



# UNIVERSITY OF RUHUNA

## Faculty of Engineering

End-Semester 8 Examination in Engineering: December 2018

Module Number: EE8205      Module Name: Principles of Software Architecture

[Three Hours]

[Answer all questions, First question carries 20 marks and rest of each carries 10 marks]

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Q1 Answer the questions below based on the given scenario.

Your team is assigned to design a cloud-based Taxi service system called "TakeMe". The drivers should be able to register themselves in the system using the online portal. The driver should submit all the required documents such as driving license, and vehicle registration document via the online portal. Once an administrator approves the driver, he can start driving by installing the "TakeMe" driver mobile app in their mobile phones. The passengers can install the "TakeMe" passenger app in their mobile phones to order rides. When a customer orders a ride, the system will find the best driver from the nearby drivers and assign the ride to the driver.

The passenger should be able to pay via credit card or hand over the cash to the driver. Once a ride is accepted or completed, the "TakeMe" app should send the notifications to the passengers via email and SMS. The drivers should be able to see the monthly summary of their rides as a report.

Any complaint regarding a ride can be logged in by using the mobile application. The administrators should be able to see all the complaints and take necessary actions.

Reports such as monthly, weekly should be generated and visible to the administrators via the admin portal.

a) Draw a high-level architecture diagram of the "TakeMe" system. Clearly mention the architectural patterns and assumptions used.

[10 Marks]

b) Draw the component diagram of a backend system for "TakeMe" application.

[5 Marks]

c) Draw the deployment diagram of the system.

Note: Pay special attention to the heavy load generated by the large number of customers.

[5 Marks]

- Q2 a) Briefly explain the "Data-flow Architecture" in software architectural styles, by using a suitable example. [2 Marks]
- b) Write down two advantages and two disadvantages of Data flow architectural style. [2 Marks]
- c) Briefly explain the "Data-centered architecture" in software architectural styles. [2 Marks]
- d) How do the "Data-centered" architectures promote integrability? [1 Mark]
- e) The Microservices architecture pattern solves many of the common issues found in both monolithic applications as well as service-oriented architectures. State four such issues and briefly explain how microservices architecture resolves each. [3 Marks]
- Q3 a) Briefly explain two key features of a component in component level software design. [2 Marks]
- b) Explain Object-Oriented View and Process-Related View of a component by using an example. [2 Marks]
- c) Explain the following design principles used in class based component design. Provide one example for each.
- i) The Interface Segregation Principle (ISP)
  - ii) The Release Reuse Equivalency Principle (REP)
  - iii) The Common Closure Principle (CCP)
- [6 Marks]
- Q4 a) What is meant by pattern based software design? [1 Mark]
- b) Briefly explain three kinds of patterns that can be used in software designing process. [3 Marks]
- c) Explain how pattern based design helps to design a better software by using an example. [2 Marks]
- d) Briefly explain the difference between a framework and a design pattern in software engineering. [1 Mark]

- e) Assume you have a web application that displays products in different categories. Explain how you can use pattern based design to build search functionality for products in your web application.

[3 Marks]