CS 261: Database Management Systems Assignment-1

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Please read the following:

Question 1

Consider the following two relations $R(A, B, C, D)$ and $S(E, F, G, H)$ and the given instances. Write the resultant relation of the following expressions:

1. $\pi_{E,H}(\sigma_{(G=78)\vee(F=71)}(S)) - \pi_{B,C}(\sigma_{(A=49)\vee(A=19)}(R))$.

2. $S \bowtie_{F \leq A} R$

R

A	B	C	D
19	60	28	75
21	71	78	15
13	45	77	70
49	54	18	60
51	88	78	63

S

E	F	G	H
69	70	98	75
21	71	48	35
13	55	67	70
49	53	19	40
35	78	78	63
21	71	78	15
13	45	77	70

Question 2

Consider the bank database discussed in class with the same assumptions.

Branch(<u>Name</u>, Assets, City)
Customer(<u>ID</u>, Customer_Name, Street, City)
Loan(<u>Loan_Number</u>, Branch_name, Amount)
Borrower(<u>BC_ID</u>, <u>BL_Number</u>)
Account(<u>Account_Number</u>, AB_name, Balance)
Depositor(<u>DC_ID</u>, <u>A_number</u>)

Write a relational algebraic expression(s) to find the IDs of customers who has the second lowest loan amount.

Question 3

Consider the following relational schema for universities and its affiliated colleges.

University(<u>ID</u>, Name, Address, Website)
Affiliation(<u>University_ID</u>, <u>College_name</u>, City, College_Address, Principal)

Write a TRC expression for the query to *find the ID and Names of all universities with an affiliated college located in every city in which "Delhi University" has an affiliated college.*

Question 4

For this question, consider our running example of COMPANY database[1] and write a DRC expression for the query: *find the SSNs of employees who belong to "Research" department together with the project numbers of the projects which they work on.*

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[1]Page no. 162, Fundamentals of Database Systems book, 7th edition