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**University Examinations 2015/2016**

FOURTH YEAR, FIRST SEMESTER EXAMINATION FOR BACHELOR OF BUSINESS INFORMATION TECHNOLOGY AND BACHELOR OF SCIENCE IN COMPUTER SCIENCE

**CCS 3427/CCS 3351: DISTRIBUTED SYSTEMS**

**DATE: NOVEMBER, 2015 TIME:** $2$ **HOURS**

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

**QUESTION ONE – (30 MARKS)**

1. Distinguish between a distributed operating system and a network operating system in terms of system image, fault tolerance and autonomy. (6 Marks)
2. Networked systems have evolved from peer-to-peer networks to client server systems against peer to peer systems? (4 Marks)
3. Caching and file replication are two mechanisms used to help in file service in distributed remote access systems. Explain how the mechanisms are used to realize the services and state the limitations of each of the mechanism. (6 Marks)
4. Individual computers and servers in distributed systems incorporate a physical clock for timing and sequencing purposes. How are the individual clocks synchronized to serve the function of a single distributed system? (4 Marks)
5. Outline the architecture of a 2-tier fat client thin server in terms of the client server layers. (4 Marks)
6. The sketch diagram in Fig 1illustrates communication between different remote machines in a distributed system. Explain the implementation of a distributed operating system from kernels of individual communicating machines. (6 Marks)

**QUESTION TWO (20 MARKS)**

1. Explain the client/server, two message, three message and four message reliable IPC protocols. (6 Marks)
2. Process migration is a common feature in distributed systems. Define the term and state the need for migration. (5 Marks)
3. Explain the term to live (TTL) with respect to transmitted message in a distributed system. What role does it serve in a distributed network? (4 Marks)
4. Differentiate between synchronous communication and Asynchronous communication.

(5 Marks)

**QUESTION THREE (20 MARKS)**

1. With the aid of a fully labeled diagram, explain the implementation of message passing in a client server system using remote procedure call. (8 Marks)
2. Distinguish between the following distributed systems devices in terms of storage characteristics. (4 Marks)
3. Mainframe
4. Database
5. File server
6. In a distributed file system, the file server may be implemented as stateful or stateless file server. Explain. (3 Marks)
7. The major issue with respect to the implementation of a directory service are the potential size of the directory store, the frequency or clients’ request and fault tolerance. Discuss three techniques employed to implement a scalable, fault tolerant directory service(5 Marks)

**QUESTION FOUR (20 MARKS)**

1. Explain the various five reasons for designing applications in Distributed processing system

 (15 Marks)

1. Discuss the concept of optimistic concurrency control. (5 Marks)

**QUESTION FIVE (20 MARKS)**

1. Object –Oriented models are appropriate because they naturally support the concepts of distributed computing. Concepts of interfaces, inheritance, refinement and encapsulation can be applied in Distributed Systems. Justify. (10 Marks)
2. Explain the features of Concurrency Control in Distributed Computing Environment.

(10 Marks)