Deadline: April 16th

Problem 1: Environment Setup

Task 1: Manual Setup

1. **Virtual Machine Setup**
    - Create 3 Virtual Machines (VMs) using a virtualization tool like Oracle VirtualBox or VMware Workstation.
    - Install Ubuntu Server 24.04 (No GUI) on each VM.
    - Assign each VM an IP address from the network `192.168.123.0/24`.
    - Install Docker inside each VM
2. **Reverse Proxy Configuration**
    - Create a 4th VM to act as a reverse proxy.
    - Install Docker
    - Install Nginx on it (using docker)

Task 2: Automate Setup with Ansible

- Write Ansible playbooks to automate the following portion:
    - Install all system dependencies like docker
    - Steps to deploy your web app inside those VMs
    - Configure Nginx on the 4th VM

Problem 2: Web Application Development

- Develop a simple web application to be deployed on the 3 Ubuntu VMs. The app should:
    - Display the hostname of the VM it is running on.
    - Show the current commit hash of the code it was deployed with.
    - Dockerize it

Problem 3: Deployment Pipeline

- **Use GitHub Action To:**
    - Continuous Integration (CI)
        - Build the docker image
        - Push it in DockerHub
    - Continuous Delivery (CD)
        - Deploy the built docker image inside the 3 VM mentioned in Task 1

Problem 4: Monitoring

Monitoring Setup

1. **Install Prometheus and Grafana**
    - Install Prometheus and Grafana on the reverse proxy VM.
2. **System Monitoring**
    - Set up Prometheus to monitor the web application running on the 4 Ubuntu VMs.
    - Create a Grafana dashboard displaying the following metrics:
        - CPU usage
        - Memory usage
        - Disk usage
        - Network statistics

Testing

- Test the entire setup by accessing the web application via the domain: `myapp.com`.

Learning Materials:

- **Git:** https://filebrowser.anwarh.com/share/dNKSRy6P
- **Ansible:** https://filebrowser.anwarh.com/share/5E3QTPK2
- **Docker:** https://filebrowser.anwarh.com/share/tuGlFdby
- **GitHub Action:** https://filebrowser.anwarh.com/share/60-4jt6P
- **Prometheus and Grafana:** Google & Youtube (We will learn in-depth later)
- **Nginx:** Google & Youtube (We will learn in-depth later)