Quiz-3, CSE-202, Fundamentals of Database Systems

Name:_____

Roll Number:_____

Maximum Marks: 20   Time: 1 hour

Question 1: Consider the following relational schema (keys are underlined):

Product(**pid**, name, price, mfgr), Buys(**cid, pid**), Customer(**cid**, cname, age)

   a) Write the following query **in relational algebra without using the division operator**: "Find the names of all customers who have purchased all products that are not manufactured by Tata." [**2.5 marks**] [Binary marking]

   Ans. $S=\prod_{pid}(\sigma_{mfgr!="Tata"}(Product))$ **: Products not manufactured by Tata**

   $T=\prod_{cid}(Buys) \times S$ **: All customers, non-Tata product combinations**

   $U=T-\prod_{cid}(Buys)$ **: Customers, product combinations to be removed**

   $W=\prod_{cid}(Buys)- \prod_{cid}(U)$ **: Customer product combinations of the result**

   Required expression= $\prod_{cname}(\sigma(W \bowtie Customer))$
   Combining all to obtain the final expression, required expression is

   $\prod_{cname}(\sigma((\prod_{cid}(Buys)- \prod_{cid}(\prod_{cid}(Buys) \times (\prod_{pid}(\sigma_{mfgr!="Tata"}(Product))) -\prod_{cid}(Buys))) \bowtie Customer))$

   b) Write the following query **in SQL**: "Find the names and cids of all customers who have purchased the **second most expensive** product." You can assume that no two products have the same price. [**2.5 marks**] [Binary marking]

Ans1. SELECT C.name, C.cid from
        FROM Customer, Product, Buys
        WHERE Customer.cid = Buys.cid and Buys.pid = Product.pid
               and Product.price = (select max(Product2.price) from Product Product1, Product Product2, Product Product3 where Product1.price > Product2.price and Product2.price > Product3.price)

Question 2: [**2.5 marks + 2.5 marks**] Consider the following relational schema. An employee can work in more than one department: the pct_time field of the Works relation shows the percentage of time given employee works in a given department.

Emp(<u>eid:integer</u>, ename:string, age:integer, salary:real)
Works(<u>eid:integer, did:integer</u>, pct_time:real)
Dept(<u>did:integer</u>, budget:real, manager_id:integer)

Write the following SQL queries: [Binary Marking]

a) For each department with more than 20 employees (part time or full_time), print the department id, i.e., did, manager_id and the number of employees that work in that department.

Answer. SELECT W.did, D.manager_id, COUNT (W.eid)
      FROM Works W, Dept D
      WHERE W.did = D.did
          GROUP BY W.did
          HAVING count(W.eid) > 20

b) Find the manager id's of manager who manage only departments with budgets greater than Rs. 5 crores.

Answer. SELECT DISTINCT D.managerid
      FROM Dept D
      WHERE 50000000 < ALL (SELECT D2.budget
      FROM Dept D2
      WHERE D2.managerid = D.managerid)

Another way to formulate the "only query".
http://www.mathcs.emory.edu/~cheung/Courses/377/Syllabus/5-SQL/select3c.html

Question 3: [**10 marks**] Draw an ER diagram for the following information that Galleries need to maintain.

Galleries keep information about artists, their names (which are unique), birthplaces, age, and style of art. For each piece of artwork, the artist, the year it was made, its unique title, its type of art (e.g., painting, lithograph, sculpture, photograph), and its price must be stored. Pieces of artwork are also classified into groups of various kinds, for example, portraits, still lifes, works by Picasso, or works of the 19th century; a given piece may belong to more than one group. Each group is identified by a name (like those just given) that describes the group. Finally, galleries keep information about customers. For each customer, galleries keep that person's unique name, address, total amount of dollars spent in the gallery (very important!), and the artists and groups of art that the customer tends to like.

[MARKING SCHEME: 10 marks: distribution-
- **0.5 for every relation, [4*0.5=2 marks]**
- **Correct cardinality constraints for every relation, [4*0.5=2 marks]**
- **1 mark for each entity(0.5 for primary key + 0.5 for other attributes), [4*1=4 marks]**
- **2 mark for marking total participation where required [2 marks]**

2 marks will be deducted for extra entity.
1 mark will be deducted for incorrect notation.
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