Course Name: GCP DevOps Engineer Professional Certification Course

Course Overview

This course equips learners with the skills to integrate DevOps principles with Google Cloud's tools and services. Covering foundational DevOps concepts, CI/CD pipelines, Kubernetes orchestration, and infrastructure automation, the course emphasizes hands-on experience. Learners will build and deploy applications, automate cloud infrastructure, and manage operations through Google Cloud's suite. The program concludes with an advanced final project that integrates CI/CD, Kubernetes, Terraform, and Cloud Monitoring.

Course Type

Intermediate Level

Course Objectives

1. Understand DevOps principles and their implementation on GCP.

2. Build CI/CD pipelines using Cloud Build for automated deployments.

3. Automate infrastructure provisioning with Terraform.

4. Monitor and manage cloud applications using Google Cloud Monitoring.

5. Orchestrate and deploy applications using Kubernetes and GKE.

6. Respond to incidents and implement best practices for operational excellence.

What You'll Learn

- Implement CI/CD pipelines to streamline application deployment on GCP.

- Use Terraform to automate GCP infrastructure setup and management.

- Deploy and scale containerized applications with Kubernetes and GKE.

- Monitor application performance and configure alerting using GCP-native tools.

- Create secure, resilient systems with advanced Kubernetes configurations.

- Integrate DevOps tools and concepts to manage real-world projects effectively.

Duration

46–48 hours

Requirements

- Access to a Google Cloud account for practical labs.

- A computer with a stable internet connection for using GCP services and tools.

Prerequisites

- Basic programming knowledge (Python, Java, or similar).

- Familiarity with Linux commands and cloud computing basics.

- Understanding of containerization concepts (e.g., Docker) is recommended.

Target Audience

- DevOps engineers aiming to specialize in GCP tools and services.

- IT professionals transitioning into DevOps roles.

- Cloud practitioners looking to integrate DevOps principles into their workflows.

- Individuals preparing for GCP DevOps certifications or similar roles.

- Software developers and system administrators eager to enhance deployment pipelines.

Curriculum

Module 1: Introduction to DevOps and GCP

- Overview of DevOps concepts and principles
- Introduction to the Google Cloud Platform (GCP)
- Key GCP services for DevOps engineers (Compute Engine, Cloud Storage, GKE, Cloud Build)
- Setting up GCP and configuring Google Cloud CLI
- Cloud Identity and Access Management (IAM) basics for DevOps

Hands-on Labs:

- Setting up a GCP project
- Navigating the GCP Console and Cloud Shell

Module 2: Continuous Integration and Delivery (CI/CD) with Cloud Build

- Introduction to CI/CD pipelines
- What is Cloud Build and how it integrates with other GCP services
- Building and deploying applications with Cloud Build
- Creating `cloudbuild.yaml` file
- Triggering builds from Cloud Repository, GitHub, or Bitbucket
- Configuring build steps and environment variables
- Integrating Cloud Build with other tools (e.g., Docker, Kubernetes)
- Managing build artifacts with Google Container Registry

Hands-on Labs:

- Setting up a CI/CD pipeline with Cloud Build
- Deploying a containerized application using Cloud Build

Module 3: Infrastructure Automation using Terraform

- Introduction to Infrastructure as Code (IaC)
- Overview of Terraform and its integration with GCP

- Writing Terraform configurations

- Providers and resources in GCP

- Managing state files and modules

- Using Terraform CLI and GCP Service Accounts

- Automating GCP infrastructure provisioning with Terraform

- Managing and versioning infrastructure with Terraform Cloud/Enterprise

Hands-on Labs:

- Writing a simple Terraform script to create a GCP Virtual Machine

- Using Terraform to deploy a full GCP environment (network, instances, storage)

Module 4: Monitoring and Alerting with Cloud Monitoring

- Introduction to Google Cloud Monitoring (formerly Stackdriver)

- Setting up monitoring for cloud resources (VMs, Kubernetes, Cloud Functions)

- Collecting and analyzing logs with Cloud Logging

- Creating custom metrics and dashboards

- Setting up alerting policies to monitor application health

- Integrating Cloud Monitoring with Slack, email, and other third-party services

Hands-on Labs:

- Creating custom monitoring dashboards in Cloud Monitoring

- Configuring alerts based on application logs

- Monitoring application health with GCP-native monitoring tools

Module 5: Incident Management in DevOps

- Understanding incident management and response in DevOps

- Setting up Incident Response Plans and Runbooks

- Configuring Google Cloud's Incident Management tools

- Automating incident detection with Cloud Monitoring and Cloud Logging

- Using Google Cloud's operations suite to resolve incidents

- Postmortems and Root Cause Analysis (RCA)

Hands-on Labs:

- Configuring Cloud Monitoring to detect incidents

- Writing an incident response runbook for a cloud application

- Using Google Cloud's operations suite to investigate incidents

Module 6: Kubernetes Orchestration

- Introduction to Kubernetes and GKE (Google Kubernetes Engine)

- Setting up GKE clusters in Google Cloud

- Deploying applications to GKE using Kubernetes manifests

- Understanding Kubernetes pods, deployments, and services

- Managing Kubernetes resources (Namespaces, Secrets, ConfigMaps)

- Autoscaling, rolling updates, and monitoring GKE clusters

- CI/CD integration with Kubernetes using Cloud Build and GKE

Hands-on Labs:

- Deploying a simple application on GKE

- Configuring Kubernetes autoscaling for a cloud application

- Integrating Kubernetes deployment with Cloud Build for CI/CD

Module 7: Advanced Kubernetes Features and Best Practices

- Advanced Kubernetes concepts (Helm, Operators, StatefulSets)

- Managing GKE cluster security (RBAC, IAM, Network Policies)

- Using Helm to manage Kubernetes applications

- Best practices for scaling, securing, and monitoring Kubernetes clusters

- Disaster recovery in Kubernetes

Hands-on Labs:

- Deploying and managing Helm charts

- Configuring Kubernetes RBAC and IAM for access control

- Scaling GKE clusters based on traffic patterns

Module 8: Final Project and Review

- Final project overview and instructions

- Design and implement a complete CI/CD pipeline using Cloud Build

- Automate infrastructure using Terraform

- Set up monitoring and alerting for deployed applications

- Deploy and manage applications on GKE

- Course review and Q&A

- Certification preparation and exam tips

Final Project:

- Build and deploy a scalable, containerized web application using GCP services and DevOps tools (Terraform, Cloud Build, GKE, Cloud Monitoring)

Assessment and Certification

- Quizzes after each module to assess understanding

- A final project demonstrating the integration of CI/CD, Kubernetes, and Infrastructure Automation

- Certification of Completion for the course