ProTech Professional Technical Services, Inc.

Kubernetes Administration with HELM

Course Summary

Description

Kubernetes is an open-source system for automating deployment, scaling, and management of containerized applications.

This course introduces participants to the basic concepts and architecture of Kubernetes, its initial install & setup, Kubernetes Pods, Deployments and Services, Persistent Storage, Networking, Automating Deployment, Scaling and Management of Containerized Applications, the Kubernetes Helm Package Manager, and finally, it's logging and monitoring facilities.

This course doesn't only prepare delegates for the daily administration of Docker and Kubernetes systems but also for the official Certified Kubernetes Administrator (CKA) exam of the Cloud Native Computing Foundation (CNCF).

Topics

- Introduction
- Installing Kubernetes
- Accessing Kubernetes
- Kubernetes Workloads
- Scheduling and node management
- Accessing the applications
- Persistent storage in Kubernetes
- Logging, monitoring and troubleshooting

- Introduction to Helm Package Manager
- Installing Helm and Tiller
- Using Helm
- Helm Charts
- Chart Templates
- Helm plugins
- Helm Security

Audience

This course is designed for system administrators and DevOps professionals who want to understand and use Kubernetes in cloud and data center environments.

Prerequisites

Before taking this course, you should have the following skills and experience:
- Proficiency with the Linux CLI (PT6795 "Linux Fundamentals")
- A broad understanding of Linux system administration (PT9992 "Enterprise Linux Systems Administration").
- Basic knowledge of Linux containers, e.g. Docker (PT10169 "Docker")

Duration

Four days

Course Outline

I.   Introduction
A. Cloud computing in general
B. Cloud types
C. Cloud native computing
D. Application containers
E. Containers on Linux
F. Container runtime
G. Container orchestration
H. Kubernetes
I. Kubernetes concepts, objects categories, and architecture
J. Kubernetes master and node
Lab

II. Installing Kubernetes
A. Picking the right solution
B. One node Kubernetes install
C. Kubernetes universal installer
D. Install using kubeadm on CentOS
E. Kubernetes Networking
Lab

III. Accessing Kubernetes
A. Accessing the Kubernetes cluster
B. Controlling access to the API
C. Authorization
D. Role Based Access Control
E. Roles and ClusterRoles
F. Role bindings
Lab

IV. Kubernetes Workloads
A. The pod
B. Restart Policy examples
C. InitContainers
D. Our first Pod
E. Operations on pods
F. Replication Controller
G. Working with Replication Controller
H. Deployments
I. Working with Deployments
J. Jobs, CronJobs
K. Jobs example
L. CronJobs example
M. DaemonSets
Lab

V. Scheduling and node management
A. The Kubernetes Scheduler
B. Assigning Pods to Nodes
C. Assigning Pods to Nodes – node affinities
D. Assigning Pods to Nodes – Pod affinities
E. Taints and tolerations
F. Managing nodes
Lab

VI. Accessing the applications
A. Services
B. Service types
C. Working with Services
D. Ingress
E. Ingress definition
F. Network Policies
G. Network Policy example
Lab

VII. Persistent storage in Kubernetes
A. Volumes
B. Volume types
C. Persistent Volumes
D. Secrets
E. Using Secrets as environmental variables
F. Using Secrets as volumes
G. ConfigMaps
Lab

VIII. Logging, monitoring and troubleshooting
A. Logging architecture
B. Monitoring
C. Troubleshooting

IX. Introduction to Helm Package Manager
A. Its Purpose
B. Main Helm Concepts
C. Helm Components
D. Helm Implementation

X. Installing Helm and Tiller
A. Installing Helm client
B. Installing Tiller, the Server Side of Helm
C. Upgrading Tiller
D. Deleting or Reinstalling Tiller

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Course Outline (cont'd)

Course Outline (sidebar)

XI. Using Helm
A. Helm Search: Finding Charts
B. Helm Install: Installing A Package
C. Helm Upgrade and Helm Rollback: Upgrading A Release, And Recovering on Failure
D. Helm Delete: Deleting a Release
E. Helm Repo: Working with Repositories
F. Creating Your Own Charts
G. Tiller, Namespaces and RBAC

XII. Helm Charts
A. Intro to Charts
B. Chart Lifecycle Hooks
C. Charts Tips and Tricks
D. Charts Repository Guides
E. Syncing your Chart Repo
F. Signing Charts
G. Chart Tests

XIII. Chart Templates
A. Getting started
B. Built-in Objects
C. Values Files
D. Template Functions and Pipelines
E. Flow Control
F. Variables
G. Named Templates
H. Accessing Files Inside Templates
I. Creating a NOTES.txt file
J. Sub charts and Global Values
K. Debugging Templates

XIV. Helm plugins
A. Overview
B. Installing a Plugin
C. Building Plugins
D. Downloader Plugins
E. Environment Variables

XV. Helm Security
A. Role-based Access Control (RBAC) Intro
B. Tiller and Role-Based Access Control
C. Helm and Role-Based Access Control
D. Using SSL Between Helm and Tiller: Overview/li>
E. Generating Certificate Authorities and Certificates
F. Creating a Custom Tiller Installation
G. Configuring the Helm Client
H. Best Practices for Securing Helm and Tiller