

Nepal College of Information Technology
Subject: Distributed System (BESE VII)
Tutorial

Tutorial submission is compulsory.

1. What are the major consequences of distributed system? Explain the characteristic features of distributed system.
2. What are the major roles of middleware system? Explain different distribution transparency in detail.
3. Why do we need an Interprocess communication? Explain different IPC mechanisms in distributed system.
4. How synchronous communication is different from asynchronous communication? Explain the variations of client server model.
5. What are the similarities and dissimilarities between RPC and RMI? Explain the term distributed object, remote object, remote interface, proxy and skeleton.
6. How traditional RPC lacks in access transparency? Explain the detail of RPC semantics in presence of failure? What are the mechanisms to handle orphan message?
7. Explain the architecture of Remote Method Invocation. What are the different invocation semantics of RMI?
8. What is interface repository and implementation repository? Explain the static and dynamic invocation in CORBA.
9. List and explain few application why those applications uses blocking and non-blocking message passing system. In which situation we can use asynchronous RPC? Before transmission, Sun XDR marshals data by transforming it to a standard big-endian format. Compare and contrast the benefits and drawbacks of this technique with CORBA CDR.
10. What is Domain Namespace? Explain the working mechanisms of DNS with relevant example.
11. What is cache consistency problem? Explain the File service architecture.
12. Compare stateful vs stateless file service. Explain Network File System Architecture.
13. Why it is difficult to synchronize things in distributed system? How accuracy is maintained in Berkeley clock synchronization algorithm?
14. What is clock synchronization? What is drift rate? Explain NTP and Cristian's algorithm for distributed clock synchronization.
15. Why is computer clock synchronization necessary? Describe the design requirements for a system to synchronize the clocks in a distributed system.
16. What do you mean by partial order, total order and causal order of messages? In Lamport's logical clock: $a \Rightarrow b$ implies $\text{Lamport_timestamp}(a) < \text{Lamport_timestamp}(b)$ but $\text{Lamport_timestamp}(a) < \text{Lamport_timestamp}(b)$ doesn't imply $a \Rightarrow b$. How this problem does solve? Explain with algorithm and example.
17. Differentiate concurrent event and causal event? How logical clock is different from physical clock? How do we enforce the global ordering requirement in a distributed environment (without a common clock)?
18. What are the basic requirements for the distributed mutual exclusion? Explain Suzuki Kasami Algorithms for distributed mutual exclusion.
19. Differentiate token based mutual exclusion algorithm and non-token based mutual exclusion algorithm. Compare Lamports and Ricart Agarwala algorithm for distributed mutual exclusion
20. In Ricart-Agrawala token based mutual exclusion algorithm: Explain various states used with state transition diagram. How does any process find out if there is a pending request? Illustrate with example.
21. List various token based and non-token based mutual exclusion algorithm. Also compare them according to number of message passing in order to execute per critical section.
22. Describe the need of election algorithm. Explain Chang and Robert (ring based) election algorithm with suitable example.

23. Why replication is required in distributed system? Explain five phases performing a request by replication manager.
24. What is fault, failure and fault tolerance? Explain active and passive replication.
25. Explain the different approaches of fault tolerance. Explain cold failover, warm failover and hot failover.
26. What are the different types of failure models? In distributed systems where messages are asynchronous and failures can be Byzantine, we have to use at least $n = 3m + 1$ replicas in total to tolerate m faulty replicas. Show that this bound is tight, i.e., that $n \geq 3m + 1$ must hold in order for the system to work properly.
27. What is reliable multicasting? Explain virtual synchrony.
28. What is sub transaction and distributed transaction? Explain the two-phase commit and three-phase commit algorithm.
29. What is forward and backward recovery? Explain naïve snapshot algorithm.
30. What is flat transaction and nested transaction? Explain the concepts of Lost update protocol, Inconsistence retrieval problem, serial equivalence and conflict operation with an appropriate example.
31. What is Atomic commitment protocol? Explain the locking rule for two phase locking.
32. What is phantom Deadlock? Explain different deadlock detection algorithms in distributed system.
33. Differentiate communication deadlock with resource deadlock. Explain, how deadlock is occurred in message communication?
34. What is mutual waiting? Explain Timestamped based deadlock prevention Scheme.

*** ALL THE BEST ***