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**University Examinations 2014/2015**

THIRD YEAR SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF BUSINESS INFORMATION TECHNOLOGY

**CCS 3427: DISTRIBUTED SYSTEMS**

 **DATE: APRIL 2015 TIME: 2 HOURS**

**INSTRUCTIONS:** *Answer question* ***one*** *and any other* ***two*** *questions*

**QUESTION ONE (30 MARKS)**

1. Distinguish between the following:
2. A centralized and a distributed transaction (2 Marks)
3. File service and file server (2 Marks)
4. Tightly coupled and loosely coupled systems (2 Marks)
5. Stateless and stateful servers (2 Marks)
6. With the help of a diagram show the position of middle ware in a network operating systems

(4 Marks)

1. Explain four scaling techniques that can be used in distributed systems (4 Marks)
2. Explain two mutual exclusion distributed algorithm properties (4 Marks)
3. Compare and contrast bus based and switch based connection as used in distributed systems

(6 Marks)

1. Remote procedure call is a specialized version of message passing. Do you agree with this statement? Give two reasons (4 Marks)

**QUESTION TWO (20 MARKS)**

1. Define concurrency control and explain any four reasons why it is needed in distributed systems (4 Marks)
2. Consider the following two transactions: T1 and T2

T1: debit (account –X, 3000)

TI: credit (account-Y, 3000)

T2: read-balance (account-X)

T2: read-balance (account –Y)

T2: print (account X + account Y)

1. Show that it is possible to run these two transactions concurrently but still meeting the isolation property of transactions (4 Marks)
2. Show that it is possible to run these two transactions concurrently but without meeting the isolation property of transactions (3 Marks)

c) Discuss the steps of passive replication (5 Marks)

d) Compare and contrast RPC and RMI (4 Marks)

**QUESTION THREE (20 MARKS)**

1. Describe four categories of security threats in distributed systems (4 Marks)
2. Describe four security requirements for client server systems (8 Marks)
3. Discuss four reasons why you would advice Meru University to apply file replication mechanism (8 Marks)

**QUESTION FOUR (20 MARKS)**

1. Explain the objective of the following forms of coordination in distributed systems
2. Clock synchronization (4 Marks)
3. Mutual exclusion (3 Marks)
4. Leader election (3 Marks)
5. Describe one algorithm that can be used to ensure each of these forms of synchronization

 (5 Marks)

1. Explain any five consistency models used in distributed shared memory (5 Marks)

**QUESTION FIVE (20 MARKS)**

1. Describe four application areas of distributed systems in modern society (4 Marks)
2. Explain distributed file system requirements (4 Marks)
3. Discuss four distributed system design goals that must be achieved and clearly state why each is important in implementing distributed system in any organization (4 Marks)
4. Discuss two phase commit protocol (4 Marks)
5. List and explain any four types of transparency (4 Marks)