



COMSATS University, Islamabad (CUI)
Department of Computer Science
Quiz - 2

Course: CSC371 - Database Systems

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Time Allowed (min): Total Marks: 20 / 10

Class / Semester: BCT-IV / Fall 2023

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CLO-2: (Apply the concept of domain and tuple relational calculus)

1. In this question, you are to write relational algebra queries against the following needs, over a small sample database. The database contains following four relations: [3]

MovieGoer(moviegoer_name, moviegoer_age, is_student) if moviegoer_name is the key

Like(moviegoer_name, movie_title, moviegoer_age, is_student) if moviegoer_name is the key

Visits(moviegoer_name, movie_theatre) if (moviegoer_name, movie_theatre) is the key

Show(movie_theatre, movie_title, ticket_price) if movie_theatre is the key

1a. Find all movie theatres, showing movie liked by Ahmad, having ticket price less than 500 rupees [1]

$$\sigma_{\text{moviegoer_name} = \text{Ahmad}}(\text{Likes}) \times \sigma_{\text{ticket_price} < 500}(\text{Shows})$$

- 1b. Find the names of all students who visit movie theatre showing movie they like. [2]

$$\pi(\text{moviegoer_name})(\text{Visits}) \times \pi(\text{movie_title})(\text{Likes})$$

2. Suppose relations R (A, B) and S (A, C, D) have the following tuples:

A	B
3	3
6	4
2	3
3	5
7	1

A	C	D
5	1	6
1	5	8
4	3	9

A	B	A	C	D
3	3	5	1	6
6	4	1	5	8
2	3	4	3	9
3	5			
7	1			

- Compute the natural join of R and S (i.e., $R \bowtie S$) and show the resultant table. [1]

3. Write a relational algebra expression using cross product to obtain the same result (Same number of columns and rows) as in Q2. [1]

A	B	A	C	D
3	3	5	1	6
3	3	1	5	8
3	3	4	3	9
6	4	5	1	6
6	4	1	5	8
6	4	4	3	9
2	3	5	1	6
2	3	1	5	8
2	3	4	3	9

4. Suppose relations R (A, B, C) has the following tuples:

A	B	C
1	2	2
4	2	4
3	5	3
1	6	1
2	3	5

- Compute the projection and selection $\pi_B, C(\sigma_{A=C}(R))$. [1]

A = C	B
4	2
3	5
1	6

6- Suppose relations R (A, B) and S (B, C, D) have the following tuples

A	B
1	2
2	4
3	4

B	C	D
2	4	5
4	4	8
4	7	9

Compute R $\bowtie$ S with the condition $R.A > S.C$
 Add R.B $>$ S.D [1]

A	B
1	2
2	4
3	4

7- In this question, you are provided a sample database containing two relations

Student(student_id, student_name) // student_id is the key

Enrolled(student_id, course_code) // (student_id, course_code) is the key

You have also been provided instances of each of the above relations.

student_id	student_name
1234	Ahmed
4000	Ali
2000	Osman

student_id	course_code
1234	CS1500
1234	CS1200
1234	CS2001
4000	CS3010
4000	MA3000

Compute $\sigma_{\text{Student student_id}=2000}(\text{Student} \bowtie \text{Enrolled})$ [1]

Student_id	Student_name	course_code
2000	Osman	NULL

7- Suppose Relation (Employees) have the following tuples

Name	SSN	salary	DNO	Super_ssn
John	1	20000	55	33344
Franklin	2	40000	55	85866
Abdel	3	60000	44	98765

Write a query to find, how many employees in each department and find their average salary. Rename the name and attributes of resultant relation and show the resultant table. [2]

$f_{\text{count}=\text{SSN}, \text{Average}=\text{salary}}$

DNO	Count
55	2
44	1

output
 3, 120000

DNO	Avg salary
55	120000