Terraform, Docker, CKA and Azure Pipeline

Duration: 8 Days (8 hours / day)

Module 1 – Getting Started & Setting Up Labs

Introduction to Infrastructure as Code and Terraform
Lab: Installation of Terraform on Windows
Comparison between Terraform and Ansible
Introduction to Azure CLI
Understanding Terraform Providers
Authenticate Azure with Terraform
Lab: Setting Up Terraform on Windows and Azure Authentication
Basic Terraform commands: init, plan, apply
Lab: Defining Provider & Using Basic Terraform commands

Module 2 – Building Cloud Infrastructure with Terraform

Lab: Creating Resource Groups in Azure
Lab: Provisioning Virtual Networks, Subnets, Public IPs, and Network Interfaces
Lab: Deploying Windows and Linux VMs
Lab: Configuring Azure Storage, Security Groups, and Load Balancers
Understanding Terraform State file
Understanding Working of State file – Desired State & Current State
Terraform Provider Versioning
Lab: Methods to define Terraform Provider Versions

Module 3 – Docker fundamentals

Introduction to Docker
What problem does Docker Solve
Docker Terminology
Docker Installation
Docker - Pull Docker Image from Docker Hub and Run it locally
Docker - Build Docker Image locally, Test and Push it to Docker Hub

Module 4 – Core Concepts of Kubernetes

Overview of Container Orchestration
Introduction to Kubernetes
Understanding Kubernetes Architecture

Module 5 – Installation, Configuration & Validation

Design a Kubernetes Cluster
Lab: Installation of Kubernetes 1-Master and 2-Nodes Cluster
Lab: Choose a Network Solution and Configure
Lab: Verify Installation with Kubectl command

Module 6 – Creating Kubernetes Resources

Understanding Pods, Labels & Selectors
Lab: Deploying Applications as a Pod
Lab: Managing Labels & Selector
Understanding Replication Controller & Replica Set
Lab: Deploying Replication Controller & Replica Set
Understanding Services – ClusterIP, NodePort & LoadBalancer
Lab: Creating & Managing Service
Understanding Daemon Sets
Lab: Deploying Applications as Daemon Sets

Module 7 – Scheduling

Manual Scheduling of Pods
Taint and Tolerations
Lab: Using Manual Scheduling or Taints and Tolerations

Module 8 - Application Lifecycle Management

Overview of Deployment
Deployment Strategies – Blue/Green & Canary
Lab: Deploying Applications as Deployment
Lab: Implementing Deployment Strategies on Deployments

Module 9 - Environment Variable

Plain Key
Config Map
Secret
Lab: Using Plain Keys, Config Map & Generic Secret as Environment Variables
Lab: Mount Environment Variable as Volumes

Module 10 – Storage

Understanding Volume Management in K8s
Types of Volumes Provisioning
Persistent Volumes
Persistent Volume Claim
Lab: Using PV & PVC to attach Persistent Volume to a Pod as HostPath
Understanding Storage Class

Module 11 – Security

Understanding Kubernetes Authentication
Lab: Creating and Managing Users in Kubernetes
Lab: Creating Service Accounts
Understanding Role, ClusterRole, RoleBinding & ClusterRoleBinding
Lab: Managing Roles and Role Binding
Lab: Managing Cluster Role and Cluster Role Binding
Understanding Security Context
Lab: Adding Security Context to Pod to enable ping

Module 12 – Cluster Maintenance

Understanding OS Upgrade
Lab: Upgrade a Kubernetes Cluster Version
Sta1c Pod
Lab: Deploying Pods as Sta1c Pod
Lab: ETCD Backup
Cron Job
Lab: Deploying Pod as Cron Job

Module 13 – Logging and Monitoring

Understand how to Monitor Application and Cluster Components
Lab: Understand how to Read Application & Cluster Component Logs
Lab: Deploying Prometheus & Grafana to Monitor K8s Cluster

Module 14 – Networking in Kubernetes

Understand Basics of Kubernetes Networking
Understand CNI overview
Understand Pod Networking Concepts
CoreDNS overview of K8s
Understanding Ingress
Lab: Configure and Manage Ingress Rule
Understanding Namespace & Use-Cases
Lab: Creating Namespace & Deploying K8s resources in Different Namespaces

Metal Load Balancer
Lab: Deploying Metal Load Balancer

Module 15 – Troubleshooting

Ways to Troubleshoot ETCD Failure
Ways to Troubleshoot Kubelet Failure
Ways to Troubleshoot Container Runtime Failure
Ways to Troubleshoot Scheduler Failure

Module 16 – Azure DevOps – Build Docker Image and Push to ACR

Introduction to Azure DevOps Build Pipeline & Azure Container Registry
Create a Local Repository, Check-In Files and Push to Remote Github Rep
Create ACR, Azure DevOps Organization and Project
Create a Build Pipleline to Build and Push Docker Image to ACR
Commit and push changes
Understand Namespaces in Azure Container Registry using Azure DevOps Pipeline
Review Docker Build and Push Pipeline code on a high level

Module 17 – Azure DevOps – Create Pipelines

Introduction to Azure Starter Pipelines and Pipeline Key Concepts
Create Semi customized Pipeline for Build, Push Docker Image to ACR
Create using Starter Pipeline for Build, Push Docker Image to ACR