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Sri Sivasubramaniya Nadar College of Engineering, Kalavakkam – 603 110

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

Department of Computer Science and Engineering

Continuous Assessment Test – II

Answer Key

Degree & Branch	BE & Computer Science and Engineering				**Semester**	VII	
Subject Code & Name	UCS1701- Distributed Systems				**Regulation:**	**2018**	
Academic Year	2022-2023 ODD	**Batch**	2019-2023	**Date**	**14-10-2022**	**FN / ~~AN~~**	
Time: 08:15 – 09:45 AM (90 Minutes)	**Answer All Questions**				**Maximum: 50 Marks**		

Part – A (6×2 = 12 Marks)

KL2	1. Explain any two performance parameters of distributed mutex exclusion. Ans: Synchronization Delay, Response Time, Message Complexity.	CO3
KL1	2. Define idle token. Ans: A process having token and executing outside critical section.	CO3
KL2	3. Outline the message complexity of two non-token-based D-MUTEX algorithms. Ans: Lamport's DMutex – 3(N-1) Ricart Agrawala's DMutex – 2(N-1)	CO3
KL2	4. Outline the difference between starvation and deadlocks. Starvation: Process waiting indefinitely to access the shared resource. Deadlock: Process waiting in the queue for some other process to release the resources which is also waiting in the queue.	CO3
KL3	5. Identify the maximum number of malicious processes when the total number of processes is 12 for the Byzantine agreement problem in the synchronous environment. Ans: 3 ; n>3*f	CO4
KL1	6. List any two applications of Byzantine consensus. Agreement Distributed Databases.	CO4

Part – B (3×6 = 18 Marks)

KL2	7. Illustrate the effect of Byzantine Consensus for Asynchronous non-malicious environment in which the source sends the commands as 1 → 0. Ans: In Asynchronous environment, the message delay doesn't have any time limit and so when some process receives 0 after 1, there will be some processes receiving 1 which could be difficult to arrive at a consensus.	CO4
KL3	8. Consider 4 cohorts and 1 source in synchronous environment. Apply Byzantine consensus for the following cases and illustrate the result. i. Two of the cohorts are malicious. ii. Only the source is malicious.	CO4

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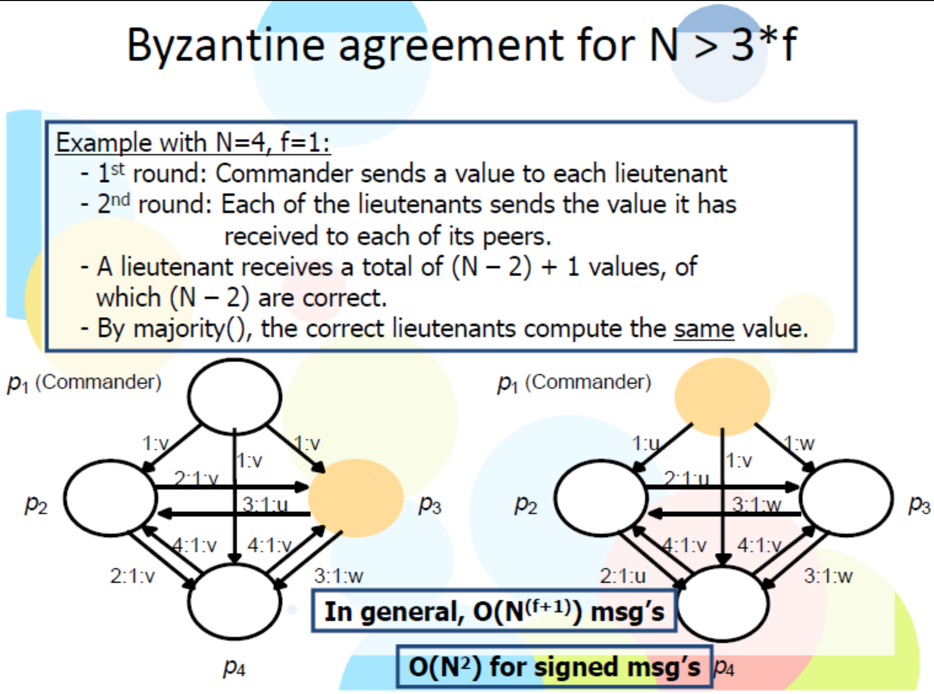

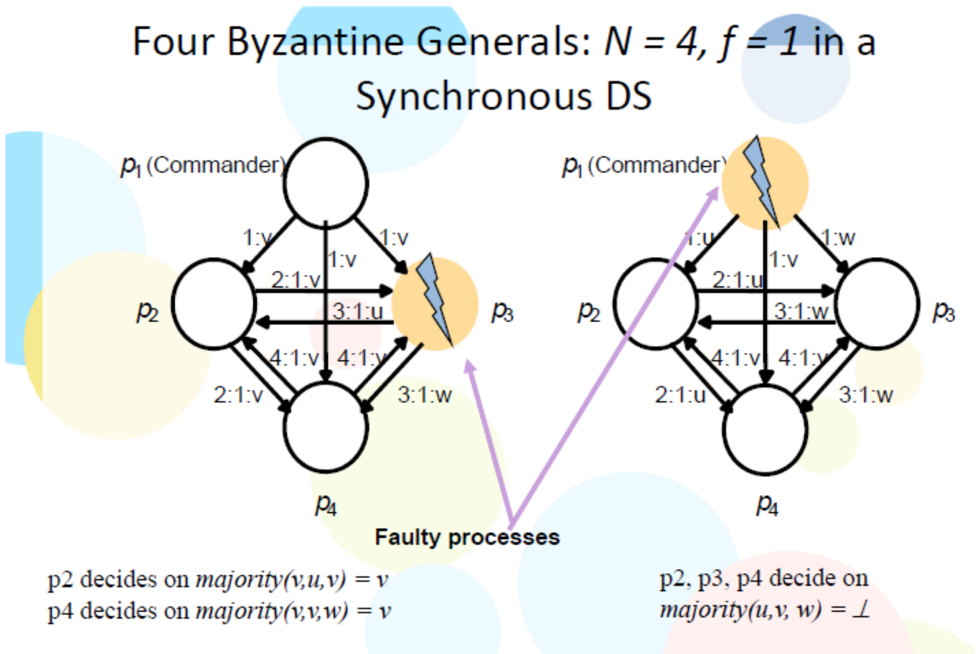

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<td>KL2</td>
<td>8. Demonstrate the limitations of Path -Pushing algorithm with an example.</td>
<td>CO3</td>
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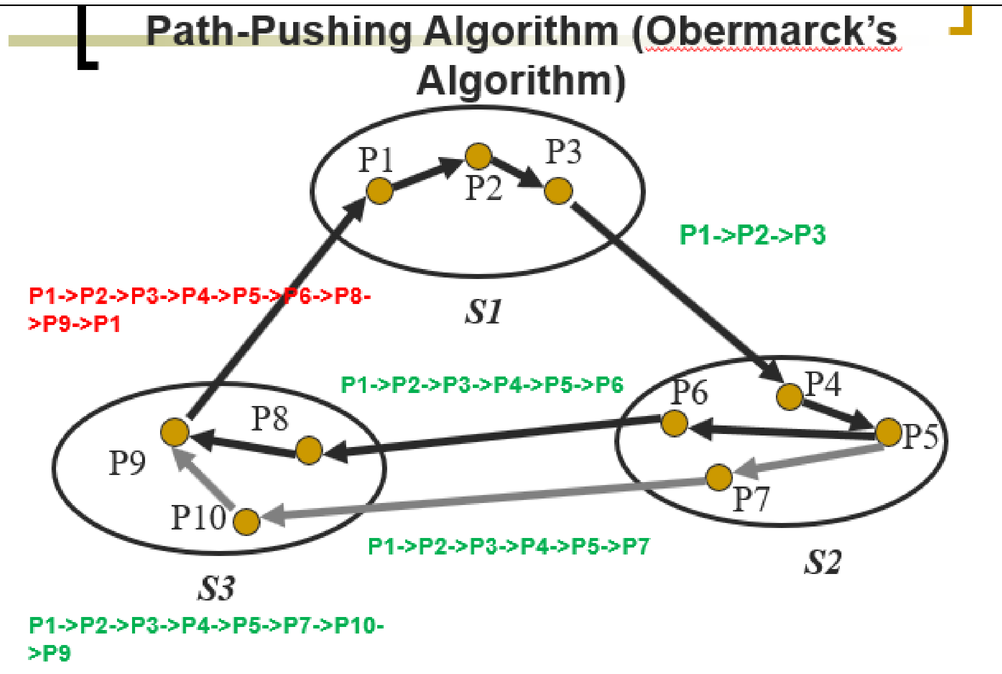
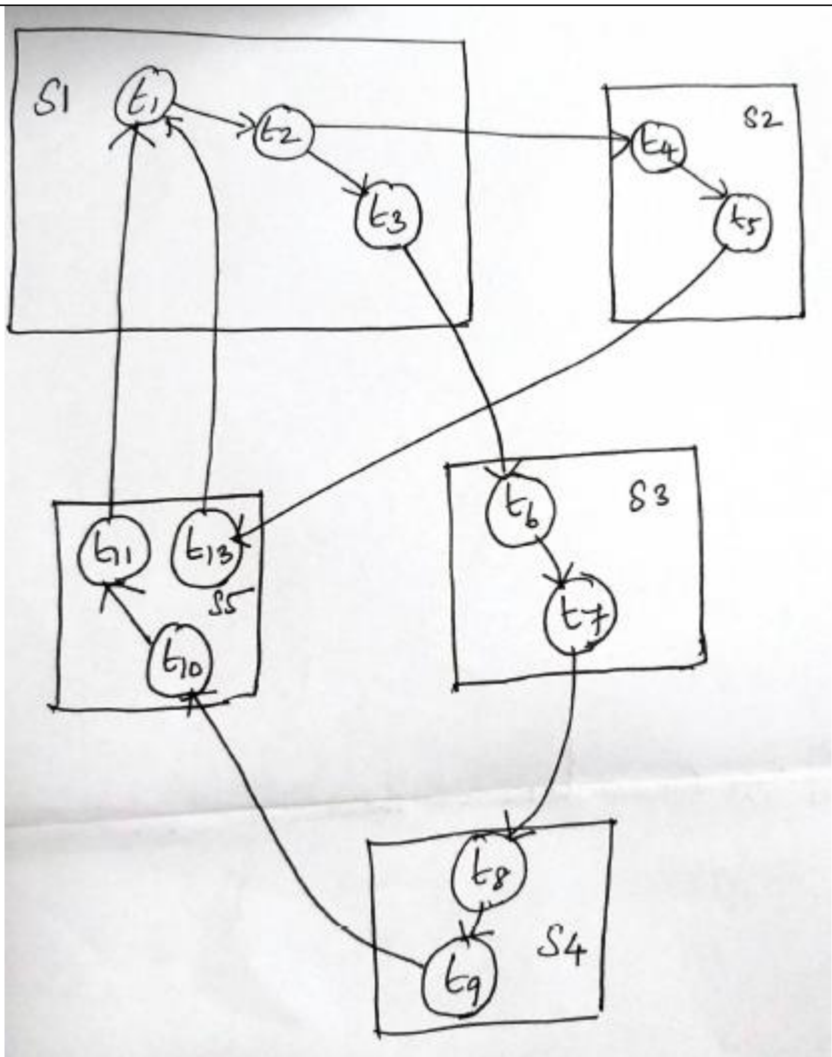
	 Limitation: Phantom deadlocks would occur as the message length is high.	

Part – C (2×10 = 20 Marks)

KL3	10. Apply the Lamport's non-token based distributed mutual exclusion algorithm for the scenario in which the order of request for critical section is as follows. P1 → (P2 || P3) → P4 There will ne request , reply and release messages. So, 3(N-1) messages. CS will be given to the process in the order P1 → P2 → P3 → P4	CO3
	(OR)	
KL3	11. Apply the Ricart Agrawala's distributed mutual exclusion algorithm for the scenario in which the order of request for critical section is as follows. P3 → (P1 || P2) → P3 A request deferred array is mainintaind at each process and P1 will defeer the reply to P2 until CS acess is achieved by P1. There will be request and reply messages. So, 2(N-1) messages. CS will be given to the process in the order P3 → P1 → P2 → P3	CO3
KL3	12. Apply the token based distributed mutual exclusion algorithm for the scenario in which the order of request for critical section is as follows. P1 → P2 → (P3 || P4) *Note: Initially the token is held by process P3* *Token will be sent in the order P1 → P2 → P3 → P4*	CO3
	(OR)	
KL3	13. Apply Edge chasing algorithm for the given scenario and identify the presence of deadlocks. Justify the fact "*Edge Chasing Algorithm will not identify any phantom deadloccks*".	CO3



At S1:
Probe (1,2,4)
Probe (1,3,6)
At S2:
Probe (1,5,13)
At S3:
Probe (1,7,8)
At S4:
Probe (1,9,10)
At S5:
Probe (1,11,1)
Probe (1,13,1)
i=k

So deadlock
As the probe messages are very small, phantom deadlocks will not occur.

--------------------ALL THE BEST-------------------