UIT UNIVERSITY

Faculty of Engineering Technology
SPRING-2025

Course Title: Software Operations & Maintenance

Assignment # 02

Objective:

To evaluate the student's understanding of designing robust systems that ensure minimal downtime (High Availability) and efficient performance under increasing workloads (Scalability).

Instructions:

- Submit your assignment in typed or neatly written format.
- Diagrams and tables are encouraged where appropriate.
- Plagiarism will result in disqualification.

Part A: Conceptual Questions

Answer the following questions in brief (100–150 words each):

1. Define High Availability. How is it achieved in modern IT systems?
2. Differentiate between vertical scaling and horizontal scaling.
3. What role do load balancers play in a high availability environment?
4. Describe the concept of failover. Give an example of its implementation.
5. List and explain any three challenges faced when designing for scalability.

Part B: Practical Research and Design

Case Study:

A web application hosted on a single server has recently experienced service outages due to traffic spikes and hardware failures. The management wants to redesign the architecture for better uptime and performance.

Tasks:

1. Propose an improved architecture for high availability and scalability.
2. Suggest technologies/tools you would use (e.g., load balancers, replication, autoscaling groups).
3. Design a simple architecture diagram showing key components.
4. Estimate cost or complexity considerations for the proposed solution.
5. Outline how you would monitor and maintain the setup.

Submission Requirements:

- Submit a single PDF or DOCX file with answers to both sections.
- Include your name, roll number, and course title on the first page.
- Use clear labels and headings.
- **Due Date:** 26/05/2025