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B.Sc. Engg. 8th Semester (47)

ISLAMIC UNIVERSITY OF TECHNOLOGY
ORGANISATION OF ISLAMIC COOPERATION

Department of Computer Science and Engineering

MID SEMESTER EXAMINATION

DURATION: 1 Hour 30 Minutes

CSE 4803: Parallel & Distributed Processing

Programmable calculators are not allowed. Do not write anything on the question paper.

There are **4 (four)** questions. Answer any **3 (three)** of them.

Figures in the right margin indicate marks.

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a) Suppose you are tasked to create a distributed system for a fast food chain restaurant which provides tasty foods all over the world from various outlets. To order food from these outlets, consumers have to insert the first name and email along with the security PIN into a client's machine at every outlet. They will also have to insert the foods they want to order. Unlike most restaurants, here the users refill their accounts with monetary transactions, similar to a prepaid system and then they can order food using credits stored in their accounts. Under these circumstances, your task is to analyze the following scenarios using proper examples and diagrams:

i. Design the system in such a way that the **Authentication** server and **Menu Information** server are different. How can you put a middleware so that each transaction is processed by single request/reply message from/to the **clients' end**?

ii. As there would be considerable geographic distance between client and server, what should be your approach to minimize the communication latency? Also discuss how you can design the communication such a way that do not freeze the UI of client's machine.

iii. There are various goals that can be achieved to develop a distributed system. Describe the requirements for the system so that it can achieve **Migration, Relocation** and **Replication Transparency** where database files are resources.

iv. After each transaction, the user receives a transaction report which includes the transaction time. What can be the problem if the transaction time is taken from the **client machine** or the **server machine**? If the server would have to report the amount of money left inside the accounts of the users to the corresponding users at a particular time of the day, what would be problem(s), assuming that the bandwidth between Clients' machines and the server is infinite? Why?

v. Discuss the **ACID** properties of your system and with the help of proper examples describe how the system is conserving those properties.

b) What is **Clock Drift**? Suppose you have created a new JavaScript library (e.g., jQuery) that is reusable for different web based applications. Now, the application developers use your library to develop their web based applications. Whenever the end users access the applications, they need to have the access the JavaScript library too. Design a distributed system for the users of your library so that the end users can easily access it efficiently, considering the number of users are very high and they are scattered throughout the globe. 1+4

a) What is super-peer. Give an example how a super-peer can be selected and under which circumstances that would be necessary. 2+3+3

b) Suppose you are tasked to design a Smart Home System where each electric appliance's data are monitored by a Distributed Network. Data from each appliances are stored in a 8

centralized database for the occupants to motitor. The doctors can search by appliance's ID to find out the current status and regulate voltage. Now design the system in a three level architecture and find out the benefits of such architecture in terms of performance, scalibility and maintanance.

c) With proper diagrams, describe the working principle of Skype.

3. a) Discuss different types of communications. What are the different stages of Synchronous Communication? 6+

b) What is RPC? How can one machine call a remote procedure using Server and Client stubs? Discuss different ways and challenges of passing parameters in RPC. Use proper example for explanation. 6+5+

4. a) Discuss the differences between horizontal and vertical distribution.

b) What is Virtual Organization? Describe the tasks assigned to different parts of Grid Computing System. 1+

c) Suppose in a structured peer-to-peer communication there can be at most 30 machines. If they implement Chord System to track all the machines as well as the resources, let us assume that, the 10 machines online have the following IDs: 1, 4, 9, 11, 14, 18, 20, 21, 28. Also assume that the length of finger table is 6. Now develop finger tables for each node and describe the process for locating a resource with key 26. 1