

## C12-R3: DISTRIBUTED SYSTEMS

### NOTE:

1. Answer question 1 and any FOUR questions from 2 to 7.
2. Parts of the same question should be answered together and in the same sequence.

Time: 3 Hours

Total Marks: 100

1.
  - a) What is meant by openness of a distributed system?
  - b) How are 'interoperability' and 'portability' characterized the distributed system?
  - c) Write down the distinct features of tightly coupled and loosely coupled system.
  - d) How does RPC Exchange Protocol work in client server communication?
  - e) Why is multithreaded process model preferred to ordinary process model?
  - f) When does a starvation occur in optimistic concurrency control? How can it be avoided?
  - g) In a distributed system, computers are attached to a network and their operating system offer a standard communication interface that enables virtual communication channel to be established. Outline the methods by which security violation can be perpetrated in the distributed system.

**(7x4)**
  
2.
  - a) Define the uses of software agent in distributed systems. Give its characteristics and functions.
  - b) What are the services offered by middleware in a distributed system?
  - c) Explain the term 'location transparency' in the distributed environment. Illustrate with an example.

**(8+6+4)**
  
3.
  - a) When the main and the called procedure are in the same machine, the calling operation can be implemented using conventional procedure calls. Is it possible to process the calling operation in the same way when the main and the called procedure are in the different machines? If not, describe the method by which they are processed.
  - b) There are two ways of distributing a transaction across multiple machines. They are nested and distributed transactions. Give the underlined differences between nested and distributed transactions.
  - c) Explain parameter marshaling in RPC system.

**(6+6+6)**
  
4.
  - a) What are the drawbacks of locking in concurrency control? Mention some alternative optimistic approach to serialization of transaction that avoids these drawbacks.
  - b) Write down the features of a good distributed file system.
  - c) Compare secret cryptography with public key cryptography.

**(9+5+4)**
  
5.
  - a) What are the important issues involved in the design and implementation of Distributed Shared Memory (DSM).
  - b) Discuss the potential advantages and drawbacks in the use of a X.500 directory service in place of domain name system (DNS) and internet mail delivery program.
  - c) Discuss, whether Message Passing or Distributed Shared Memory (DSH) is preferable for fault-tolerant applications

**(7+7+4)**

**6.**

- a) What are the reasons for migrating code in the design of a distributed system? Mention different models for code migration.
- b) What is a distributed Deadlock? What are the necessary conditions for deadlock to occur in distributed environment?
- c) How do the client-server architecture of one or more major Internet applications invoke the partitioning and/or replication of data amongst servers?

**(6+6+6)**

**7.**

- a) Why is the file caching scheme needed? What are the three design issues of a file caching scheme for a distributed file system? Describe each in brief.
- b) Describe in brief the sequential consistency model proposed by Lamport for a Distributed Shared Memory.

**(10+8)**