



### Försättsblad Prov Original

| Kurskod     | Provkod                             | Tentamensdatum      |
|-------------|-------------------------------------|---------------------|
| D T 0 5 0 A | T 1 0 1                             | 2 0 1 8 - 1 1 - 0 1 |
| Kursnamn    | Datateknik AV, Distribuerade system |                     |
| Provnamn    | Skriftlig tentamen                  |                     |
| Ort         | Sundsvall                           |                     |
| Termin      | H18                                 |                     |
| Ämne        | Datateknik                          |                     |

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## **Examination of Distributed System, 2018**

**Time: 2018-11-01**

**Total: 100**

**A: 90**

**B: 80**

**C: 70**

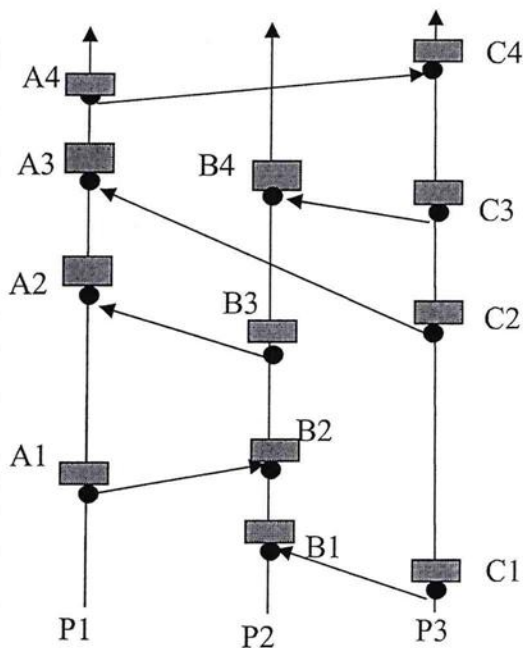
**D: 60**

**E: 50**

**Fail < 50**

**Good Luck**

1. (10 p) What kind of system is scalable? Is an open system always scalable? Scalability can be achieved by applying different techniques. What are these techniques?
2. (10 p) Explain why transient synchronous communication has inherent scalability problems, and how these could be solved. Suppose that you could make use of only transient synchronous communication primitives. How would you implement primitives for transient asynchronous communication?
3. (10 p) An ATP server B receives server A's message at 10:40:20.020 bearing a timestamp 10:40:20.040 and replies to it. A receives the message at 10:41:00.060 bearing B's timestamp 10:41:00.070.
  - a) Use ATP method to estimate (1) the offset between B and A and (2) the accuracy of the estimate.
  - b) Using Cristian algorithm to decide what time should the A device set its clock? Suppose that if the minimum round trip is 10 ms estimate the accuracy of this setting.
5. (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. Globale logical time and
  - b. Vector time
- 2) For each of the following global state, decide if it is consistent, transitless and strong consistent.
 

|                                 |                                 |                                 |
|---------------------------------|---------------------------------|---------------------------------|
| a) $\langle A1, B2, C2 \rangle$ | b) $\langle A2, B2, C1 \rangle$ | c) $\langle A2, B3, C1 \rangle$ |
|---------------------------------|---------------------------------|---------------------------------|

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6. (5 p) Explain how DNS can be used to implement a home-based approach to locating mobile hosts.
7. (5 p) Which other name server addresses do DNS name servers hold by default, and why?
8. (10 p) Suppose that P1, P2, P3, P4, P5, ..., P8 are in one group. The group will use bully algorithm to select new coordinator. P8 was coordinator and just crashed. If P5 find that P8 has been crashed. If during the election time, P7 process crashes, how many messages will be send for select a new coordinator? Why?
9. (7 p) Briefly describe two phase commit protocol. If two phase commit protocol is used, in which situation the processes can be blocked?
10. (5p) How does a Hadoop file system handle multiple replica consistency?
11. (8 p) Compare strictly, sequentially, casually consistency,
  - Which one is most strong and which one is most weak.
  - If a system guarantees strictly consistency, does it also guarantee sequentially consistency?
  - If a system guarantees sequentially consistency, does it also guarantee casually consistency?
  - If a system guarantees casually consistency, does it also guarantee sequentially consistency?
12. (10 p)
  - 1) Is there any pair of multicasts that is FIFO but not causal? If so, give an example.
  - 2) Is there any pair of multicast that is Causal order but not Total order? If so, give an example.
  - 3) Is there any pair of multicast that is Total order but not causal order? If so, give an example.
  - 4) Is there any pair of multicast that is FIFO and total order but not causal order? If so, give an example.