Tutorial 5.5 (Week 8) Relational Algebra

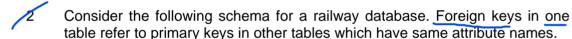
Classroom Exercise

The schema of a database containing university-type data is given below. Primary key is underlined for each relation.

```
STUDENT(<u>Sid</u>, Sname, Sex, Age, Year, GPA)
DEPT(<u>Dname</u>, Numphds)
PROF(<u>Pname</u>, Dname)
COURSE(<u>Cno</u>, Cname, <u>Dname</u>)
MAJOR(<u>Dname</u>, <u>Sid</u>)
SECTION(<u>Dname</u>, <u>Cno</u>, <u>Sectno</u>, Pname)
ENROLL(Sid, Grade, Dname, Cno, Sectno)
```

Write the following queries in relational algebra.

- (i) Find the names of professors who work in departments that have fewer than 50 PhD students.
- (iii) Find the name(s) of student(s) with the lowest GPA.
- (iii) Find the names and majors of students who have taken the 'Database System' course.
- (iv) Find the ids, names, and GPAs of the students who have taken all courses from the 'Civil Engineering' department.



TRAINS(train_num, source_city, destination_city)
DEPARTURES(train_num, date, train_type)
PASSENGERS(passenger_ssn, passenger_name, address)
RESERVATIONS(passenger_ssn, train_num, date, seat_number)

Express the following queries using Relational Algebra.

- (ii) Find the Cities that have direct (non-stop) trains to both *Minneapolis* and *San Francisco*.
- ரி) Find the train_num and date of all trains for which there are no reservations.

The following questions are to be answered on the following simplified soccer relational schema.

```
Teams (name, groupname, teamid);
Players (name, teamid, matches, numgoals);
Results (teamid-one, teamid-two, scoreone, scoretwo, matchdate);
```

Express the following queries using Relational Algebra.

- (i) Lists all the pairs of teamids such that all the matches between each pair of teams that ended in a tie. For simplicity, you can assume that teamid-one is always smaller than teamid-two.
- (ii) Find the <u>"names"</u> (not "teamids") of the teams that lost every game they played.
- Give a relational algebra expression to find the maximum value in the relation R(A) without using aggregate operations.
- Given the following relations, where a, b, c are integer attributes: R(a, b), S(b, c), Write relational algebra expression for the following queries.

Find the top 2 values of a present in R.