Databases and Information Systems

Course code: CS-303

Assignment 1

Total: 17 marks

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1. Consider the banking database shown below: **7 marks**

Branch (branch_name, branch_city, assets)
customer (customer_name, customer_street, customer_city)
loan (loan_number, branch_name, amount)
borrower (customer_name, loan_number)
account (account_number, branch_name, balance)
depositor (customer_name, account_number)

a) Give an expression in the relational algebra for each of the following queries. **2 marks**
   i. Find the names of all branches located in "Chicago".
   ii. Find the names of all borrowers who have a loan in the branch "Downtown".

b) What are the appropriate primary keys? Given your choice of primary keys, identify appropriate foreign keys. **2 marks**

c) Give an expression in the relational algebra for each of the following queries: **3 marks**
   i. Find all loan numbers with a loan value greater than $10,000.
   ii. Find the names of all depositors who have an account with a value greater than $6,000.
   iii. Find the names of all depositors who have an account with a value greater than $6,000 at the "Uptown" branch.

2. Consider the following tables: **10 marks**

User

Id	Name	Age	Gender	OccupationId	CityId
1	John	25	Male	1	3
2	Sara	20	Female	3	4
3	Victor	31	Male	2	5
4	Jane	27	Female	1	3

Occupation

OccupationId	OccupationName
1	Software Engineer
2	Accountant
3	Pharmacist
4	Library Assistant

City

CityId	CityName
1	Halifax
2	Calgary
3	Boston
4	New York
5	Toronto

What will be the output of the following relational algebra expressions:

i. ΠName(σage > 25 (User))

ii. (σId > 2 V age != 31 (User))

iii. (σUser.OccupationId = Occupation.OccupationId (User X Occupation))

iv. User $\bowtie$ Occupation $\bowtie$ City

v. ΠName,Gender (σCityName = “Boston” (User $\bowtie$ City))

NOTE:

1. Due date for Assignment is ***6th September 2022(10 PM).***
2. Answer all the questions and submit the answers in LATEX format on Moodle.
3. Mode of submission is moodle.
4. We will run a plagiarism check for all the submissions.
5. Penalty for late submission is 15% of secured marks.
6. Penalty for plagiarism is 100% of the secured marks.