

Assignment 2

Subject: Database Management System

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1) Given relation schema as below

Employee(emp-id, name, address, telephone, salary, age)

Works-on (emp-id, project-id, join-date)

Project(project-id, project-name, city,duration, budget)

Write the **SQL commands** for the following.

- i. Insert new record in project relation.
- ii. Find the name of employees with the name of project they work on.
- iii. Find the name and city of that project on which salary of employee is greater than or equal to 20000.
- iv. List the name of employees whose name starts with “m” and ends with “a”
- v. Find the employee name and project name of those employees who living in address Pokhara.
- vi. List name of employee whose age is greater than average age of all employees.
- vii. List employee id of all employees whose age is greater than minimum budget of all projects.
- viii. List employee id of all employees who joint project on “05/01/2015”
- ix. List the name of employees whose name starts with N or with K
- x. Display the project id with maximum budget.

2) Consider the relational database of figure given below, where primary keys are underlined. Given an expression in **SQL** for each of the following queries.

Employee(employee_name,street,city)

Works(employee_name,company_name,salary)

Company(company_name,ciy)

Manages(employee_name,manager_name)

- i. Find the names of all employees who work for the First Bank Corporation.
- ii. Find the names of all employees who live in the same city and on the same street as do their managers.
- iii. Find the names, street address, and cities of residence of all employees who work for First Bank Corporation and earn more than \$10,000 per annum
- iv. Find the names of all employees who earn more than every employee of Small Bank Corporation
- v. Find those companies whose employees earn a higher salary, on average, than the average salary at First Bank Corporation.
- vi. Find the names of all employees in this database who live in the same city as the company for which they work.
- vii. modify the databases so that Ram now lives in Kathmandu
- viii. Give all employees of First Bank Corporation a 10 percent raise

- ix. Give all managers of First Bank Corporation a 10 percent raise
- x. Delete all in the work relation for employees of small bank corporation
- xi. Find all employees who earn more than the average salary of all employees of their company

3) Consider the following schema

Branch(bname, bcity, assets)

Customer(cname, street, ccity)

Depositor (cname, account#)

Account(bname, account#, balance)

Loan(bname, loan#, amount)

Borrower(cname, loan#)

Write **SQL statement** for the following

1. Find the name of all branch in account relation.
2. Finds the names of all branches that have assets greater than at least one branch located in Burnaby
3. Find all customers whose street includes the substring "Main".
4. Finds all customers who have a loan and an account at the SFU branch.
5. Find the name and loan number of all customers who have a loan at SFU branch.
6. Finding all customers who have a loan but not an account at the SFU branch.
7. Find the branches whose assets are greater than some branch in Pokhara.

4) Consider the following relational schema

branch (branch-name, branch-city, assets)

customer (customer-name, customer-street, customer-city)

account (account-number, branch-name, balance)

loan (loan-number, branch-name, amount)

depositor (customer-name, account-number)

borrower (customer-name, loan-number)

Write **relational algebraic expressions** for the following

1. Find all loans of over \$1200
2. Find the loan number for each loan of an amount greater than \$1200
3. Find the names of all customers who have a loan, an account, or both, from the bank
4. Find the names of all customers who have a loan and an account at bank.
5. Find the names of all customers who have a loan at the Perryridge branch
6. Find the names of all customers who have a loan at the Perryridge branch but do not have an account at any branch of the bank.
7. Find the names of all customers who have a loan at the Perryridge branch.
8. Find the largest account balance
9. Find all customers who have an account at all branches located in Brooklyn city.
10. Delete all account records in the Perryridge branch.
11. Delete all loan records with amount in the range of 0 to 50
12. Delete all accounts at branches located in Needham

13. Insert information in the database specifying that Smith has \$1200 in account A-973 at the Perryridge branch.
14. Update interest payments by increasing all balances by 5 percent
15. Update all accounts with balances over \$10,000 6 percent interest and pay all others 5 percent
16. Create the view (named all-customer) consisting of branches and their customers.

5) Consider the following relational database, where primary keys are underlined.

employee(person_name,street,city)

works(person_name,company_name,salary)

company(company_name,city)

manages(person_name,manager_name)

Given an expression in the **relational algebra** to express each of the following queries.

- i) Find the name of all employees who work for first bank corporation.
- ii) Find the name and cities of residence of all employees who work for first bank corporation.
- iii) Find the name, street address and city of residence of all employees who work for first bank corporation and earn more than \$10000 per annum.
- iv) Find the name of all employees in this database who lives in same city as the company for which they work.
- v) Find the name of all employees who live in the same city and on the same street as do their managers.
- vi) Find the name of all employees in this database who do not work for first bank corporation
- vii) Display the name of employee whose name begin from S.
- viii) Find the average salary of employee
- ix) Find the average salary of employee companywise
- x) Find the name of all employees who earn more than their managers
- xi) Find the name of employees who earn more than top earner at “NBL company” in the database.
- xii) Find the name of all employee who live in “Lalitpur” and salary is less than 50000
- xiii) Assume that companies may located in several cities. Find all companies located in every city in which small bank corporation is located.
- xiv) List the name and city of employee who work in “Pokhara” and have salary greater than Rs.50000
- xv) Delete all employee who come from “Chitwan”
- xvi) Increase salary of all employee by 15%
- xvii) Insert new records in employee relation

- xviii) Create view for which employee earns 20000\$ or more
- xix) Modify the database so that Ramesh now lives in Kathmandu
- xx) Give all salary of employee of "ABC company" 18.5% rise

6) Differentiate between relational algebra and relational calculus? Define TRC and DRC?

7)

- i) consider the following relational schema

Sailors (sid,sname,rating,age)

Boats(bid,bname,color)

Reserves(sid,bid,day)

Write a relational algebra expression for the query "find the name of sailors who have reserved red or green boat". Construct the initial operator tree and final efficient operator tree after applying transformation rules.

- ii) Consider the relational schema

Employee(person_name,street,city)

Works(person_name,company_name,salary)

Company(company_name,city)

Write the relational algebra expression for the query "Find the names of all employees who lives in Pokhara". Construct the initial operator tree and final efficient operator tree after applying transformation rules.

- iii) Make an operator tree for the following SQL expression.

Select customer_name

From branch,account,depositor

Where branch_city='btl' AND balance>2000;

8) Create a un-normalized table and normalized it upto 3NF.

9) Convert ER diagram you have designed in **previous Assignment 1** into relational schema.

10)

- i) Find the closure set of attributes and functional dependency from following

$A \rightarrow BC, B \rightarrow C, AB \rightarrow C, AC \rightarrow D$

- ii) Compute the closure of functional dependencies $AB \rightarrow C, B \rightarrow C, C \rightarrow D, D \rightarrow A$ for the relation $R=(A,B,C,D)$. Also list candidate key, prime and non-prime attributes.

- iii) Let $R=\{A,B,C,D,E,F\}$ $F= \{A \rightarrow BC, E \rightarrow CF, B \rightarrow E, CD \rightarrow EF\}$ Now compute $(AB)^+$

11)

- i) Consider the following table. Identify all the functional dependencies in the table and convert it into 3NF.

Employee

EmpNo	EName	City	Post	Salary
E001	Ram	Pokhara,Dharan	Manager	30000
E002	Sita	Kathmandu	Analyst	25000
E003	Bharat	Bharatpur,Pokhara	Programmer	22000
E004	Laxman	Butwal	Manager	30000
E005	Dashrath	Lalitpur,Kathmandu	Analyst	25000

- ii) Explain second Normal form? Whether the following table is in 2NF?

Sector	PlotNo	City
A	1	KTM
A	2	KTM
A	3	KTM
B	1	Pokhara
B	2	Pokhara

Explain the different anomalies in the database table.

- iii) What do you mean by functional dependency, multivalued dependency and transitive dependency in Normalization process of Database? Why Normalization is needed? Assume the un-normalized relation as given below and find the final normalized logical ER diagram normalizing the un-normalized relation upto 3NF explaining what you going to check at each normal step.

Roll.No	Name	SubID	SubName	FeePaid
1	Hari Man Dangol	DBMS	Database Management System	20000
2	Mohan Prasad Shah	DBMS	Database Management System	20000
3	Indira Rimal	DBMS	Database Management System	30000
1	Hari Man Dangol	CPROG	C programming	20000
2	Mohan Prasad Shah	CPROG	C programming	15000
3	Indira Rimal	MATH	Mathematics	30000