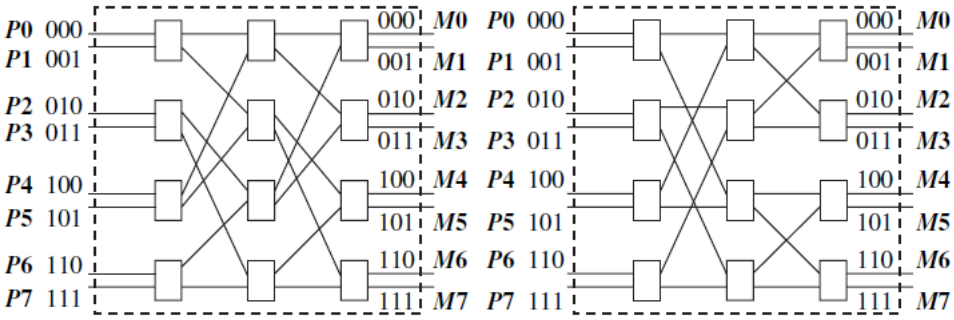
7th semester
Distributed System (CSE751)

Sample Question Bank only

Unit -1

1. Define Distributed System. Explain the features of a distributed system. 21,22
2. Explain the layered architecture of distributed system Interaction of the software components at each processor. 22,23
3. List the motivation for using a distributed system in detail. 24,25
4. Write the rules to update the clocks in scalar time and vector time. 73,75
5. Draw the Omega and Butterfly networks for n = 16 inputs and outputs.
6. For the Omega and Butterfly networks shown

https://wiki.zhen-zhang.com/tech/notes/books/Distributed/Distributed%20-%20Intro/



(a) 3-stage Omega network ($n = 8$, $M = 4$) (b) 3-stage Butterfly network ($n = 8$, $M = 4$)

trace the paths from P5 to M2, and from P6 to M1.

7. Explain Flynn's taxonomy in detail. 30,31
8. Explain the issues and challenges from an algorithm perspective of distributed computing systems. 44->50
9. Explain blocking/non-blocking and synchronous/asynchronous primitives in detail with diagram. 35->38
10. Show that all events on the surface of the past cone of an event are message send events. Likewise, show that all events on the surface of the future cone of an event are message receive events. 67
11. Why is it difficult to keep a synchronized system of physical clocks in distributed system? Discuss.
12. Draw the k-stage Omega networks for n = 8 inputs and outputs where k=3.
13. Illustrate the global state of a distributed computation by constructing the space–time diagram of a distributed execution. 63->65
14. Illustrate how the efficient implementation of vector time occurs by using Singhal–Kshemkalyani's differential technique.

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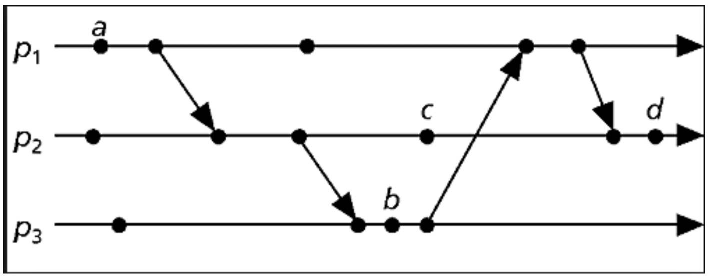
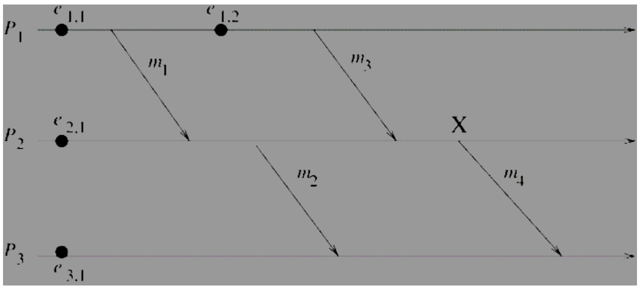


15. Apply Jard-Jourdan’s adaptive technique for the given space timing diagram, and compute the vector clock progress.



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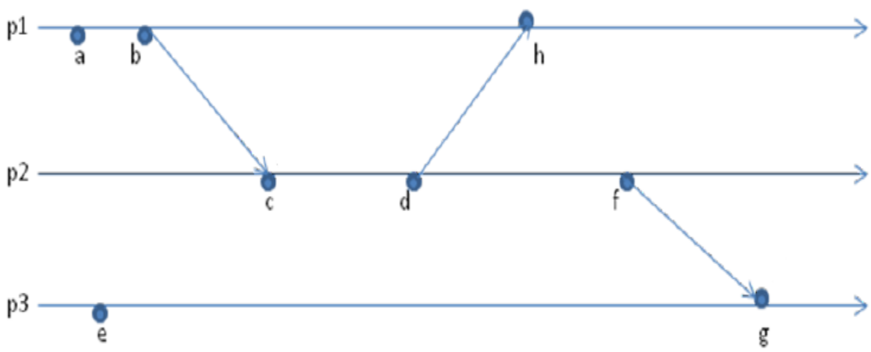
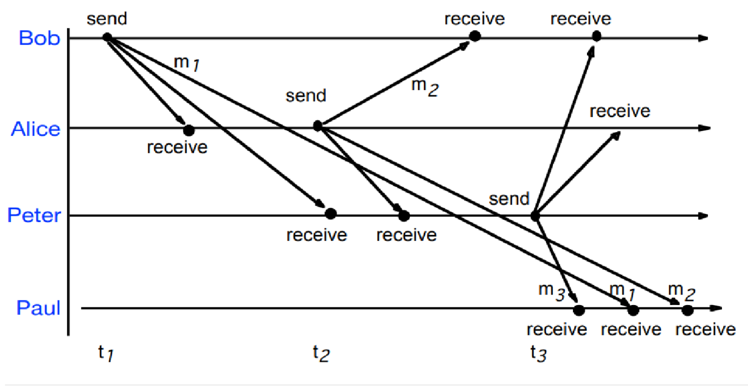
14.Apply Jard-Jourdan’s adaptive technique for the given space timing diagram, and compute the vector clock progress.

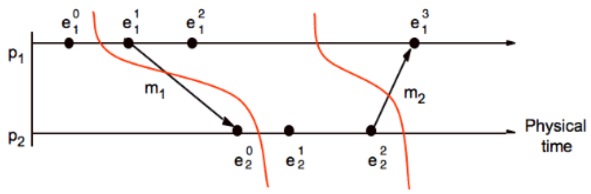


15 Apply Singhal-Kshemkalyani’s differential technique for the given space timing diagram, and compute the vector clock progress.



Unit -2

1. Discuss about the cuts in distributed computation and state whether the cuts specified in the given space time diagram are consistent or inconsistent.



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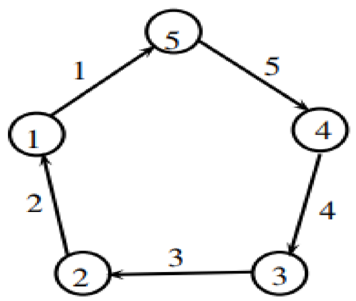
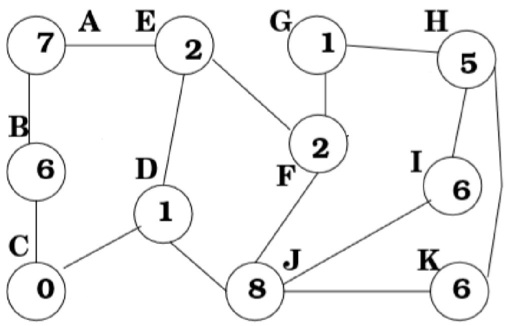
2. Write and Illustrate Chandy–Lamport snapshot algorithm. 113
3. Explain how Lai and Yang's global snapshot algorithm fulfills the role of marker in a non-FIFO system by using a coloring scheme on computation messages. 122
4. Explain the Mattern's algorithm based on vector clocks with an example. 125
5. Explain the 2 phases in Spezialetti-Kearns algorithm for the efficient dissemination of the recorded snapshot.
6. Using a coloring scheme on computation messages, explain how the Lai–Yang algorithm fulfills this role of a marker in a NON-FIFO system.
7. Illustrate the Asynchronous execution of single-initiator spanning tree algorithm using flooding. 158
8. How does γ synchronizer process its function using clustering scheme, discuss the same.
9. Illustrate Luby's Randomized Algorithm 190
10. Briefly discuss MIS 189
11. Explain the working of Channel state recording in Acharya–Badrinath algorithm. 127
12. List and explain the 4 standard synchronizers proposed by Awerbuch. Also tabulate the message and time complexity for each synchronizer.
13. Indicate the variant techniques followed in Spezialetti–Kearns algorithm for efficient snapshot recording when compared to Chandy–Lamport algorithm. Recall the message complexity assembling and disseminating the snapshot.

240

14. Classify the four classes of source–destination relationships for open-group multicasts and discuss the propagation tree approach for each of them.
15. Ilustrate the LCR leader election algorithm assuming process 3 is the initiator and Identify the Leader. 194



16Apply Luby's algorithm for the maximal independent set in an asynchronous system by showing the execution. Random Initiators: {C,A,K,G}



17.How does γ synchronizer process its function using clustering scheme, discuss the same.
18.Explain the 2 phases in Spezialetti-Kearns algorithm for the efficient dissemination of the recorded snapshot.
19.Illustrate how the marker in Chandy-Lamport algorithm helps to record the global snapshot?

Unit 3

222 224 1. Write the Bagrodia's Algorithm for Binary Rendezvous. Write the observations about synchronous communication under binary rendezvous.

188 2. Write the procedures for executing the β synchronizer phase, Converge cast and broadcast phase.

3. Prove the correctness of the termination detection by weight throwing algorithm by defining the invariants. Describe the message optimal termination detection algorithm.

237 4. Explain the three-phase total ordering algorithm by illustrating the messages REVISE_TS, PROPOSED_TS and FINAL_TS.

273 5. Describe the stack _clean up procedure in message-optimal termination detection algorithm.

237 6. Write and explain the centralized algorithm to implement total order and causal order of messages. Write the Drawbacks and the complexity of the algorithm.

7. Write the Bagrodia's Algorithm for Binary Rendezvous. Write the observations about synchronous communication under binary rendezvous.

8. Design a termination detection algorithm that is based on the concept of weight throwing and is tolerant to message losses. Assume that processes do not crash. 265

9. Discuss the features of a reliable multicast of the message.

10. State the rules defined for Termination detection using distributed snapshots. 264

11. Justify the importance of Message-Optimal Termination Detection algorithm stating its application.

Unit 4

374 1. Describe the issues in Deadlock Detection. State the conditions to be satisfied by a deadlock detection algorithm during execution.

344 2. Explain Lodha and Kshemkalyani’s fair mutual exclusion algorithm, stating their application.

327 3. List the requirements of Mutual Exclusion Algorithms.

338 4. Write Singhal’s dynamic information-structure algorithm.

329 5. Illustrate the operation of lamport’s algorithm, requesting for the critical section. Discuss the proof for ensuring the correctness of algorithm.

329 6. Describe the working of distributed mutual exclusion algorithm developed by Lamport.

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332, 348 14. Show that in the Ricart–Agrawala algorithm the critical section is accessed in increasing order of timestamp. Does the same hold in Maekawa's algorithm?

15. Define all the relevant variables and formulate in detail, a deadlock detection algorithm based on stable predicate detection.

382 16. Discuss the data structures used in Chandy–Misra–Haas algorithm for the AND model.

385 17. Write and explain in detail Kshemkalyani–Singhal algorithm for the P-out-of-Q model.

342 18. Describe the Multiple uses of a REQUEST message and REPLY message in Lodha and Kshemkalyani's fair mutual exclusion algorithm.

Unit -5

710 1. Illustrate the scalable object location algorithm for Chord distributed hash table by showing a query lookup using the logarithmically-structured finger tables.

699 2. Classify and explain the Data Indexing mechanisms.

698 3. Show the desirable characteristics and performance features of P2P systems.

400 4. Appraise about active and passive states in termination of an execution.

541 5. Show the relationships between messages and rounds in the oral messages algorithm for the byzantine agreement.

400 6. Compare Stable predicates and unstable predicates. Identify the challenges in detecting unstable predicates and the two-phase detection of a stable property.

404 7. Illustrate with an example, how to detect a relational predicate by examining the state lattice

409,410 8. Illustrate *Possibly*(ϕ) and *Definitely*(ϕ) vith an example

534 9. Justify how in a system of n processes, the byzantine agreement problem (as also the other variants of the agreement problem) can be solved in a synchronous system.

10. When can be a predicate considered to be conjunctive predicate? Justify with example.

11. Write the Protocol for k-set consensus in an asynchronous system.

402 12. State the challenges in detecting unstable predicates. Mention how they can be addressed.

570 13. Discuss the Wait-free Consensus using Compare and Swap, state atleast one real time application of the same.

701 14. List out the main advantages of unstructured overlays.