Subject : Relational algebra

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Quiz 4

1. Considering the `University Schema` below:

   Classroom (building, room_number, capacity)
   Department (dept_name, building, budget)
   Course (course_id, title, dept_name, credits)
   Instructor (ID, name, dept_name, salary)
   Section (course_id, sec_id, semester, year, building, room_number, time_slot_id)
   Teaches (ID, course_id, sec_id, semester, year)
   Student (ID, name, dept_name, tot_cred)
   Takes (ID, course_id, sec_id, semester, year, grade)
   Advisor (s_ID, i_ID)
   Timeslot (time_slot_id, day, start_time, end_time)
   Prereq (course_id, prereq_id)

   Write the following queries in relational algebra, using the university schema.

   a. Find the names of all students who have taken at least one Comp. Sci. course.

   b. Find the ID s and names of all students who have not taken any course offering before Spring 2009.

   c. For each department, find the maximum salary of instructors in that department. You may assume that every department has at least one instructor.

   d. Find the lowest, across all departments, of the per-department maximum salary computed by the preceding query.

2. Find the results of the following relational algebra queries applied on the database provided thereafter:

P(A,B,C)

A	B	C
1	11	X
2	11	Y
3	11	X
4	12	Z

R(C,D)

X	1
X	2
Y	1

a. $X1 \leftarrow (\pi_{C,A} P) - R$

b. $X2 \leftarrow \pi_{B,C} P \div R$

c. $X3 \leftarrow \sigma_{A=D} (P \times R)$

d. $X4 \leftarrow (P \bowtie R)$

Grading:

- 60 p. for 1st answer (15 p. for each)
- 40 p. for 2nd answer (10 p. for each)