Mittuniversitetet
MID SWEDEN UNIVERSITY

Försättsblad Prov Original

Kurskod	Provkod	Tentamensdatum
DT050A	T101	2019-01-08

Kursnamn	Datateknik AV, Distribuerade system
Provnamn	Skriftlig tentamen
Ort	Sundsvall
Termin	
Ämne	

6895642268

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Examination of Distributed System 2018

Time: 2019-01-08

Total: 100

A: 90
B: 80
C: 70
D: 60
E: 50
Fail < 50

Good Luck

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1. (10 p) What are the characteristics of a transparent system? Name the three most important transparencies. What types of transparencies are important for scalability?

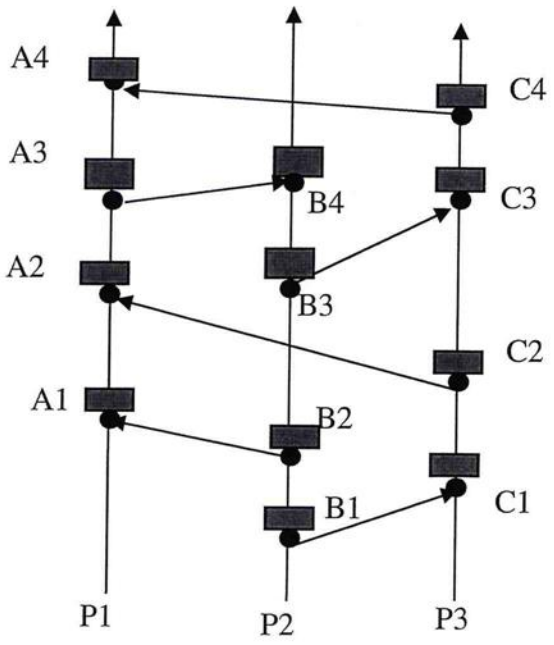
2. (10 p) What is *maybe*, *at least once* and *at most once* semantics? In what kind application, should *at most* semantics be used? What protocol(s) are used to implement the *at most once* semantics and how?

3. (10 p) An NTP server *B* receives server *A*'s message at 12:00:20.100 bearing a timestamp 12:00:20.100. *A* receives the message at 12:01:00.300 bearing *B*'s timestamp 12:01:00.200.

   a) Use NTP method to estimate (1) the offset between *B* and *A*, and (2) the accuracy of the estimate.

   b) Using Cristian's algorithm to decide what time A should set its clock to? Suppose that if the minimum round trip is 10 ms, estimate the accuracy of this setting.

4. (15 p) For the distributed system shown in the figure below:



1) Provide logical time for all the events (A1, A2, A3, A4, B1, B2, B3, B4, C1, C2, C3, C4) using

   a. Global logical time

   b. Vector time

2) For each of the following global states, decide if they are *consistent*, *transitless*, and/or *strong consistent*.

a) <A2, B2, C2> b) <A2, B3, C3> c) <A2, B2, C1>

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5. (10 p) Given *N* processes, for *centralized*, *Lamport algorithm*, *Ricart and Agrawala*'s algorithm, and *token ring*, list out:

    a. The average number of messages required for a process to access and release a shared resource.

    b. Synchronization delay (the delay between the resource being released and another one to get the resource).

    c. If we assume that the algorithms can be implemented on a LAN that supports hardware broadcasts, how will this affect the above list?

6. (5 p) A file is replicated on 6 servers. List all the combinations of read quorum and write quorum that are permitted by the voting algorithms.

7. (5 p) What is an open transaction? What is a close transaction? What kind of application should use a close transaction?

8. (10 p) What is iterative name resolution? What is recursive name resolution? What are advantages and disadvantages of the iterative and recursive name resolution methods?

9. (10 p) In a certain system, each process typically uses a critical section many times before another process requires it. Explain why Ricart and Agrawala's multicast-based mutual exclusion algorithm is inefficient for this case, and describe how to improve its performance. Does your adaptation satisfy liveness condition ME2?

10. (6 p) Briefly describe the coordinate check point algorithm. Explain which actions in coordinate check point algorithm guarantees that the recorded global states are consistent?

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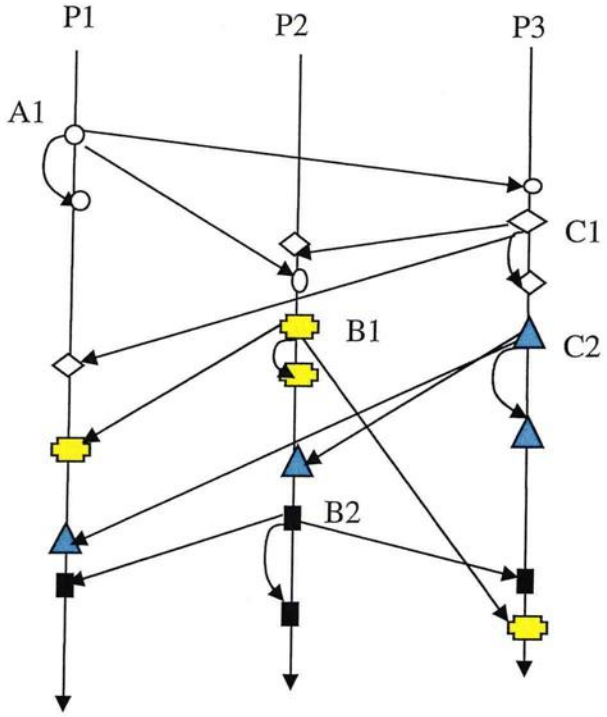
11. (9) Suppose that the closed group *G* includes *P1*, *P2* and *P3*.



1) From the above multicast message-passing situation, 1) find a pair of multicast from two different processes that is causal ordered, 2) find a pair of multicast that is not causal ordered.

2) From the above multicast message-passing situation, 1) find a pair of multicast that is FIFO ordered, 2) a pair of multicast that is not FIFO ordered.

3) From the above multicast message-passing situation find 1) a pair of multicast that is total ordered and 2) a pair of multicast that is not total ordered.