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M.Sc. TE 13 March 2018 (Afternoon)

# ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
ORGANISATION OF ISLAMIC COOPERATION (OIC)

## Department of Computer Science and Engineering (CSE)

**MID SEMESTER EXAMINATION** **WINTER SEMESTER, 2017-2018**

**DURATION: 1 Hour 30 Minutes** **FULL MARKS: 75**

## CSE 6197: Parallel and Distributed Computing

**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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1. a) Briefly describe the architecture of a message queuing system. What is the role of a message broker in a message queuing system? 7+2

   b) With an example explain the process of parameter marshaling in a remote communication through RPC. 8

   c) What is Quality of Service (QoS). Suppose one single packet contains multiple sequential audio and video frames. While transmitting the packet is lost. What problem will occur in this case? How to solve this problem? 8

2. a) Scalability can be achieved by applying different techniques. What are these techniques? Explain briefly. 8

   b) 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. 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? 8

   c) Consider a chain of processes $P_1$, $P_2$,...., $P_n$ implementing a multi-tiered client-server architecture. Processes $P_i$ is client of process $P_{i+1}$ and $P_i$ will return a reply to process $P_{i-1}$ only after receiving a reply from $P_{i+1}$. What are the main problems with this organization when taking a look at the request-reply performance at process $P_1$? 4

   d) Write the differences between Cloud and Grid computing as the distributed computing systems. 5

3. a) Mention the role of virtualization in distributed system. Explain the architecture of process virtual machine and virtual machine monitor. 2+5

   b) Suppose a web document consists of an HTML file containing plain text along with a collection of images, icons, etc. To fetch each element of a web document, the browser has to set up a TCP/IP connection, read the incoming data and passes it to a display component. Setting up a connection as well as reading incoming data is inherently blocking operations. When dealing with long-haul communication, the time for each operation to complete may be relatively long. Briefly explain how to improve the performance of the system? 5

   c) What is client stub and server stub? Briefly describe the process of client server binding in Remote Procedure Call (RPC). 2+5

   d) What are ACID properties? Describe the ACID properties for performing successful transaction in a distributed system. 6

4. a) What do you mean by horizontal distribution in a decentralized architecture? Briefly explain how a distributed hash table (DHT) is used to organize such type of architecture. 2+6

   b) What is Berkley Sockets? What are the different primitives of Berkley Sockets? Explain the connection-oriented communication pattern using Berkley Sockets. 5+4

   c) Figure 1 demonstrates the alternative client-server organization of multi-tiered architecture for distributed systems. Explain its different types with appropriate example. 8

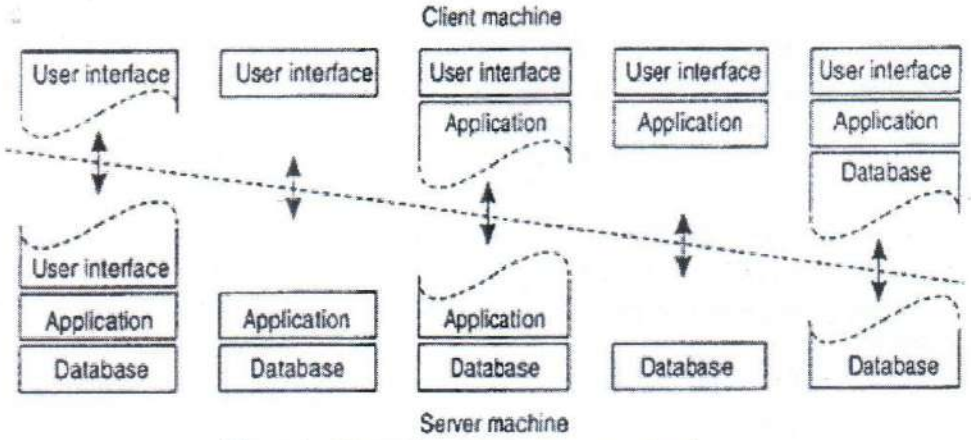


Figure 1: Alternative client-server organization