Total no. of Pages: .....

Roll no. 2022UCD2110

Degree: B.Tech Semester: 5th

MID-SEMESTER EXAMINATION, September, 2024

Course Title: Distributed Computing
Course Code: CACSC15 / CDCSC15

Duration: 1:30 Hours

Max. Marks: 15

Note: - Attempt all questions in the given order only. Missing data/information (if any), maybe suitably assumed & mentioned in the answer.

Q. No.	Question	Marks	CO
1a	List down the differences between client-server model and peer to peer model.	1.5	CO1
1b	What are the key characteristics that define a distributed system Provide three real world examples of distributed systems and briefly describe how they function.	1.5	CO1
2a	Describe the main steps involved in a remote method invocation process in a distributed system.	1.5	CO2
2b	What is the difference between marshalling and unmarshalling, and why are these processes important in RPC?	1.5	CO1
3a	Explain the concept of network virtualization and give an example of how it is used in real-world scenarios.	1.5	CO2
3b	Describe parallelism/concurrency in distributed systems.	1.5	CO3
4a	What is a role of buffer in inter-process communication, Explain it's types.	1.5	CO3
4b	What role does the architectural model play in defining how components of a distributed system interact.	1.5	CO2
5a	How does multicast communication differ from broadcast communication and what are some real applications of multicast?	1.5	CO1
5b	Explain the concept of a physical model in distributed computing with all its components. How does the physical structure of a distributed system impact its communication protocols and overall performance?	1.5	CO1

Total no. of Pages: 2 Roll no. .....

Degree: B. Tech Semester-5th

END-SEMESTER THEORY EXAMINATION, NOV-DEC,2024

Course Code: CDCSC15/ CACSC15 Course Title: Distributed Computing

Time: 03 Hours Max. Marks: 40

Note: - Attempt all the five questions. Missing data/ information (if any), maybe suitably assumed & mentioned in the answer.

Q. No.	Question	Marks	CO
Q 1	**Attempt any 2 parts of the following**		
1a	Provide examples of two types of distributed systems where interaction models play a crucial role in maintaining system performance and reliability. Explain why the interaction model is significant in each case.	4	CO1
1b	Identify applications where blockchain technology is used within distributed computing. Discuss the advantages and challenges of using blockchain in each example.	4	CO1
1c	Explain the significance of the physical model in designing distributed systems, particularly in relation to network topology and communication.	4	CO2
Q 2	**Attempt any 2 parts of the following**		
2a	Define message queues and explain their role in distributed computing systems. Describe how they enable asynchronous communication between different components of a distributed application.	4	CO2
2b	Describe two common shared memory approaches used in distributed computing. For each approach, explain how it works and discuss one advantage and one disadvantage.	4	CO3
2c	Describe the concept of overlay networks and explain how they are implemented on top of physical networks.	4	CO2
Q 3	**Attempt any 2 parts of the following**		
3a	Describe the role of various modules in Distributed File System Architecture. Explain how each module functions individually and collaboratively to support file access, organization, and management in a distributed environment.	4	CO4

3b	Explain the importance of Clock synchronization in Distributed computing. How do algorithms like Lamport's logical clock and vector clock for logical clocks contribute to achieving consistency?	4	CO3
3c	Consider two processes P1and P2, each with its own sequence of events. Analyse their behaviour using Lamport's logical clock. Intitial clock values of process P1 and P2 are C1=0 and C2=0 respectively.Events and Communications: • Process P1generates events a,b,c • Process P2generates events d,e,f • P1sends a message to P2 between events b and c • P2 sends a message to P1 between events e and f Calculate the values of C1 and C2 after the occurrence of all the events.	4	CO3
Q 4	**Attempt any 2 parts of the following**		
4a	Explain the concept of Distributed Mutual Exclusion in distributed systems. Discuss the challenges of achieving Coordination and Agreement in distributed systems.	4	CO5
4b	Describe the approach of any two algorithms that helps to approach mutual exclusion effectively. Also Discuss how nested transactions help manage complex, multi-step operations across distributed systems	4	CO3
4c	Elaborate the process of how transactions work in distributed computed diagram. Discuss the roles of two-phase commit and three-phase commit protocols in ensuring transaction consistency	4	CO3
Q 5	**Attempt any 2 parts of the following**		
5a	In distributed systems, transactions can be structured as flat or nested. Describe how each type of transaction works, and discuss the advantages and challenges associated with using nested transactions compared to flat transactions in a complex distributed application.	4	C02
5b	In a distributed banking system, multiple users are transferring money between accounts simultaneously. Describe a potential scenario where a deadlock could occur during these transactions. Suggest a suitable deadlock detection and resolution strategy to avoid transaction failures and ensure consistency.	4	C03
5c	A government portal requires that only authorized users can access confidential citizen data. Describe how digital signatures and cryptographic algorithms can be used to authenticate users and protect sensitive data from unauthorized access and tampering.	4	C05