Course Outline

Module 1: Introduction to Containerization

Learning Objectives: Understand the origins and the need for containerization in modern applications. Learn how Docker emerged as one of the best container platforms in the industry and about the technology behind it.

Topics

- Containerization
- History of Containers
- Namespaces and Cgroups
- Containers vs Virtual Machines
- Types of Containers
- Introduction to Docker
- Docker Architecture
- Container Lifecycle
- Docker CE vs Docker EE

Module 2: The Docker Engine

Learning Objectives: Set up the Docker Engine on Google Compute Engine Instance and perform various operations on Containers. Configure logging drivers, bind container ports, and write restart policy for containers.

Topics

- Docker Engine
- Configuring Logging Drivers
- Docker Terminology
- Port Binding
- Detached vs Foreground Mode
- Docker CLI
- Docker Exec
- Restart Policy

Hands-On:

- Setting up Docker Engine
- Upgrading Docker Engine

- Setting up logging drivers in Docker
- Port Binding
- Starting Containers in different modes
- Docker CLI Commands
- Docker Exec Commands
- Restart Policy in Docker
- Removing Containers

Module 3: Image Management and Registry

Learning Objectives: Learn how to write a Dockerfile and create custom images by building the Dockerfile. Create and manage remote registry to store your custom images.

Topics:

- Dockerfile
- Dockerfile Instructions
- Build Context
- Docker Image
- Docker Registry

Hands-On:

- Write a Dockerfile to create an Image
- Docker Image Tags
- Setting up Docker Hub
- Configuring Local Registry
- Removing Images from the Registry

Module 4: Storage in Docker

Learning Objectives: Create persistent storage solutions for stateful containerized applications. Utilize different methods for storing container data and perform image cleanup for optimization

Topics:

- Docker Storage
- Types of Persistent Storage
- Volumes
- Bind Mounts
- tmpfs Mount

- Storage Drivers
- Device Mapper
- Docker Clean Up

Hands-On:

- Deploy Docker Volumes
- Deploy Bind Mounts
- Use tmpfs mounts
- Configure Device Mapper
- Docker Clean Up

Module 5: Orchestration in Docker

Learning Objectives: Create and run multi-container applications using Docker Compose and manage clusters of Docker nodes using Docker Swarm.

Topics:

- Docker Compose
- Docker Swarm
- Docker Service
- Service Placement
- Rolling Update and Rollback
- Docker Stack

Hands-On:

- Deploy a Multi-container Application using Compose
- Running Docker in Swarm mode
- Deploying a Service in Swarm
- Scale Services
- Service Placement
- Rolling Updates and Rollbacks
- Docker Stack

Module 6: Networking and Security

Learning Objectives: Configure Docker network using various built-in network drivers such as a Network Bridge and Overlay Network. Secure your environment by authenticating images using

Docker Content Trust.

Topics:

- Docker Networking
- Network Drivers
- Bridge Network
- Overlay Network
- Host and Macvlan
- Docker Security
- Docker Content Trust
- Securing the Docker Daemon

Hands-On:

- Create and use a User-defined Bridge Network
- Create and use a Overlay Network
- Use Host and Macvlan Network
- Configure Docker to use External DNS
- Signing images using DCT
- Securing the Docker Daemon

Module 7: Docker EE and Monitoring

Learning Objectives: Install and configure Docker Enterprise Edition and learn how to use the Universal Control Plane and the Docker Trusted Registry in your enterprise cluster.

Topics:

- Docker Enterprise
- Universal Control Plane (UCP)
- UCP Architecture
- Access Control in UCP
- Docker Trusted Registry (DTR)
- Monitoring using Prometheus

Hands-On:

- Set up Docker Enterprise Edition
- Install UCP
- Access Control using UCP
- Installing DTR
- Using DTR for Image Storage

- Monitoring using Prometheus

Module 8: Docker with Kubernetes

Learning Objectives: Learn about container orchestration engine Kubernetes and its various services to help orchestrate Docker containers.

Topics:

- Kubernetes Core Concepts
- Kubernetes Common Commands
- Pods
- Deployments
- Labels, Selectors and Annotations
- Services
- Persistent Volumes and Persistent Volume Claims
- Storage Classes

Hands-On:

- Setup Kubernetes cluster using GKE
- Kubectl Common Commands
- Deploy a Pod
- Use a Deployment for pod management
- Deploy different Services
- Use Persistent Storage in Kubernetes
- Use Storage Classes