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B.Sc. Engg. 8th Semester (44)

24 August 2017 (Afternoon)

ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
ORGANISATION OF ISLAMIC COOPERATION (OIC)
Department of Computer Science and Engineering (CSE)

MID SEMESTER EXAMINATION — SUMMER SEMESTER, 2016-2017

DURATION: 1 Hour 30 Minutes — FULL MARKS: 75

CSE 4803: Parallel and 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) What are interceptors? Briefly explain the difference between a horizontal and a vertical distribution. 2+5

b) Suppose you are tasked to design a decision support system for a stock brokerage.The system is divided into two parts. The front end simply provides an user interface to collect data from users. Back end is responsible for accesing financial data from database. It is to be noted that analysis of financial data may require sophisticated methods and techniques from statistics and Artificial intelligence. Now design the system following the layered architectural style and find out the benefits of such architecture. 8

c) Figure 1 demonstrates the alternative client-server organization of multi-tiered architecture for distributed systems. Explain its different types with appropriate example. 10

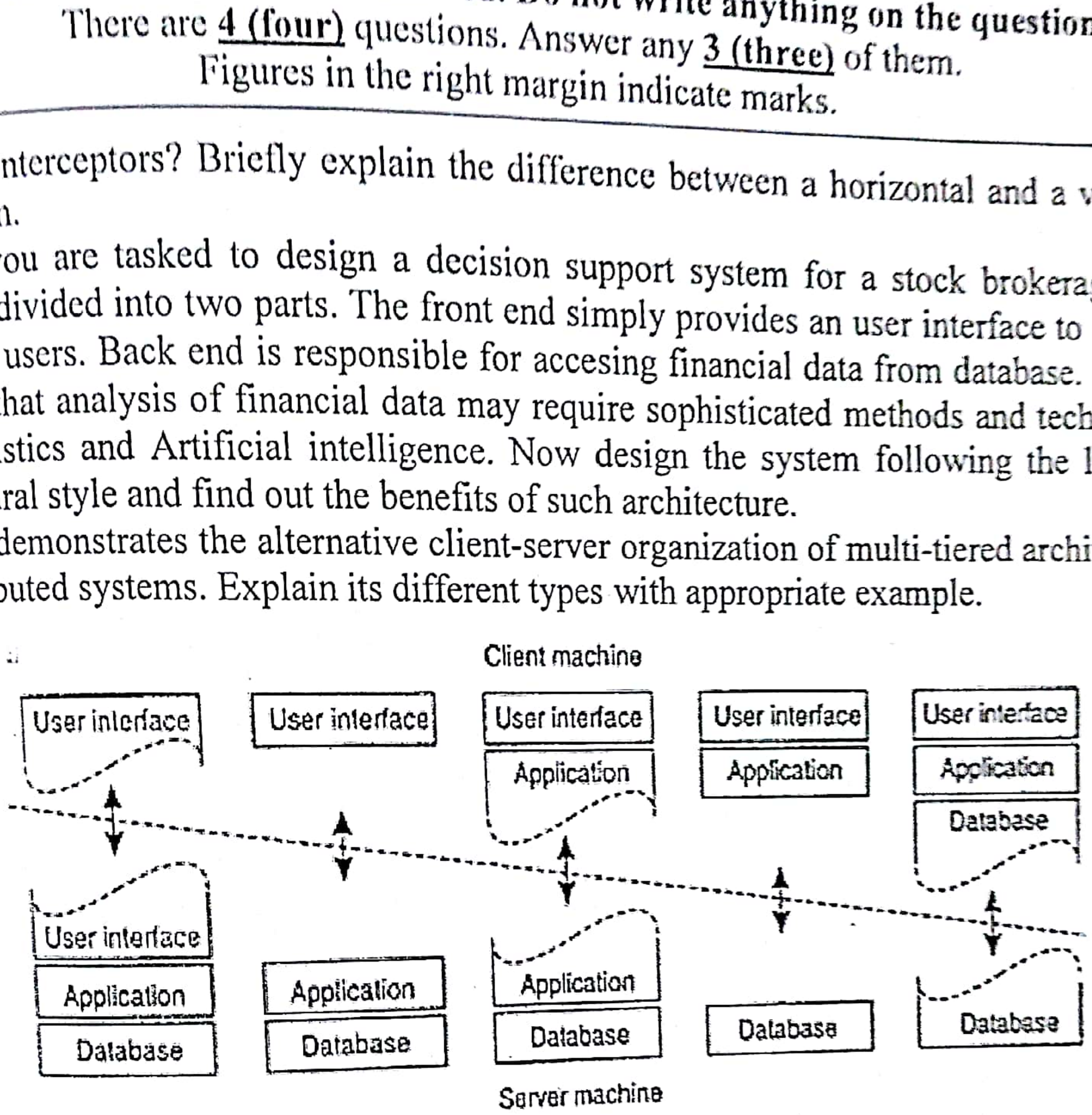

Figure 1: Alternative client-server organization

2 a) Suppose you are tasked to create an E-Commerce application where a user submits orders via a web browser. The front-end program reads and writes forms and menus and maintains a shopping cart. The transaction server processes the order, which requires accessing the database that keeps track of orders, catalog information, and warehouse inventory. Based on the scenario answer the following questions using proper examples and diagrams: 5×4

i. Design the system in such a way that the transaction server and database 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 does 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. Discuss the ACID properties of your system and with help of proper examples describe how the system is conserving those properties.

b) Describe the Publish/Subscribe paradigm. Use a diagram and include a description of the API used in a Publish/Subscribe system.

3. a) With an example explain the process of parameter marshaling in a remote communication through RPC.
   b) MPI, the Message Passing Interface, is commonly used for high-performance computing on clusters. Explain the difference between the primitives MPI_bsend and MPI_isend in MPI.
   c) Briefly describe the general organization of a message broker in a message queuing system.

4. a) 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's 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 5.

      i. Develop finger tables for each node and describe the process for locating a resource with key 26.
      ii. Assume that node 7 has just joined the network. What would its finger table be and would there be any changes to other finger tables?

   b) Explain how DNS can be used to implement a home-based approach to locate mobile hosts.