CS127 Homework 1

Due: September 17th, 2014 3:00PM

Grading Information

Grading for the homeworks is as follows:

- Warmup problems will be graded as one of (✓+, ✓, ✓-)
- All other problems will be graded in detail and will be given a numeric score.

Solutions for the warmup problems will be provided along with your graded work.

Collaboration Policy

Please submit your signed collaboration policy attached to your solutions for Homework 1. The collaboration policy can be found under the `DOCS` section of the course website.

Warmup 1 (Textbook Problem 2.7)

Consider the relational database of Figure 2.14 in the textbook. Give an expression in the relational algebra to express each of the following queries:

a. Find the names of all employees who live in city "Miami".

b. Find the names of all employess whose salary is greater than $100,000.

c. Find the names of all employees who live in "Miami" and whose salary is greater than $100,000.

Warmup 2 (Textbook Problem 2.10)

Consider the *advisor* relationship shown in Figure 2.8 in the textbook, with *s_id* as the primary key of *advisor*. Suppose a student can have more than one advisor. Then, would *s_id* still be a primary key of the *advisor* relation? If not, what should the primary key of *advisor* be?

Warmup 3 (Textbook Problem 2.13)

Consider the bank database of Figure 2.15 in the textbook. Give an expression in the relational algebra for each of the following queries:

a. Find all loan numbers with a loan value greater than $10,000.

b. Find the names of all depositors who have an account with a value greater than $6,000.

c. Find the names of all depositors who have an account with a value greater than $6,000 at the "Uptown" branch.

Warmup 4 (Textbook Problem 6.2)

Consider the relational database of Figure 6.22 in the textbook, where the primary keys are underlined. Give an expression in the relational algebra to express each of the following queries:

a. Find the names of all employees who live in the same city and on the same street as do their managers.

b. Find the names of all employees in this database who do not work for "First Bank Corporation".

c. Find the names of all employees who earn more than every employee of "Small Bank Corporation".

Problem 5 (To Be Graded)

The following is a sample of the database that might be used at the university registrar's office:

Student		
name	**gradyear**	**gpa**
Amy	2016	3.95
Ben	2015	3.87
Carl	2016	3.29
Dan	2017	3.43
Eliza	2015	4.0

Course		
title	**semester**	**instructor**
CS33	2014F	Doeppner
CS127	2014F	Zdonik
CS195	2013F	Kraska
CS127	2012F	Zdonik
CS136	2012S	Fonseca

Enrollment			
name	**title**	**semester**	**grade**
Eliza	CS33	2014F	A
Eliza	CS127	2014F	A
Ben	CS127	2012F	A
Carl	CS195	2013F	C
Carl	CS127	2014F	B

The keys for each relation are as follows:

- *Student:* name (all student names are assumed to be unique)
- *Course:* title and semester
- *Enrollment:* name, title, and semester

Give expressions in relational algebra to answer the following questions:

1. How many courses is Professor Kraska teaching this semester (2014F)?
2. Which student(s) have the highest GPA?
3. Which courses have students with a GPA greater than 3.5 enrolled this semester?
4. Which students are enrolled in **both** CS127 and CS33 this semester?
5. Which students are enrolled in CS127 but **not** CS33 this semester?
6. Which students graduating in 2015 are taking all of Professor Doeppner's courses this semester?