ComponentSoft
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KBS-105: Docker + Kubernetes Administration accelerated training

Course Length: 5 days

Course Description: This training is a combination of the DCK-102 Docker Basic Administration and KBS-101 Kubernetes Administration.

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.

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

Structure: 50% theory 50% hands on lab exercises

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

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

Detailed Course Outline

Section 1: Docker

1. **CONTAINER TECHNOLOGY OVERVIEW**
    1. Application Management Landscape
    2. Application Isolation
    3. Resource Measurement and Control
    4. Container Security
    5. Container Security
    6. Open Container Initiative
    7. Docker Ecosystem
    8. Docker Ecosystem (cont.)

    LAB TASKS
    1. Container Concepts runC
    2. Container Concepts Systemd
2. **INSTALLING DOCKER**
    1. Installing Docker
    2. Docker Architecture
    3. Starting the Docker Daemon
    4. Docker Daemon Configuration
    5. Docker Control Socket
    6. Enabling TLS for Docker
    7. Validating Docker Install

    LAB TASKS
    1. Docker Basics
    2. Install Docker via Docker Machine
    3. Configure a docker container to start at boot.

3. **MANAGING CONTAINERS**
    1. Ceating a New Container
    2. Listing Containers
    3. Viewing Container Operational Details
    4. Running Commands in an Existing Container
    5. Interacting with a Running Container
    6. Stopping, Starting, and Removing Containers
    7. Copying files in/out of Containers
    8. Inspecting and Updating Containers

    LAB TASKS
    1. Docker Images
    2. Docker Platform Images
4. **MANAGING IMAGES**
    1. Docker Images
    2. Listing and Removing Images
    3. Searching for Images
    4. Downloading Images
    5. Committing Changes
    6. Uploading Images
    7. Export/Import Images
    8. Save/Load Images

    LAB TASKS
    1. Docker images
    2. Docker Platform images
5. **CREATING IMAGES WITH DOCKERFILE**
    1. Dockerfile
    2. Caching
    3. docker image build
    4. Dockerfile Instructions
    5. ENV and WORKDIR
    6. Running Commands
    7. Getting Files into the Image
    8. Defining Container Executable
    9. Best Practices

    LAB TASKS

    1. Dockerfile Fundamentals

Section 2: Kubernetes

1. **Introduction**
    1. Cloud computing in general
    2. Cloud types
    3. Cloud native computing
    4. Application containers
    5. Containers on Linux
    6. Container runtime
    7. Container orchestration
    8. Kubernetes
    9. Kubernetes concepts
    10. Kubernetes objects categories
    11. Kubernetes architecture
    12. Kubernetes master
    13. Kubernetes node
    14. Lab 1
2. **Installing Kubernetes**
    1. Picking the right solution.
    2. One node Kubernetes install
    3. Kubernetes universal installer
    4. Install using kubeadm on CentOS

5. Kubernetes Networking

- Lab 2

3. Accessing Kubernetes

1. Accessing the Kubernetes cluster
2. Controlling access to the API
3. Authorization
4. Role Based Access Control
5. Roles and ClusterRoles
6. Role bindings

- Lab 3

4. Kubernetes Workloads

1. The pod
2. RestartPolicy examples
3. InitContainers
4. Our first Pod
5. Operations on pods
6. Replication Controller
7. Working with Replication Controller
8. Deployments
9. Working with Deployments
10. Jobs, CronJobs
11. Jobs example
12. CronJobs example
13. DaemonSets

- Lab 4

5. Scheduling and node management

1. The Kubernetes Scheduler
2. Assigning Pods to Nodes
3. Assigning Pods to Nodes – node affinities
4. Assigning Pods to Nodes – Pod affinities
5. Taints and tolerations
6. Managing nodes

- Lab 5

6. Accessing the applications

1. Services
2. Service types
3. Working with Services
4. Working with Services
5. Ingress
6. Ingress definition
7. Working with Ingress
8. Network Policies
9. Network Policy example

- Lab 6

7. **Persistent storage in Kubernetes**
    1. Volumes
    2. Volume types
    3. Persistent Volumes
    4. Secrets
    5. Using Secrets as environmental variables
    6. Using Secrets as volumes
    7. ConfigMaps

    - Lab 7

8. **Logging, monitoring and troubleshooting**
    1. Logging architecture
    2. Monitoring
    3. Troubleshooting