## CS430/630 – Homework 2

50 points (5/100 of final grade)

**Instructions:** The homework is **due at 19:00 EST on Fri March 18**. The submission must have **A SINGLE TEXT FILE** called **Q1.sql**.

All submissions must be in digital form. Create a folder "HW2" under your main folder for the course, and place the script file named Q1.sql there. Ensure that the files are not readable by "others" (using `chmod o-r filename`) and that the files belong to the group CS630-1G and are readable by the group (`chmod g+r filename`). DO NOT CHANGE PERMISSIONS FOR ANY OF THE DIRECTORIES (ESPECIALLY THE 630 DIRECTORY IN YOUR HOMEDIR)!

**YOU MUST ENSURE THAT THE SCRIPT CAN CORRECTLY EXECUTE ON THE DBS3 SERVER.**

One-line comments in the script are recommended, in order to make the homework more readable.

All questions have equal weight.

**Question 1 (50 points)**

Consider a database schema with three relations:

```
Employee (eid:integer, ename:string, age:integer, salary:real)
Works (eid:integer, did:integer, pct_time:integer)
Department(did:integer, dname:string, budget:real, managerid:integer)
```

The keys are underlined in each relation. Relation `Employee` stores employee information such as unique identifier `eid`, employee name `ename`, `age` and `salary`. Relation `Department` stores the department unique identifier `did`, department name `dname`, the department `budget` and `managerid` which is the `eid` of the employee who is managing the department. The `managerid` value must always be found in the `eid` field of a record of the `Employee` relation. The `Works` relation tracks which employee works in which department, and what `percentage` of the time s/he allocates to that department. Note that, an employee can work in several departments.

Provide SQL statements for the following:

(a) Write SQL declarations for creating the schemas. Include necessary key constraints.
(b) Find the salaries of employees that work in a department whose name starts with 'Mar'.
(c) Find the ages of employees who work at least 30% of their time in a single department. List each age only once.
(d) Find the salaries of employees who work only in departments that have budget more than $500,000. List each salary value only once.
(e) Find the names of employees who are managers.
(f) Find the average salary over all employees.
(g) Find the ages of employees who work at least 10% of their time in a department called 'Catering' but who do not work in any department with budget higher than $500,000.
(h) Find the names of employees who work in all departments with budget higher than $500,000.
(i) Find the name(s) of the department(s) with the highest budget.
(j) Find the maximum salary among employees 30 years old or younger for each department with at least 10 employees of any age.

(k) Find for each manager (listed in the output by eid) the average salary of employees working for that manager.
(l) Find the average age of employees for each department where every employee is 30 years old or younger.
(m) [630 students only] Find the name(s) of department(s) who have the highest average employee age.
(n) [630 students only] Find the age(s) that most employees have, i.e., best represented age(s) among employees that work in departments with budget larger than $300,000. If an employee works in multiple such departments, his/her age is only counted once.
(o) [630 students only] Find the average salary among employees that work in all departments whose names starts with 'Ca'.