Practical Task

Part 1: Kubernetes and Helm with a Go Application

Tasks:

1. **Go Application Deployment:**
    a. Write a basic Go web application: an HTTP server that responds with "Hello, World!”.
    b. Containerize this application.
    c. Create a Kubernetes deployment for the Go application
2. **Helm Chart:**
    a. Package the deployment using Helm.
    b. Include a Helm values file that allows customization of the number of replicas and image tags.
3. **Bonus: Managing Kubernetes Secrets:**
    a. Store a sensitive configuration value as a Kubernetes secret.
    b. Modify the Golang app and its k8s resources /deployments to read an env that contains sensitive data (/secret).

Part 2: Infrastructure as Code and k3s Installation

Using Terraform and/or Pulumi and/or Ansible

Task:

1. Write infrastructure as code (IaC) to provision one or more virtual machines (VMs) using either Terraform or Pulumi. Use a cloud provider of your choice.
2. Install k3s on the provisioned VM(s) and set up a lightweight Kubernetes cluster.
3. Deploy the Go application from Part 1 onto the k3s cluster.

Part 3: DevOps

Task:

1. **CI/CD Pipeline:**
    a. Design a CI/CD pipeline for the Go application from Part 1. Describe the steps involved in building, testing, and deploying the application.
2. **Bonus:**
    a. Running integration tests on the deployed application.
4. **Documentation:**
    a. Provide a README file explaining how to set up and run the pipeline and any prerequisites.

Submission

1. **Provide a GitHub repository link containing:**
    a. The CI/CD pipeline configuration files.
    b. The Terraform/Pulumi/Ansible scripts.
    c. The Kubernetes manifests.
    d. The README file with all necessary documentation.
    e. Any additional files required for the task.
2. **Alternative Documentation:** If there are technical limitations that prevent you from fully completing the task, please provide a detailed document explaining:
    a. The steps you would take to complete the task.
    b. Any assumptions or considerations.
    c. How you would set up and configure the necessary infrastructure and pipeline components.
    d. Challenges you might expect and how you would address them.
3. **Prepare a brief presentation (5-10 minutes) explaining your approach to the task, focusing on:**
    a. Key design decisions.
    b. How the CAMS model was applied.
    c. The CI/CD pipeline setup and how it manages the application lifecycle.