CS 425 – Database Organization
Summer 2016
Homework Assignment 2

Instructions
- Try to answer all the questions using what you have learned in class
- **When writing a query, write the query in a way that it would work over all possible database instances and not just for the given example instance!**
- Some questions are marked as bonus. You do not have to answer these questions to get full points for the assignment. However, you can get bonus points for these questions!
- **Please submit the homework as a hard copy in class or electronically using blackboard**

Consider the following database schema and example instance storing information about organ donors:

organ

donor	organ	available
Alice	Heart	2014
Bob	Lung	2015
Bob	Bladder	2015
Peter	Foot	2011
Gert	Lung	2014

donor

dName	age	bloodType
Alice	53	A+
Peter	34	AB+
Bob	44	AB-
Gert	23	A-

patient

pName	insurance	age	bloodType
Hilde	HMO	13	A-
Fritz	PPO	87	AB+

takeCare

patient	organ	doctor
Hilde	Lung	Wilhelm
Fritz	Heart	Wilhelm

doctor

docName	insurance	rate
Wilhelm	HMO	15,000
Wilhelm	PPO	20,000
Heinz	HMO	12,000
Pferd	PPO	14,000

Hints:
• Attributes with black background form the primary key of a relation
- The attribute *donor* of relation *organ* is a foreign key to relation *donor*.
- The attribute *patient* of relation *takeCare* is a foreign key to relations *patient*.
- The attribute *doctor* of relation *takeCare* stores doctors. However, it is not a foreign key to relation *doctor*, because the primary key of that relation also includes insurance information.

Part 2.1 SQL DDL (Total: 14 points)

Question 2.1.1 (6 points)

Write a SQL statement that creates a new table *assignedTo* that stores the *donor* and the donor's *organ* assigned to a *patient*. Furthermore, we want to store a *treatment price* for each such assignment. The combination of donor, organ, and patient uniquely identifies an assignment. Each assignment has a treatment price that is bigger than 0 and smaller than 1,000,000 dollar.

Question 2.1.2 (7 Points)
Write a SQL statement that creates a table *worksFor* that records which doctor works for which hospital. For each such relationship between doctors and hospitals we record a salary for the doctor. A doctor may work for several hospitals (and obviously a hospital can employ multiple doctors).

Part 2.2 SQL Queries (Total: 56 Points)

Question 2.2.1 (5 Points)
Write a SQL query that returns the names of all donors that donate hearts or lungs. Make sure that every donor is only returned once.

Question 2.2.2 (4 Points)
Write a SQL query that returns organs and their availability.

Question 2.2.3 (6 Points)
Return the name and rate for all doctors that support HMO combined with each patient they are taking care of.

Question 2.2.4 (6 Points)
Write a SQL query that returns the average age for all donors.

Question 2.2.5 (6Points)
Write a SQL query that returns the number of compatible donor-patient pairs. A donor is considered compatible to a patient if they have the same bloodType.

Question 2.2.6 (6 Points)
Write a SQL query that returns blood types for which the average age of donors for that blood type is below 35.

Question 2.2.7 (9 Points)
Write a SQL query that returns the names of potential donors for each patient. A donor is a potential donor for a patient if he/she has the same blood type and is donating an organ that the patient needs. Return each such pair only once.

Question 2.2.8 (3 Points)
Write a SQL query that returns the name(s) of the doctors in order by rate from lowest to highest.

Question 2.2.9 (6 Points)
Write a SQL query that returns patients (name) for which there exist no donor that is of the right blood type and donates the correct organ.

Question 2.2.10 (5 Points)
Write a SQL query that returns the average number of organs donated by donors per blood type.

Part 2.3 SQL Updates (Total: 30 Points)

Question 2.3.1 (6 Points)
Write a SQL operation that deletes all organs that were available before 2014.

Question 2.3.2 (7 Points)
Increase the rate of all doctors for HMO insurances by 1,000.

Question 2.3.3 (5 Points)
Insert a new organ *Foot* for donor *Alice* available in 2014.

Question 2.3.4 (5 Points)
Update the availability of all hearts to 2016 if their current availability is 2015.

Question 2.3.5 (7 Points)
Change the rates for all doctors. The HMO rate should be set to the average rate for that doctor minus 500.
The PPO rate should be set to the average rate for that doctor plus 500.