Training: Component Soft

KBS-535 Kubernetes admin & K8s and Container-based Application Security with exam.prep.

TRAINING GOALS:

Linux containers are changing the way companies think about service development and deployment. Containers play a vital role in the modern data-center, and Docker is leading the way. And Kubernetes is the leading open-source system for automating deployment, scaling and management of containerized applications.

Participants will first gain a basic understanding of Linux containers and proceed with learning the most important features of Docker Community Edition (CE) as well as their installation, initial setup and daily administration.

The second part of the course introduces participants to the basic concepts and architecture of Kubernetes, its initial install, setup and access control, Kubernetes Pods and Workloads, Scheduling and node management, Accessing the applications, Persistent storage in Kubernetes and finally its Logging, Monitoring and Troubleshooting facilities.

The third part deals with Helm, the Kubernetes Package Manager.

This course doesn’t only prepare delegates for the daily administration of Docker & Kubernetes systems but also for the official Certified Kubernetes Administrator (CKA) and Certified Kubernetes Application Developer (CKAD) exams of the Cloud Native Computing Foundation (CNCF).

Course parts: 1 day Docker + 3 days Kubernetes + 1 day Helm, 5 days altogether

Structure: 50% theory 50% hands on lab exercises

Target audience: System administrators, developers and DevOps who want to understand and use Docker and Kubernetes in enterprise and cloud environments.

CONSPECT:

- PART I. DCK-101 Docker Intro
  - Module 1. Container introduction
    - Application containers
    - Container runtimes

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- Docker introduction
- LAB TASKS: Understand Linux namespaces

- Module 2. Managing containers using Docker
  - Starting/stopping containers with docker
  - Listing/inspecting containers
  - Executing commands in containers
  - LAB TASKS: Managing docker containers
- Module 3. Managing the container's filesystem with Docker
  - Accessing the filesystem
  - Overlay FS
  - Image layers
  - Creating images from running containers
  - Working with images
  - Building images using Dockerfile
  - LAB TASKS: Managing images
  - Using volumes in Docker containers
  - LAB TASKS: Managing volumes
- Module 4. Managing container images
  - How containers are connected to the network
  - Using host networking
  - Sharing the network among multiple containers
  - Publishing ports
  - LAB TASKS: Managing images
- Module 5. Docker architecture
  - The processes
  - Extracting logs
  - Registry
  - LAB TASKS: Accessing container logs

- PART II. KBS-103 Kubernetes Admin with CKA & CKAD exam.prep.
  - Module 1: Kubernetes introduction
    - Cloud computing in general
    - Cloud types
    - Cloud native computing
    - Container orchestration
    - Kubernetes
    - Kubernetes concepts

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- Kubernetes objects categories
- Custom resource definitions
- Kubernetes architecture
- Kubernetes control plane
- Kubernetes node
- Kubernetes Addons
- Kubernetes Lab: Health check

- Module 2: Accessing Kubernetes
  - Accessing the Kubernetes cluster
  - Access multiple contexts and clusters
  - Controlling access to the API
  - Authorization
  - Role Based Access Control
  - Roles and ClusterRoles
  - Role bindings
  - Admission control
  - Kubernetes Lab: Accessing API
- Module 3: Kubernetes Workloads
  - The pod
  - Our first Pod
  - Operations on pods
  - Pod Status and Lifecycle Pod Status and Lifecycle (cont)
  - Pod probe examples
  - RestartPolicy examples
  - InitContainers
  - Pod resource management
  - Pod security context
  - Patterns for Composite Containers
  - ReplicaSet
  - Deployments
  - Kubernetes Lab: Workloads
- Module 4: Scheduling and node management
  - The Kubernetes Scheduler
  - Pod priorities and preemption
  - Assigning Pods to Nodes
  - Assigning Pods to Nodes - Node affinities

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- Assigning Pods to Nodes - Pod affinities
- Assigning Pods to Nodes - Pod Topology spread constraints
- Taints and tolerations
- Managing nodes
- Kubernetes Lab: Scheduling

- Module 5: Accessing the applications
  - Services
  - Service types
  - Working with Services
  - Ingress
  - Ingress definition
  - Working with Ingress
  - Network Policies
  - Kubernetes Lab: Accessing Applications
- Module 6: Persistent storage in Kubernetes
  - Volumes, Volume example, Volume types
  - Persistent Volumes, Persistent Volume example
  - Dynamic PVC provisioning
  - Secrets
  - Using Secrets as environmental variables
  - Using Secrets as volumes
  - ConfigMaps
  - Kubernetes Lab: Persistent Storage
- Module 7: Kubernetes Special Workloads
  - StatefulSets StatefulSets - Limitations
  - StatefulSet example
  - StatefulSet example with PVC
  - Jobs, CronJobs
  - Jobs example
  - CronJobs example
  - DaemonSets
  - Custom resources
  - Kubernetes Lab: Special workloads
- Module 8: Logging, monitoring and troubleshooting
  - Logging architecture
  - Monitoring

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- Troubleshooting
- Kubernetes Lab: Logging and Monitoring

- Module 9: Installing and upgrading Kubernetes
  - Picking the right solution
  - One node Kubernetes install
  - Kubernetes universal installer
  - Install using kubeadm on Ubuntu
  - Upgrading Kubernetes
  - Lab: Upgrading Kubernetes

- PART III. Helm Package Manager
  - Module 1: Introduction to Helm
    - What is Helm?
    - Helm concepts
    - Helm v2 (legacy) components
    - Helm v3 components
    - Installing Helm
    - Helm Lab: Installing Helm
  - Module 2: Using Helm
    - Generic options and help
    - Working with repositories
    - Finding charts
    - Installing a release
    - List releases
    - Upgrade/rollback releases
    - Uninstalling releases
    - Helm Lab: Using Helm
  - Module 3: Helm charts
    - Introduction to charts
    - The structure The Chart.yaml File
    - The components of a Chart
    - Chart dependencies
    - Chart dependencies (cont.)
    - Managing Charts with helm
    - Helm Lab: Working with charts
  - Module 4: Chart Templates
    - Writing Templates Templates and Values

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- Dependencies and values Dependencies and values
- Chart lifecycle hooks Functions and pipelines
- Flow control
- Variables
- Named templates
- Helm Lab: Writing templates

- Module 5: Helm plugins
  - Building plugins
  - Helm Lab: Helm plugins

REQUIREMENTS:

Proficiency with the Linux CLI. A broad understanding of Linux system administration.

Difficulty level



CERTIFICATE:

The participants will obtain certificates signed by Component Soft (course completion).

TRAINER:

Certified Component Soft Trainer.

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