**Advanced Kubernetes Training**

**Duration : 6 days**

**Day1 :**

**Container and Kubernetes Basics**

• Container Basics

• History of Kubernetes

• Introduction to Kubernetes

o Need for Kubernetes

o Kubernetes Components

* Creating Docker image using dockerfile
* Application containerization

**Kubernetes Cluster Architecture**

• Kubernetes Cluster Architecture

• Managed vs. Unmanaged Cluster

• Creating AKS Cluster from Azure Portal

• Creating AKS cluster from Azure CLI

o Using Availability Zones

o Using multiple node pools

• Kubernetes Master Node Architecture

• Kubernetes Worker Node Architecture

• Kubernetes Master – Worker Node Communication

• Namespace

• Labels-Selector and Annotations

• Kubernetes resources

• Pod and Pod Lifecycle

• Imperative commands

**Day 2 :**

**Kubernetes Basic Networking**

• Pod networking concepts

• CNI in Kubernetes

o Kubenet

o Azure CNI

• DNS and IP Address Management

• Inter pod communication

• Inter node pod communication

• Using kind Service for persistent networking • Types of Services

o ClusterIP

o LoadBalancer

**Deploying High Available and Scalable Application**

• Understanding Deployment and ReplicaSet • Rolling update and rollback

• Scaling application with Deployment

• Horizontal Pod Autoscaler

Resource Estimation

**Day 3:**

**Kubernetes Persistent Storage**

• Understanding and creating persistent volumes • Access modes for volumes

• Understanding persistent volume claims • Mounting persistent volume in pods

• Static vs Dynamic Provisioning

• Host Path and Empty Dir Storage

• Storage Class

• Configure Storage Classes of Azure

• Using Azure Storage for Containers

**Advanced Kubernetes Concepts**

• Multi-Container Pattern

o Ambassador

o Adapter

o Sidecar

• ConfigMap

• Secrets

Auto-Healing and Health check with Probes o Readiness probes

o Liveness probes

o Probing parameters and use case

**AKS cluster Management and scaling** • Scaling an AKS cluster

• Upgrading an AKS cluster

• Deletion of an AKS cluster

• Adding virtual nodes

• Configuring Cluster Autoscaler

• Automate deployment of AKS with Terraform • Configuring Kubernetes dashboard

**Day 4:**

**Azure Devops :**

* Introduction to azure devops
* Getting started with azure boards
* Define work and items
* Understand and define sprint
* Define features and sprint
* **Using azure devops with (Azure Repos )**
* Building sample project with github and azure devop
* Azure Repos
* Code Management with Azure Repos
* Create the Build Environment
* Create a Code Repository
* Commit Changes to Code
* Understand and Manage Commit History
* Azure Pipelines
* DevOps Pipelines
* Manage Your Release Pipelines with Azure DevOps
* Builds vs. Releases
* Create a Build Pipeline
* Create a Azure Repo Pipeline
* Create a DevOps Release Pipeline
* Release Flatris - Real-World Troubleshooting of a Pipeline
* OLD - Deploy Flatris (using a YAML from Microsoft)
* Start DevOps Using a CI/CD Pipeline
* Copying Build Artifacts from the Project to Azure Staging Directory
* Apply Continuous Integration to the Build pipeline for every commit
* Configuration to Add tests from Azure Repositories to Release pipelines
* Concept of using Docker file to dockerize the code repositories
* Creating Docker Image through Azure Build Pipelines
* Creating Personal Access token for Installable Server Agent
* Connecting to Local Windows Agent with Azure instructions
* Deploying application into Configured Local Agent with build changes
* Configuring Variables and Environmental variables for Azure Pipelines

**Day 5:**

**Module 1: Introduction to Terraform**

* What is Infrastructure as Code (IAC)?
* Introduction to Terraform
* Key Features of Terraform
* Use Cases for Terraform
* Terraform Ecosystem Overview

**Module 2: Installing and Configuring Terraform**

* Installing Terraform
* Configuring Terraform Providers
* Authentication and Credentials

**Module 3: Terraform Basics**

* Terraform Configuration Files (.tf)
* Terraform Blocks (resource, provider, variable, output, etc.)
* Initializing a Terraform Project
* Terraform Commands (init, plan, apply, destroy)
* Terraform State and Backend Configurations

**Module 4: Managing Resources**

* Creating and Managing Infrastructure Resources
* Variables and Data Types
* Interpolation and Functions
* Resource Dependencies and References
* Resource Meta-Arguments (count, for\_each, depends\_on)
* Terraform Best Practices

**Module 5: Terraform Modules**

* Introduction to Terraform Modules
* Creating and Using Modules
* Input Variables and Outputs
* Module Best Practices

**Day 6:**

1. Helm charts - Covered with AKS
2. Pipeline using Helm
3. InitContainers with one Example
4. Service Mesh Basic
5. datadog basic -monitoring -