



SABARAGAMUWA UNIVERSITY OF SRI LANKA
FACULTY OF COMPUTING
DEPARTMENT OF COMPUTING AND INFORMATION SYSTEMS
BSc HONOURS DEGREE PROGRAMME IN COMPUTING AND INFORMATION
SYSTEMS

025

2020/2021 SEMESTER IV END SEMESTER EXAMINATION - OCT./DEC 2024

IS4106 – SOFTWARE ARCHITECTURE

Time allowed: **THREE (03) Hours**

INSTRUCTIONS TO CANDIDATES:

This paper consists of **FIVE (05) questions**. Answer **ALL** questions.

The marks in brackets indicate the weight given to each part of the question.

Write your Index No. clearly in all places where appropriate.

Write clearly in English and use blue or black ink.

Non-programmable calculators are **ALLOWED** in this examination.

No clarifications will be provided on the given questions.

Strike a line through all unused pages in the answer booklet/sheets.

Cross out all scratch paper and hand it in at the time of collection.

- 1)
 - a) Define software architecture and briefly explain its key components with examples. [10 Marks]
 - b) Differentiate between functional and non-functional requirements in software architecture. Provide examples of each. [20 Marks]
 - c) Using an example, explain how software architecture influences software maintenance and adaptability. [30 Marks]
 - d) Propose an architectural solution for a library management system and justify your approach. [40 Marks]

- 2)
 - a) Explain Kruchten's 4+1 View Model and its relevance to software development. [10 Marks]
 - b) Draw and describe a component diagram for a simple e-commerce application. [30 Marks]
 - c) Analyze the importance of the process view in achieving system performance and reliability. [30 Marks]
 - d) Evaluate the suitability of using layered architecture for a university course management system. [30 Marks]

- 3)

Modern software systems often rely on established architectural patterns and styles to achieve scalability, maintainability, and performance. For instance, an e-commerce platform may adopt a microservices architecture, while a collaborative editing tool may use an event-driven style.

 - a) Define architectural patterns and explain the role of design patterns (e.g., Singleton, MVC) in software development. [10 Marks]

P.T.O

- b) Discuss the main characteristics of the event-driven architectural style. Provide an example of its application. [20 Marks]
- c) Analyze the advantages and disadvantages of adopting a microservices architecture for a large-scale web application. [30 Marks]
- d) Design a software architecture for a task management application, incorporating modularity and scalability. Justify your choices. [40 Marks]
- 4) *Ensuring quality attributes like performance, availability, and security is a significant challenge in software architecture. For example, an online multiplayer gaming platform must balance scalability and latency to provide a seamless experience for users.*
- a) Define quality attributes and briefly describe three attributes critical to a video streaming platform. [10 Marks]
- b) Explain the trade-offs between availability and modifiability in software systems. [30 Marks]
- c) Analyze a scenario where scalability conflicts with security requirements in an online shopping platform. Suggest a balanced solution. [30 Marks]
- d) Evaluate the impact of poor architectural decisions on system usability and suggest methods to mitigate such risks. [30 Marks]

P.T.O

5)

Real-world software systems often present unique challenges. For instance, a weather monitoring system with distributed sensors needs to ensure data collection accuracy and efficient communication between nodes.

- a) Briefly describe the importance of Conway's Law in team organization for software projects **[10 Marks]**
- b) Create a UML deployment diagram for a weather monitoring system with distributed sensors. **[30 Marks]**
- c) Compare the layered architecture and client-server architecture for building a social networking platform. Discuss their suitability. **[30 Marks]**
- d) Develop an architecture for a traffic light control system. Justify your choice of patterns and styles. **[30 Marks]**