Introduction to Databases (winter term 2004/2005)

Assignment 8

RWTH Aachen: hand in on December 20, 2004 during tutorial
B-IT: hand in on December 23, 2004 during tutorial

Try to hand in your solutions in groups of up to three students.
Do not forget to write down your name and matriculation number on the solutions you hand in.
Please also add your study course (e.g. Dipl.-Inf., Master SSE, ...).

Task 8.1 (Distributed Databases)  (2 Points)
Explain briefly the differences between the following levels of ‘distribution transparency’:

- Fragmentation transparency
- Location transparency
- Local mapping transparency
- No transparency

Task 8.2 (Inheritance vs. Subtyping)  (2 Points)
Inheritance and subtyping are commonly associated with one another. However, this mix of the two (slightly) different concepts may lead to problems. As an example, consider modelling of Cubes and Cuboids. Assume that a Cube is modelled by one attribute length and a Cuboid by three attributes length, width, and height.

a) Consider that type Cuboid is represented as a subtype of Cube, which inherits the one attribute length and augments the structural representation by two further attributes width and height. Illustrate the problems arising from this type structure on program fragments.

b) Consider alternatively that Cube is represented as a subtype of Cuboid. Sketch the problems that occur now.

Task 8.3 (ODL and OQL)  (3 Points)
Given is the following ER diagram:

![ER Diagram](image-url)
The class of the hotel is between 1 and 5 stars, the capacity is measured by the number of beds, the category of a room can be ‘single’ or ‘double’. The occupation of the maid can be ‘full-time’ or ‘part-time’.

a) Map the above ER schema to ODL classes. For one of the classes of your choice, include two appropriate methods declarations describing meaningful operations on the object data.

b) Specify in OQL the following queries on the basis of your object model:
   - Find the social security number (SSN) of all maids that are responsible for single rooms in hotels of 3 stars.
   - List the hotel id (hid), class and maximum manager salary of each hotel.

Task 8.4 (Object-Relational Databases) (5 Points)
We consider the scenario of a small information system for a CD collection, which is illustrated by the following ER diagram:

Albums can contain up to 30 songs. A song is performed by arbitrarily many performers. It has a title and a length (given in seconds). An album is produced by a producer. Producer and performers are special persons.

a) Model the above scenario using the object-relation model facilities of our Oracle test database installation, i.e.: Model each entity as an object type and connect the classes by using appropriate attribute types.
   Define tables of suitable types to store the objects. For simplicity we do not consider methods in this task.

b) Create 3 producers and 5 performers and store them in your defined tables. Then compile 2 albums produced by some of the producers with songs performed by some of the performers\footnote{It makes sense to use attribute values that occur in the queries of subtask c. So you can use your data to test these queries.}.

c) Use Oracle’s object-relational extension of standard SQL-queries to formulate the following information demands:
   (a) Show the addresses of all producers who have produced an album of genre ‘Funk’.
   (b) Show the names of all performers who played in songs of an album of genre ‘Funk’.
   (c) Show the names of all performers who play the ‘Piano’.
   (d) Show the cities and the styles of producers who produced an album which contains songs where a ‘Guitar’ is played.

Expressivity and concrete syntax of Oracle’s object-relational features differ from the more general presentation in the lecture. On our home page you will find a link to an example scenario in the next days. You can use the commands used there as a template for your solution.