University Examinations 2023/2024

THIRD YEAR SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF COMPUTER TECHNOLOGY AND BACHELOR OF SCIENCE COMPUTER SCIENCE

CCS 3351: DISTRIBUTED SYSTEMS

DATE: APRIL 2024   **TIME: 2 HOURS**

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

QUESTION ONE (30 MARKS)

a)   By use of an illustration discuss the term distributed systems.   [2 marks]

b)   Discuss any four-design consideration for a distributed file.   [8 marks]

c)   Using examples illustrate why distributed systems are in high demand in most

   organization.   [5 marks]

d) Briefly describe the following terms as used in distributed systems.   [5marks]

   i) Degree of transparency

    ii) Socket

   iii) Openness

   iv) RMI

v) Scalability

e) Describe what a distributed Transaction Processing System (DTPS) is and describe any two types of DTPS in business organizations? [4 marks]

f) Distinguish between the following distributions transparencies. [6 marks]

i) Location transparency

ii) Replication transparency

iii) Concurrency transparency

iv) Failure transparency

v) Performance transparency

QUESTION TWO [20 MARKS]

a) Before DNS, a single file was used to store all name information for computer son the Internet. This file was downloaded by everyone on the Internet on a daily basis, from the well-known host that provided it. Briefly explain three problems with this approach that prompted people to develop DNS. [3 marks]

b) The RPC model has been basically used to demonstrate how messages may be passed between two or more remotely connected computers. With an aid of diagram briefly describe what takes place between the two machines during this process. [6 marks]

c) Apart from actual network delay, explain four factors that contribute to the delay incurred when making an RMI call. [4 marks]

d) Answer the following questions about Java RMI:

i. Can objects be created remotely? Explain your answer. [2 marks]

ii.   Explain the deference between a local invocation and a remote invocation. If two Java Virtual Machines are on the same physical machine, and invocation is made between them, is this local or remote?   [2 marks]

iii. What is a remote reference? Using illustrations, explain how an object obtains a remote reference.   [3 marks]

OUESTION THREE [20 MARKS]

Security is a major issue of concern in many establishments that have adopted distributed systems. Assuming that you have recently been appointed as the IT specialist for a large corporate and global organization;

a) Explain five types of security concerns/challenges that you think would bother you as an ICT Manager in a large global organization that has adopted distributed systems.

[10 marks]

b) Demonstrate HOW you would go about implementing at least five transparencies of distribution for this organization, explaining why each of them is important [10 marks]

OUESTION FOUR [20 MARKS]

a)   Consider a distributed file system that implements file replication. Briefly discuss file replication, its benefits and the problems that can occur.   [4 mark]

b)   Discuss five (5) uses of Replication by briefly naming the scenarios it is used in for each.

[5 marks]

c)   Distinguish between the following terms?   [6 marks]

i)   State-full servers and Stateless servers

ii)   Call by value and call by reference

iii)   Blocking and   Non Blocking semantics

d)   Draw an interaction diagram to explain the RRA protocol. Explain what problem(s) the RRA protocol solves that the RR protocol does not.   [4 marks]

QUESTION FIVE (20 MARKS)

(a)   Distinguish between distributed systems physical model and architectural model.

[4 marks]

(b)   Explain the term replication transparency in a distributed system and explain any two forms of replication transparency.   [6 marks]

(c)   When distributed systems are designed and engineered, certain fundamental properties have to be taken into account, including:

    i. Concurrent execution of components.

    ii. Communication latency.

    iii. No global time.

Give two examples of the implications of these properties on the engineering of large-scale, widely distributed systems.   [10 marks]