



VAGILE TECHNOLOGIES

Docker and Kubernetes Course Content

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1.Introduction to Dockers & Containers:

Learning Objectives:

This module provides introduction to containers and the benefits of using containers as opposed to VMs. You will learn use cases of Containers and Docker and be able to describe Docker architecture and its components.

Sub-Topics:

- Evolution of Docker and Containers
- Differences between VM'S and Containers
- Docker Use Cases
- Benefits of using Containers
- Working with Docker Commands

Hands-on description:

Learn various Docker Commands for creating, stopping, removing and copying containers.

2.Docker Installation & Architecture

Learning :

Learning Objectives:

In this module, you will explore the prerequisites for installing Dockers. Learn to install & configure Docker toolbox on Windows OS, and install & configure Docker on Amazon EC2. Validate the Docker installation. Get deeper into Docker Architecture and components.

Sub-Topics:

- Installing and Configuring Docker toolbox on Windows
- Installing and Configuring Docker in Amazon Linux EC2

Hands-on description:

Installing and Configuring Dockers

3.Docker Images, Docker Volumes & Docker Networking:

Learning Objectives:

Create images by starting a container using a base image and interactively make changes to it, create a Docker file that will let Docker build the image automatically. Learn to create and work with Docker Volumes. Understand the three of Docker Network-Local Host and Bridge

Sub-Topics:

- Image & Layers
- Container Layers
- Working with Docker Images
- Building own Images using Docker file
- Working with Docker Volumes and Docker Networking

Hands-on workshop description:

Pulling and pushing images. Creating own images using Dockerfile and push to Docker Hub, Creating Automated Build using Docker Hub, Creating Docker Volumes and copying the data, Creating Bridge Network for container communication.

4.Docker Registries:

Learning Objectives:

Learn to create Public and Private Repositories using Docker Hub. You will also be able to share your image using Docker Hub, deploy your own Docker images registry and set up your own automated build.

Sub-Topics:

- Overview of Registries – Public and Private
- Deep Dive into Docker Hub
- Other Public & Private Registries

Hands-on description:

- Creating Public and Private Repositories using Docker Hub
- Share your Image using Docker Hub
- Deploy your own Docker image registry
- Set up your own automated build

Creating Organizations and teams in Docker Hub

5.Docker Orchestration:

Learning Objectives:

Get an overview of Docker Compose & Swarm. Learn to build High Availability Structures needed for critical applications, and understand how to filter and schedulenodes for optimal deployment

Sub-Topics:

Overview of Docker Compose
Defining and running multi-container applications
Overview of Docker Swarm Cluster
Filtering & Scheduling containers

Hands-On Description:

Building multi – container applications using Docker Compose
Creating Swarm cluster and adding the worker nodes
Creating Services and scheduling nodes for optimal deployment

6.Introduction to Kubernetes:

Learning Objectives:

Learn what / why Kubernetes is required and study Kubernetes Use Cases.

Sub Topics:

Evolution of Kubernetes
What is Kubernetes
Kubernetes use cases
Differences between Kubernetes and Docker Swarm

7.Kubernetes Architecture:

Learning Objectives:

Understand the key components of Kubernetes Cluster- Master, Nodes andAddOns.

Sub Topics:

Understand Kubernetes Architecture
Introduction to Kubernetes master
Components of Kubernetes master
Introduction to node components

8.Installing Kubernetes :

Learning Objectives:

Gain knowledge on installing & Kubernetes Cluster on Virtualbox, AWS Cloud and Google Cloud Platforms.

Sub Topics:

Installing and Configuring Kubernetes via Minikube
Creating Kubernetes Cluster in Google cloud
Creating Kubernetes Cluster in AWS cloud

Hands-on description:

Creating 2 VM'S in Virtual Box
Download Kubectl and Minikube and install them
Start Minikube and Deploy sample deployment and expose to external network
List all the nodes of the Clusters
Stopping and deleting the Cluster
Working with Kubernetes Dashboard

9.Deploying applications on Kubernetes Cluster:

Learning Objectives:

Here you will understand about Pods and how to deploy an app using kubectl commands.

Sub Topics:

Introduction to Pods
Pods lifecycle
Working with Pods to manage multiple containers
Deploying Pods via Replication Controllers

Hands-on description:

Deploy Containerized application Image in Minikube
Viewing Pods and nodes

10.Services, Labels and Replica Sets:

Learning Objectives:

This module helps you to learn what is a Service, how to scale up and down the application replicas, provide updates to the application and autoscaling containers.

Sub Topics:

Overview of Services
Labels and Selectors
Scale out deployment using Replicas
Horizontal Pod Autoscaling
Load Balancing
Rolling Updates

Hands-on description:

Creating a Service
Using service to expose App
Working with Labels
Scale Up/Down the Deployment to maximum and minimum Replicas
Check the rollout status and roll back an update
Delete the Services created

11.Managing State with Deployments:

Learning Objectives:

On completing this module, you will be able to deploy both stateless applications and stateful applications. You will also be able to scale the stateful sets and provide rolling updates.

Sub-Topics:

Working with Stateful set

Pod management Policies
On Delete and Rolling Update Strategies
Cluster DNS
Persistent Volumes

Hands-On Description:

Deploy Stateful and Stateless applications creating Persistent Volumes

12.Other important concepts:

Running Kubernetes on the AWS Cloud
Deleting the Cluster
How to run Kubernetes in Google Cloud
Logging a Kubernetes Cluster
Monitoring a Kubernetes Cluster with Prometheus and Grafana
The Alert Manager

1. **Going Further with Kubernetes**
2. **Kubernetes Requests and Limits**
3. **Metrics Profiling in Kubernetes**
4. **Horizontal Pod Autoscaling**
5. **Readiness and Liveness Probes**
6. **Quality of Service and Eviction**
7. **RBAC (Role Based Access Control) on a Kubernetes cluster**
8. **Kubernetes ConfigMaps and Secrets**
9. **Ingress Controllers**
10. **Other Workload Types**
11. **Continuous Deployment on a Kubernetes Cluster**
12. **Conclusion**



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