Kubernetes Fundamentals and Cluster Operations

Course code: VMW_KFCO

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.

Who is the course for

Anyone who is preparing to build and run Kubernetes clusters.

What we teach you

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

Required skills

- Linux concepts and command line proficiency.
- General networking proficiency.

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

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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

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