

Distributed Computing

Paper code: IT 702

Branch: IT

Time: 3 hours

Full Marks: 70

Answer ANY FIVE questions

1. (a) What are the desirable features of a distributed system? Discuss.
(b) Out of the above features, which are achieved by today's Internet?
(c) To qualify the Internet as a true distributed system, in your opinion, which are the properties at least to be incorporated?

6 + 4 + 4
2. (a) Discuss the role of middleware in a distributed system.
(b) Describe the NFS (Network File System) architecture for UNIX systems with suitable diagram.
(c) Discuss about the role of RPC in NFS.
(d) What is the role of naming in distributed file systems?

3 + 5 + 3 + 3
3. (a) "Distributed system is a GOD-less system" – Discuss.
(b) Define the Leader Election problem.
(c) How do you measure the performance of distributed algorithms?
(d) Find the lower bound of Leader Election problem.

3 + 2 + 3 + 6
4. (a) Is it possible to perfectly synchronize the physical clocks of a number of computers? Discuss.
(b) What is happens-before relation?
(c) When do you tell that two processes are concurrent while the processes communicate by only message passing?
(d) Describe a method to record Global state of a distributed system.

3 + 2 + 3 + 6
5. (a) What are the desirable features of load balancing algorithms?
(b) Suppose, there are two good algorithms – one is load balancing algorithm and another is load sharing algorithm. To get better performance, which one will you prefer to implement in a distributed system? Why?
(c) What are the difficulties one may face in implementing the process migration in a distributed system?

5 + 4 + 5
6. (a) Discuss about the consistency models.
(b) Show with examples that if there are f faulty nodes in an n -node distributed system, then the system can reach to some agreement if $n \geq 3f + 1$.
(c) How can you handle Deadlock in a distributed system?

5 + 5 + 4
7. (a) Find the message complexity of Lamport's algorithm for mutual exclusion problem.
(b) Describe Meakawa's algorithm. Find its complexity.
(c) Find the complexity of Remond's algorithm.

4 + 5 + 5