UNIVERSITY OF RUHUNA

Faculty of Engineering

End-Semester 8 Examination in Engineering: November 2017

Module Number: EE8205 **Module Name: Principles of Software Architecture**

[Three Hours]

[Answer **all questions**, each question carries 12.5 marks]

Q1 a) i) What is meant by Software Architecture?

[1 Mark]

ii) "Architect should finalize the architectural descriptions ahead of the development."
Explain with three reasons why this statement could be incorrect.

[1.5 Marks]

b) i) What is defined by "Non-Functional" requirements?

[1 Mark]

ii) Why it is important to concentrate on non-functional requirements in software architecture?

[1.5 Marks]

iii) Define below terms that you may encounter under Software quality factors

1. Throughput – Latency
2. Modifiability
3. Authentication – Authorization
4. Availability

[2 Marks]

c) i) Briefly explain Scalability.

[1 Mark]

ii) What is Horizontal and Vertical Scalability in software architecture?

[1 Mark]

iii) What are the advantages of scaling horizontally over scaling vertically?

[2 Marks]

iv) Give a disadvantage of a horizontally scalable system over vertically scalable system.

[1.5 Marks]

Q2 a) Explain 3 practical examples for Serverless computing.

[4.5 Marks]

b) i) What is a container?

[1 Mark]

ii) Explain why "Containers are considered better compared to VMs" by giving 3 reasons.

[2 Marks]

iii) Name at least 2 technologies associated with containers.

[1 Mark]

c) iHome is an IOT driven company that creates smart home appliances, such as smart lightening systems, smart door locks and smart surveillance systems.

i) The company is in the process of designing a security mechanism in which a security camera detects objects passing by, then take photos and send them to the system owner. Propose a suitable design for the application to fulfill the need.

[2 Marks]

ii) iHome has been collecting user's behavioral data, such as their power consumption patterns. And it is necessary to perform certain processing in order to extract useful information. Suggest a suitable architecture, to fulfill the task.

[2 Marks]

Q3 a) Give 5 common benefits of cloud computing.

[2 Marks]

b) Give short notes on following topics associated with SOA.

i) Service Statelessness
ii) Standardized Service Contract
iii) Service Discoverability
iv) Service Reusability

[2 Marks]

c) Explain the meaning of following statements.

i) "Build to change instead of building to last"
ii) "Smart Endpoints and Dumb Pipes – in Microservice Principles"

[2 Marks]

d) YeeGo is a taxi company they provides services to the community around Colombo area and owns around 250+ taxi cars. They are in the process of creating a software solution, which will help managing their orders and monitor their cab locations. They invited a software firm to develop the software and you are assigned to do the new design.

i) What are the external technologies you would use to maximize the reusability?

[1.5 Marks]

ii) Design the architecture component diagram for the proposed design. Propose suitable technology stack for the application. Use appropriate design architecture and note wherever applicable.

[5 Marks]

Q4 a) i) What is meant by Microservice Architecture?

[1 Mark]

ii) Explain how Microservice Architecture deviates from other architectural paradigms, stating its pros and cons.

[3 Marks]

b) i) What is "Two Pizza Rule" in Microservice team building?

[0.5 Marks]

ii) Why it is important to keep the teams in above manner?

[0.5 Marks]

c) "Request -Response" and "Observer" are two patterns of Microservice Communication. Explain their behavior stating real world examples where these patterns are applicable.

[2 Marks]

d) "Just In Second" is an online retail website which is specialized in selling everyday items. Their products are ranging from house hold items, fashion items to consumer electronics.

i) What are the domain-model boundaries for each microservice that can be identified in the business scenario?

[2.5 Marks]

ii) Draw an architecture diagram, indicating how those microservices may fit in, in the application.

[3 Marks]