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Sri Sivasubramaniya Nadar College of Engineering, Kalavakkam – 603 110

(An Autonomous Institution, Affiliated to Anna University, Chennai)

Computer Science and Engineering

Continuous Assessment Test - III

Answer Key

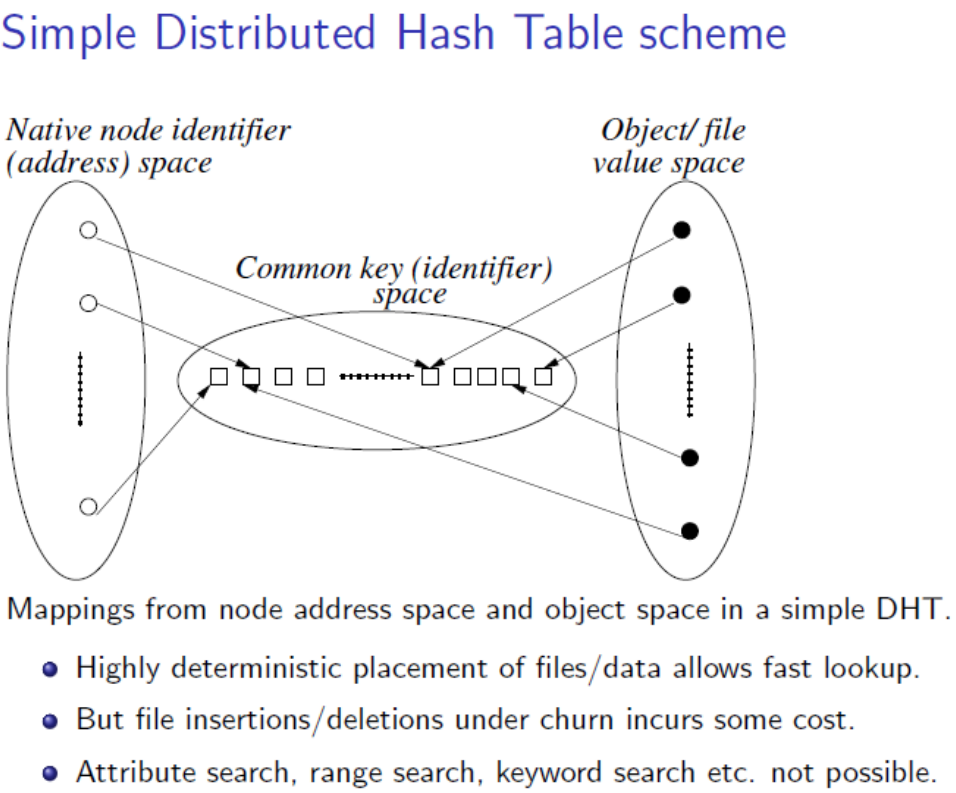
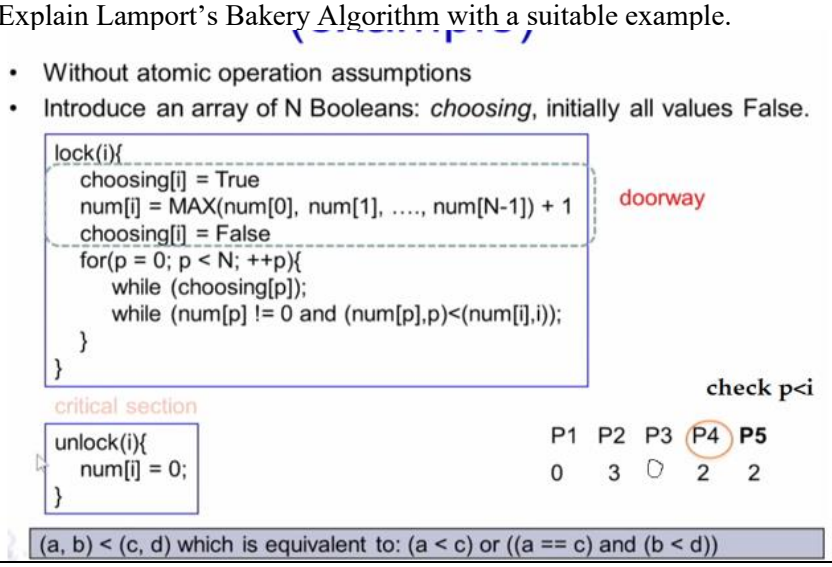
Degree & Branch	BE - CSE				**Semester**	7
Subject Code & Name	UCS1701- Distributed Systems				**Regulation:**	**2018**
Academic Year	2023-2024 ODD	**Batch**	2020-2024	**Date**	**03.11.2023**	**FN / ~~AN~~**
Time: 08:10 - 09:40 a.m (90 Minutes)	**Answer All Questions**				**Maximum: 50 Marks**	

Part – A (6×2 = 12 Marks)

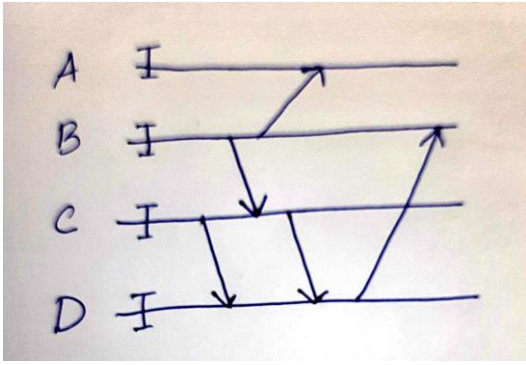
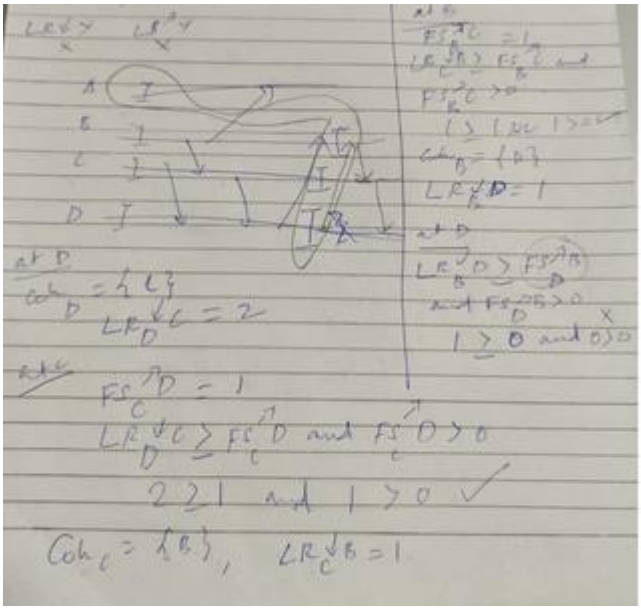
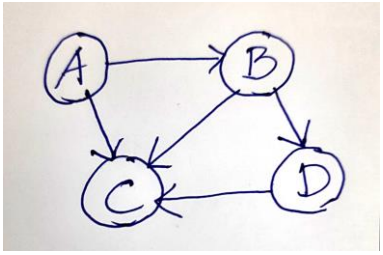
K2	1. If the source is faulty, outline the effect of consensus. If the source is faulty, it is difficult to arrive at consensus due to source sending the incorrect values or subset or all processes.	CO4	1.4.1 2.2.3
K1	2. Define Orphan Messages in distributed systems. Received being recorded and send event is not recorded due to rollback recovery.	CO4	2.2.3
K1	3. What is the difference between a P2P and Client Server system. Client-server networks have a dedicated server and specialized clients, whereas peer-to-peer networks allow any node to operate as both a client and a server. In a client-server model, the server gives the client services.	CO5	1.4.1 2.2.3
K1	4. Define the term Overlay Networks. Virtual network on top of physical network formed in P2P is called overlay network.	CO	1.4.1 2.2.3
K1	5. Mention any two applications of P2P systems. Skype Bittorent Distributed Databases and Computation. Oceanstore	CO5	2.1.1
K1	6. What is local indexing and in which type of overlay it is used? Local indexing is used in P2P to store and access the data in the local node and unstructured overlay is used in local indexing.	CO5	2.1.1

Part – B (3×6 = 18 Marks)

K3	7. Consider a Distributed System with three processes. Apply **Asynchronous Recovery Algorithm** for the occurrence of a crash at Process 2.  RCVDi←j (CkPti) <= SENTj→i(CkPtj)	CO4	1.4.1 2.2.3 13.2.1

K2	8. Discuss Distributed indexing of P2P systems in detail. Data identified by indexing, which allows physical data independence from apps. **Centralized indexing,** e.g., versions of Napster, DNS **Distributed indexing**. Indexes to data scattered across peers. Access data through mechanisms such as Distributed Hash Tables (DHT). These differ in hash mapping, search algorithms, diameter for lookup, fault tolerance, churn resilience.  **Local indexing.** Each peer indexes only the local objects. Remote objects need to be searched for. Typical DHT uses at key space. Used commonly in unstructured overlays (E.g., Gnutella) along with flooding search or random walk search. Another classification **Semantic indexing** - human readable, e.g., filename, keyword, database key. Supports keyword searches, range searches, approximate searches. **Semantic-free indexing.** Not human readable. Corresponds to index obtained by use of hash function.	CO5	1.4.1
K2	9. Explain Lamport's Bakery Algorithm with a suitable example.  	CO5	1.4.1 2.1.1

Part – C (2×10 = 20 Marks)

K3	10. Apply **synchronous checkpointing** algorithm for the given scenario in which D initiates the algorithm.  last_label_rcvdY[X] > = last_label_sentX[Y] > 0 	CO4	1.4.1 2.2.3 13.2.1
(OR)			
K3	11. Consider the following topology,  Apply **synchronous Recovery** algorithm for the given scenario.	CO4	1.4.1 2.2.3 13.2.1

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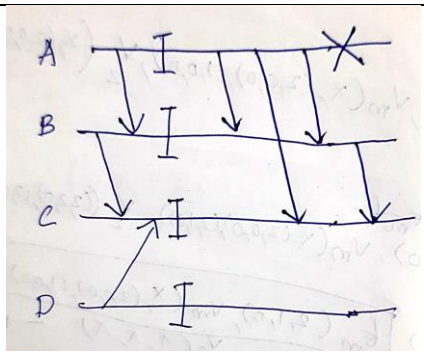
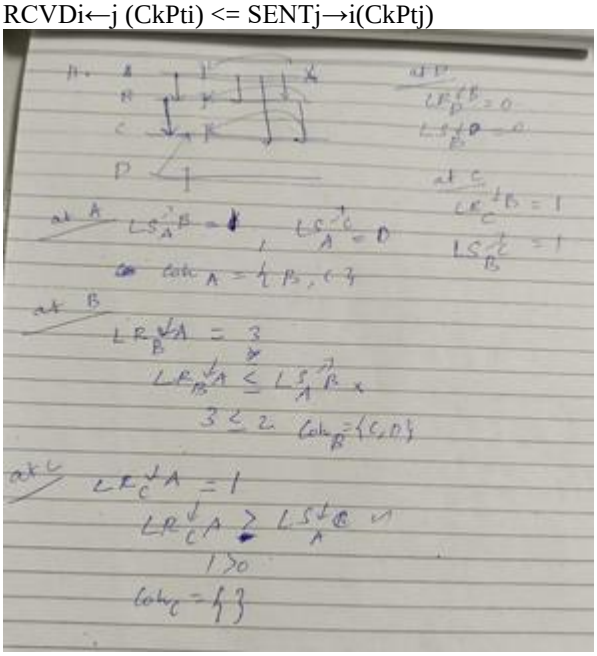


RCVDi←j (CkPti) <= SENTj→i(CkPtj)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<td>K3</td>
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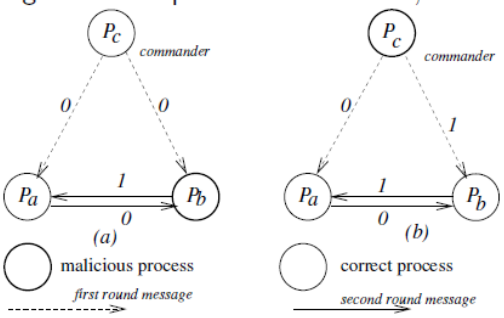
12. Apply Byzantine consensus for a distributed System with 4 processes including the source. Discuss the effect of Byzantine Agreement for an Asynchronous distributed systems

Agreement impossible when $f = 1, n = 3$.



- Taking simple majority decision does not help because loyal commander P_a cannot distinguish between the possible scenarios (a) and (b);
- hence does not know which action to take.
- Proof using induction that problem solvable if $f \leq \lfloor \frac{n-1}{3} \rfloor$. See text.
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<td>CO4</td>
<td>1.4.1
2.2.3
13.2.1</td>
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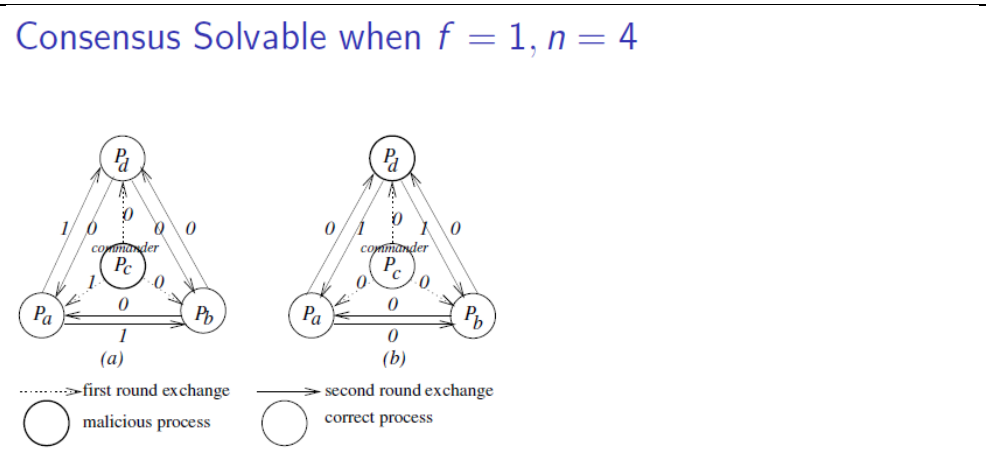
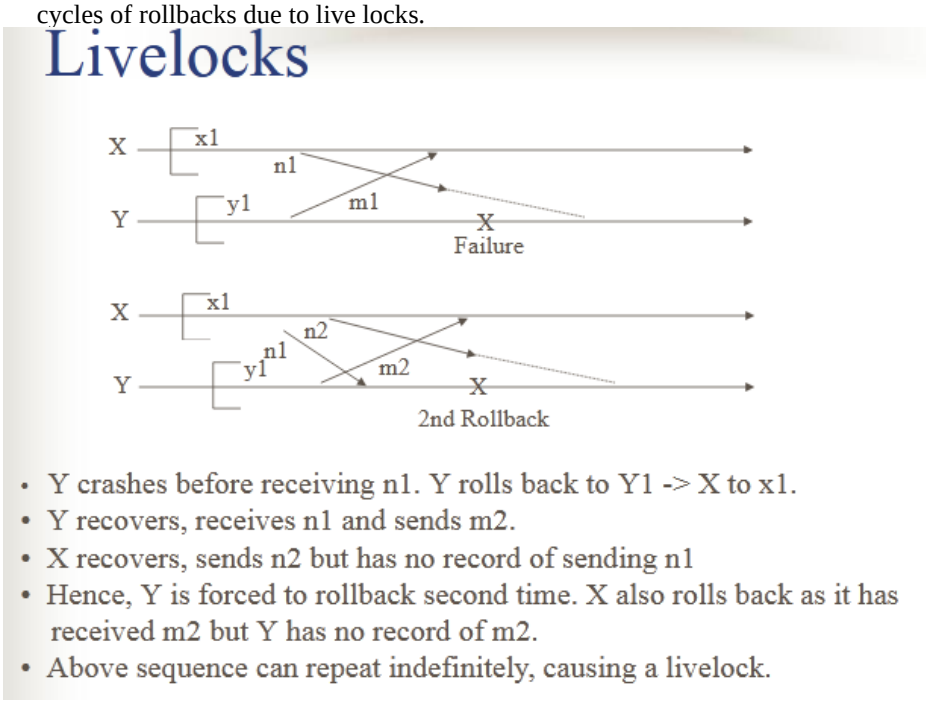
	 Byzantine Agreement for an Asynchronous distributed systems: It is difficult to arrive at consensus in Asynchronous system as there is no time bound. There is no guarantee to achieve consensus immediately but consensus can be arrive later point in time.		
(OR)			
K3	13. Construct a Live locks scenario for two given processes A & B. Simulate 3 three cycles of rollbacks due to live locks. 	CO4	1.4.1 2.2.3 13.2.1

Prepared By	Reviewed By	Approved By
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