm, Kubernetes Operators, Prometheus and Grafana. The course explains how these tools

support application packaging, automation, monitoring and cluster operations.

Practical recommendations and best practices for deployment, scaling, monitoring and troubleshooting are discussed throughout the course.

End-to-End Application Transformation

Working in groups under the guidance of the instructor, participants transform a traditional application stack into a containerized workload and deploy it on Kubernetes and OpenShift.

The exercise covers application deployment, configuration, service exposure, storage, networking, monitoring and scaling, allowing participants to reinforce both theoretical knowledge and practical skills.

Problem Solving and Troubleshooting

Participants examine common problems encountered in Kubernetes and OpenShift environments. Working in groups, they use cluster status information, logs, events and Kubernetes resources to diagnose and resolve several troubleshooting scenarios.

Customized Kubernetes and OpenShift Training for Organizations

The Kubernetes and OpenShift Training program can be customized according to your organization's infrastructure, cloud or data center environment, participant experience levels and technical objectives.

Organizations can request a tailored program focusing on Kubernetes cluster management, container orchestration, application deployment, networking, security, high availability, monitoring or OpenShift administration.

Outline

Three-Day Kubernetes and OpenShift Course Outline

Day 1: Kubernetes Fundamentals and Cluster Installation

- Introduction to container orchestration, terminology and history
- Introduction to Kubernetes and its common use cases
- Kubernetes installation alternatives for Windows and macOS: Minikube and Docker Desktop
- Installing a Kubernetes cluster on a Linux server with kubeadm
- Examining Kubernetes architecture and core components
- Examining Kubernetes objects, including Pods, Deployments and Services
- Deploying a containerized application on Kubernetes

- Introduction to Kubernetes manifests and YAML files
- Understanding the Pod lifecycle
- Working with Kubernetes Secrets
- Hands-on workshop

Day 2: Kubernetes Networking, Security, Scaling and Monitoring

- Service Discovery with Kubernetes
- Kubernetes service types: ClusterIP, NodePort and LoadBalancer
- Ingress and Ingress Controller
- High-availability scenarios
- Affinity and anti-affinity rules
- Kubernetes networking infrastructure
- Pod, Service and Node communication
- Horizontal Pod Autoscaling
- Enterprise use cases and Role-Based Access Control
- Cluster maintenance, logging and troubleshooting
- Helm and Helm Charts
- Kubernetes Operators
- Collecting metrics with Prometheus
- Visualizing metrics with Grafana

Day 3: OpenShift Administration and End-to-End Deployment

- Introduction to OpenShift
- The relationship and key differences between Kubernetes and OpenShift
- Installing OpenShift Local (CRC) on Windows and macOS
- Understanding the transition from MiniShift to OpenShift Local
- Installing an OpenShift cluster on a Linux server
- Examining OpenShift cluster architecture
- Collecting and visualizing metrics in OpenShift
- Deploying a Kubernetes application on OpenShift
- Storage management
- Network management
- High-availability scenarios
- Autoscaling
- End-to-end application transformation
- Problem-solving and troubleshooting workshop

Prerequisites

Participants are expected to understand the fundamentals of **Docker and container technologies**. Previous attendance in a Docker Fundamentals course is recommended but not mandatory.

Basic knowledge of the following subjects will help participants follow the course more effectively:

- Linux or Unix command-line operations
- Fundamental networking concepts
- Docker images and container operations
- Application installation and deployment processes
- At least one programming or scripting language

For corporate training programs, the content and technical depth can be adapted to the participants' experience levels and the organization's infrastructure requirements.