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The Open University of Sri Lanka
Faculty of Engineering Technology
Department of Electrical and Computer Engineering

Study Programme	: Bachelor of Software Engineering
Name of the Examination	: Final Examination
Course Code and Title	**: ECI6267/EEI6567 Software Architecture and Design**
Academic Year	: 2019/2020
Date	: 10th of August 2020
Time	: 1330-1630hrs
Duration	: **3 hours**

General Instructions

1. Read all instructions carefully before answering the questions.
2. This question paper consists of **Five (5)** questions in **Four (4)** pages.
3. Answer **all** questions given in **SECTION A** and any **One (1)** question from **SECTION B**.
4. All questions carry equal marks.
5. Answer for each question should commence from a new page.
6. This is a Closed Book Test **(CBT).**
7. Answers should be in clear hand writing.
8. Do not use red colour pen.

Answer all the questions from SECTION A.

SECTION A

Question 1.

With the outbreak of COVID-19, the Ministry of Health has decided to invest on a project to track people using smart devices they carry. Once the software is installed in someone's phone, it will trace the locations the person visited and record in the *cloud*.

Once it is found that someone is infected, and then the trace can be used to track everyone else who contacted this person closely during the past few days.

1. Identify four (4) features that you can provide using this application.
(2 Marks)
2. Briefly explain three (3) advantages of this system
(3 Marks)
3. Identify the stakeholders of this system.
(3 Marks)
4. Draw a use case diagram for this system.
(4 Marks)
5. Identify major software components.
(5 Marks)
6. Draw a diagram to depict the high level architecture of the system that you are going to design.
(8 Marks)

Question 2.

ABC, a courier service, has decided to expand their service to provide essential services allowing retailers and other delivery parties to join with them. What they have planned is, to give a portal in ABCs platform for retailers and delivery parties to register and publish their services. Retailers can now sell their items through the portal while the courier service can be used as the delivery partner. Delivery parties that register will be assigned delivery jobs from the portal. They would also contact the local police station closest to the registering delivery parties and retailers to provide necessary permissions to operate.

- People can visit this portal and view retailers and their goods and order online
- People can either pay online or pay cash on delivery.
- Orders are traceable and customers get notifications on delivery vehicles departure and when the vehicle is close by.
- System should identify delivery vehicles closest to the retailer and the customer.

a. Identify two major use cases of this system.
(2 Marks)

b. Draw a diagram to show the high level architecture of this system.
(8 Marks)

c. Draw sequence diagrams for a retailer registering in the system.

(10 Marks)

d. State two design patterns that can be used in this system, and briefly explain how to use them.

(5 Marks)

Question 3.

The Ministry of Education has hired you to design a system to facilitate a virtual classroom for teachers to teach from home and students to learn from home. Notably the platform should facilitate a lot of data streams. As the architect, your task is to design a system by keeping this aspect of the system in mind.

a. Identify the stakeholders of his system

(5 Marks)

b. Suggest a mechanism to keep all live teaching sessions, so that students can access them at a later time.

(5 Marks)

c. Where do you suggest this system be installed? On cloud or on-premises? Briefly explain.

(5 Marks)

d. Draw a high level architecture of your solution.

(10 Marks)

Answer one (1) question from SECTION B.

SECTION B.

Question 4.

SOLID is an acronym for 5 important design principles.

a. Explain the concepts of *Open/Closed Principle* and *Interface segregation Principle* with examples for each.

(10 Marks)

b. Dependency Inversion is a design pattern, which is used to comply with dependency inversion principle. Write a simple java code to show how dependency inversion can be used. (Hint: use dependency injection)

(15 Marks)

Question 5.

Event based architectural style or event driven architecture (EDA) is commonly used in social media, specially to manage notifications.

a. Identify components in an event driven architecture.

(5 Marks)

b. Take a post in a social media as an example, and draw a diagram showing message/event flow, which send notifications to users who are following the post.

(5 Marks)

c. Define and explain the term *Coupling* and why loose coupling is desirable?

(5 Marks)

d. Explain how an event driven model can be used to avoid Strong *coupling* between components.

(10 Marks)