



THE CATHOLIC UNIVERSITY OF EASTERN AFRICA

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MAIN EXAMINATION

JANUARY – APRIL 2015 TRIMESTER

FACULTY OF SCIENCE

DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE

REGULAR PROGRAMME

CMT 416: CLIENT/SERVER SYSTEMS AND COMPUTING

Date: APRIL 2015	Duration: 2 Hours
Instructions: Answer Question ONE and any other TWO Questions.	

- Q1. a) i) With the use of a diagram, explain the concept of a client/server interaction. **(4 marks)**
- ii) Provide a real-life example of a client/server system. **(2 marks)**
- b) Distinguish the following terms in as far as client/server systems are concerned.
- i) Stateful Vs. Stateless server
- ii) Horizontal Vs. Vertical distribution
- iii) Fat Vs. thin client. **(6 marks)**
- c) i) Name and explain the functions performed by each of the interaction layers/tiers found in a client/server architecture. **(6 marks)**
- ii) With the use of suitable diagrams, distinguish a 2-tier from a 3-tier client/server architecture. **(6 marks)**
- iii) Outline 2 strengths and 2 weaknesses of each of the above architectures. **(4 marks)**
- d) Differentiate a peer-to-peer model from a client/server model. **(2 marks)**

- Q2. a) i) Using well-labeled diagrams, differentiate a centralized from a distributed client/server system. **(4 marks)**
- ii) Provide 2 strengths and 2 weaknesses of each of the types of systems. **(4 marks)**
- iii) In as far as distributed client/server systems are concerned, briefly explain the meaning of the following terms, giving 2 examples of each. **(6 marks)**
1. Transparency
 2. Partitioning
- b) i) Two of the most commonly used protocols in client/server interactions are the Transmission Control Protocol (TCP) and the user datagram protocol (UDP). Outline two similarities and two differences between these two protocols. **(4 marks)**
- ii) Distinguish simplex from half-duplex communication modes. **(2 marks)**
- Q3. a) Using diagrams, differentiate the following classes of client/server models.:
- i) Host-based Vs. Server based
 - ii) Client-based Vs. cooperative based. **(6 marks)**
- b) A database server contains a table called STUDENT with attributes: Reg#, Surname, Firstname, gender, date-of-birth and fees balance. Using SQL, write suitable client requests to:
- i) Create the table **(3 marks)**
 - ii) Display all male students with fees balances of more than 20,000. **(3 marks)**
 - iii) Display all female students aged 20 years and below. **(3 marks)**
 - iv) Display the mean fees balance for all male students. **(3 marks)**
- c) Differentiate a blocking server from a non-blocking one. **(2 marks)**
- Q4. a) i) State what you understand by a remote procedure call (RPC). **(2 marks)**
- ii) With the use of a well-labeled diagram, describe in details all the steps involved in the implementation of a RPC.

- (10 marks)**
- b) i) Explain four situations that may lead to a failed client/server interaction. **(4 marks)**
- ii) Outline four communication mechanisms used in client/server interactions. **(4 marks)**
- Q5. a) i) Define a concurrent server. **(2 marks)**
- ii) Describe using an example, the uncommitted dependency problem that may occur in a concurrent database server. **(6 marks)**
- iii) Discuss the optimistic approach as a solution to the above problem. **(6 marks)**
- b) Using a diagram, explain the 2 – phase commit protocol as used in concurrent transactions. **(6 marks)**

END