Kubernetes Fundamentals and Cluster Operations Training

Duration: **4 Day**

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Overview

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.

Prerequisites

- Linux concepts and command line proficiency
- General networking proficiency

What You Will Learn

- 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

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

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• 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

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- 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