Devops Final Project Objective

This project comprehensively integrates application development, Dockerization, Kubernetes deployment, CI/CD automation, and infrastructure management with Terraform. It allows trainees to apply their knowledge practically and gain hands-on experience with real-world scenarios.

Project Overview:

1. **Part 1: Application Development**
2. **Part 2: Dockerization**
3. **Part 3: Infrastructure as Code with Terraform**
4. **Part 4: Kubernetes Deployment on EKS**
5. **Part 5: CI/CD Pipeline Setup**
6. **Part 6: Documentation and Presentation**

Part 1: Application Development

Task 1.1: Develop a Simple Application

- **Description:** Create a simple web application using Python (Flask).
- **Instructions:**
    1. Set up a Python virtual environment.
    2. Create a simple Flask application with basic routes.
    3. Test the application locally.

Part 2: Dockerization

Task 2.1: Dockerize the Application

- **Description:** Create a Dockerfile to containerize the application.
- **Instructions:**
    1. Write a Dockerfile to define the application environment.
    2. Build and test the Docker image locally.
    3. Push the Docker image to Docker Hub.

Part 3: Infrastructure as Code with Terraform

Task 3.1: Set Up Terraform for AWS EKS

- **Description:** Use Terraform to provision the AWS EKS cluster and other required resources.
- **Instructions:**
    1. Install Terraform.

2. Write Terraform configuration files to create an EKS cluster, VPC, and related resources.
3. Apply the Terraform configuration to provision the infrastructure.

Part 4: Kubernetes Deployment on EKS

Task 4.1: Deploy the Application on EKS

- **Description:** Deploy the Dockerized application on the AWS EKS cluster.
- **Instructions:**
    1. Write Kubernetes deployment and service YAML files.
    2. Use `kubectl` to apply the configuration to the EKS cluster.

Part 5: CI/CD Pipeline Setup

Task 5.1: Set Up Jenkins

- **Description:** Create a CI/CD pipeline to automate the deployment process.
- **Instructions:**
    - **For Jenkins:**
        1. Install Jenkins and configure the necessary plugins.
        2. Create a Jenkins pipeline to build the Docker image, push it to Docker Hub, and deploy it to EKS.

Part 6: Documentation and Presentation

Task 6.1: Document the Project

- **Description:** Document all steps taken to complete the project.
- **Instructions:**
    1. Write detailed instructions for each part of the project.
    2. Include screenshots and code snippets where necessary.
    3. Prepare a presentation summarizing the project and its outcomes.

Bonus Task: Set Up Monitoring and Logging

- **Objective:** Implement monitoring and logging for the deployed application to ensure its health and performance.

- **Task:**

  - Set up monitoring using Prometheus and Grafana.
  - Deploy Prometheus on the EKS cluster to collect metrics.
  - Deploy Grafana on the EKS cluster to visualize metrics from Prometheus.
  - Create dashboards in Grafana to monitor the application's performance.
  - Set up alerts in Prometheus to notify when specific conditions are met (e.g., high CPU usage).