RUSTAMJI INSTITUTE OF TECHNOLOGY

DEPARTMENT OF INFORMATION TECHNOLOGY

ASSIGNMENT – II

DBMS (4th Sem)

Date of assignment: 27 Mar 2014

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Topics: Relational Algebra and SQL

Note:

- Students are asked, not copy from anyone else. For this purpose, a student may be asked to present and explain one or two answers (randomly chosen) during a *Tutorial Class*.
- A student may be asked to name the text books/reference books/Internet Sources, he/she has referred, to solve assignment questions.

Q1. Relational Algebra

The following relations keep track of used car sale information in a city:

Seller (***SID***: integer, SNAME: string, CITY: string, STATE: string, STREET: string, REP: integer)

Car (***CARID***: integer, ***POSTDATE:*** date, BRAND: string, MILEAGE: integer, YEAR: integer, SID: integer, ASKPRICE: integer)

Transaction (***BID: integer, CARID: integer, POSTDATE:*** date ACTUALPRICE: integer, TDATE: date)

Buyer (***BID***: integer, BNAME: string, CITY: string, STATE: string, STREET: string)

The Seller table contains every seller's ID, name, credit, address information, and reputation/rating (1-6). The Buyer table records the information of customers' IDs, names and address information. The Car table includes car IDs, posted selling date (when the seller puts it up for sale), brand (e.g. Toyota/Ford), mileage, production year, and owner's id and ask price. Note that a car can be bought and sold several times. The Transaction table records the transaction history: the buyer's id, the car id, the corresponding posted date, the transaction date and actual price.

Write each of the following queries in **Relational Algebra**:

A. List all cars that have an asking price of less than 10,000 dollars.
B. List names of the sellers who have sold/are trying to sell a Toyota car produced in 2009.

C. List names of sellers whose reputation is more than 4.
D. Help Robert Carlos find a used car nearby: List all cars and their owners who live in the same street as Robert Carlos.
E. List all the 'available' cars with the cheapest asking price and mileage between 10,000 and 30,000 miles.
    1. *Hint:* First try finding all the available cars. An available car means that it has been put up for sale, but hasn't been sold yet.

Q2. Relational Algebra

Consider two relation instances below, with the following schemas:

Country (country_name, continent);

City (city_name, country_name, is_capital, population).

Country

country_name	continent
US	North America
Canada	North America
England	Europe
Germany	Europe
France	Europe
Mali	Africa

City

city_name	country_name	is_capital	population
New York, NY	US	no	8,000,000
Washington, DC	US	yes	600,000
Philadelphia, PA	US	no	1,500,000
Ottawa	Canada	yes	800,000
Toronto	Canada	no	2,500,000
Berlin	Germany	yes	3,500,000
Hamburg	Germany	no	2,000,000
Bonn	Germany	no	300,000
Paris	France	yes	2,000,000
Lyon	France	no	700,000
Bamako	Mali	yes	2,000,000
Timbuktu	Mali	no	50,000
Mopti	Mali	no	100,000

In each question (A) - (D) below, **write a relational algebra expression** and **show its result** when the expression is executed with the given instances.

A. List the names of all European cities with population of more than 600,000.

B. List the names of all countries for which no cities have been entered into the City table.

C. List names and continents of countries that are either in Europe or whose capitals have a population of over 1 million.

D. List all pairs of cities such that one of them is a capital of some country, and the other is a non-capital city in that same country. For each city in the pair, list its name.

Q3. SQL

The following relations try to keep track of airline flight information:

Flights (***FLIGHTNO***: integer, ***FROM***: string, ***TO***: string, ***DISTANCE***: integer, ***DEPARTS***: time, ***ARRIVES***: time,

PRICE: integer, ***AID***: integer, ***CID***: integer)

Aircraft (***AID:*** integer, ***MANUFACT:*** string, ***MODEL:*** string)

AirlineComp (***CID***: integer, ***CNAME***: string, ***HADDRESS***: string)

Most of the fields are self-explanatory: the Aircraft table records the flight number, the departing and arriving city and scheduled times (all in PST), the distance between the two cities, price of a seat (assume all seats cost the same), which aircraft (id) it uses and which airline company it belongs to. The AirlineComp table, stores an airline company's id, name, and address of its headquarter. The Aircraft table includes the aircraft ids, model names, and manufacturers' information.
Write each of the following queries in **SQL**:

A. List all the flights (only their numbers) that use a Boeing aircraft.
B. List each airline company with the number of distinct aircraft models it owns.
C. List the cheapest non-stop flights (just the flight numbers) from Roanoke to New York.
D. For each pair of cities, list the average price of all non-stop flights that depart before 2:00 PM, and order them by the ascending average price. (Note: "Los Angeles, New York" and "New York, Los Angeles" should be considered different pairs)
E. Mary wants to travel from Los Angeles to New York with no more than one layover. For example, she can choose a non-stop flight from Los Angeles to New York, or she can also take a flight to Chicago first, and then transit to another flight to New York. List all such valid routes from Los Angeles and which have total cost less than 800 dollars and have total travel time less than 10 hours. An example output would be like, say [(3134, null), (3115, 4563)] where 3134 is a valid non-stop flight and 3115, 4563 is a valid one-stop schedule.

Hint: Assume that there is an 'hour' function to get time in Hours only.