Sardar Patel Institute of Technology

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(Autonomous College Affiliated to University of Mumbai)

End Semester Examination

May 2021

Max. Marks: 60 Duration:130 min.
Class: T.Y. Semester: VI
Course Code:IT61 Branch: IT
Name of the Course: Distributed Systems

Instruction:
(1) All questions are compulsory
(2) Draw neat diagrams
(3) Assume suitable data if necessary

Q. No.		Max. Marks	CO-BL-PI
1 a)	What is a phantom deadlock? What might be the reason for phantom deadlock in a distributed system? Suppose that centralized deadlock detection scheme in which the transfer on request method is used to transfer the information from the local coordinator to the central coordinator. Give an example to show that the algorithm may still detect a phantom deadlock.	5	2-2-2.3.1
b)	How the code is executed on the CPU and GPU memory in CUDA? How the allocating and deallocating of device memory space via cudaMalloc and cudaFree takes place?	5	5-2-1.4.1
c)	Why is heterogeneity unavoidable in many distributed systems? What are some of common types of incompatibilities encountered in heterogeneous distributed systems? What are the common issues with which the designer of a heterogeneous distributed system must deal?	5	1-3-2.2.2
2 a)	A server is designed to perform simple integer arithmetic operations (addition, subtraction, multiplication and division). Clients interact with this server by using an RPC mechanism. Describe the contents of the call and reply messages of this RPC application, explaining the purpose of each component. **OR** How would you incorporate persistence asynchronous communication into model of communication based on RMI to	7	2-2-3.3.1

	remote objects? In Java Remote object invocation how to pass object by reference or by value give an example with justification.		
b)	How GIOP and IIOP used in CORBA? What is the role of ORB? Give the example of interface and implementation repository used in CORBA. What are the functions of interfaces used in CORBA at client and server side?	8	4-4-2.2.2
3a)	The process migration facility of distributed system does not allow free migration of processes from one node to another but has certain restrictions regarding which node's processes can be migrated to which other nodes of the system. What might be the reasons behind imposing such a restriction? What are the action to be taken with respect to the references to the local resources when migrating the code to another machine?	7	2-5-2.2.3
b)	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 clock 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. **OR** In the ring-based election algorithm, two or more processes may almost simultaneously discover that the coordinator has crashed and then each one may circulate an election message over the ring. Although this may not cause any problem in the election, it results in waste of network bandwidth. Modify the algorithm so that only one election message circulates completely round the ring and others are detected and killed as soon as possible.	8	3-2-2.4.1
4 a)	A programmer is writing an application for release consistent system. However an application needs sequential consistency to produce correct results. What precautions must the programmer take? Choose an example of an application for which causal consistency is the most suitable consistency model.	7	3-3-2.2.2
b)	How to construct message queuing model is used in message oriented persistent communication? What is the relationship between the queue level addressing and network level addressing is used in message queuing system?	8	2-3-2.2.2