Kubernetes Fundamentals and Cluster Operations



Course Description

This four-day course is the first step in learning about Containers and Kubernetes Fundamentals and Cluster Operations. Through a series of lectures and lab exercises, the fundamental concepts of containers and Kubernetes are presented and put to practice by containerizing and deploying a two-tier application into Kubernetes.

Course Duration:

4 days

Prerequisites:

- Linux concepts and command line proficiency
- General networking proficiency

Objectives:

By the end of the course, you should be able to meet the following objectives:

- Build, test, and publish Docker container images
- Become familiar with YAML files that define Kubernetes objects
- Understand Kubernetes core user-facing concepts, including pods, services, and deployments
- Use kubectl, the Kubernetes CLI, and become familiar with its commands and options
- Understand the architecture of Kubernetes (Control plane and its components, worker nodes, and kubelet)
- Learn how to troubleshoot issues with deployments on Kubernetes
- · Apply resource requests, limits, and probes to deployments
- Manage dynamic application configuration using ConfigMaps and Secrets
- Deploy other workloads, including DaemonSets, Jobs, and CronJobs
- Learn about user-facing security using SecurityContext, RBAC, and NetworkPolicies

Course Outline:

- 1. Course Introduction
 - Introductions and objectives
- 2. Containers
 - · What and Why containers
 - Building images
 - Running containers
 - Registry and image management
- 3. Kubernetes Overview
 - Kubernetes project
 - Plugin interfaces
 - Building Kubernetes
 - Kubectl CLI
- 4. Beyond Kubernetes Basics
 - Kubernetes objects





- YAML
- Pods, replicas, and deployments
- Services
- Deployment management
- Rolling updates
- Controlling deployments
- Pod and container configurations

5. Kubernetes Networking

- Networking within a pod
- Pod-to-Pod Networking
- Services to Pods
- ClusterIP, NodePort, and LoadBalancer
- Ingress controllers
- Service Discovery via DNS

6. Stateful Applications in Kubernetes

- Stateless versus Stateful
- Volumes
- Persistent volumes claims
- StorageClasses
- StatefulSets

7. Additional Kubernetes Considerations

- Dynamic configuration
- ConfigMaps
- Secrets
- Jobs, CronJobs

8. Security

- Network policy
- Applying a NetworkPolicy
- SecurityContext
- runAsUser/Group
- Service accounts
- Role-based access control

9. Logging and Monitoring

- Logging for various objects
- Sidecar logging
- Node logging
- Audit logging
- Monitoring architecture
- Monitoring solutions
- Octant
- VMware vRealize® Operations Manager™

10. Cluster Operations

- Onboarding new applications
- Backups
- Upgrading
- Drain and cordon commands
- Impact of an upgrade to running applications
- Troubleshooting commands

• VMware Tanzu™ portfolio overview



Who Should Attend

Anyone who is preparing to build and run Kubernetes clusters.