

Course Title: Software Operations & Maintenance

Course Project

Project Title: Design and Deployment of a Secure, Scalable Web Application with CI/CD, Monitoring, and Reliability Features

1. Introduction:

Modern web applications must meet high security, performance, scalability, and uptime standards. This project aims to implement a real-world deployment of a dynamic web application using modern DevOps practices, full CI/CD pipelines, and industry-grade monitoring and security tools.

2. Project Scope Highlights:

- Build a real-world web app (e.g., e-commerce, booking system, inventory tool)
- Implement **full deployment pipeline** using GitHub Actions, Jenkins, or GitLab CI
- Integrate **security measures** (e.g., HTTPS, user authentication, firewall rules)
- Include **monitoring tools** (e.g., Prometheus + Grafana, CloudWatch)
- Ensure **high availability and reliability** via load balancers, failover, and backups

3. Objectives:

- Develop a functional, database-driven web application.
- Set up a CI/CD pipeline for automated deployment.
- Implement basic to intermediate security practices.
- Enable monitoring and alerting systems.
- Ensure reliability through backups and failover configurations.

4. Tools and Technologies:

- **Frontend:** HTML, CSS, JavaScript (React/Angular optional)
- **Backend:** Node.js / Python (Flask or Django) / PHP / Java (Spring Boot)
- **Database:** MySQL / PostgreSQL / MongoDB
- **CI/CD:** GitHub Actions / Jenkins / GitLab CI
- **Deployment:** Docker, Kubernetes (optional), AWS EC2 / DigitalOcean / Azure
- **Monitoring:** Grafana, Prometheus, or ELK Stack
- **Security:** HTTPS, firewall rules, basic authentication/authorization, fail2ban

5. Modules / Project Breakdown:

Module 1: Application Development

- Design database schema
- Develop core features (CRUD, user login)

Module 2: CI/CD Pipeline Implementation

- Configure GitHub/Jenkins for automatic build, test, deploy

Module 3: Security Setup

- Enable SSL, set up authentication, implement secure headers

Module 4: Monitoring Integration

- Install and configure Prometheus/Grafana
- Set up log and uptime monitoring

Module 5: Reliability Measures

- Backup scripts, failover policies, auto-restart configurations

6. Expected Outcomes:

- Working on secure web applications deployed to the cloud
- Live CI/CD process for updates
- Active monitoring dashboard
- Documented disaster recovery strategy

7. Team Members:

- Name 1 (Team Lead)
- Name 2 (Backend Developer)
- Name 3 (DevOps & Security)
- Name 4 (Documentation & QA)