COMP 5531 DATABASES

Bipin C. **Desai**

Assignment 2 Due: To be uploaded to CrsMgr by the deadline

1. (4 points) Consider the following database scheme: the key attributes in each relation are underlined.

EMPLOYEE(Emp#, Name)
PROJECT(Proj#, ProjName, ChiefArchitect) — ChiefArchitect = emp# of chief architect.
ASSIGNED_TO(Proj#, Emp#), Hours).

Express the following queries in Relational Algebra: if a query cannot be expressed in RA, explain why.

(a) Find the names of all employees assigned only to projects whose chief architect is *Zeke Aptin*.

(b) Find the employee numbers and names of all employees who are assigned to all projects.

(c) Find the names of all chief architects also assigned to a project on which they are not chief architect.

(d) Find the names of all employees who are chief architect on more than one project.

2. (8 points) Consider the following database scheme: the key attributes in each relation are underlined.

MOVIE(MName, Year, Profit)
DIRECTED(DName, MName, Year, Earnings)
ACTED_IN(AName, MName, Year, Earnings)
REVIEW(RName, MName, Year, Number_of_stars).

Express the following queries in Relational Algebra: if a query cannot be expressed in RA, explain why.

(a) Find the name and year of all movies in which *Prima Donna* has acted and which have a profit of at least 100 million.

(b) Find the names of all actors who have earned more than 10 million acting in a movie to which the reviewer *Jean Ti-guy* gave 0.5 stars.

(c) Find the name of the actor(s) who had the highest earnings in a single movie, of all actors in 1996.

(d) Find the names of all reviewers who have given 0.5 stars to all movies in which *Slash Bore* has acted.

(e) Find the names of all directors who have directed *Prima Donna* and *Me Mimi* in the same movie.

(f) Find the names of all reviewers who, in 1996, gave 5 stars to a movie which did not make a profit.

(g) Find the names of the director and actors of the 1977 movie which had the highest profit.

(h) Find the names of all actor/directors who have acted in every movie which they have directed.

3. (8 points) Consider a DB Scheme consisting of the following relation schemes.

FLIGHTS (flno, from, to, distance, departs, arrives)
AIRCRAFT(aid, aname, cruiserange)
CERTIFIED(eid, aid)
EMPLOYEES(eid, ename, salary)

The key attributes in each relation are underlined. In the *flights* relation, *from* and *to* indicate the names of the two airports and *distance* the distance between them. *departs* and *arrives* are departure and arrival times. The semantics of the other relations should be clear enough from the identifiers used. The *employees* relation describes pilots and other employees as well. Every pilot is certified for some aircraft.

1. Give an example of a foreign key constraint that involves the AIRCRAFT relation. What are the options for enforcing this constraint when a user attempts to delete an AIRCRAFT tuple?

2. Express the following queries in Relational Algebra (RA): if a query cannot be expressed in RA, explain why.

   (a) Get the id's and names of employees who have a salary of more than 150 K.

   (b) Get details on pilots who are certified for a Airbus aircraft.

   (c) Find the *aid*'s of all aircraft that can be used on non-stop flights from Montreal to Beijing.

   (d) Find the names of pilots who can operate planes with a range greater that 15000 km but are not certified on any Boeing aircraft.

   (e) Find the pilot(s) who make(s) the highest salary among pilots.

   (f) Find those pilots who are certified for at least two different kinds of aircraft.