

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

In an Internet bookstore the documents about the books, customers, and transactions are stored. Book documents are either public (such as ISBN number, reviews and price) or intern (such as selling history and analytical results). Customer documents are either extern (such as name and address) or intern (such as the buying records and recommendations) or confidential (such as credit card number). Transaction documents consist of the information for the selling records, delivery information and payment information.

Customer service staff members can read and write the customer extern and confidential information and the transaction documents. Data analysts can read the customer extern and intern information and book documents (both public and intern). In addition, data analysts can read and write book analytical results and customer recommendations. Marketing staff members can read the book documents and the customer extern, intern documents.

- 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: customer service staff member, data analysts and marketing staff members. Assume that when a positive authorization is not stated in the text that the authorization is not given.

5. Ontologies (3p)

Discuss the following problems for the syntactic web and show how the semantic web could alleviate these problems:

- locating relevant information
- retrieving relevant information
- integrating information

6. Description logics and reasoning (3p)

Define the following concepts using description logics:

- C1: football team for which there is a Swedish player
- C2: football team for which all players are Swedish

Does C2 subsume C1, i.e. C1 is-a C2? Prove your answer using a tableau algorithm.

7. Integration (3p)

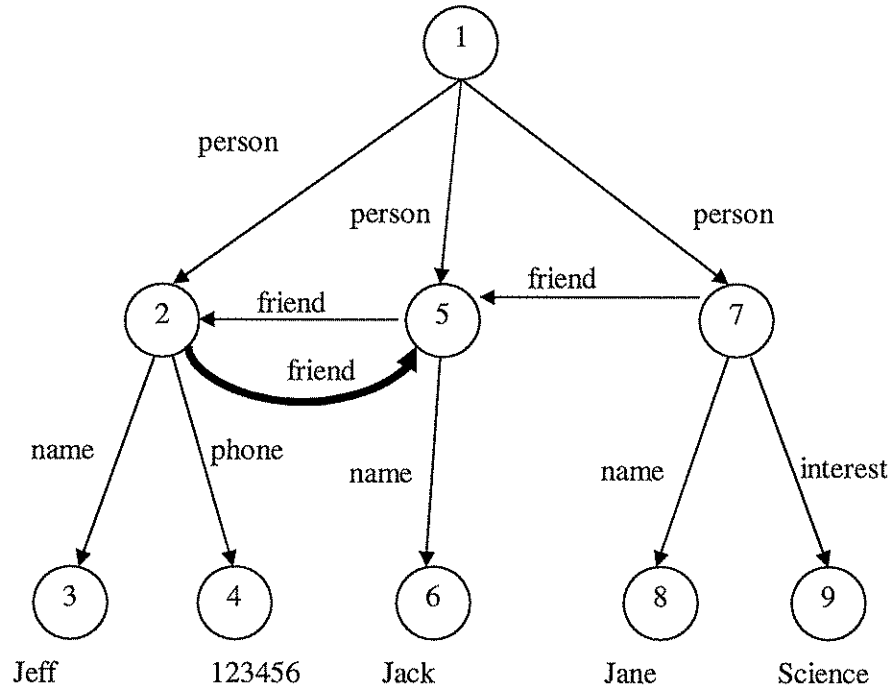
Describe the global as view approach for integration of data sources. Discuss knowledge representation, query formulation and query processing, and give examples of each.

8. Ontology alignment (3p)

- Define the notions of precision, recall, f-measure.
- What is the influence of the threshold on precision and recall for matchers based on string matching? Explain why.
- Give an example of a structure-based approach for ontology alignment. Explain what it does.

2. Data Guides (4p)

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.*

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

Study the following XML file:

- a) What is the result of executing the following XPath expressions on the XML file?
 - i) /bookings
 - ii) //activities//item
 - iii) //persons[person/@id=1]
- b) Express "Find the name of everyone booked at soccer" as an XQuery query.

```
<?xml version="1.0" encoding="UTF-8"?>
<activitylist>
  <persons>
    <person id="1" name="Ludvig" age="10" />
    <person id="2" name="Filip" age="15" />
    <person id="3" name="Lisa" age="7" />
    <person id="4" name="Lena" age="40" />
  </persons>
  <activities>
    <item id="1" type="Soccer">
      <minimumage>10</minimumage>
      <maximumage>80</maximumage>
    </item>
    <item id="2" type="Movie">
      <minimumage>15</minimumage>
    </item>
  </activities>
  <bookings>
    <booking who="1" what="2" when="2011-01-12"/>
    <booking who="2" what="1" when="2011-02-13"/>
    <booking who="3" what="2" when="2011-03-12"/>
  </bookings>
</activitylist>
```

Institutionen för datavetenskap
Linköpings universitet

TENTAMEN

TDDD43 Advanced Data Models and Databases

April 12, 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!



Försättsblad till skriftlig tentamen vid Linköpings universitet

(fylls i av ansvarig)

Datum för tentamen	2012-04-12
Sal	U7
Tid	8-12
Kurskod	TDDD43
Provkod	TEN1
Kursnamn/benämning	Advanced Data Models and Databases
Institution	IDA
Antal uppgifter som ingår i tentamen	8
Antal sidor på tentamen (inkl. försättsbladet)	5 + försättsblad
Jour/Kursansvarig	Patrick Lambrix / Fang Wei-Kleiner
Telefon under skrivtid	2605
Besöker salen ca kl.	9.30, 11.00
Kursadministratör (namn + tfnr + mailadress)	
Tillåtna hjälpmedel	
Övrigt (exempel när resultat kan ses på webben, betygsgränser, visning, övriga salar tentan går i m.m.)	For a pass grade you need to obtain 50% of the total points.
Vilken typ av papper ska användas, rutigt eller linjerat	
Antal exemplar i påsen	