**Docker and Kubernetes Training**

**Duration 40 hours**

**Day 1**

**1. Docker and Linux Container Technology: Introduction and Use-Cases**

* Modern Infrastructure Terminology
* Virtualization
* Hypervisors
* Hypervisor Types
* Type 1 Hypervisors
* Type 2 Hypervisors
* Type 1 vs Type 2 Processing
* Paravirtualization
* Virtualization Qualities (1/2)
* Virtualization Qualities (2/2)
* Disadvantages of Virtualization
* Containerization
* Virtualization vs Containerization
* Where to Use Virtualization and Containerization
* Containerization: High-Level
* Popular Containerization Systems
* What are Linux Containers
* Docker
* OpenVZ
* Solaris Zones (Containers)
* Container Orchestration Tools
* Docker Swarm
* Kubernetes
* Mesos and Marathon
* Mesos and Marathon (contd.)
* Docker Use-Cases
* Microservices
* Microservices and Containers / Clusters
* Summary

**2. Docker in Action**

* Docker Basics
* Where Can I Run Docker?
* Installing Docker Container Engine
* Docker Toolbox
* What is Docker?
* Docker Architecture
* Docker Architecture Diagram
* Docker Images
* Docker Containers
* Docker Integration
* Docker Services
* Docker Application Container Public Repository
* Docker Run Command
* Starting, Inspecting, and Stopping Docker Containers
* Docker Volume
* Dockerfile
* Docker Compose
* Using Docker Compose
* Dissecting docker-compose.yml
* Specifying services
* Dependencies between containers
* Injecting Environment Variables
* Summary

Day 2

**3. Managing Docker State**

* State and Data in Docker
* Volumes
* More About Volumes
* Uses for Volumes
* Working With Volumes
* Create Volume
* Use Volumes with Containers
* Bind Mounts
* Using Bind Mounts
* tmpfs Mounts
* Storing Data in the Container
* Storage Drivers
* Remote Data Storage
* Networking
* The Default Bridge Network
* User-Defined Bridge Networks
* Docker Network Commands
* Creating a User-Defined Bridge Network
* Summary

**4. Kubernetes Core Concepts**

* Kubernetes Basics
* What is Kubernetes?
* Container Orchestration
* Kubernetes Architecture
* Kubernetes Concepts
* Cluster and Namespace
* Nodes
* Master
* Pod
* Using Pods to Group Containers
* Label
* Label Syntax
* Annotation
* Label Selector
* Replication Controller and Replica Set
* Service
* Storage Volume
* Secret
* Resource Quota
* Authentication and Authorization
* Routing
* Docker Registry
* Summary

Day 3

**5. Kubernetes Architecture(Openshift)**

* Architecture Diagram
* Components
* Kubernetes Cluster
* Master Node
* Kube-Control-Manager
* Nodes
* Other Components
* Interacting with Kubernetes
* Summary

**6. Working with Kubernetes**

* Installation
* Startup
* Kubernetes Tools
* kubectl Command Line Interface
* API Proxy
* Dashboard
* Kubernetes Component Hierarchy
* Deployments
* Deployment Commands
* Updating Deployments
* Network Considerations
* Services
* Namespaces
* Other Useful Commands
* Summary

**7. Scheduling and Node Management**

* Kubernetes Scheduler Overview
* Trusting the Kubernetes Scheduler
* Scheduling Process
* Scheduling Process – Predicates
* Scheduling Process – Priorities
* Scheduling Algorithm
* Kubernetes Scheduling Algorithm
* Scheduling Conflicts
* Controlling Scheduling
* Label Selectors
* Label Selectors (Contd.)
* Node Affinity and Anti-affinity
* Node Affinity Example
* Node Antiaffinity Example
* Taints and Tolerations
* Taints and Tolerations (Contd.)
* Taints and Tolerations – Example
* Summary

Day 4

**8. Managing Networking**

* Kubernetes Networking Components
* The Kubernetes Network Model
* Networking Scenarios
* Container-Container Communication
* Pod-Pod Communication
* 1.3 Pod-Service Communication
* External-Service Communication
* Accessing Applications
* Useful Commands
* Summary

**9. Managing Persistent Storage**

* Storage Methods
* Container OS file system storage
* Docker Volumes
* Kubernetes Volumes
* K8S Volume Types
* Cloud Resource Types
* configMaps
* Creating configMaps from Literals
* Creating configMaps from files
* Using configMaps
* emptyDir
* Using an emptyDir Volume
* Other Volume Types
* Persistent Volumes
* Creating a Volume
* Persistent Volume Claim
* Persistent Volume
* Pod that uses Persistent Volume
* Secrets
* Creating Secrets from Files
* Creating Secrets from Literals
* Using Secrets
* Security Context
* Security Context Usage
* Summary

Day 5

**10. Working with Helm**

* What is Helm?
* Installing Helm
* Helm and KUBECONFIG
* Helm Features
* Helm Terminology
* Searching for Charts with helm CLI
* Adding Repositories
* Helm Hub – Search
* Helm Hub – Chart Page
* Installing a Chart
* Upgrading a Release
* Rolling Back a Release
* Creating Custom Charts
* Common Chart Files
* Helm Templates
* Installing A Custom Chart
* Packaging Custom Charts
* Summary

**11. Continuous Integration Fundamentals**

* Jenkins Continuous Integration
* Jenkins Features
* Running Jenkins
* Downloading and Installing Jenkins
* Running Jenkins as a Stand-Alone Application
* Running Jenkins on an Application Server
* Installing Jenkins as a Windows Service
* Different types of Jenkins job
* Configuring Source Code Management(SCM)
* Working with Subversion
* Working with Subversion (cont’d)
* Working with Git
* Build Triggers
* Schedule Build Jobs
* Polling the SCM
* Maven Build Steps
* Configuring Jenkins to Access Kubernetes
* Jenkins Pipeline
* Jenkins Pipeline Output
* Installing Jenkins Plugins
* Summary

**12. Lab Exercises**

*Lab 1. Managing Containers  
Lab 2. Building Images  
Lab 3. Dockerfiles  
Lab 4. Deploying Stateful Services in Docker  
Lab 5. Custom Network Management  
Lab 6. Docker Volumes  
Lab 7. Accessing the Kubernetes API  
Lab 8. Working with Kubernetes Workloads  
Lab 9. Scheduling and Node Management  
Lab 10. Accessing Applications  
Lab 11. Using Persistent Storage  
Lab 12. Getting Started with Helm  
Lab 13. Build CI Pipeline with Jenkins*