Information page for written examinations at Linköping University

Examination date	2012-08-23
Room (1) If the exam is given in different rooms you have to attach an information paper for each room and <u>mark intended place</u>	TER2
Time	8-12
Course code	TDDD43
Exam code	TEN1
Course name **Exam name**	Datamodeller och databaser, avancerad kurs Skriftlig tentamen
Department	IDA
Number of questions in the examination	7
Teacher responsible/contact person during the exam time	Patrick Lambrix / Fang Wei-Kleiner
Contact number during the exam time	2605 / 4604
Visit to the examination room approx.	9.30, 10.45
Name and contact details to the course administrator (name + phone nr + mail)	Madeleine Häger Dahlqvist, madeleine.hager.dahlqvist@liu.se, 2360
Equipment permitted	
Other important information	For pass, half of the max points is required.
Which type of paper should be used, cross-ruled or lined	
Number of exams in the bag	

Institutionen för datavetenskap
Linköpings universitet

TENTAMEN
TDDD43 Advanced Data Models and Databases

August 23, 2012, 8-12

Grades: For a pass grade you need to obtain 50% of the total points.

Instructions: In addition to the instructions on the cover page:
- Write clearly.
- Start the answers to a question on a new page.
- If you make assumptions that are not given in a question, then clearly describe these assumptions. (Of course, these assumptions cannot change the exercise.)
- Give relevant answers to the questions. Points can be deducted for answers that are not answers to the question.
- Answer in English.

LYCKA TILL!

1. XML querying (3+ 2 = 5p)

Study the following XML file. It represents information about a resource that has pallets and items, and these pallets and items are combined into parcels. For instance, parcel 1 contains pallet 1 ('pals') and items ('its') 1 and 2.

    a) What is the result of executing the following XPath expressions on the XML file?

        i)   /parcels

        ii)   //items//item

        iii)   //pallets[pallet/@id=1]

    b) Express *"Find the capacity of the pallet that is used in parcel 2"* as an XQuery query. (You can assume only 1 pallet is used.)

```
<?xml version="1.0" encoding="UTF-8"?>
<resource>
   <pallets>
      <pallet id="1" capacity="Large" />
      <pallet id="2" capacity="Small" />
      <pallet id="3" capacity="Small" />/>
      <pallet id="4" capacity="Medium" />
   </pallets>
   <items>
      <item id="1" type="Shoes">
         <amount>100</amount>
      </item>
      <item id="2" type="Dress">
         <amount>50</amount>
      </item>
   </items>
   <parcels>
      <parcel id="1">
         <pals>
            <pal>1</pal>
         </pals>
         <its>
            <it> 1 </it>
            <it> 2 </it>
         </its>
      </parcel>
      <parcel id="2">
         <pals>
            <pal>4</pal>
         </pals>
         <its>
            <it> 1 </it>
         </its>
      </parcel>
   </parcels>
</resource>
```

2. Data Guides (3p)

Draw a strong data guide for the data model below.
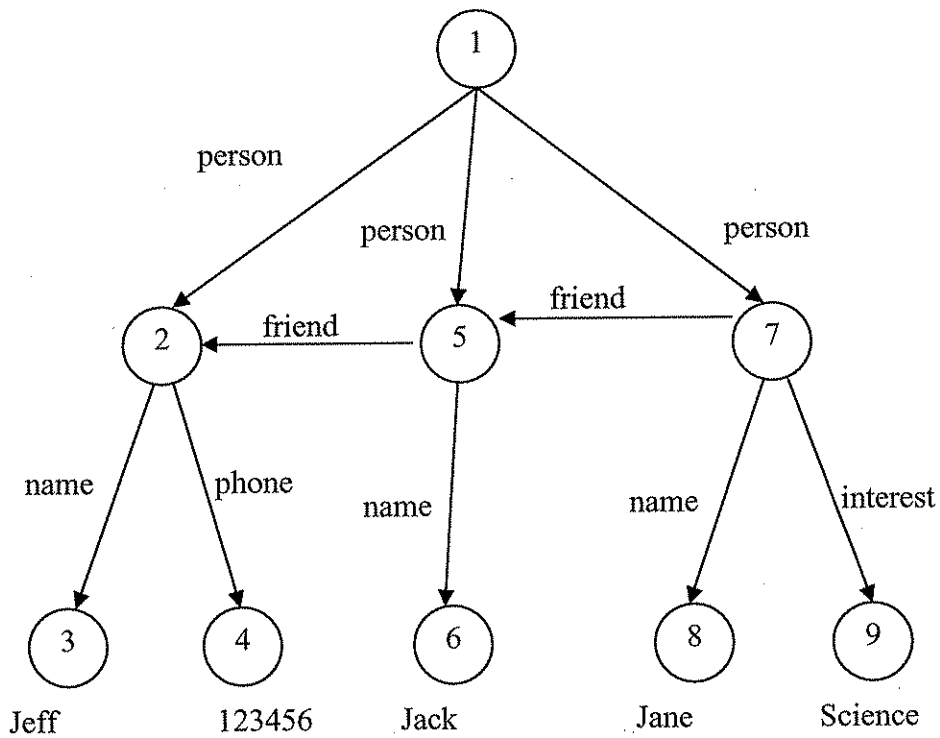
3. NoSQL databases (2p)

Consider the figure on the last page. Let P1, P2 and P3 be three processes and each of them maintain a vector clock with the initial value of (0,0,0).
Fill in the values of the vector clock of each process for the events illustrated with black points. Hand in the last page with your answer.

4. OO databases (1 + 3 = 4p)

In a conference submission system the documents about papers, authors and reviewers are stored. A paper document consists of the paper itself and related metadata (such as abstract, keywords) and reviews of the paper, as well as the names of the reviewers of the paper. Author documents are either personal (such as email, telephone numbers) or public (such as submissions). Reviewer documents consist of the information about the reviewers.

An author can read and write the paper data and related metadata, can also read and write his (her) own author information (both personal and public). A reviewer can read and write the reviews of the papers, his (her) own reviewer information, and public information about the authors. A program chair can read all information about the authors, can read and write the reviews and name of the reviewers information of the papers.

a) Draw the subject, authorization object and authorization type hierarchies.
b) Draw an authorization model using implicit/explicit, weak/strong and positive/negative authorizations for each of the following: authors, reviewers and program chairs. Assume that when a positive authorization is not stated in the text that the authorization is not given.

5. Ontologies (2 + 2 = 4p)

- Give the 4 components of ontologies and give an example for each.
- Give and explain 4 principles of the OBO foundry.

6. Description logics (3 + 3 = 6p)

- (i) Represent the following information in description logics: *LFC is a football team. A football team is a team with at least 11 members and all members are football players. At least one of the members is a goal keeper. Goal keepers are football players. Teams that have at least 10 members are large teams. LFC is Swedish champion. Champions are entitled to play in the European Champions League. Lotta Rohlin is a member of LFC.*

- (ii) Given a domain of objects D = {P1, P2, P3, P4; P5, P6, P7, P8, P9, P10, P11, P12, P13, P14, P15, T1, T2, T3}. Define an interpretation function that together with D, gives an interpretation that is a model for the knowledge base you created in (i).

7. Integration (3p)

- Describe and explain the different steps in data source integration.
- How are these different steps dealt with in the mediation/view integration approach that uses global as view?

P0 (0,0,0) (, ,)   (, ,)   (, ,)   (, ,) (, ,) (, ,)(, ,)

P1 (0,0,0)

(, ,)   (, ,)

P2 (0,0,0)

(, ,)   (, ,)

time