



**CAREER INNOVATIONS**

## **Empowering Future DevOps Leaders**

# **DevOps Program**

### **Introduction to DevOps: Bridging Development and Operations**

Welcome to the DevOps course! In today's fast-paced software industry, the need for collaboration and efficiency between development (Dev) and operations (Ops) teams has never been more critical. DevOps is the cultural and technical approach that aims to break down silos, streamline processes, and enable continuous integration, delivery, and deployment of software.

#### **Course Overview**

#### **Module1: Introduction to DevOps.**

**Objectives:** After completing this module, you should be able to Understand the benefits of DevOps over other software development processes.

Gain insights into the DevOps environment.

Get an overview of different DevOps Tools.

Get a picture of the working of the DevOps Delivery Pipeline.

#### **Topics:**

Introduction to DevOps

Benefits of working in a DevOps environment

DevOps Lifecycle

DevOps Stages

DevOps Delivery Pipeline

## Module2: Version Control with Git

**Objective:** In this module, you will gain insights into Source Control management and learn the functionalities of Git.

**Topics:**

Version Control  
Git Introduction  
Git Installation  
commonly used commands in Git  
Working with Remote repository  
Hands on Git Common Commands  
Working with Remote Repository

## Module3: Git, Jenkins & Maven Integration

**Goal:** In this module, you will learn about the different actions performed through Git and will be introduced to Jenkins and Maven.

**Objectives:** After completing this module, you should be able to:

Execute branching and merging operations.  
Perform various Git commands.  
Understand Maven Architecture and dependencies.  
Learn about Continuous Integration & its importance.  
Understand Jenkins and its features.

**Topics:**

Branching and merging in Git  
Merge Conflicts  
Stashing, Rebasing, Reverting and Resetting  
Git Workflows  
Introduction to Maven  
Maven Architecture  
Introduction to Continuous Integration  
Introduction to Jenkins  
Hands On:  
Branching and Merging  
Merge Conflicts  
Stashing, Rebasing, Reverting, and Resetting  
Configuring Maven

## Module4: Continuous Integration using Jenkins.

**Goal:** In this module, learn how to perform Continuous Integration by building applications with the help of Maven and create deployment pipelines using Jenkins.

**Objectives:** After completing this module, you should be able to

- Managing authorization in Jenkins
- Jenkins notification management
- Master-slave architecture in Jenkins
- Add a slave node to Jenkins master
- Build and deploy codes using Jenkins
- Build pipeline plugin in Jenkins
- Use Declarative pipeline in Jenkins

**Topics:**

- Jenkins Architecture
- Plugin Management in Jenkins
- Jenkins Security Management
- Notification in Jenkins
- Jenkins Master-slave architecture
- Jenkins Delivery Pipeline
- Jenkins Declarative pipeline
- Hands On:
  - Create pipeline view using Decompile and QJUnitTest
  - Adding Slave node in Jenkins
  - Build Pipeline project using Groovy script

## Module5: Configuration Management Using Ansible

**Goal:** Learn how to manage and configure your infrastructure using Ansible Ad-Hoc commands, Playbooks, and Roles.

**Objectives:** After completing this module, you should be able to

- Utilize Ansible CLI.
- Execute Ansible Ad-Hoc Commands for one-off tasks.
- Automate host servers using Ansible Playbooks
- Use Variables in Playbooks
- Using Handlers

**Topics:**

- Introduction to Configuration Management
- Infrastructure as Code
- Introduction to Ansible
- Ansible Architecture
- Inventory Management
- Ansible Modules

AD-HOC Commands  
Ansible Playbooks  
Ansible Roles  
Hands On:  
Ad-Hoc Commands  
Running a Simple Playbook  
Using Variables and handlers  
Using Ansible Roles

## Module6: Containerization using Docker Part – I

**Goal:** This module introduces learners to the core concepts and technology behind Docker. Learn in detail about containers and various operations performed on them.

**Objectives:** After completing this module, you should be able to

Understand Containerization

Learn the evolution of virtualization to containers

Understand the Docker Architecture

Perform Various actions using Docker CLI

Bind container ports to the Machine ports

Run containers in different modes

Write and build a Dockerfile to create a Docker Image

**Topics:**

Containerization

Namespaces

Docker

Docker Architecture

Container Lifecycle

Docker CLI

Port Binding

Detached and Foreground Mode

Dockerfile

Dockerfile Instructions

Docker Image

**Hands On:**

Docker CLI Commands

Port Binding

Starting Containers in Different Modes

Writing a Dockerfile to Create an Image

## **Containerization using Docker Part – II**

**Goal:** Learn how to use Docker Hub registry, deploy a multi-tier application using Docker Compose, and create a swarm cluster.

**Objectives:** After completing this module, you should be able to  
Use Docker Hub to store custom Images  
Store data in Container Volumes for persistent storage  
Setup Docker Compose  
Deploy a multi-container application using Docker Compose  
Deploy a Swarm Cluster

### **Topics:**

Docker Registry

Container Storage

Volumes

Docker Compose

Docker Swarm

Hands On:

Setting up Docker Hub

Docker Volumes

Installing Docker Compose

Installing a Multi-Container Application using Compose

Running Docker in Swarm Mode

## **Module 7: Orchestration using Kubernetes Part – I**

**Goal:** In this module, you will learn about Container Orchestration and Basic of container management using Kubernetes.

**Objectives:** After completing this module, you should be able to  
Understand Container Orchestration  
Learn about Kubernetes Core Concept  
Deploy Pods  
Create Deployments to manage Pods  
Launch DaemonSets for Background applications  
Update and Rollback your Deployments  
Scale your containerized Applications

### **Topics:**

Introduction to Container Orchestration

Kubernetes Core Concepts

Understanding Pods

Replica Set and Replication Controller

Deployments

DaemonSets

Rolling Updates and Rollbacks

Scaling Application

**Hands On:**

Kubectl Common Commands  
Deployments  
DaemonSets  
Rolling update and Rollbacks  
Scaling in Kubernetes

**Orchestration using Kubernetes Part - II**

**Goal:** Learn and deploy different service discovery mechanisms, utilize Volumes for persistent storage and deploy StatefulSets for stateful applications.

**Objectives:** After completing this module, you should be able to  
Deploy different Kubernetes Services.  
Utilize Volumes to store Persistent Data.  
Create Persistent Volume Claims to attach volumes to Pods  
Understand Persistent Volume Claims Primitives  
Use Headless Services in Stateful Sets  
Deploy Helm Charts

**Topics:**

Services  
Persistent Storage in Kubernetes  
Primitives for PersistentVolumeClaims  
Secrets and ConfigMaps  
Headless Services  
StatefulSets  
Helm Charts

**Hands On:**

Deploying Services  
Persistent Volumes and Persistent Volume Claims  
StatefulSets  
ConfigMaps and Secrets

**Module8: Provisioning using Terraform Part – I**

**Goal:** Learn how to provision and manage infrastructure on a Cloud Platform (AWS) using Terraform Configuration Files.

**Objectives:** After completing this module, you should be able to  
Understand Provisioning using Terraform .  
Learn the Difference between Terraform vs Ansible.  
Understand Terraform Architecture.  
Deploy a Terraform Configuration File  
Use Basic Terraform Commands  
Manage Terraform Resources

**Topics:**

Introduction to Terraform  
Terraform vs Ansible  
Terraform Architecture  
Terraform Configuration  
Terraform Common Commands  
Managing Terraform Resources

**Hands On:**

Setting Up AWS and Terraform  
Executing a Terraform Configuration  
Managing Terraform Resources  
Referencing Terraform Resources

**Provisioning using Terraform Part - II**

**Goal:** Use Terraform State commands to manage the current state of your infrastructure. Deploy a fully usable and working infrastructure using Terraform.

**Objectives:** After completing this module, you should be able to  
Perform Terraform State Commands  
Deploy a Terraform Project on AWS

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