

M.E. SOFTWARE ENGINEERING (6 SEM)2nd year, 2nd semester**DISTRIBUTED SYSTEMS**

Time: 3 Hours

Full Marks: 100

Note: Answer any five questions

1. (a) Explain what is meant by (distributed) transparency, and give examples of different types of transparency.
- (b) What is the role of middleware in a distributed system?
- (c) Why is it sometimes so hard to hide the occurrence and recovery from failures in a distributed system?
- (d) What do you mean by openness and flexibility of a Distributed System?
- (e) State the difference between distributed OS and network OS?

(5+4+4+4+3)

2. (a) Discuss the consequence of the following in a distributed system:

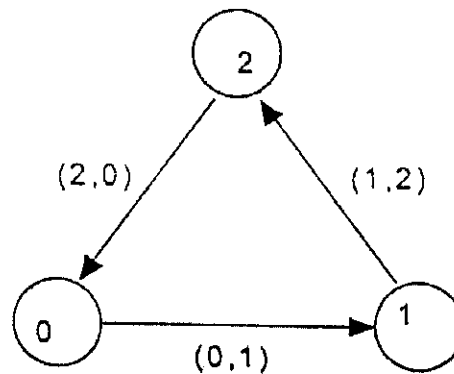
(i) Absence of global clock (ii) absence of shared memory

- (b) Introduce the Lamport's system of logical clocks. How can it be guaranteed that the logical clocks satisfy correctness of 'happened before' conditions? What is the limitation of Lamport's clocks?
- (c) How vector clocks are maintained at each process? Formally state the fundamental property of vector clocks.

(2x2+5+2+2+5+2)

3. (a) Explain the Chandy-Lamport Algorithm for finding out the Distributed Snapshot.

- (b) Prove that the algorithm indeed records the consistent global state. What is the message complexity of the algorithm?



- (c) Three processes are connected as shown in above figure. A number of tokens are circulating along the directed channels. Show how Chandy-Lamport algorithm can be used to count the number of tokens.

(10+3+2+5)

4. (a) Define 'Global State'. Discuss the use of cuts of a distributed Computation. When does a cut become inconsistency?
(b) Explain how the termination of a computation is detected in a distributed system.
(c) How is termination of a computation detected for any unidirectional ring network?

(2+2+2+8+6)

5. (a) Consider the following situation and draw a resource allocation graph : "There are 1 (one) unit of resource R1 and 2 (two) units of resource R2. Process P3 is holding one unit of R2, process P1 is holding another unit of R2 and process P2 is holding the single unit of R1. P1 places a request for R1, P2 places a request for R2. Find out if deadlock exists in the wait-for-graph. Give reasons for your answer.
(b) What are the different strategies for handling deadlocks?
(c) Describe the Chandy-Misra-Haas algorithm for and model for distributed deadlock detection with a suitable example.

(6+2+12)

6. (a) What are the issues in Distributed File System ?
(b) What are the major goals of Sun NFS?
(c) Write a note on Andrew file system.
(d) In the context of Distributed System explain following-
i) Mounting ii) Caching iii) Replication

(4+3+4+3x3)