

Introduction to Containers, Kubernetes, and OpenShift

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Course Number: GL992

Duration: 5 days

Overview

Course Description

The "Introduction to Containers, Kubernetes, and OpenShift" course is designed to offer a comprehensive understanding of container orchestration, leveraging Kubernetes and OpenShift platforms. This course begins with foundational concepts of container technology, including an overview of daemonless containers and essential tools like Podman and Buildah, which are critical for managing container lifecycles and configurations. Participants will gain practical skills in creating and managing container images using industry-standard practices, which are crucial for streamlining application deployment in modern IT environments. The course also covers essential networking aspects, emphasizing container network interfaces and service discovery, thereby equipping attendees with the skills to architect resilient and scalable applications.

The course progresses to advanced Kubernetes core concepts, such as understanding its architecture, mastering cluster communication, and working with Kubernetes objects and properties. It emphasizes the importance of YAML configuration files for defining and managing complex Kubernetes environments, offering a blend of theoretical knowledge and hands-on labs for practical understanding. Attendees will delve into managing application lifecycles, exploring the intricacies of pod and container lifecycle management, and the use

of Init Containers and ReplicaSets for ensuring high availability and seamless application updates. These skills are essential for professionals aiming to excel in cloud-native application management and deployment.

Finally, the course provides an in-depth exploration of OpenShift, comparing its features with Kubernetes and highlighting its enterprise advantages, such as enhanced security, integrated developer tools, and seamless CI/CD pipelines. Participants will learn about OpenShift's architecture and its additional capabilities, like managing custom resources with the Operator Lifecycle Manager, offering a robust framework for deploying cloud-native applications in an enterprise context. The course's practical labs enable learners to apply concepts through real-world scenarios, preparing them to handle complex projects and effectively leverage the power of OpenShift for advanced cloud solutions.

Who Can Benefit

- DevOps Engineers: seeking to enhance their skills in managing and automating containerized applications using Kubernetes and OpenShift in their CI/CD pipelines.
- Cloud Architects: will benefit from this course by gaining the knowledge needed to design scalable and secure cloud-native solutions utilizing Kubernetes and OpenShift's full potential.
- Software Developers: looking to understand containerization and improve their ability to build, deploy, and manage applications in containerized environments will find this course beneficial.
- IT Operations Professionals: can enhance their skills in maintaining and monitoring production environments by learning how to manage and troubleshoot containerized applications effectively.
- IT Managers and Decision Makers: a strategic overview of adopting Kubernetes and OpenShift, aiding in informed decision-making for digital transformation initiatives.

Prerequisites

Course: GL990 "Linux Fundamentals for Containers and Kubernetes". Linux experience is a must as this will not be covered in the course.

Audience

Course Details

Container Technology Overview

- Container Fundamentals
- Daemonless Containers
- Podman
- Podman Configuration
- Podman Images
- Podman Volumes

- Podman Networking
- Rootless Podman
- Podman and Pods
- Building Images with Buildah
- Managing Images with Skopeo

Lab Tasks

- Podman
- Podman Networking
- Podman and Pods

Managing Container Images

- Docker Images
- Listing and Removing Images
- Searching for Images
- Downloading Images
- Uploading Images
- Export/Import Images
- Save/Load Images
- Committing Changes

Lab Tasks

- Installing Docker
- Docker Images
- Docker Platform Images

Creating Images with Dockerfile

- Dockerfile
- Caching
- docker image build
- Dockerfile Instructions
- ENV and WORKDIR
- Running Commands
- Getting Files into the Image
- Defining Container Executable
- HEALTHCHECK

- Best Practices
- Multi-Stage builds with Dockerfile

Lab Tasks

- Dockerfile Fundamentals
- Optimizing Image Build Size
- Image Builds and Caching

Kubernetes Core Concepts

- Kubernetes Architecture
- Cluster Communication
- Objects
- Object Properties
- Labels & Selectors
- Annotations
- Object Management
- Image Fundamentals
- Container Fundamentals
- Pod Fundamentals
- Working with Pods
- Writing YAML Files

Lab Tasks

- Container and Pod Fundamentals
- Single Node Install
- Pod Fundamentals

Installation

- Installation pre-requisites
- Installation (single node)
- Installation (production)
- Client Tool Optimizations
- Installing HA Control Plane (DEMO)

Lab Tasks

- (DEMO) Kubernetes HA Masters Install

- Kubernetes Install
- Joining Worker Nodes

Application Lifecycle Management

- CKA Objectives Covered
- Pod Lifecycle
- Container Lifecycle
- Init Containers
- Container: command and args
- Container: Defining Environment
- ReplicaSet
- Deployments
- Working with Deployments
- Deployment Rollouts

Lab Tasks

- Pod Lifecycle
- Init Containers
- Deployments

Networking

- CKA Objectives Covered
- Network Overview
- Service Discovery & CoreDNS
- Container Network Interface (CNI)
- Services
- Ingress Objects

Lab Tasks

- (DEMO) Ingress Controller
- Port-Forwarding
- Services
- Ingress

Storage

- CKA Objectives Covered

- Storage
- Volume Types
- Static Volumes (DEMO)
- ConfigMaps
- Secrets

Lab Tasks

- (DEMO) Static Volumes
- (DEMO) ConfigMaps & Secrets
- Static Volume Provisioning
- ConfigMaps and Secrets

OpenShift

- Kubernetes vs. Openshift
- Openshift Overview
- DEMO: Openshift Web Console

Lab Tasks

- Openshift CLI Basics
- Openshift GUI Basics

Working with YAML and JSON

Lab Tasks

- Troubleshooting YAML Errors in k8s Objects

Git for Gitops

- Git Fundamentals
- Git Branches
- Git Pull/Merge Requests
- Git Merge
- Disaster Recovery

Lab Tasks

- Local Git
- Working with remotes

Create, view, and edit text files

- Producing File Statistics
- Replacing Text Characters
- Text Sorting
- Duplicate Removal Utility
- Extracting Columns of Text
- Combining Files and Merging Text
- Comparing File Changes

PCF to OpenShift Terms and Concepts