

Database Management System Lab Worksheet

Lab attendance: 10 marks

Lab report: 10 marks

Project report: 20 marks

Lab objective test: 10 marks

Total: 50 Marks

These lab tasks will guide you to prepare for SQL CRUD operations and submission of lab reports. You have to submit lab report of previous lab into corresponding next lab. Your lab report to be submitted should include the following topics.

- 1. Cover page**
- 2. Title**
- 3. Objective(s)**
- 4. Related Theory**
- 5. List all the records of the table**
- 6. Questions and SQLs**
- 7. Output snapshot**
- 8. Discussion & Conclusion.**

NOTE: Lab report should be Hand-written (not printed form).

Write SQL to solve the following queries. All students have to insert at least 10 unique tuples in each relation of the given schema. The tabulated data should be unique [no match to your friends]. You can use MySQL/SQL Server or anything else, it is up to you. Answer of every SQL must be screen shot or clipped part of your query result with SQL

Lab Task 1 and 2

Objective: To be familiar with Data Definition Language [create database, create table, drop database, drop table, alter/ modify columns]

- 1) Create Database “Bank” and display the list of databases
- 2) Drop the database “Bank” and display the list of databases
- 3) Create tables of given schema

*branch (branch_number, 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)*

- 4) List all the tables of Bank database

- 5) List all the columns of “branch” and “customer” tables
- 6) Add column “*Branch_manger*” in branch table and list all the columns of branch table
- 7) Drop column “*Branch_manger*” from branch table and list all the columns of branch table
- 8) Change the *data type of a column “balance”* from *decimal (12,2)* to *int* in account table.
- 9) Modify the length of data type “*customer_name*” from *varchar (30)* to *varchar (50)* in a customer table.
- 10) Add a NOT NULL constraint in the column “*branch_city*” of the branch table.
- 11) Add default constraint in “account” table and *set default balance is 1000*. And list the columns of account table.
- 12) Drop the default constraint of balance from the account table and list the columns of account table.
- 13) Add Check constraint in “branch” Table assets must be greater than 100,00,000 and department city must be either KTM or PKR or BRT.
- 14) Drop the check constraints from the branch table.
- 15) Add Primary Key constraint in table branch, customer, loan and account based on relational schema. List the columns of all tables.
- 16) Drop the primary key from the account table. List the columns of account table.
- 17) Add the foreign key constraints on the borrower and depositor table.
- 18) Drop the foreign key constraints form depositor table.
- 19) Add unique constraints on “*customer_name*” column in the customer table.
- 20) Drop the unique constraints from the customer table.
- 21) Add primary key constraint in the account table. And also add the foreign key constraints on the depositor table

Lab Task 3, 4, and 5

Objective: To be familiar with Data Manipulation Language [*insert, select, where, group by, having, set operation, in, not in, union, intersect, and except*]

Write SQL to achieve the following results:

- 1) Insert at least 10 records in branch, customer, account, loan, borrower and depositor relations. [Every student inserts their own set of records and should be different from your friends.]
- 2) Display all the records of branch relation.
- 3) Display all the records of customer relation.
- 4) Display all the records of loan relation.
- 5) Display all the records of borrower relation.
- 6) Display all the records of account relation.

- 7) Display top 5 records of depositor relation
- 8) Find the names of all branches in the loan relation (with or without duplicates).
- 9) Find all loan numbers for loans made at the **Tinkune** branch with loan amounts greater than 200000.
- 10) Find the loan number of those loans with loan amounts between 9,00,000 and 10,00,000.
- 11) For all customers who have a loan from the bank, find their names, loan numbers, and loan amount.
- 12) Find the customer names, loan numbers, and loan amounts for all loans at the **Tinkune** branch.
- 13) Find the names of all branches that have assets greater than at least one branch located in **Baneshwor**.
- 14) Find the names of all customers whose street address includes the substring 'main'.
- 15) Find the names of all customers whose name contains *at least four characters*.
- 16) Find the names of all customers whose name start with 'b' and end with 'a'.
- 17) List all the customer's name in alphabetic order who have a loan at the **Tinkune** branch.
- 18) List the entire loan relation in descending order of amount. If several loans have the same amount, then order them in ascending order by loan number.
- 19) Find all the bank customers having a loan, an account, or both at the bank (with or without duplicates).
- 20) Find all customers who have both a loan and an account at the bank (with or without duplicates).
- 21) Find all customers who have an account but no loan at the bank (with or without duplicates).
- 22) Find the largest account balance in the bank [with or without aggregate function].
- 23) Find the names of all customers who have an account in **Tinkune** branch or **Baneshwor** branch, or both.
- 24) Find the average account balance at the Tinkune branch.
- 25) Find the number of tuples in the customer relation.
- 26) Find the average account balance at each branch.
- 27) Find the number of depositors for each branch.
- 28) Find the name of branches where the average account balance is more than 12,00,000.
- 29) Find the average balance for all account.

- 30) Find the average balance for each customer who lives in **Pokhara** and has at least three accounts.
- 31) Find all customers who have both an account and a loan at the **Tinkune** branch. [use set membership]
- 32) Find all customers who do have a loan at the bank, but do not have an account at the bank. [use set membership]
- 33) Find out the total balance of the bank.
- 34) Find the number of branches appearing in the account relation.
- 35) Find the total balance of each branch of the bank.
- 36) Find the maximum balance at each branch and sum of the balance of each branch. Rename your output attributes.
- 37) List the names of customers who have a loan at the bank, and whose names are neither Shyam nor Hari.
- 38) Find the name of all branches that have assets greater than those of at least one branch located in Baneshwor. [with or without using Set Comparison]
- 39) Find the names of all branches that have an asset value greater than that of each branch in Baneshwor.
- 40) Delete all account tuples in the **Tinkune** branch.
- 41) Delete all loans with loan amounts between 13000 and 150000.
- 42) Delete all account tuples at every branch located in Baneshwor.
- 43) Delete the records of all accounts with balances below the average at the bank.
- 44) Increase all balance by 5 percent.
- 45) Increase balance only to accounts with a balance of 10000 or more by 5 percent.
- 46) Pay 5 percent interest on accounts whose balance is greater than average.
- 47) Update all accounts with balances over 10,00,000 receive 6 percent interest, whereas all others receive 5 percent.
- 48) Create a view called *all_customer* consisting of branches and their customer's name.
- 49) List the records of view *all_customer*.
- 50) Drop *all_customer* view.
- 51) Perform the Join operation (Natural join, Left join, Right join, and Full join) in the tables account and customer tables.

Lab 6,7, and 8: Project Development

- There shall be 4 students in each group.

Roll Number	Group	Roll Number	Group	Roll Number	Group
1 to 4	A	17 to 20	E	33 to 36	I
5 to 8	B	21 to 24	F	37 to 40	J
9 to 12	C	25 to 28	G	41 to 44	K
13 to 16	D	29 to 32	H	45 to 48	L

- You should build GUI to perform stated operations of the project theme. You might elaborate the given project theme, but document all assumptions that you make about your project. Your project report should contain following:
 - **Cover page**
 - **Project introduction** [450 to 600 words]
 - **Problem statement** [200 to 300 words]
 - **Objective**
 - **Methodology:** E-R diagram, relational schema, Database schema diagram, and SQL used in your project [at least 40 SQLs]
 - **Results:** Snapshot of your project output with elaborated text.
 - **Conclusion**

Project A: A lecturer, identified by his or her number, name and room number, is responsible for organizing a number of course modules. Each module has a unique code and also a name and each module can involve a number of lecturers who deliver part of it. A module is composed of a series of lectures and because of economic constraints and common sense, sometimes lectures on a given topic can be part of more than one module. A lecture has a time, room and date and is delivered by a lecturer and a lecturer may deliver more than one lecture. Students, identified by number and name, can attend lectures and a student must be registered for a number of modules. We also store the date on which the student first registered for that module. Finally, a lecturer acts as a tutor for a number of students and each student has only one tutor. Document all assumptions that you make about your project.

Project B: A Bus Company owns a number of busses. Each bus is allocated to a particular route, although some routes may have several busses. Each route passes through a number of towns. One or more drivers are allocated to each stage of a route, which corresponds to a journey through some or all of the towns on a route. Some of the towns have a garage where busses are kept and each of the busses are identified by the registration number and can carry different numbers of passengers, since the vehicles vary in size and can be single or double-decked. Each route is identified by a route number and information is available on the average number of passengers carried per day for each route. Drivers have an employee number, name,

address, and sometimes a telephone number. Document all assumptions that you make about your project.

Project C: Consider a MOVIE database in which data is recorded about the movie industry. The data requirements are summarized as follows:

- Each movie is identified by title and year of release. Each movie has a length in minutes. Each has a production company, and each is classified under one or more genres (such as horror, action, drama, and so forth).
- Each movie has one or more directors and one or more actors appear in it. Each movie also has a plot outline. Finally, each movie has zero or more quotable quotes, each of which is spoken by a particular actor appearing in the movie.
- Actors are identified by name and date of birth and appear in one or more movies. Each actor has a role in the movie. Directors are also identified by name and date of birth and direct one or more movies. It is possible for a director to act in a movie (including one that he or she may also direct).
- Production companies are identified by name and each has an address. A production company produces one or more movies.
- Document all assumptions that you make about your project.

Project D: Design a database for an automobile company to provide to its dealers to assist them in maintaining customer records and dealer inventory and to assist sales staff in ordering cars. Each vehicle is identified by a vehicle identification number (VIN). Each individual vehicle is a particular model of a particular brand offered by the company (e.g., the XF is a model of the car brand Jaguar of Tata Motors). Each model can be offered with a variety of options, but an individual car may have only some (or none) of the available options. The database needs to store information about models, brands, and options, as well as information about individual dealers, customers, and cars. Your design should include an E-R diagram, a set of relational schemas, and a list of constraints, including primary-key and foreign-key constraints. Document all assumptions that you make about your project.

Project E: You have to develop e-commerce platform, where a customer can register and buy a product. Your developed platform should have a registration window where the user will provide their details, and bank account details. After they've registered, the system should give them unique user IDs and customer IDs. They should have the option to set up their passwords. It should have product listings as well, classified according to their prices (or some other criterion). The user should have the option to buy one or more products from your platform. And after the user makes a purchase, the system would generate an invoice, which will contain the user's name. The system can allow ordering from different suppliers according to availability. Document all assumptions that you make about your project.

Project F: Hospital management database project: A patient will have unique Patient ID. Full description about the patient about personal detail and phone number, and then Disease and what treatment is going on. The doctor will handle patients, one doctor can Treat more than 1 patient. Also, each doctor will have unique ID. Doctor and Patients will be related. Patients can

be admitted to hospital. So different room numbers will be there, also rooms for operation theaters and ICU. There are some nurses, and ward boys for the maintenance of hospital and for patient take care. Based upon the number of days and treatment bill will be generated. Document all assumptions that you make about your project.

Project G: A XYZ company has decided to store information about musicians who perform on its albums (as well as other company data) in a database. The company has wisely chosen to hire you as a database designer:

- Each musician that records at XYZ company has an SSN, a name, an address, and a phone number. Poorly paid musicians often share the same address, and no address has more than one phone.
- Each instrument used in songs recorded at XYZ company has a unique identification number, a name (e.g., guitar, synthesizer, flute) and a musical key (e.g., C, B-flat, E-flat).
- Each album recorded on the XYZ company label has a unique identification number, a title, a copyright data, a format (e.g., CD or MC), and an album identifier.
- Each song recorded at XYZ company has a title and an author.
- Each musician may play several instruments, and a given instrument may be played by several musicians.
- Each album has a number of songs on it, but no song may appear on more than one album.
- Each song is performed by one or more musicians, and a musician may perform a number of songs.
- Each album has exactly one musician who acts as its producer. A musician may produce several albums, of course.

Project H: The prescriptions-R-X chain of pharmacies has offered to give you a free lifetime supply of medicine if you design its database. Given the rising cost of health care, you agree. Here's the information that you gather:

- Patients are identified by an SSN, and their names, addresses, and ages must be recorded.
- Doctors are identified by an SSN. For each doctor, the name, specialty, and years of experience must be recorded.
- Each pharmaceutical company is identified by name and has a phone number.
- For each drug, the trade name and formula must be recorded. Each drug is sold by a given pharmaceutical company, and the trade name identifies a drug uniquely from among the products of that company. If a pharmaceutical company is deleted, you need not keep track of its products any longer.
- Each pharmacy has a name, address, and phone number.
- Every patient has a primary physician. Every doctor has at least one patient.
- Each pharmacy sells several drugs and has a price for each. A drug could be sold at several pharmacies, and the price could vary from one pharmacy to another.
- Doctors prescribe drugs for patients. A doctor could prescribe one or more drugs for several patients, and a patient could obtain prescriptions from several doctors. Each

prescription has a date and a quantity associated with it. You can assume that, if a doctor prescribes the same drug for the same patient more than once, only the last such prescription needs to be stored.

- Pharmaceutical companies have long-term contracts with pharmacies. A pharmaceutical company can contract with several pharmacies, and a pharmacy can contract with several pharmaceutical companies. For each contract, you have to store a start date, an end date, and the text of the contract.
- Pharmacies appoint a supervisor for each contract. There must always be a supervisor for each contract, but the contract supervisor can change over the lifetime of the contract.

Project I: A large bank has several branches at different places. Each branch maintains the account details of the customers. The customers may open joint as well as single accounts. The bank also provides loan to the customer for different purposes. Bank keeps record of each transaction by the customer to his account. All of the branches have employees and some employees are managers.

Project J: Design a database for an airline. The database must keep track of customers and their reservations, flights and their status, seat assignments on individual flights, and the schedule and routing of future flights. Document all assumptions that you make about your project.

Project K: Design a database for keeping track of the exploits of your favorite sports league. You should store the matches played, the scores in each match, the players in each match, and individual player statistics for each match. Summary statistics should be modeled as derived attributes. Document all assumptions that you make about your project.

Project L: Dashboard automatically depicts project data in easy-to-read, colorful charts, so you get total transparency into projects. Design the QFX cinema chain Dashboard system. Your dashboard should contain current showing movies list, time slot, number of screens in Mahal, and upcoming movie. Keep track the records of customer. First you have to provide the registration and then go to the login page. Your dashboard also contains book ticket system with seat number. Assume all necessary data if necessary and document it.

Lab 9 and 10: Project Demonstration and Viva.

*******GOOD LUCK*******