

Tentamen i kursen
Distribuerade System- TDDB 37
2005-08-09, kl. 8-12

Hjälpmedel:

Engelsk ordbok.

Supporting material:

English dictionary.

Poänggränser:

Maximal poäng är 40.
För godkänt krävs sammanlagt
21 poäng.

Points:

Maximum points: 40.
In order to pass the exam you need a
total of minimum 21 points.

Jourhavande lärare:

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Good luck !!!

1. Synchronous and asynchronous distributed systems. What are their main features and what are the consequences of these features?

(3p)

2. Define the following three possible semantics for remote procedure calls:
 - a. At least once semantics
 - b. At most once semantics
 - c. Exactly once semantics.

Is it possible to achieve *exactly once semantics* in the case of lost messages? But in the case of server crashes? Explain.

(3p)

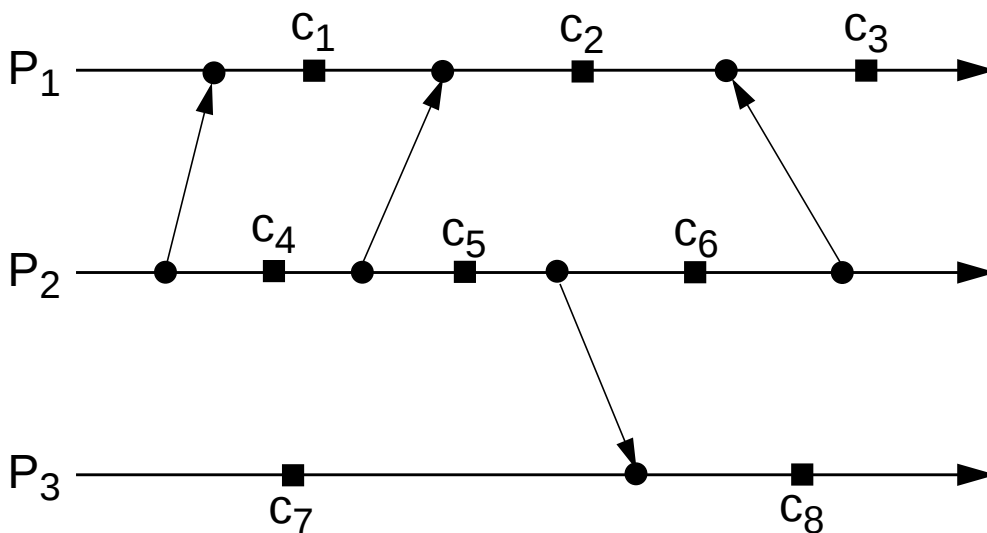
3. Static and dynamic invocation in CORBA: How do they work? Compare.

(3p)

4. Remote Method Invocation: trace the way of a request and of the reply from the client to a remote server and back. Illustrate with a figure.

(3p)

5. What is a cut of a distributed computation? What means a consistent and a strongly consistent cut? Consider the following set of events:



Determine for each of the following cuts if it inconsistent, consistent or strongly consistent:

$\{c_2, c_6, c_8\}$, $\{c_1, c_4, c_7\}$, $\{c_1, c_5, c_7\}$, $\{c_1, c_6, c_8\}$, $\{c_1, c_6, c_7\}$, $\{c_3, c_6, c_8\}$.

(3p)

6. Consider mutual exclusion with the Ricart-Agrawala algorithm (the first algorithm, not using a token). Imagine three processes: P_0 , P_1 , and P_2 . P_1 and P_2 are requesting the same resource, and the timestamp of the requests is (6, 1) and (5, 2) respectively. Illustrate the sequence of messages exchanged (use figures). Who gets the resource first? (3p)
7. What is the basic idea behind the token based distributed mutual exclusion algorithm by Ricart-Agrawala (the second algorithm)? Consider how mutual exclusion is guaranteed and how the token is passed after a process has left the critical section. How many messages are passed in order a process to get permission to a critical section? Compare to the first algorithm by Ricart-Agrawala (which is not using a token). (3p)
8. Consider a bully election with 6 processes, $P_1, \dots, P_6$. P_6 , the current coordinator, fails and P_3 starts the election. Illustrate the sequence of messages exchanged (use figures). (3p)
9. Explain the following types of redundancy:
- Time redundancy
 - Hardware redundancy
 - Software redundancy
 - Information redundancy
- (3p)
10. What is the basic idea with voting protocols for updating replicated data? How do they work? Consider a set of 11 replica managers. Define two voting protocols. One for a situation when the number of writes is relatively large compared to that of reads, and the other for the reverse situation. Give examples of read and write quorums (use figures). (3p)

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Du kan skriva på svenska eller engelska!

11. Define a k -fault tolerant system.

How many components do you need in order to achieve k -fault tolerance with byzantine faults:

- for agreement?
- with a majority voting scheme?

(2p)

12. Cristian's algorithm for clock synchronization. Describe how it works. How does it estimate the time at the receiver? What is the accuracy of this estimation?

(4p)

13. You know the maximum drift rate of the clocks on two processors and the maximal allowed skew between them. How do you determine the maximum interval between two successive synchronizations between the clocks?

(2p)

14. What does it mean by external and internal synchronization of physical clocks?

(2p)