Försättsblad till skriftlig tentamen vid Linköpings universitet

(fylls i av ansvarig)

Datum för tentamen	2010-08-25
Sal	
Tid	14-18
Kurskod	TDDD43
Provkod	TEN1
Kursnamn/benämning	Advanced data bases and data models
Institution	*IDA*
Antal uppgifter som ingår i tentamen	9
Antal sidor på tentamen (inkl. försättsbladet)	6
Jour/Kursansvarig	Lena Strömbäck
Telefon under skrivtid	0709-396776, 013-282324
Besöker salen ca kl.	15
Kursadministratör (namn + tfnnr + mailadress)	Madeleine Häger Dahlqvist, tel 2360 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.)	
Vilken typ av papper ska användas, rutigt eller linjerat	Valfritt
Antal exemplar i påsen	

2010-08-15

Lena Strömbäck

Written exam in

TDDD43 Databases and Data Models Advanced course

Location:
Date: 2010-08-25
Time: 14-18

Equipment: None

Requirements:

16 points is required for passing the exam
Approx. 22 points is required for grade 4
Approx. 28 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 (6p)

The XML schema in example 1 at the end of this document defines an XML document for a database containing information about friends.

a) Generate one sample XML document that is valid for the XML schema. (2p)
b) Can you see any drawbacks with the given schema? If yes, state which and explain why there is a problem. If not, motivate why the schema is good. (1p)
c) Assuming that Karin is one of my friends. Express "*What is Karin's phone number*" as an XPath query. (1p)
d) Express "*Which friends of Karin are also friends to me?*" as an XQuery query (2p)

If you make any additional assumptions for your queries these must be stated.

2. RDF (2p)

The data model in RDF consist of triples. Explain how these triples are built and give a simple example of how they can be used to model data.

3. XML storage (4p)

In the course we have discussed native, shredded and hybrid XML storage. Compare these three models in terms of:

- General concept
- Logical data model
- Physical data model
- Available query language(s)

4. Data Guides (4p)

In example 2 at the end of this exam an example data guide is given using the OEM model.

a) Draw a minimal data guide for this data. (1 p)
b) Draw a strong data guide for this data. (3p)

5. OODBMS modeling (4p)

In a pharmaceutical company different kinds of reports are stored including strategic documents, research documents and public material.

Managers in the company can read all kinds of documents and write strategic documents and public material. Researchers can read and write research documents and read public material. PR employees can read research documents and read and write public material. Other employees can only read public material.

a) Draw the subject, authorization object and authorization type hierarchies. (2p)
b) Draw an authorization model using implicit/explicit, weak/strong and positive/negative authorizations for each of the following: managers, researchers, PR employees. Assume that when a positive authorization is not stated in the text that the authorization is not given. (2p)

6. Semantic Web (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

7. Description logics (3p)

Define the following concepts using description logics:

C1: conference for which all participants are Swedish
C2: computer science conference for which there exists a Swedish participant

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

8. Integration (3p)

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 processing

Explain your answer for each issue with an example.

9. Ontology alignment (3p)

Explain the notion (what is it?) of ontology alignment and why we want to do this. Describe a framework for ontology alignment and describe the different components (what do they do?).

```
<?xml version="1.0" encoding="UTF-8"?>

<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
   targetNamespace="myns" xmlns="myns"
   elementFormDefault="qualified">

   <xs:element name="friends">
      <xs:complexType>
         <xs:sequence>
            <xs:element name="friend" type="friendType"
                        minOccurs="0" maxOccurs="unbounded"/>
         </xs:sequence>
      </xs:complexType>
   </xs:element>

   <xs:complexType name="friendType">
      <xs:sequence>
         <xs:element name="id" type="xs:positiveInteger"/>
         <xs:element name="name" type="xs:string"/>
         <xs:element name="address" type="addressType"/>
         <xs:element name="friend" type="friendType" minOccurs="0"
maxOccurs="unbounded"/>
      </xs:sequence>
   </xs:complexType>

   <xs:complexType name="addressType">
      <xs:sequence>
         <xs:element name="street" type="xs:string"/>
         <xs:element name="city" type="xs:string"/>
         <xs:element name="telephone" type="telephoneType"
                     minOccurs="0" maxOccurs="unbounded"/>
      </xs:sequence>
   </xs:complexType>

   <xs:complexType name="telephoneType">
      <xs:sequence>
         <xs:element name="home" type="xs:string"/>
         <xs:element name="work" type="xs:string"/>
         <xs:element name="cellphone" type="xs:string"/>
      </xs:sequence>
   </xs:complexType>

</xs:schema>
```

Example 1: XML schema for the friend database.

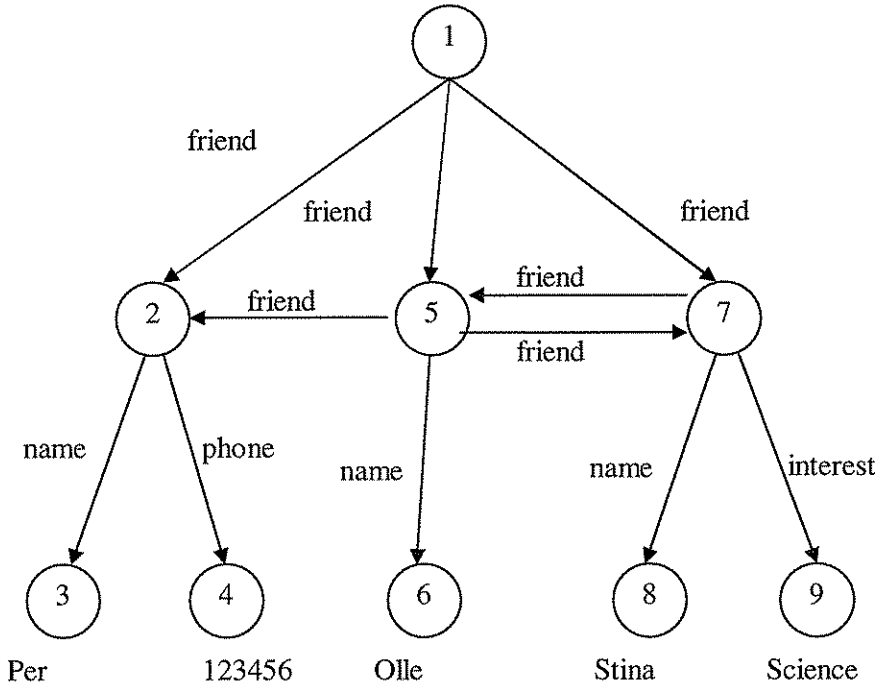

Figure 2: Example data guide