Försättsblad till skriftlig tentamen vid Linköpings Universitet

Datum för tentamen	2013-06-05
Sal (1) Om tentan går i flera salar ska du bifoga ett försättsblad till varje sal och ringa in vilken sal som avses	TER3
Tid	14-18
Kurskod	TDDD25
Provkod	TEN1
Kursnamn/benämning **Provnamn/benämning**	Distribuerade system Skriftlig tentamen
Institution	IDA
Antal uppgifter som ingår i tentamen	14
Jour/Kursansvarig Ange vem som besöker salen	Petru Eles
Telefon under skrivtiden	0703681396
Besöker salen ca kl.	15:30
Kursadministratör/kontaktperson (namn + tfnr + mailaddress)	Carita Lilja, 1463, carita.lilja@.liu.se
Tillåtna hjälpmedel	Ordbok
Övrigt	
Vilken typ av papper ska användas, rutigt eller linjerat	
Antal exemplar i påsen	

LINKÖPINGS TEKNISKA HÖGSKOLA
Institutionen för datavetenskap
Petru Eles

Tentamen i kursen

Distribuerade System- TDDD25

2013-06-05, kl. 14-18

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:

Petru Eles, tel. 0703681396

Good luck !!!

Tentamen i kursen Distribuerade System -TDDD25, 2013-06-05 kl. 14-18
Du kan skriva på svenska eller engelska!

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

(3p)

2. How can *exactly once semantics* be achieved in the case of lost messages (assuming the server never crashes)?.

(2p)

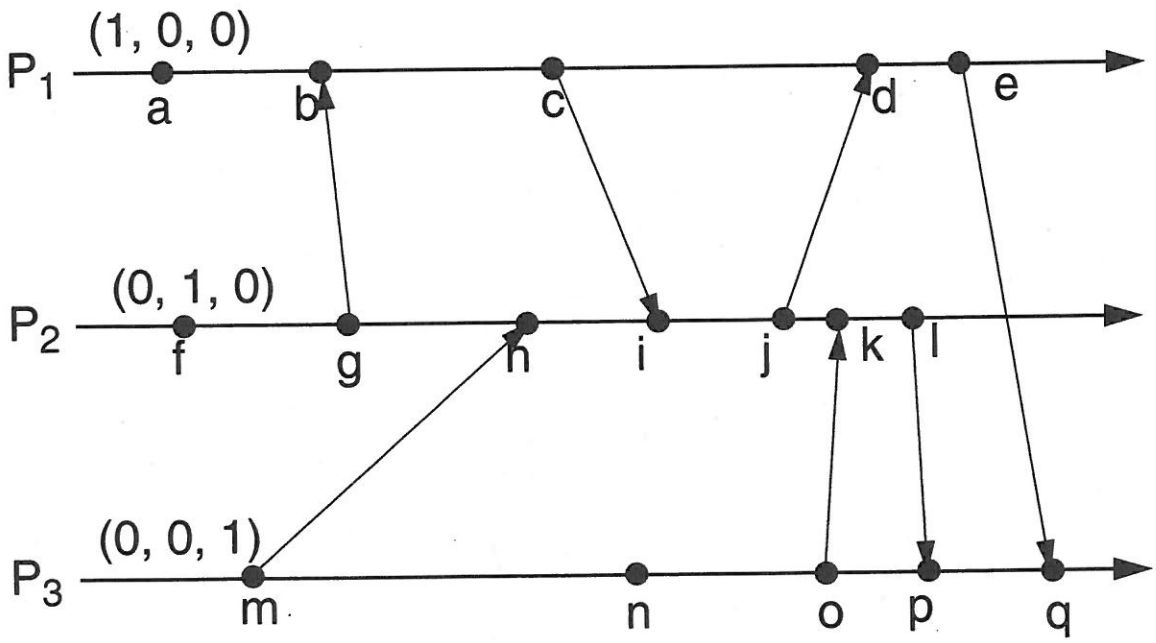
3. What is an Interface Definition Language. What is its function in the context of Middleware.

(2p)

4. What are potential problems with client-server systems?
How are they solved with peer-to-peer systems?
What are key issues and problems with peer-to-peer systems?

(3p)

5. Consider the following set of events:



Assign the missing vector clock values to the events.

(3p)

Tentamen i kursen Distribuerade System -TDDD25, 2013-06-05 kl. 14-18
Du kan skriva på svenska eller engelska!

6. Explain the following types of redundancy:
   - Time redundancy
   - Hardware redundancy
   - Software redundancy
   - Information redundancy

(3p)

7. 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 fist?

(3p)

8. 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)

9.

a. Define total and causal ordering of requests. Illustrate by an example.
b. How can total ordering be implemented using a central sequencer?
c. Consider total ordering based on distributed agreement (no central sequencer); consider one front end and several replica managers.
   In this case, the replica mangers, after receiving a request, send back to the front end a *cuid*. What does the front end send back to the replica managers after receiving the *cuid* from each replica manager? How does the front end calculate the value it sends back?
d. What happens if a replica manager crashes before sending to the front end the *cuid* for a request it received?

(4p)

10. Consider a bully election with 6 processes, P_1, ..., P_6. P_6, the current coordinator, fails and P_3 starts the election. Illustrate the sequence of messages exchanged (use figures).

(3p)

Tentamen i kursen Distribuerade System -TDDD25, 2013-06-05 kl. 14-18
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11. Explain the following types of redundancy:
    - Time redundancy
    - Hardware redundancy
    - Software redundancy
    - Information redundancy

    (3p)

12. Adjusting drifted clocks: T_{curr} is the time shown by the clock and T_{new} is the value we have to change the clock to.
    a) What is the main problem and how is it solved in principle?
    b) Concrete solution with mathematical discussion.

    (3p)

13. What does it mean by external and internal synchronization of physical clocks?
    What does it mean by centralised and distributed synchronisation algorithms?

    (2p)

14. For clock synchronisation with the Precision Time Protocol the communication delays on the way master to slave and slave to master have to be considered. The calculations for clock synchronisation assume that the delays in both directions are equal. This, however, should not be necessarily true, in general. How is this particular problem solved? Explain and illustrate your explanation with a figure?

    (3p)