**CKA Training**

This document provides the curriculum outline of the Knowledge, Skills and Abilities that a **Kubernetes Administrator** can be expected to demonstrate.

**Prerequisite:**

* + Linux/Unix Systems Fundaments
  + Familiarity with Command Line Interface (CLI)
  + Fundamental knowledge of editors on Linux (any one of vi/nano/emacs)
  + Familiarity with at least one scripting/programming language

**Duration : 40 hrs.**

**Expected Out Come:**

After attending this training, the trainees will be gaining the below skills on Docker and Kubernetes,

* + Docker Architecture and Understanding
  + Install and Configure Docker
  + Build Custom Images
  + Manage Container Lifecycle
  + Kubernetes Container Orchestration fundamentals
  + Installing and Configuring Kubernetes cluster
  + Deploying and Scaling Cluster apps
  + Understand the Pods, Volumes and Services in Kubernetes
  + Secrets and ConfigMaps using Kubernetes
  + Scheduling Container Applications
  + Auditing and Troubleshooting Kubernetes Cluster
  + Kubernetes best Security Practices

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| **Local setup for Remote Connect** | **Remote Lab Setup** |
| Laptop/Desktop with high-speed internet connection | OS: CentOS8 |
| Memory: 4 GB RAM | Memory: 32 GB RAM |
| CPU: 1 CPU Cores | CPU: 8 CPU Cores |
| Storage: 20 GB | Storage: 500 GB SSD |

1. **Kubernetes Platform**

* Comparison with Docker Swarm
* Orchestration and Various Tools
* History of Kubernetes
* Features of Kubernetes
* What Kubernetes is not!
* Kubernetes Versions

1. **Kubernetes Architecture**

* Kubernetes Terminology
* Kubernetes Components
* Kubernetes Cluster Architecture
* Understanding Kubernetes Master Components
  + Kube-apiserver
  + ETCD
  + Kube-scheduler
  + Kube-controller
  + Kube-DNS
* Understanding Kubernetes Node Components
  + Kube-proxy
  + Kubelet
  + Container Runtime

1. **Kubernetes Setup and Validation**

* Understanding different tools for deploying Kubernetes Cluster
* Release Binaries, Provisioning and Types of Clusters
* Building the Kubernetes Cluster using kubeadm
* Installing Kubernetes Master and Nodes
* Configuring Secure Cluster Communications
* Testing the Cluster

**Lab:** Deploying Kubernetes Cluster using Kubeadm

**Lab:** Adding Nodes to Kubernetes Cluster

**Lab:** Deploying and Accessing Kubernetes Dashboard Service

1. **Working with Pod**

* Pod Overview
* Understanding Pod Lifecycle
* Multi-container Pod
* Static Pod
* Init Containers
* Labels, Selectors & Annotations

**Lab:** Imperative Commands and Formatting Output with kubectl

**Lab:** Working with Single Container Pods

**Lab:** Creating multi container Pod

**Lab:** Creating init container Pod

**Lab:** Working with Static Pod

1. **kubernetes Networking and Service**

* Cluster Communications
* Pod and Node Networking
* Container Network Interface (CNI)
* Service Networking: ClusterIP, NodePort & Load Balancer
* Ingress Rules
* Cluster DNS
* Network Policies

**Lab:** Exposing Applications using various types of Services

**Lab:** Install and Configure Ingress Controller

**Lab:** Create Network Policies to control traffic flow

1. **Application Lifecycle Management**

* Pods: Single Container, Multi Container, Static, Init
* Deploying Applications in the Kubernetes Cluster
* Controllers: RS and Deployment
* Security context
* Deploying an Application, Rolling Updates, and Rollbacks
* Configuring an Application for High Availability and Scale
* Imperative Commands & Manifests (YML Intro)

**Lab:** Deploying Application using Replication Controller

**Lab:** Deploying Application using Replica Set

**Lab:** Rolling Updates and Rollbacks using Deployment

**Lab:** Deploying Application using Daemon Set

**Lab:** Deploying StatefulSet Application

**Lab:** Deploying Multi-Tier Application

1. **Working with Kubernetes Scheduler**

* Pod Scheduling within the Kubernetes Cluster
* Configuring the Kubernetes Scheduler
* Running Multiple Schedulers for Multiple Pods
* Taints, Tolerances, Node Selector, labels & Selectors
* Scheduling Pods with Resource Limits and Label Selectors
* Displaying Scheduler Events

**Lab:** Manually scheduling Pod

**Lab:** Scheduling Pod based on Node Selector and Labels

**Lab:** Taints and Tolerations

**Lab:** Working with Affinity and Anti-Affinity

1. **Storage**

* Managing Data in the Kubernetes Cluster
* EmptyDir, hostPath, PV, PVC
* Volume Access Modes
* Applications with Persistent Storage
* ConfigMaps, Secrets

**Lab:** Working with Kubernetes Volume Service

**Lab:** Working with ConfigMaps and Secrets

1. **Logging and Monitoring**

* Describe Resources
* Pod/container logs
* Metric Server & top command
* Events

**Lab:** Working on Logs and Events

**Lab:** Working with Metric Server

**Lab:** working with HPA

1. **Managing Cluster**

* Managing the Kubernetes Cluster
* Upgrading the Kubernetes Cluster
* Backing Up and Restoring a Kubernetes Cluster

**Lab:** Upgrading Kubernetes Cluster

1. **Troubleshooting/Debugging**

* Control Plane Failures
* Node Failure
* Application Failure
* Components manifests and errors
* Scenarios and Solutions

**Lab:** Troubleshooting in Kubernetes