# Försättsblad till skriftlig tentamen vid Linköpings universitet

(fylls i av ansvarig)

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|---|---|
| **Datum för tentamen** | 2011-08-27 |
| **Sal** | TER3 |
| **Tid** | 8-12 |
| **Kurskod** | TDDD43 |
| **Provkod** | TEN1 |
| **Kursnamn/benämning** | Databases and Data Models Advanced Course |
| **Institution** | *IDA* |
| **Antal uppgifter som ingår i tentamen** | 9 |
| **Antal sidor på tentamen (inkl. försättsbladet)** | 4 |
| **Jour/Kursansvarig** | Lena Strömbäck |
| **Telefon under skrivtid** | 0709-396776, 013-164699 |
| **Besöker salen ca kl.** | 9.30 |
| **Kursadministratör (namn + tfnnr + mailadress)** | Madeleine Häger Dahlqvist, 282360<br>madeleine.hager.dahlqvist@liu.se |
| **Tillåtna hjälpmedel** | Inga |
| **Övrigt (exempel när resultat kan ses på webben, betygsgränser, visning, övriga salar tentan går i m.m.)** | Resultat annonseras efter två veckor.<br>För godkänt krävs 15 poäng,<br>betyg 4: 20 poäng,<br>betyg 5: 25 poäng. |
| **Vilken typ av papper ska användas, rutigt eller linjerat** | Valfritt |
| **Antal exemplar i påsen** | |

2011-08-27

Lena Strömbäck

**Written exam in**

# TDDD43 Databases and Data Models Advanced course

Location: TER3
Date: 2011-08-27
Time: 8-12

Equipment: None

Requirements:

15 points is required for passing the exam
Approx. 20 points is required for grade 4
Approx. 25 points is required for grade 5

The results are announced within two weeks.

Teacher in charge: Lena Strömbäck, 0709-39 6776

**Use one sheet for each question.**

**Write name and personal number on each sheet.**

**Only write on one side of each sheet.**

**Give relevant answers to the question.**
**Points can be deducted for answers that are not answers to the question.**

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

Study the XML example in Appendix A:

a) What is the result of executing the following XPath expressions on the XML in the example:
   i) /person
   ii) //person
   iii) //person/@age
b) Express *"Who is booked at an activity not suitable for his or her age?"* as an XQuery query.

## 2. XML technologies (3p)

Explain briefly the main purpose of the following three XML technologies. In your explanation, the relations and differences between the three technologies should be clear.

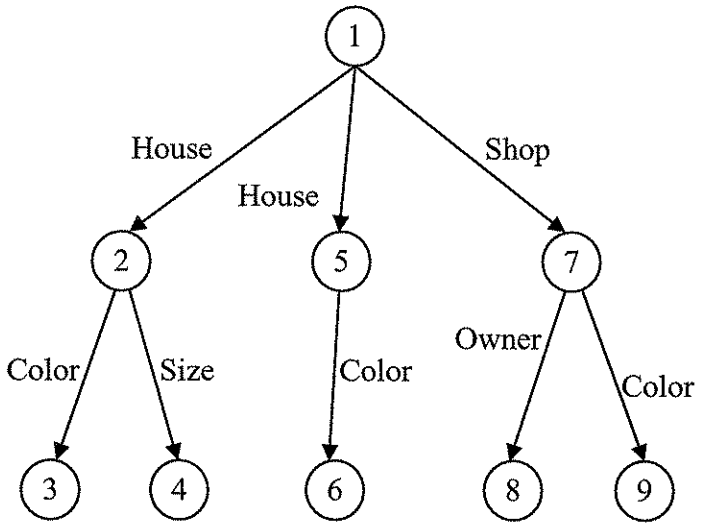
a) XPath
b) XQuery
c) XSLT

## 3. XML storage (3p)

Shred the data given in appendix A into a relational storage. You may use any method exemplified in the course. You have to explain the method you used and show the resulting tables and their content.

## 4. Data Guides (3p)

The figure below shows a sample dataset. Draw a strong and a minimal data guide for this data. Use the OEM model.



## 5. OODBMS modeling (2 + 2 = 4p)

- Describe the following notions from the OODBS Manifesto: complex objects, encapsulation, extensibility, multiple inheritance.

- Describe the difference between strong and weak authorizations and give an example.
- Using strong/weak, negative/positive, and implicit/explicit authorizations, is it always possible to determine the authorization for a given subject and object? If yes, sketch a proof. If no, give an example where you cannot determine the authorization.

## 6. Semantic Web and ontologies (3p)

- Describe the different kinds of components for ontologies and give an example for each.
- Describe the different kinds of ontologies in terms of the components that they contain.

## 7. Description logics (3p)

- Define the semantics of
  $\forall$ hasMember.SoccerPlayer
  $\exists$ hasMember.SoccerPlayer

- Given a domain of objects D = {John, Jack, Jane, Joe, IFK, ÅFF, LFC}. Define an interpretation function that together with D, gives an interpretation that is a model for the knowledge base:
  - SoccerPlayer $\leq$T
  - Team $\leq$T
  - SoccerTeam = Team $\wedge$ $\forall$ hasMember.SoccerPlayer
  - SoccerTeam(t)
  - hasMember(t,j)

## 8. Integration (3p)

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

## 9. Ontology alignment (3p)

Given the concept 'cell death' in ontology O1 and the concept 'apoptosis' in ontology O2. What kinds of matchers would give this pair of concepts a high similarity value and in which cases? Discuss the situations. You may make assumptions about the content, structure etc. of the ontologies.

## Appendix A:

```
<?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">
      <minimalage>10</minimalage>
      <maximalage>80</maximalage>
    </item>
    <item id="2" type="Movie">
      <minimalage>15</minimalage>
    </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>
```