



Information page for written examinations at Linköping University



Examination date	2015-04-09
Room (1)	<u>G32</u>
Time	8-12
Course code	TDDD43
Exam code	TEN1
Course name Exam name	Advanced Data Models and Databases (Datamodeller och databaser, avancerad kurs) Written examination (Skriftlig tentamen)
Department	IDA
Number of questions in the examination	7
Teacher responsible/contact person during the exam time	Patrick Lambrix
Contact number during the exam time	2605
Visit to the examination room approximately	09:30,11
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Equipment permitted	Dictionary
Other important information	
Number of exams in the bag	

Institutionen för datavetenskap
Linköpings universitet

TENTAMEN

TDDD43 Advanced Data Models and Databases

April 9, 2015, 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)

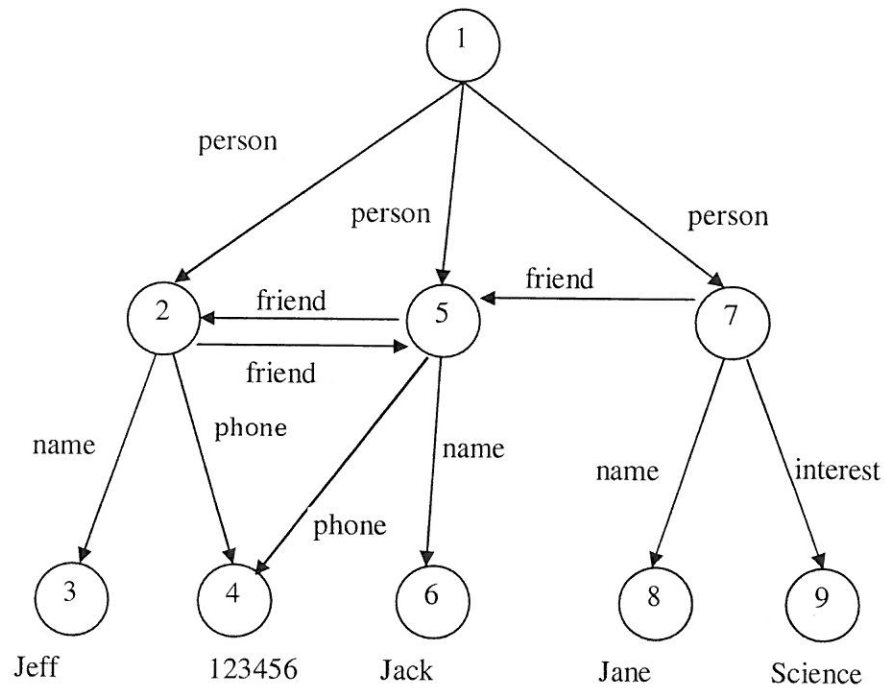
Study the following XML file:

- a) What is the result of executing the following XPath expressions on the XML file?
 - i) `/players`
 - ii) `//teams//item`
 - iii) `//persons[person/@id=4]`
- b) Express “*Find the name of everyone who plays in LFC.*” as an XQuery query.

```
<?xml version="1.0" encoding="UTF-8"?>
<Linköpingsportslist>
  <persons>
    <person id="1" name="Magnus" job="hockey" tool="stick" />
    <person id="2" name="Jonas" job="hockey" tool="puck"/>
    <person id="3" name="Lotta" job="football" tool="ball"/>
    <person id="4" name="Kim" job="hockey" tool="mask"/>
  </persons>
  <teams>
    <item id="1" type="LHC">
      <usable-tool>stick</usable-tool>
      <usable-tool>puck</usable-tool>
      <usable-tool>mask</usable-tool>
    </item>
    <item id="2" type="LHC Dam">
      <usable-tool>stick</usable-tool>
      <usable-tool>puck</usable-tool>
      <usable-tool>mask</usable-tool>
    </item>
    <item id="3" type="LFC">
      <usable-tool>ball</usable-tool>
    </item>
  </teams>
  <players>
    <plays-in who="1" what="1" when="2014-2015"/>
    <plays-in who="2" what="1" when="2014-2015"/>
    <plays-in who="3" what="3" when="2015"/>
    <plays-in who="4" what="2" when="2014-2015"/>
  </players>
</Linköpingsportslist>
```

2. Data Guides (3p)

Draw a strong data guide for the data model below.



3. NoSQL databases (3p)

Discuss the C, A and P in the CAP Theorem (explain the theorem) and its connections to the ACID and BASE properties (explain the properties as well).

4. Information Retrieval (2 + 2 = 4p)

- a. Compare the boolean and vector models for information retrieval regarding D, Q, F and R (document model, query model, framework and ranking).
- b. Explain tf and idf in the vector model.

5. Description logics (2 + 3 = 5p)

- a. Represent the following information in description logics: *LHC is an ice hockey team. An ice hockey team is a team with at least 22 members and all members are ice hockey players. Teams that have at least 10 members are large teams. Magnus Johansson is a member of LHC.*
- b. Given a domain of objects $D = \{X_1, X_2, X_3, \dots, X_{49}, X_{50}\}$. Define an interpretation function that together with D, gives an interpretation that is a model for the knowledge base you created in (i).

6. Integration (3 + 2 = 5 p)

- a. Compare the global as view approach versus the local as view approach for integration of data sources regarding the following issues:
 - easy/hard to add new data sources
 - easy/hard query processingExplain your answer for each issue with an example.
- b. Data source 1 has information about cars and contains model, year, price, seller information. Data source 2 contains reviews for cars based on the model and the year. Assume the global schema defines the following relations: Car(model, price, year) and Car-review(model, year, review).
 - Give the global as view mappings.
 - Give the local as view mappings.

7. Ontologies (2 + 1 = 3p)

- (i) Give 4 different kinds of matchers. For each kind of matcher give an example and explain briefly what it does.
- (ii) Given a concept A and a Tbox T, what is a MUPS(A,T) in the context of debugging semantic defects?