Kubernetes Master Workshop (FI-KMT-WS)

Course Description

This course covers some advanced topics that become relevant when using Kubernetes to orchestrate application at scale, in the data center or in the cloud.

The course continues the Basic Kubernetes course with presenting some more advanced Kubernetes resources like Job, CronJob, Daemoset, ConfigMap and Secrets. It also covers the Ingress Resources alongside with the Ingress Controller. Helm is a widely use package manager for installing, upgrading and managing Kubernetes application and the students will have the chance to understand the concepts and use it. Next, the course covers the basic concepts of Kubernetes Security and RBAC mechanism. In the end, the course covers 2 major topics that should be part of every Kubernetes cluster: Centralized Logging and Monitoring. The students will be able to see how can centralized logging be achieved by using ELK stack and also monitoring by using Prometheus and Grafana dashboards.

Course Duration:

2 days

Prerequisites:

- Students must have a basic knowledge of Kubernetes which includes:
  - Kubernetes terminology (nodes, pods, resources)
  - Interacting with a Kubernetes cluster via the command line (kubectl)
  - Resource primitives (nodes, pods, replicasets, deployments, etc)
- Recommended training: Kubernetes Fundamentals.

Objectives:

After completing this course, the students will have a firm understanding on more advanced Kubernetes Resources, how can a Kubernetes cluster be monitored and also how the logs are stored in a centralized manner.

Course Outline:

Chapter 01: Daemon Sets. CronJobs. Secrets. ConfigMaps

- CronJobs – running tasks periodically
- ConfigMaps – deploying reusable applications
- Secrets – passing around sensitive information
- DaemonSets – pods on every node
- Hands-on Lab

Chapter 02. Ingresses

- Ingress Controller
- Ingress Operation
- The Nginx Ingress Controller
- Deploying the ingress Controller
- Ingress Resource

- Path Manipulation
- Hands-on Lab

Chapter 03. The Kubernetes Dashboard

- Installing the Kubernetes Dashboad
- Connecting to the dashboard using Kubectl proxy, NodePort and External auth proxy
- Dashboard User
- Hands-on Lab

Chapter 04: Helm - The Kubernetes Package Manager

- Helm Overview
- Helm Components
- Installing Helm
- Helm commands and usage examples
- Hands-on Lab

Chapter 05. Security

- Identity and Access Management
- Service Accounts
- User Management
- Role Based Access Control
- Role Scoping
- Hands-on Lab

Chapter 06. Working with Logs

- Kubernetes Logging
- Centralized logging with Elastic Stack
- Hands-on Lab

Chapter 07. Monitoring

- Kubernetes metrics
- Metrics Terminology
- Collecting metrics
- Using Prometheus for monitoring
- Deploying Prometheus
- Using Grafana for time series analytics
- Grafana + Prometheus
- Using Elastic Stack for monitoring
- Hands-on Lab

Chapter 08. Advanced Pod Scheduling

- nodeName and nodeSelector
- Affinity and Anti-Affinity
- Terms and Expressions
- Node Affinity Operations
- Taints and Tolerations
- Cordon and Drain
- Resource Control
- Requests and Limits
- Hands-on Lab

Who should attend:

- DevOps engineers
- Linux system administrators
- Systems design engineers
- Architects