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SRI SIVASUBRAMANIYA NADAR COLLEGE OF ENGINEERING

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

Register Number	205001085		
Name of the Student	Sabastiyasan . V		
Degree and Branch	BE CSE	Semester	VII
Subject Code and Name	UCS1701 Distributed Systems		
Assessment Test No.	II	Date	11/10/2023

Details of Marks Obtained									
Part A		Part B				Part C			
Question No.	Marks	Question No.	(a) Marks	(b) Marks	Total Marks	Question No.	(a) Marks	(b) Marks	Total Marks
1	1	7	5		5	10	4		4
2	0								
3	1.5	8	5		5	11			
4	0					12	8		8
5	2	9	6		6	13			
6	1.5								
Total (A)	06	Total (B)			16	Total (C)			12
Grand Total (A+B+C)		34			Marks (In Words)	Three Four			
Signature of the Faculty									

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PART - A

(1) **Cut on global state**

A cut is used to find whether the global state is consistent or not. A global state is said to be consistent if sender and receiver event lie before the cut or sender event lies before the cut and receiver event lies after the cut.

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(2) **Transit message**

A transit message is defined as messages are passed among the process concurrently among different sites.

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(3)

Path-Pushing algorithm detects phantom deadlocks since it is mainly based on explicit WFG. The local state WFG will be send to the neighbour processes and hence it may detect phantom deadlocks. Why?

④ Idle token:

Idle token is defined as a token which is not yet been used for its first time and is available for usage by other processes. In mutex algorithms

⑤ Fairness: All processes are treated with fair in order to give a change for mutual exclusion.

Liveness: The algorithm should not come to halt due to deadlocks.

⑥ Number of control messages to be exchanged to achieve one second of mutex in Suzuki Kasami token based mutex algorithm = n-1 / where n is number of sites

PART - B

⑧ Chandy Lamport Algorithm:

⇒ This algorithm is based on a special type of message known as "Marker"

Begin

Process sends

Marker-sender algorithm

Begin

Process sends 'Marker' message

Marker sender algorithm

(1) Local state is saved by the process

(2) Process sends 'Marker' message along the channels connected with the process

Marker-receiver algorithm

(1) After receiving the marker,

If (local state is not saved)

then

the channel is recorded as NULL

follows marker-sender algorithm

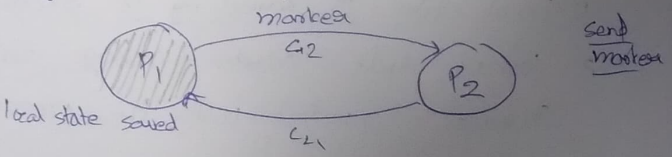
Else

The messages are recorded after the state is saved and just before receiving marker message.

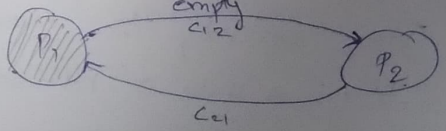
⇒ With the help of this algorithm, inconsistent snapshot can be avoided.

⇒ With the help of marker message, the local state is recorded which yields consistency.

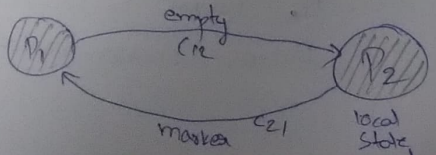
Eg:



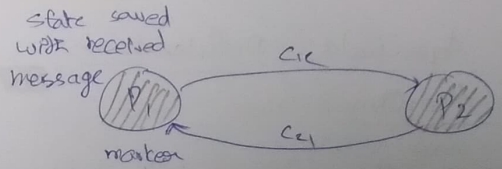
Send marker

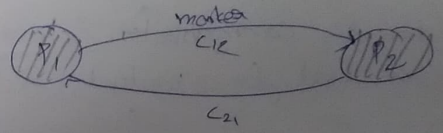


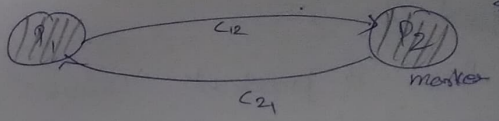
Sets empty for Channel



Follow marker sending rule







state saved with received message.

(9) Ricart Agarwala DMutex Algorithm

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⇒ This algorithm is applied on FIFO based communication channels. which is used for mutual exclusion.

Request for CS

(1) Process Pi broadcasts 'REQUEST' message to all processes connected to its channel.

(2) While receiving a 'REQUEST' message, a 'REPLY' message is sent only if the process itself is not in requesting state or the timestamp of the requested process is smaller than the current processe timestamp.

(3) Else the request is added to BD array as BD[j]=1.

Executing the CS

SSN

(4) After receiving the 'REPLY' message, it move to the critical state.

Exiting from CS

(1) While exiting from CS, all the request messages from BD array is released, (i.e) if BD[j]=1, it is changed to 0.

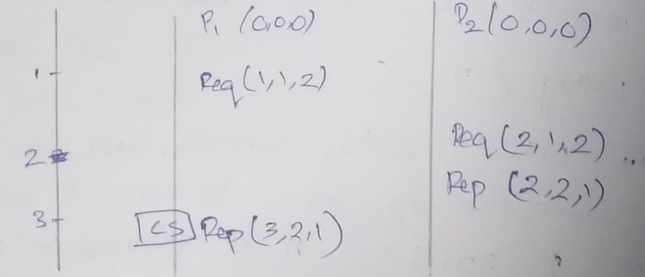
⇒ This algorithm is optimal when compared to other non-token based algorithms because it just uses two type of messages.

⇒ Time complexity is O(n).

Eg:

$P_1 \rightarrow P_2$

Timestamp



(7) Global state in Distributed System

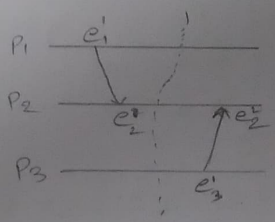
⇒ Global state is defined as collection of local states of processes and its communication channels.

⇒ Global state is used over a site with processes to find its consistency state.

Types of cuts

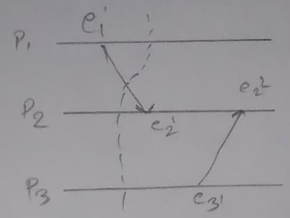
(1) ~~Strong cut~~

(i) Strongly consistent:



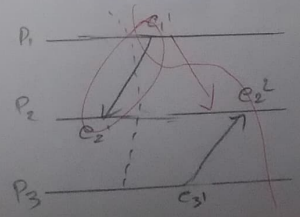
In this type of cut, all the sender - receiver events lie either before the cut or after the cut completely

(ii) Consistent:



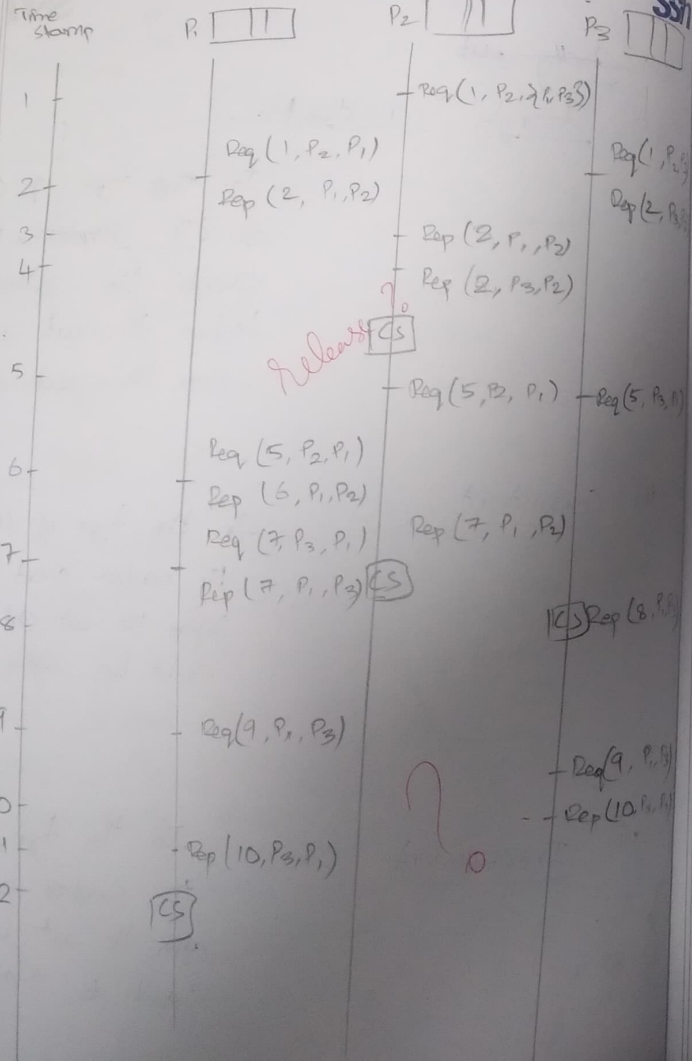
In this type of cut, the sender event lies before the cut and receiver event lies after the cut.

(iii) Inconsistent:

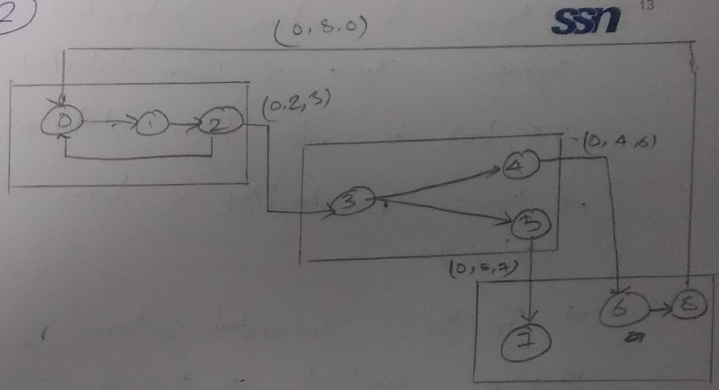


In this type of cut, the sender event lies after the cut which leads to inconsistency.

(10)



(12)



⇒ In this type of algorithm, a special type of message called probes are used to find deadlocks.

⇒ Probe has an advantage since it has fixed size (i.e) 3 values.

⇒ In AND resource model, cycles and knots are need to be detected in order to find deadlocks.

(10)

⇒ From the above distributed system, cycle is been detected

⇒ A & B also been detected

⇒ Hence, a deadlock is been detected.

⇒ In this distributed system, no phantom deadlocks are detected.

How?