Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (W), Mumbai : 400058, India

(Autonomous College of Affiliated to University of Mumbai)

End Semester Examination

December 2022

Maxi Marks: 100 Duration: 3 hours
Class: T.Y. Semester: V
Course code: 304 Branch: IT, COMP
Name of the course: Distributed Computing

Q No		Max Marks	CO	BL
Q.1 (a)	Identify the various problems of replication. How to improve the performance of distributed application using replication?	5	3	3
(b)	Compare the Cristian's clock synchronization algorithm and Berkeley's clock synchronization algorithm.	5	4	4
(c)	What is RMI? Compare between static and dynamic RMI.	5	2	4
(d)	Explain the general structure of distributed system as middleware. State the any three services provided by middleware.	5	1	5
Q. 2 (a)	A client makes a remote procedure call to a server. The client takes 5 milliseconds to compute the arguments for each request, and the server takes 10 milliseconds to process each request. The local operating system processing time for each send or receive operation is 0.5 milliseconds, and the network time to transmit each request or reply message is 3 milliseconds. Marshalling or unmarshalling takes 0.5 milliseconds per seconds per message. Evaluate the time taken by the client to generate and return from two requests: i) if it is single threaded and ii) if it has two threads that can make request concurrently on single processor. Ignore the context switching time. OR In the client server model implemented using a simple RPC mechanism, after making RPC request, a client keeps waiting until reply is received from the server for its request. It would be more efficient to allow the client to perform other jobs while the server is processing the request. Describe three mechanisms that may be used in this case to allow a client to perform other jobs while the server is processing its request.	10	2	5

(b)	What actions to be taken with respect to the references to local resources when migrating the code to another machine? Justify these actions with example.	10	3	5
Q.3 (a)	Suppose there are three processes A, B and C. All clock runs at the same rate but initially A's clock reads 10, b's clock reads 0 and C's reads 5. At time 10 by A's clock, A sends message to B, this message takes 4 units of time to reach B. B then waits one unit of time and then sends a message onto C which takes 2 units of time to reach C. Assuming that the system implements Lamport's timestamps draw a picture illustrating the timestamps for the message and explain how the timestamps are obtained.	10	4	5
(b)	What are the reasons of distributed systems are being more popular and useful? Explain any three distributed computing system models with examples.	10	1	5
Q.4 (a)	Construct with neat diagrams and give example of different forms of communication, such as persistent asynchronous, persistent synchronous, transient asynchronous, receipt based transient synchronous, delivery based transient synchronous, and response based transient synchronous communication.	10	2	3
(b)	Suppose you have decided to use the high-low policy as the process transfer policy of a load balancing algorithm for distributed system. Select the suitable method that you will use in your implementation for choosing high mark and low mark values. Do these threshold values have to be same for all processors in the system? Give reasons for your answer.	10	3	3
Q5. (a)	What is client centric consistency model? The mobile user accessing different replicas of distributed database apply the eventual consistency with respect to this scenario and explain.	10	3	3
(b)	How mutual exclusion algorithm satisfy the requirement of mutual exclusion and starvation using centralized approach and distributed approach? Give the example of centralized mutual exclusion algorithm for 3 processes and one coordinator process showing request, reply, and release messages. How it is advantages to use a timestamp for distributed mutual exclusion? Justify your answer using 4 processes with timestamp for distributed mutual exclusion.	10	4	3