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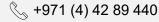   - Logging for various objects
   - Sidecar logging
   - Node logging
   - Audit logging
   - Monitoring architecture
   - Monitoring solutions
   - Octant
   - VMware vRealize® Operations Manager™

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.