Introduction to Databases (summer term 2007)

Assignment 5

Please hand in your solutions in groups of up to 3 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 5.1 (SQL DDL) (4 Points)
Given is the following ER model:

It denotes a simplified hospital scenario describing doctors who work in hospitals and patients who are treated by doctors for a certain time period and stay in a hospital.

Assume the following domains and value constraints:

- Name, Specialization Area, ZIP, City and Street are represented as strings.
- SSN is stored as an integer.
- From and To store the start and end dates of the doctor’s treatment.
- Salary is an integer between 30,000 and 100,000.
- Type is a string. Hospitals can be either ‘private’ or ‘public’, but nothing else.

a) Map the above ER model to a relational database schema. Use the formal notation as presented in the lecture, including intra- and interrelational dependencies.

b) Realize the relational database schema in the Oracle test DBMS and give the DDL statements you used to define the table structures.
Task 5.2 (Relational Algebra, Relational Calculus and SQL) (5 Points)
The following relations are given:

- **lives** with attributes `person_name`, city and street, which contains for every person the location (s)he lives,
- **works** with attributes `person_name`, `company_name` and salary,
- **located** with attributes `company_name` and city, which contains the locations for every company (i.e. a company can be located in more than one city),
- **boss** with attributes `person_name` and `manager_name`, which contains the persons that are supervised by a manager.

Define the following queries as expressions in *relational algebra, tuple relational calculus, domain relational calculus* and SQL:

a) Find name and city of all persons who work for the company 'MyComp' and earn less than 10000.
b) Find the names of all persons, who don’t work for 'MyComp' (or do not work at all).
c) Find the names of all persons, who live in a city that the company they are working for is not located in.
d) Find the names of all managers, whose company is not placed in Munich or Hamburg.
e) Find the names of all companies, that are located in exactly the same cities as 'MyComp'.

Note: Use the following notation to describe the projection of a tuple variable $t$ onto the attributes $A$ and $B$ satisfying $\delta(t)$ in tuple relational calculus: $\{t(A, B) | \delta(t)\}$.

For practical experience with a relational database management system we offer you the opportunity to access an Oracle DB-server via a web interface. This and the following exercise(s) contain tasks that can be solved using this DBMS. If you did not get an access ticket during the last tutorial session you can obtain one at our chair office.
If you are inside the network of the RWTH\(^1\) you can establish an iSQL*Plus session following the instruction on the ticket. After logging in you can create and query your private schema objects without disturbing other users.

\(^1\)If not, use a VPN client by the Rechenzentrum to get an IP from inside
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