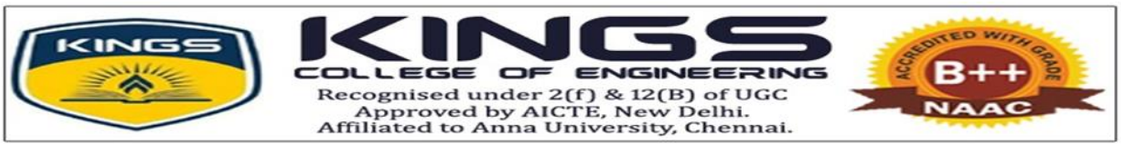

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SUBJECT: DATABASE MANAGEMENT SYSTEMS LABORATORY

YEAR/ SEMESTER: II / IV

LAB MANUAL CS3481 – R-2021

(*Version:01*)

PREPARED BY

Ms. S. Abikayil Aarthi, AP/CSE

CS3481 DATABASE MANAGEMENT SYSTEMS LABORATORY

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AIM:

The aim of this laboratory is to inculcate the abilities of applying the principles of the database management systems. This course aims to prepare the students for projects where a proper implementation of databases will be required

COURSE OBJECTIVES:

- To learn and implement important commands in SQL.
- To learn the usage of nested and joint queries.
- To understand functions, procedures and procedural extensions of databases.
- To understand design and implementation of typical database applications.
- To be familiar with the use of a front-end tool for GUI based application development.

LIST OF EXPERIMENTS:

1. Create a database table, add constraints (primary key, unique, check, Not null), insert rows, update and delete rows using SQL DDL and DML commands.
2. Create a set of tables, add foreign key constraints and incorporate referential integrity.
3. Query the database tables using different 'where' clause conditions and also implement aggregate functions.
4. Query the database tables and explore sub queries and simple join operations.
5. Query the database tables and explore natural, equi and outer joins.
6. Write user defined functions and stored procedures in SQL.
7. Execute complex transactions and realize DCL and TCL commands.
8. Write SQL Triggers for insert, delete, and update operations in a database table.
9. Create View and index for database tables with a large number of records.
10. Create an XML database and validate it using XML schema.
11. Create Document, column and graph-based data using NOSQL database tools.
12. Develop a simple GUI based database application and incorporate all the above-mentioned features
13. Case Study using any of the real life database applications from the following list

a) Inventory Management for a EMart Grocery Shop
b) Society Financial Management
c) Cop Friendly App – Eseva
d) Property Management – eMall
e) Star Small and Medium Banking and Finance

● Build Entity Model diagram. The diagram should align with the business and functional goals stated in the application.
● Apply Normalization rules in designing the tables in scope.
● Prepared applicable views, triggers (for auditing purposes), functions for enabling enterprise grade features.
● Build PL SQL / Stored Procedures for Complex Functionalities, ex EOD Batch Processing for calculating the EMI for Gold Loan for each eligible Customer.
● Ability to showcase ACID Properties with sample queries with appropriate settings

TOTAL: 45 PERIODS

COURSE OUTCOMES: At the end of this course, the students will be able to:

CO1: Create databases with different types of key constraints.
CO2: Construct simple and complex SQL queries using DML and DCL commands.
CO3: Use advanced features such as stored procedures and triggers and incorporate in GUI based application development.
CO4: Create an XML database and validate with meta-data (XML schema).
CO5: Create and manipulate data using NOSQL database.

EX.NO: 1 DDL and DML commands

AIM

To execute basic command in MySQL using DDL and DML.

PROCEDURE

Step 1: Start

Step 2: Create a database and use it for basic operations.

Step 3: Create a table with necessary attributes and execute DDL and DML commands.

Step 4: Display the result.

Step 5: Stop

DDL (DATA DEFINITION LANGUAGE)

- CREATE
- ALTER
- DROP
- TRUNCATE
- COMMENT
- RENAME

SQL> CREATE TABLE EMP (EMPNO NUMBER (4), ENAME VARCHAR2 (10),
DESIGNATIN VARCHAR2 (10), SALARY NUMBER (8,2));

Table created.

SQL: DESC <TABLE NAME>;
SQL> DESC EMP;

Name	Null?	Type
EMPNO		NUMBER(4)
ENAME		VARCHAR2(10)
DESIGNATIN		VARCHAR2(10)
SALARY		NUMBER(8,2)

SQL>ALTER TABLE EMP MODIFY EMPNO NUMBER (6);

Table altered.

SQL> DESC EMP;

Name	Null?	Type
EMPNO		NUMBER(6)
ENAME		VARCHAR2(10)
DESIGNATIN		VARCHAR2(10)
SALARY		NUMBER(8,2)

SQL>ALTER TABLE EMP ADD (DOB DATE, DOJ DATE);
Table altered.
SQL> DESC EMP;

Name	Null?	Type
EMPNO		NUMBER (7)
ENAME		VARCHAR 2(12)
DESIGNATIN		VARCHAR 2(10)
SALARY		NUMBER (8,2)
QUALIFICATION		VARCHAR 2(6)
DOB		DATE
DOJ		DATE

REMOVE / DROP

SQL> ALTER TABLE EMP DROP COLUMN DOJ;
SQL> DESC EMP;

Name	Null?	Type
EMPNO		NUMBER (7)
ENAME		VARCHAR 2(12)
DESIGNATIN		VARCHAR 2(10)
SALARY		NUMBER (8,2)
QUALIFICATION		VARCHAR 2(6)
DOB		DATE

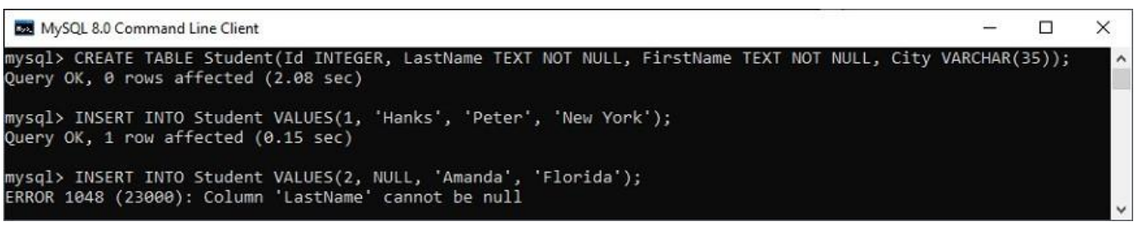
SQL>ALTER TABLE EMP DROP (DOB, QUALIFICATION);
Table altered.
SQL> DESC EMP;

Name	Null?	Type
EMPNO		NUMBER (7)
ENAME		VARCHAR 2(12)
DESIGNATIN		VARCHAR 2(10)
SALARY		NUMBER (8,2)

NOT NULL Constraint

MySQL> CREATE TABLE Student (Id INTEGER, Last Name TEXT NOT NULL, FirstName TEXT NOT NULL, City VARCHAR (35));
MySQL> INSERT INTO Student VALUES(1, 'Hanks', 'Peter', 'New York');
MySQL> INSERT INTO Student VALUES(2, NULL, 'Amanda', 'Florida');

Output



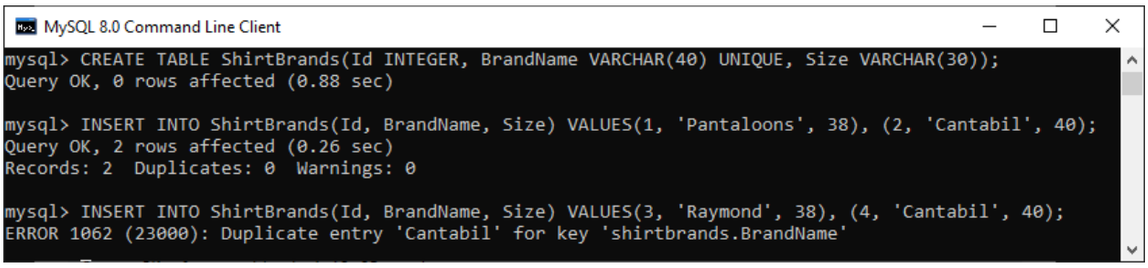
UNIQUE Constraint

MySQL> CREATE TABLE ShirtBrands(Id INTEGER, BrandName VARCHAR(40) UNIQUE, Size VARCHAR(30));

MySQL> INSERT INTO ShirtBrands(Id, BrandName, Size) VALUES(1, 'Pantaloons', 38), (2, 'Cantabil', 40);

MySQL> INSERT INTO ShirtBrands(Id, BrandName, Size) VALUES(1, 'Raymond', 38), (2, 'Cantabil', 40);

Output



CHECK CONSTRAINT

CHECK (expr)

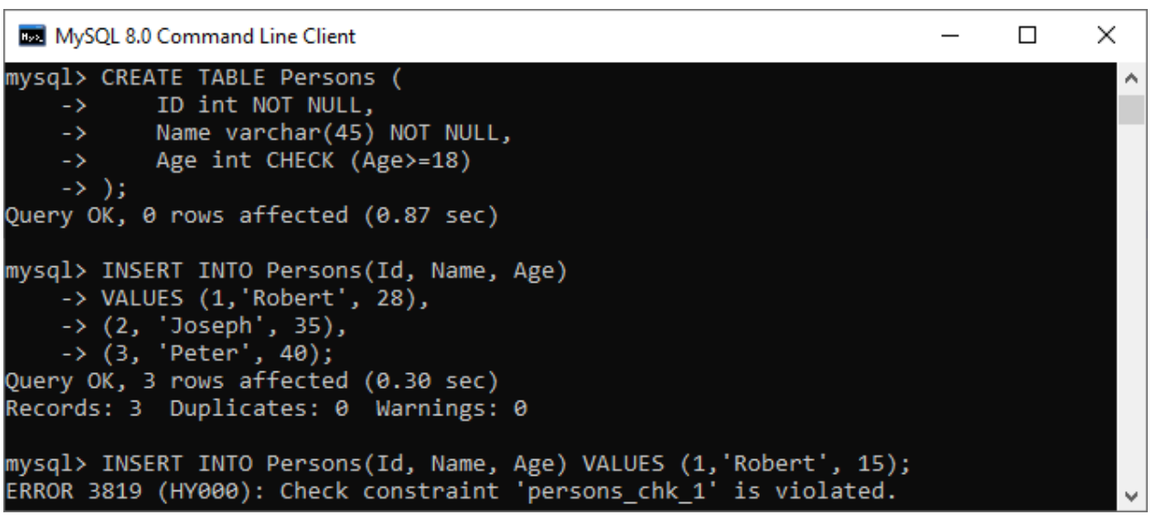
MySQL> CREATE TABLE Persons (ID int NOT NULL,Name varchar(45) NOT NULL, Age int CHECK (Age>=18));

MySQL> INSERT INTO Persons(Id, Name, Age)
VALUES (1,'Robert', 28), (2, 'Joseph', 35), (3, 'Peter', 40);

MySQL> INSERT INTO Persons(Id, Name, Age) VALUES (1,'Robert', 15);

Output

In the below output, we can see that the first INSERT query executes successfully, but the second statement fails and gives an error that says: CHECK constraint is violated for key Age.



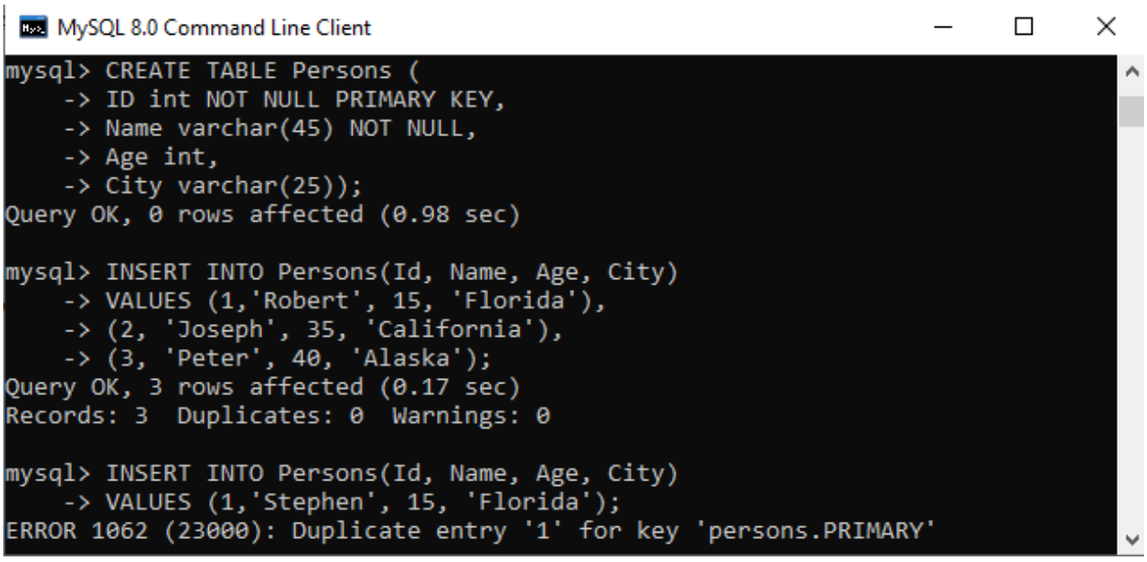
PRIMARY KEY CONSTRAINT

CREATE TABLE Persons (ID **int** NOT NULL **PRIMARY KEY**, **Name varchar**(45) NO T NULL, Age **int**, City **varchar**(25));

INSERT INTO Persons(Id, **Name**, Age, City) **VALUES** (1,'Robert', 15, 'Florida') , (2, 'Joseph', 35, 'California'), (3, 'Peter', 40, 'Alaska');

INSERT INTO Persons(Id, **Name**, Age, City) **VALUES** (1,'Stephen', 15, 'Florida');

Output



VIVA QUESTIONS:

RESULT

Thus, the queries were executed successfully.

EX.NO:2 FOREIGN KEY AND REFERENTIAL INTEGRITY CONSTRAINT

AIM

To create a set of tables and add foreign key and referential integrity constraints.

PROCEDURE

Step 1:Start

Step 2:Create Table Department and Employee with necessary attributes.

Step 3:Add Foreign Key constraints in department table by altering it.

Step 4:Check referential integrity constraints by perform any operation.

Step 5: Stop

DEPARTMENT

```
CREATE TABLE Department(
Id INT PRIMARY KEY,
Name NVARCHAR(50)
);
-- Insert some test data in Department Table
Insert into Department values (10, 'IT');
Insert into Department values (20, 'HR');
Insert into Department values (30, 'INFRA');
```

EMPLOYEES

```
CREATE TABLE Employees(
Id INT PRIMARY KEY,
Name VARCHAR(100) NOT NULL,
DepartmentID INT
);

-- Adding the Foreign Key Constraint
ALTER TABLE Employees ADD FOREIGN KEY (DepartmentId) REFERENCES
Department(Id);

-- Insert some test data in Employees Table
INSERT into Employees VALUES (101, 'Anurag', 10);
INSERT into Employees VALUES (102, 'Pranaya', 20);
INSERT into Employees VALUES (103, 'Hina', 30);
```

Delete from Parent Table

DELETE FROM Department WHERE Id = 10;

OUTPUT

SQL> DELETE from Department where Id=10;

ERROR 1451 (23000): Cannot delete or update a parent row: a foreign key constrai

nt fails (`db2`.`employees`, CONSTRAINT `employees_ibfk_1` FOREIGN KEY (`Departm

entID`) REFERENCES `department` (`Id`))

VIVA QUESTIONS:

RESULT

Thus the queries were executed successfully

EX.NO: 3 QUERIES WITH WHERE CLAUSE AND AGGREATE FUNCTIONS.

AIM

To write queries using WHERE clause and Aggreate Functions.

PROCEDURE

Step 1: Start

Step 2: Write queries using different WHERE Clause

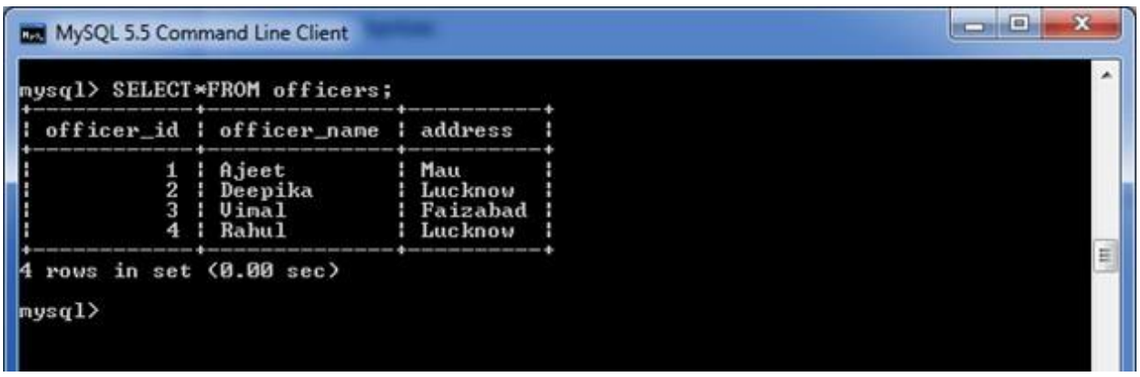
Step 3:Write queries for Aggregate functions like count,avg,min,max

Step 4:stop

MySQL WHERE Clause

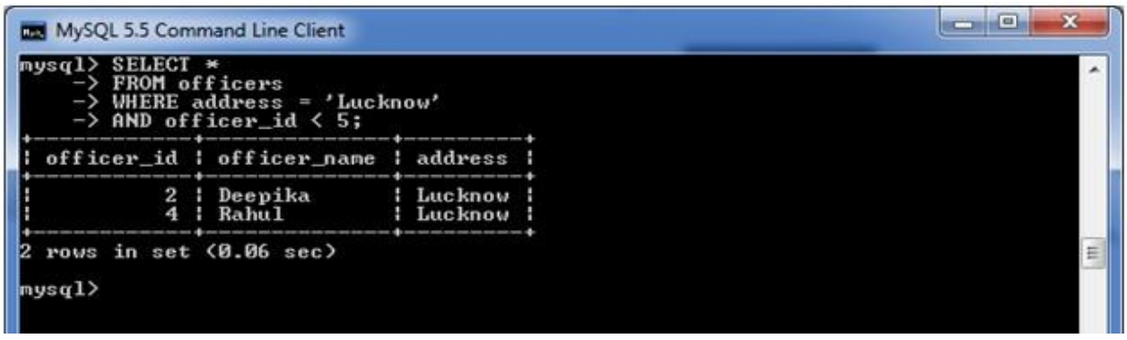
Syntax:

Select * from Tablename WHERE conditions;



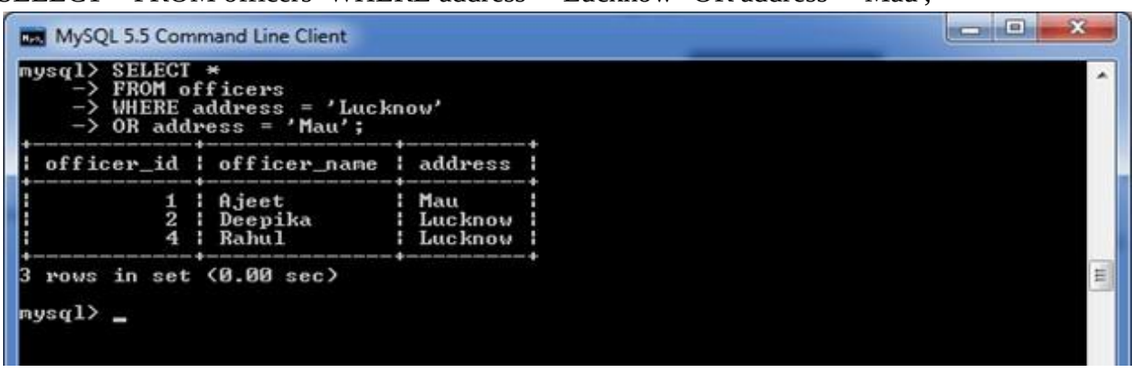
MySQL WHERE Clause with AND condition

SELECT * FROM officers WHERE address = 'Lucknow' AND officer_id < 5;



WHERE Clause with OR condition

SELECT * FROM officers WHERE address = 'Lucknow' OR address = 'Mau';

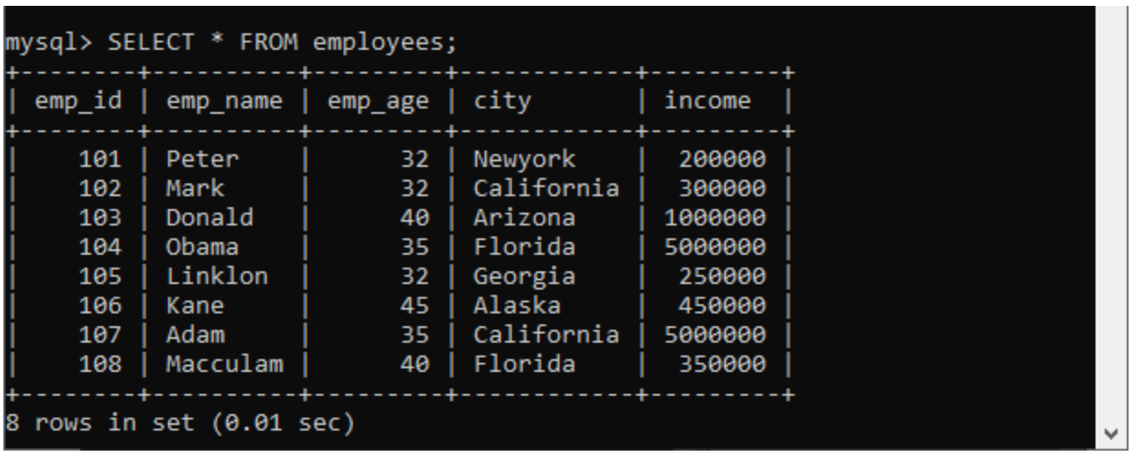


MySQL WHERE Clause with combination of AND & OR conditions

SELECT * FROM officers WHERE (address = 'Mau' AND officer_name = 'Ajeet')
OR (officer_id < 5);

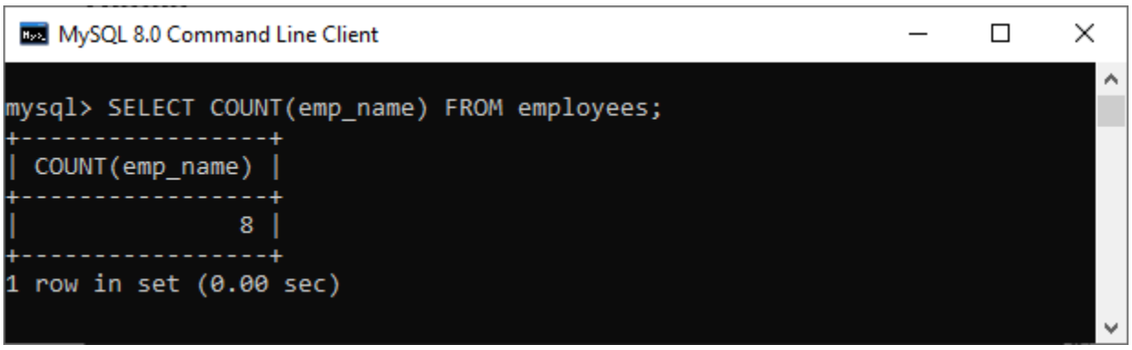
AGGREGATE FUNCTIONS

Consider a table named "employees" that contains the following data.



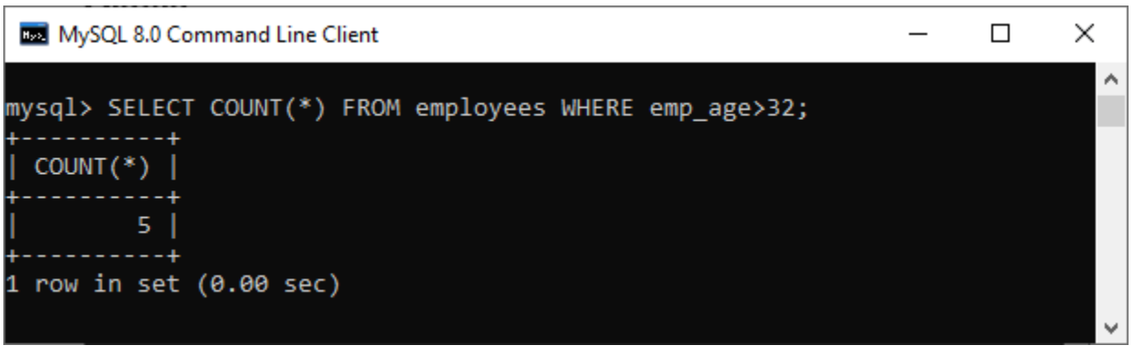
MySQL> **SELECT** COUNT(emp_name) **FROM** employees;

Output:

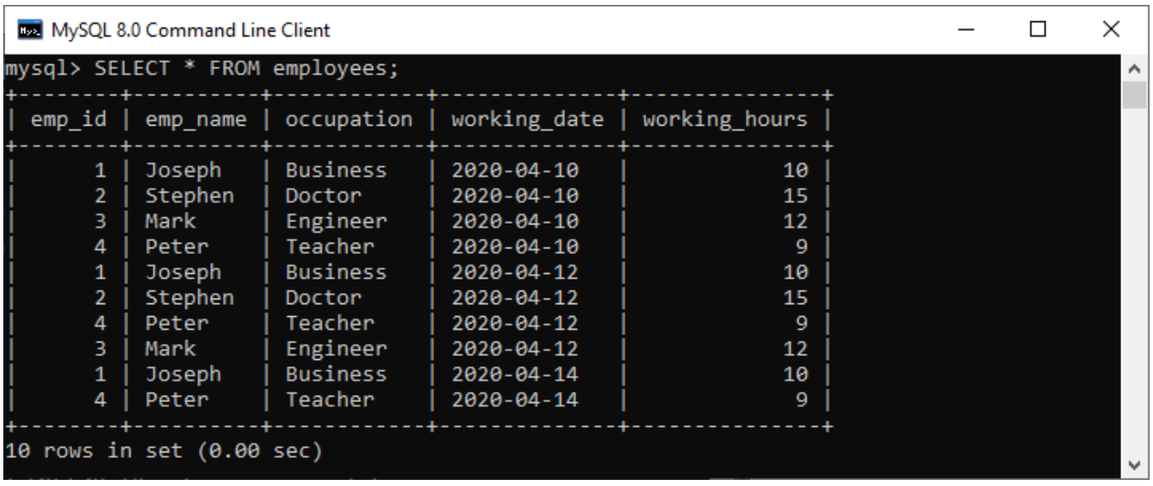


MySQL> **SELECT** COUNT(*) **FROM** employees **WHERE** emp_age>32;

Output:

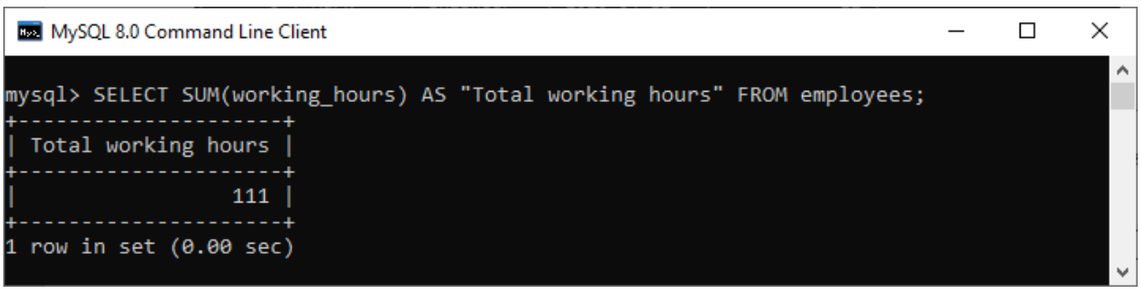


Consider our database has a table named **employees**, having the following data. Now, we are going to understand this function with various examples:



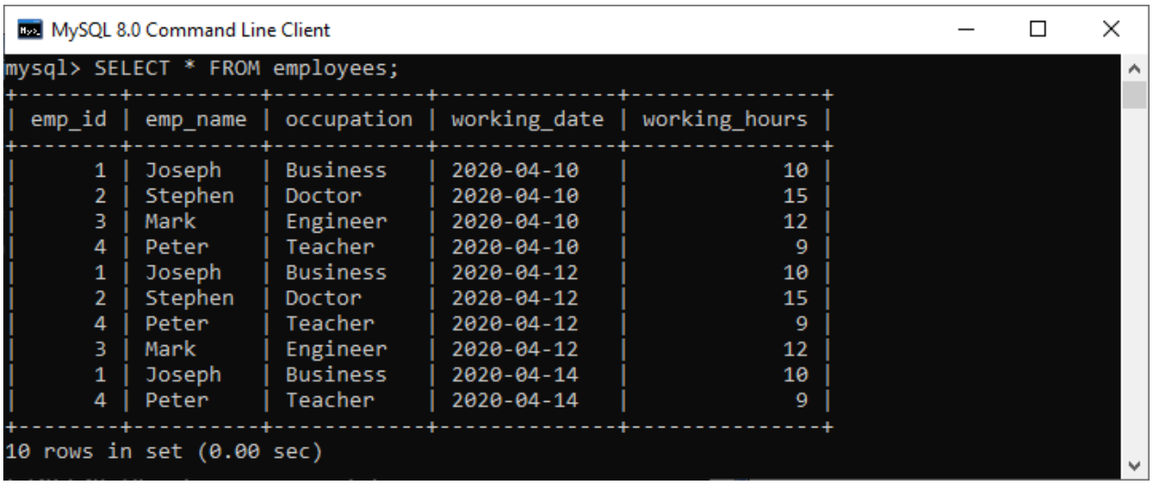
MySQL> **SELECT** SUM(working_hours) **AS** "Total working hours" **FROM** employees;

Output:



MySQL avg() function example

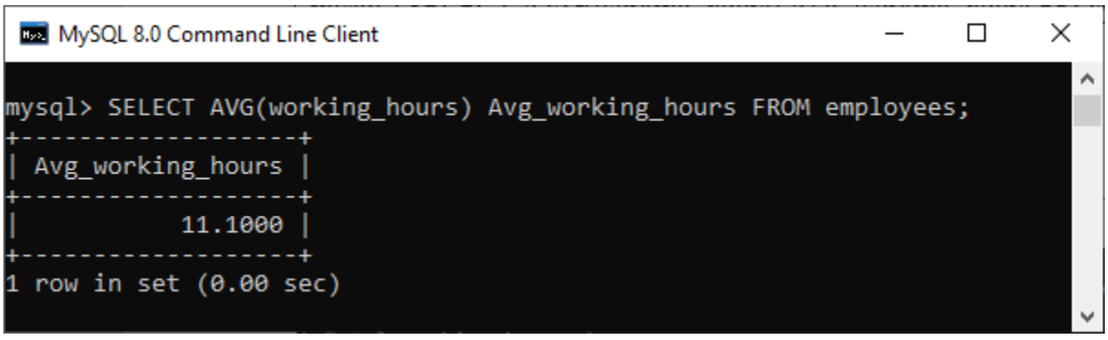
Consider our database has a table named **employees**, having the following data. Now, we are going to understand this function with various examples:



MySQL> **SELECT** AVG(working_hours) Avg_working_hours **FROM** employees;

Output:

We will get the result as below:



VIVA QUESTIONS:

RESULT

Thus the queries were executed successfully

EX.NO:4 SIMPLE JOIN AND SUB QUERIES

AIM:

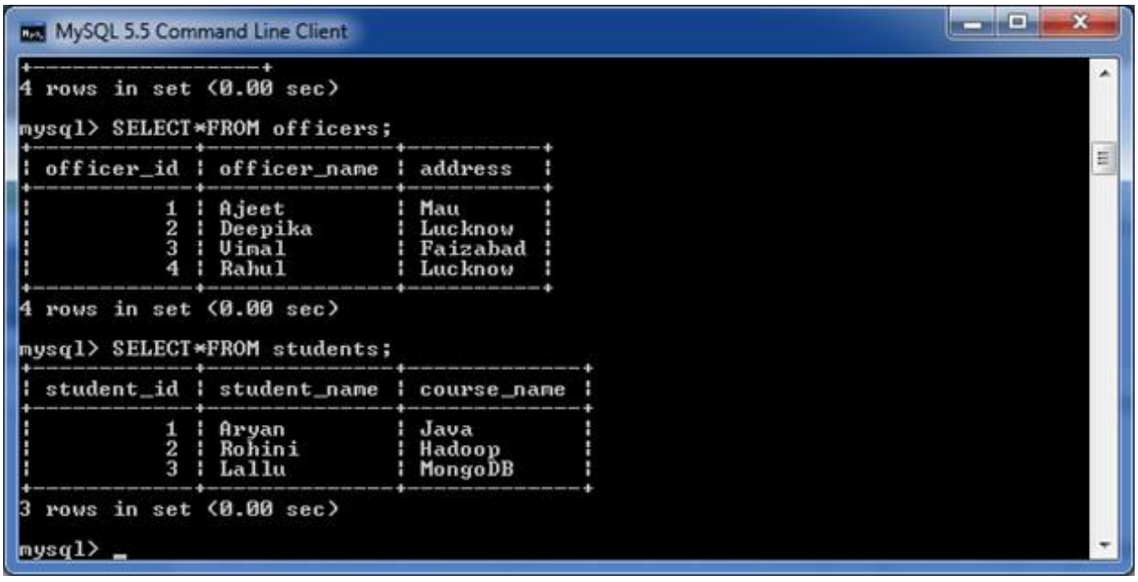
To execute and verify the SQL commands for Simple JOIN and sub queries.

PROCEDURE

STEP 1: Start
STEP 2: Create the table with its essential attributes.
STEP 3: Insert attribute values into the table
STEP 4: Execute Commands for JOIN operation and extract information from the table.
STEP 5: Execute Commands for Sub queries operation.
STEP 6: Stop

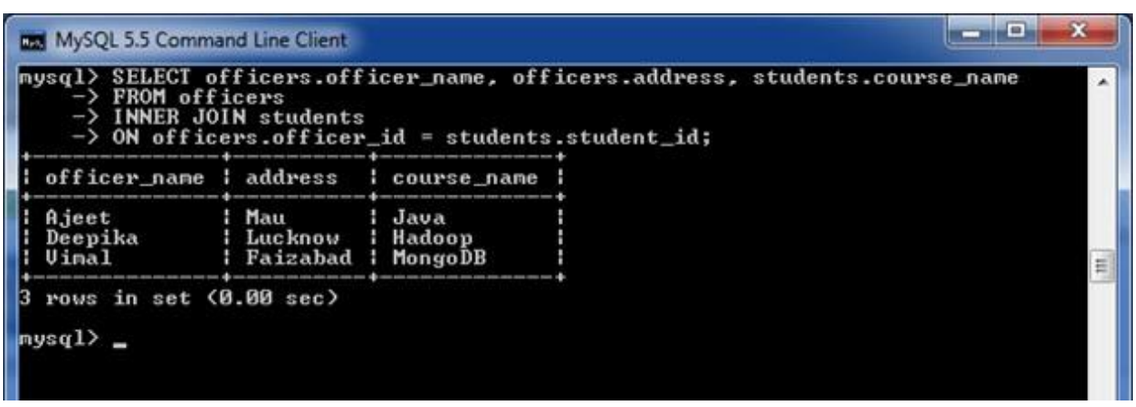
MYSQL INNER JOIN (SIMPLE JOIN)

Consider two tables "officers" and "students", having the following data.



SQL> SELECT officers.officer_name, officers.address, students.course_name
FROM officers INNER JOIN students ON officers.officer_id = students.student_id;

Output



MYSQL SUBQUERY

MySQL 8.0 Command Line Client

```
mysql> SELECT * FROM employees;
+--------+-----------+---------+------------+---------+
| emp_id | emp_name  | emp_age | city       | income  |
+--------+-----------+---------+------------+---------+
|    101 | Peter     |      32 | Newyork    |  200000 |
|    102 | Mark      |      32 | California |  300000 |
|    103 | Donald    |      40 | Arizona    | 1000000 |
|    104 | Obama     |      35 | Florida    | 5000000 |
|    105 | Linklon   |      32 | Georgia    |  250000 |
|    106 | Kane      |      45 | Alaska     |  450000 |
|    107 | Adam      |      35 | California | 5000000 |
|    108 | Macculam  |      40 | Florida    |  350000 |
|    109 | Brayan    |      32 | Alaska     |  400000 |
|    110 | Stephen   |      40 | Arizona    |  600000 |
|    111 | Alexander |      45 | California |   70000 |
+--------+-----------+---------+------------+---------+
```

SQL>SELECT emp_name, city, income **FROM** employees **WHERE** emp_id IN (**SELECT** e mp_id **FROM** employees);

MySQL 8.0 Command Line Client

```
mysql> SELECT emp_name, city, income FROM employees
    ->    WHERE emp_id IN (SELECT emp_id FROM employees);
+-----------+------------+---------+
| emp_name  | city       | income  |
+-----------+------------+---------+
| Peter     | Newyork    |  200000 |
| Mark      | California |  300000 |
| Donald    | Arizona    | 1000000 |
| Obama     | Florida    | 5000000 |
| Linklon   | Georgia    |  250000 |
| Kane      | Alaska     |  450000 |
| Adam      | California | 5000000 |
| Macculam  | Florida    |  350000 |
| Brayan    | Alaska     |  400000 |
| Stephen   | Arizona    |  600000 |
| Alexander | California |   70000 |
+-----------+------------+---------+
```

VIVA QUESTIONS:

RESULT

Thus the queries were executed successfully

EX.NO :5 NATURAL JOIN,EQUI JOIN AND OUTER JOIN

AIM

To write a query to perform natural join ,equi join and outer join.

PROCEDURE

Step 1: Start

Step 2:Create table with necessary attributes .

Step 3: Perform natural join,equi join and outer join operations with queries

Step 4: Stop

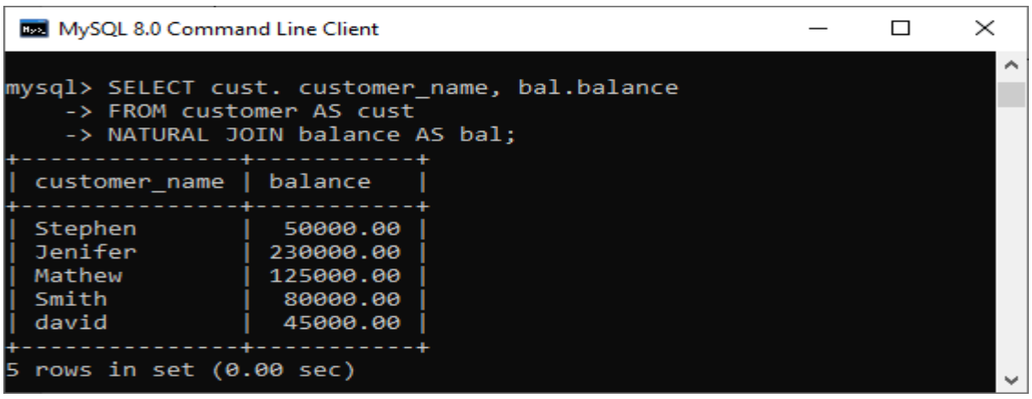
Syntax:

SELECT **[column_names | *]** FROM **table_name1 NATURAL JOIN table_name2;**

```
/* -- Table name: customer -*/
CREATE TABLE customer (      id INT AUTO_INCREMENT PRIMARY KEY,
   customer_name VARCHAR(55),  account int,  email VARCHAR(55)  );

/* -- Table name: balance -*/
CREATE TABLE balance (  id INT AUTO_INCREMENT PRIMARY KEY,
account int,  balance FLOAT(10, 2)  );

/* -- Data for customer table -*/
INSERT INTO customer(customer_name, account, email) VALUES('Stephen', 1030, 'stephen
@javatpoint.com'), ('Jenifer', 2035, 'jenifer@javatpoint.com'), ('Mathew', 5564, 'mathew@java
tpoint.com'),  ('Smith', 4534, 'smith@javatpoint.com'),  ('David', 7648, 'david@javatpoint.com');

 /* -- Data for balance table -*/
INSERT INTO balance(account, balance)
VALUES(1030, 50000.00), (2035, 230000.00), (5564, 125000.00), (4534, 80000.00),
   (7648, 45000.00);
```

NATURAL JOIN:

MySQL> **SELECT** cust. customer_name, bal.balance **FROM** customer **AS** cust NATURAL JOIN balance **AS** bal;

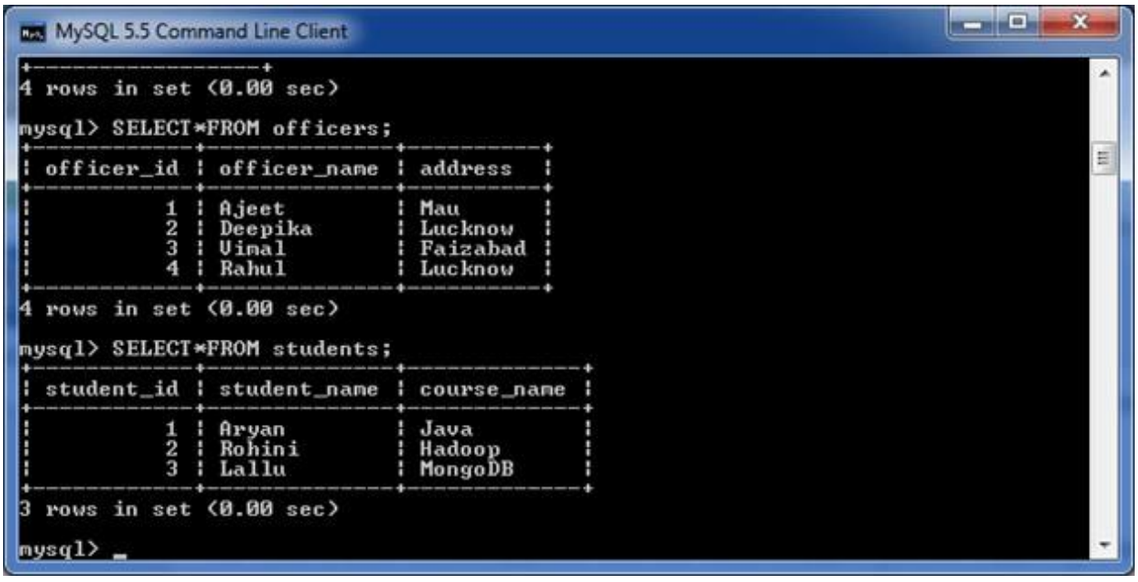


MYSQL RIGHT OUTER JOIN

Syntax:

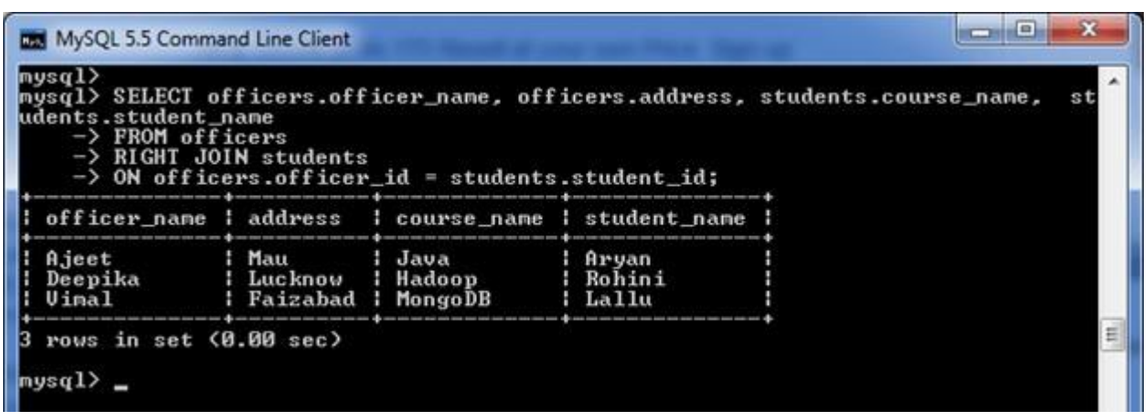
SELECT columns FROM table1 RIGHT [OUTER] JOIN table2 ON table1.column = table2.co lumn;

Consider two tables "officers" and "students", having the following data.



MySQL>SELECT officers.officer_name, officers.address, students.course_name, students.student_name **FROM** officers RIGHT JOIN students **ON** officers.officer_id = students.student_id;

Output

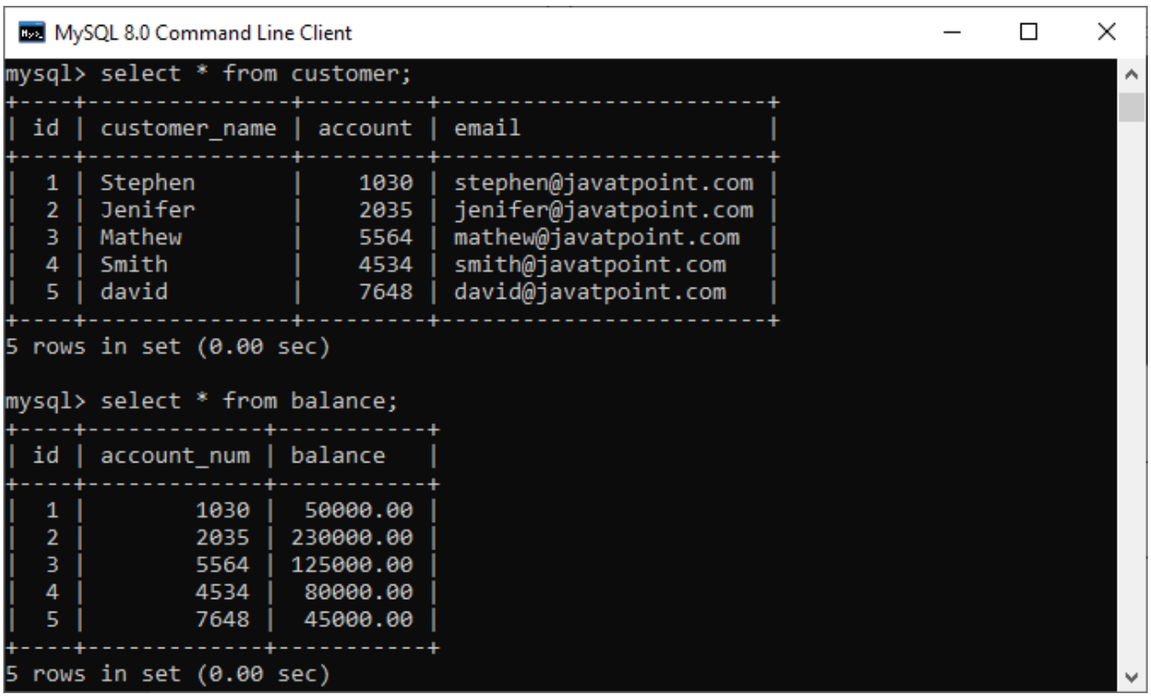


EQUI JOIN

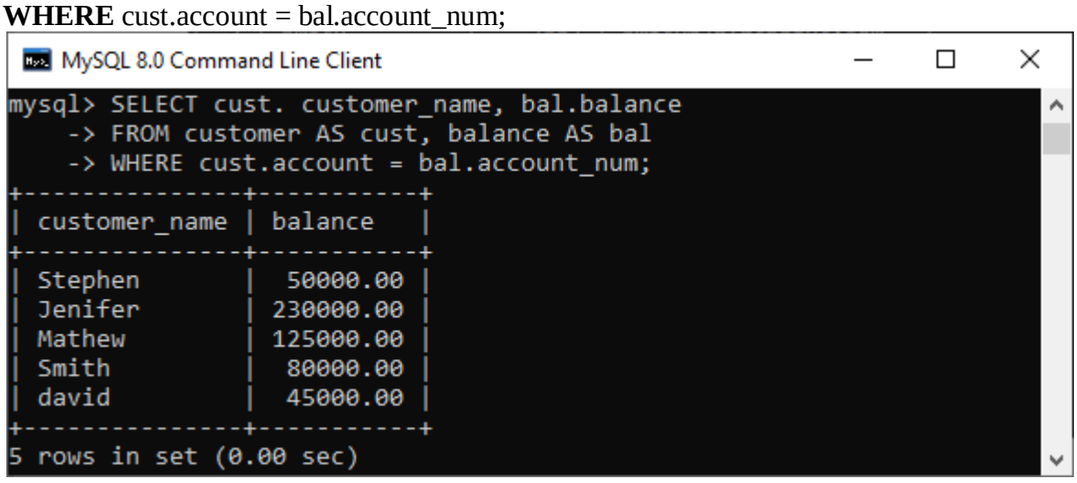
SELECT column_name (s) FROM table_name1, table_name2, ... , table_nameN

WHERE table_name1.column_name = table_name2.column_name;

Consider two tables named **customer** and **balance**



MySQL> **SELECT** cust. customer_name, bal.balance **FROM** customer **AS** cust, balance **AS** bal **WHERE** cust.account = bal.account_num;



VIVA QUESTIONS:

RESULT

Thus the queries were executed successfully

EX.NO:6 PROCEDURE AND FUNCTIONS

AIM :

To write a SQL block to display the student name, marks whose average mark is above 60%.

ALGORITHM

STEP 1:Start

STEP 2:Create a table with table name stud_exam

STEP 3:Insert the values into the table and Calculate total and average of each student

STEP 4: Execute the procedure function the student who get above 60%.

STEP 5: Display the total and average of student

STEP 6: End

SETTING SERVEROUTPUT ON:

```
SQL> SET SERVEROUTPUT ON
```

PROGRAM:

PROCEDURE USING POSITIONAL PARAMETERS:

```
SQL> SET SERVEROUTPUT ON
SQL> CREATE OR REPLACE PROCEDURE PROC1 AS
  2  BEGIN
  3     DBMS_OUTPUT.PUT_LINE('Hello from procedure...');
  4  END;
  5 /
```

Output

```
Procedure created.

SQL> EXECUTE PROC1
Hello from procedure...


PL/SQL procedure successfully completed.

SQL> create table student(regno number(4),name varchar2)20),mark1 number(3), mark2
        number(3), mark3 number(3), mark4 number(3), mark5 number(3));

        Table created
SQL> insert into student values (101,'priya', 78, 88,77,60,89);

        1 row created.
```

```
SQL> insert into student values (102,'surya', 99,77,69,81,99);

        1 row created.
SQL> insert into student values (103,'suryapriya', 100,90,97,89,91);

        1 row created.
SQL> select * from student;

regno   name       mark1 mark2  mark3  mark4  mark5
---------------------------------------------------------------------
101    priya        78    88     77      60      89
102    surya        99    77     69      81      99
103    suryapriya   100   90     97      89      91

SQL> declare
2   ave number(5,2);
3   tot number(3);
4   cursor c_mark is select*from student where mark1>=40 and mark2>=40 and
5   mark3>=40 and mark4>=40 and mark5>=40;
6   begin
7   dbms_output.put_line('regno name mark1 mark2 mark3 mark4 mark4 mark5 total
8   average');
9   dbms_output.put_line('.....');
10  for student in c_mark
11  loop
12  tot:=student.mark1+student.mark2+student.mark3+student.mark4+student.mark5;
13  ave:=tot/5;
14  dbms_output.put_line(student.regno||rpad(student.name,15)
15  ||rpad(student.mark1,6)||rpad(student.mark2,6)||rpad(student.mark3,6)
16  ||rpad(student.mark4,6)||rpad(student.mark5,6)||rpad(tot,8)||rpad(ave,5));
17  end loop;
18  end;
19 /
```

OUTPUT

```
regno   name       mark1 mark2  mark3  mark4  mark5  total  average
-------------------------------------------------------------------------
101    priya        78    88     77      60      89     393     79
102    surya        99    77     69      81      99     425     85
103    suryapriya   100   90     97      89      91     467     93

PL/SQL procedure successfully completed.
```

FUNCTIONS

AIM

To write a Functional procedure to search an address from the given database.

PROCEDURE

STEP 1: Start

STEP 2: Create the table with essential attributes.

STEP 3: Initialize the Function to carryout the searching procedure..

STEP 4: Frame the searching procedure for both positive and negative searching.

STEP 5: Execute the Function for both positive and negative result .

STEP 6: Stop

SQL> create table phonebook (phone_no number (6) primary key,username varchar2(30),doorno varchar2(10),
street varchar2(30),place varchar2(30),pincode char(6));

Table created.

SQL> insert into phonebook values(20312,'vijay','120/5D','bharathi street','NGO colony','629002');

1 row created.

SQL> insert into phonebook values(29467,'vasanth','39D4','RK bhavan','sarakkal vilai','629002');

1 row created.

SQL> select * from phonebook;

PHONE_NO	USERNAME	DOORNO	STREET	PLACE	PINCODE
20312	vijay	120/5D	bharathi street	NGO colony	629002
29467	vasanth	39D4	RK bhavan	sarakkal vilai	629002

SQL> create or replace function findAddress(phone in number) return varchar2 as
address varchar2(100);

```
begin
select username||','||doorno ||','||street ||','||place||','||pincode  into address from  phonebook
where phone_no=phone;
return address;
exception
when no_data_found then return 'address not found';
end;
/
```

Function created.

```
SQL>declare
  2  address varchar2(100);
  3  begin
  4  address:=findaddress(20312);
  5  dbms_output.put_line(address);
  6  end;
  7  /
```

OUTPUT

Vijay,120/5D,bharathi street,NGO colony,629002

VIVA QUESTIONS:

RESULT

Thus the PL/SQL procedure successfully completed.

EX.NO:7 DCL AND TCL COMMANDS

AIM

To write a query to perform DCL and TCL commands.

PROCEDURE

Step 1: Start

Step 2: Create table with necessary attributes.

Step 3: Perform DCL query like GRANT and REVOKE

Step 4: Perform TCL like SAVEPOINT,ROLLBACK and COMMIT.

Step 5: Stop.

DCL COMMANDS

GRANT

GRANT privilege_name ON object_name TO {user_name |PUBLIC |role_name}
[WITH GRANT OPTION];

MySQL> GRANT SELECT ON employee TO

user1;Command Successfully Completed

REVOKE

REVOKE privilege_name ON object_name FROM {user_name |PUBLIC |role_name}

MySQL> REVOKE SELECT ON employee FROM

user1;Command Successfully Completed

TCL(TRNSACTION CONTROL LANGUAGE)

SQL> SAVEPOINT S1;
Savepoint created.

SQL> SELECT * FROM EMP;

EMPNO	ENAME	DESIGNATIN	SALARY
101	NAGARAJAN	LECTURER	16000
102	SARAVANAN	ASST. PROF	16000
104	CHINNI	HOD, PROF	45000

SQL> INSERT INTO EMP VALUES(105,'PARTHASAR','STUDENT',100);

1 row created.

SQL> SELECT * FROM EMP;

EMPNO	ENAME	DESIGNATIN	SALARY
105	PARTHASAR	STUDENT	100
101	NAGARAJAN	LECTURER	16000
102	SARAVANAN	ASST. PROF	16000
104	CHINNI	HOD, PROF	45000

ROLL BACK

SQL> ROLL BACK S1;

Rollback complete.

SQL> SELECT * FROM EMP;

EMPNO	ENAME	DESIGNATIN	SALARY
101	NAGARAJAN	LECTURER	16000
102	SARAVANAN	ASST. PROF	16000
104	CHINNI	HOD, PROF	45000

COMMIT

SQL> COMMIT;

Commit complete.

VIVA QUESTIONS:

RESULT

Thus the queries were executed successfully

EX.NO:8 CREATION OF DATABASE TRIGGERS

AIM

To create database triggers using PL/SQL code

PROCEDURE

STEP 1: Creates a trigger for insertion of each row.

STEP 2: Declare a cursor which contains the roll number field

STEP 3: Before insertion check of the roll number already exists in the table

STEP 4: If it exists raise an application error and display “roll no exists”.

STEP 5: Else perform insertion

SYNTAX

create or replace trigger trigger name [before/after] {DML

statements} on [table name] [for each row/statement] begin

- - - - - - - - - - - - - - - -

- - - - - - - - - - - - - - - -

exception

end;

PROGRAM

SQL>create table poo(rno number(5),name varchar2(10));

Table created.

SQL>insert into poo values (01.“kala“);

1 row created.

SQL>select * from poo;

RNO	NAME
1	kala
2	priya

SQL>create or replace trigger pool before insert on poo for each row

2 declare

3 rno poo.rno%type

4 cursor c is select rno from poo;

5 begin

```
6 open c;
7 loop;
8 fetch c into rno;
9 if:new.rno=rno then
10 raise_application_error(-20005,‟rno already exist‟);
11 end if;
12 exit when c%NOTFOUND
13 end loop;
14 close c;
15 end;
16 /
Trigger created.
```

OUTPUT

```
SQL>insert into poo values(01,‟kala‟)
Insert into poo values (01,‟kala‟)
*
ERROR at line1:
ORA-20005:rno already exist
ORA-06512:”SECONDCSEA.POOL”,line 9
ORA-04088:error during execution at trigger “SECONDCSEA.POOL”
```

VIVA QUESTIONS:

RESULT

Thus the PL/SQL blocks are developed for triggers and the results are verified.

EX.NO:9 VIEWS AND INDEX

AIM

To execute and verify the SQL commands for Views and Indexes.

PROCEDURE

STEP 1: Start

STEP 2: Create the table with its essential attributes.

STEP 3: Insert attribute values into the table.

STEP 4: Create the view from the above created table.

STEP 5: Execute different Commands and extract information from the View.

STEP 6: Stop

CREATION OF TABLE

```
SQL>   CREATE TABLE EMPLOYEE (
       EMPLOYEE_NAMEVARCHAR2(10),
       EMPLOYEE_NONUMBER(8),
       DEPT_NAME VARCHAR2(10),
       DEPT_NO NUMBER (5),DATE_OF_JOIN  DATE);
```

Table created**.**

TABLE DESCRIPTION

SQL> DESC EMPLOYEE;

NAME	NULL?	TYPE
EMPLOYEE_NAME		VARCHAR2(10)
EMPLOYEE_NO		NUMBER(8)
DEPT_NAME		VARCHAR2(10)
DEPT_NO		NUMBER(5)
DATE_OF_JOIN		DATE

CREATION OF VIEW

SQL> CREATE VIEW EMPVIEW AS SELECT EMPLOYEE_NAME,EMPLOYEE_NO,DEPT_NAME,DEPT_NO,DATE_OF_JOIN FROM EMPLOYEE;

view created.

DESCRIPTION OF VIEW

SQL> DESC EMPVIEW;

NAME	NULL?	TYPE
EMPLOYEE_NAME		VARCHAR2(10)
EMPLOYEE_NO		NUMBER(8)
DEPT_NAME		VARCHAR2(10)
DEPT_NO		NUMBER(5)

DISPLAY VIEW

```
SQL> SELECT  *  FROM EMPVIEW;

EMPLOYEE_N EMPLOYEE_NO DEPT_NAME     DEPT_NO
---------- ----------- ---------- ----------
RAVI              124 ECE                89
VIJAY             345 CSE                21
RAJ                98 IT                 22
GIRI              100 CSE                67
```

INSERTION INTO VIEW

```
SQL> INSERT INTO EMPVIEW VALUES ('SRI', 120,'CSE', 67,'16-NOV-1981');

1 ROW CREATED.

SQL> SELECT * FROM EMPVIEW;
EMPLOYEE_N EMPLOYEE_NO DEPT_NAME     DEPT_NO
---------- ----------- ---------- ----------
RAVI              124 ECE                89
VIJAY             345 CSE                21
RAJ                98 IT                 22
GIRI              100 CSE                67
SRI               120 CSE                67

SQL> SELECT * FROM EMPLOYEE;

EMPLOYEE_N EMPLOYEE_NO DEPT_NAME     DEPT_NO DATE_OF_J
---------- ----------- ---------- ---------- ---------
RAVI              124 ECE                89 15-JUN-05
VIJAY             345 CSE                21 21-JUN-06
RAJ                98 IT                 22 30-SEP-06
GIRI              100 CSE                67 14-NOV-81
SRI               120 CSE                67 16-NOV-81
```

DELETION OF VIEW

DELETE STATEMENT

```
SQL> DELETE FROM EMPVIEW WHERE EMPLOYEE_NAME='SRI';

SQL> SELECT * FROM EMPVIEW;

EMPLOYEE_N EMPLOYEE_NO DEPT_NAME     DEPT_NO
---------- ----------- ---------- ----------
RAVI              124 ECE                89
VIJAY             345 CSE                21
RAJ                98 IT                 22
GIRI              100 CSE                67
```

UPDATE STATEMENT:

```
SQL> UPDATE EMPKAVIVIEW SET EMPLOYEE_NAME='KAVI' WHERE
EMPLOYEE_NAME='RAVI';

1 ROW UPDATED.

SQL> SELECT * FROM EMPKAVIVIEW;

EMPLOYEE_N EMPLOYEE_NO DEPT_NAME     DEPT_NO
---------- ----------- ---------- ----------
KAVI              124 ECE                89
VIJAY             345 CSE                21
RAJ                98 IT                 22
GIRI              100 CSE                67
```

DROP A VIEW:

SQL>DROP VIEW EMPVIEW;

VIEW DROPED

CREATE INDEX

MySQL> CREATE DATABASE indexes;Query OK, 1 row affected (0.01 sec)

USE indexes;

Database changed

MySQL>CREATE TABLE

employees (employee_id int,

first_name varchar(50),

last_name varchar(50),

device_serial varchar(15), salary int);

Query OK, 0 rows affected (0.00 sec)

INSERT INTO employees VALUES

(1, 'John', 'Smith', 'ABC123', 60000), (2, 'Jane', 'Doe', 'DEF456', 65000),

(3, 'Bob', 'Johnson', 'GHI789', 70000), (4, 'Sally', 'Fields', 'JKL012', 75000),

(5, 'Michael', 'Smith', 'MNO345', 80000), (6, 'Emily', 'Jones', 'PQR678', 85000),

(7, 'David', 'Williams', 'STU901', 90000), (8, 'Sarah', 'Johnson', 'VWX234', 95000),

(9, 'James', 'Brown', 'YZA567', 100000);

Query OK, 9 rows affected (0.010 sec)

Records: 9 Duplicates: 0 Warnings: 0

MySQL>CREATE INDEX salary ON employees(salary);

Mqsql>EXPLAIN SELECT * FROM employees WHERE salary = 100000;

+----+-------------+-----------+------------+------+---------------+--------+---------+-------+------+----------+

| id | select_type | table | partitions | type | possible_keys | key | key_len | ref | rows | filtered |
| 1 | SIMPLE | employees | NULL | ref | salary | salary | 5 | const | 1 | 100.00 |
+----+-------------+-----------+------------+------+---------------+--------+---------+-------+------+----------+

1 row in set, 1 warning (0.00 sec)

VIVA QUESTIONS:

RESULT

Thus views and indexes created successfull

EX.NO:10 XML DATABASE CREATION AND VALIDATION

Aim

To create a XML database file and Validate the Schema

Algorithm

Step 1: Start

Step 2:Open MySQL command

prompt(version.5.5) Step 3:Create new database as

bookstore and use it.

Step 4:Create XML Schema for data values and load values

Step 5:Validate XML using ExtractValue function.

Step 6:Stop

CREATE TABLE

```
CREATE TABLE person (
person_id INT NOT NULL PRIMARY KEY,
fname VARCHAR(40) NULL,
lname VARCHAR(40) NULL,
created TIMESTAMP
);
```

XML FILE PERSON.XML

```
<list>
<personperson_id="1"fname="Kapek"lname="Sainnouine"/>
<personperson_id="2"fname="Sajon"lname="Rondela"/>
<personperson_id="3"><fname>Likame</fname><lname>Örrtmons</lname></person>
<personperson_id="4"><fname>Slar</fname><lname>Manlanth</lname></person>
<person><fieldname="person_id">5</field><fieldname="fname">Stoma</field>
<fieldname="lname">Milu</field></person>
<person><fieldname="person_id">6</field><fieldname="fname">Nirtam</field>
<fieldname="lname">Sklöd</field></person>
<personperson_id="7"><fname>Sungam</fname><lname>Dulbåd</lname></person>
<personperson_id="8"fname="Sraref"lname="Encmelt"/>
</list>
```

INSERT VALUES USING LOADXMLDATAFILE

```
LOAD XML LOCAL INFILE 'c:/db/person.xml' //this is ths location of the xml data file
    INTO TABLE person
    ROWS IDENTIFIED BY '<person>';
```

OUTPUT

MySQL>Select * from person;

```
ysql> LOAD XML LOCAL INFILE 'c:/db/person.xml'
    ->       INTO TABLE person
    ->       ROWS IDENTIFIED BY '<person>';
uery OK, 8 rows affected (0.03 sec)
ecords: 8  Deleted: 0  Skipped: 0  Warnings: 0

ysql> select * from person;
-----------+--------+------------+---------------------+
 person_id | fname  | lname      | created             |
-----------+--------+------------+---------------------+
         1 | Kapek  | Sainnouine | 2023-02-23 01:17:05 |
         2 | Sajon  | Rondela    | 2023-02-23 01:17:05 |
         3 | Likame | ├ûrrtmons  | 2023-02-23 01:17:05 |
         4 | Slar   | Manlanth   | 2023-02-23 01:17:05 |
         5 | Stoma  | Milu       | 2023-02-23 01:17:05 |
         6 | Nirtam | Skl├╢d     | 2023-02-23 01:17:05 |
         7 | Sungam | Dulb├Ñd    | 2023-02-23 01:17:05 |
         8 | Sraref | Encmelt    | 2023-02-23 01:17:05 |
-----------+--------+------------+---------------------+
 rows in set (0.00 sec)
```

VALIDATE XML USING EXTRACTVALUE FUNCTION

MySQL> SELECT

ExtractValue('<?xml version="1.0" encoding="UTF-8"?>

```
mysql> use bookstore;
Database changed
mysql> SELECT
    ->   ExtractValue('<?xml version="1.0" encoding="UTF-8"?>
    '>
    '>   <person person_id="1" fname="Kapek" lname="Sainnouine"/>
    '>   <person person_id="2" fname="Sajon" lname="Rondela"/>
    '>   <person person_id="3"><fname>Likame</fname><lname>Örrtmons</lname></person>
    '>   <person person_id="4"><fname>Slar</fname><lname>Manlanth</lname></person>
    '>   <person><field name="person_id">5</field><field name="fname">Stoma</field>
    '>     <field name="lname">Milu</field></person>
    '>   <person><field name="person_id">6</field><field name="fname">Nirtam</field>
    '>     <field name="lname">Sklöd</field></person>
    '>   <person person_id="7"><fname>Sungam</fname><lname>Dulbåd</lname></person>
    '>   <person person_id="8" fname="Sraref" lname="Encmelt"/>', '//fname//person_id');
+------------------------------------------------------------------------------------------------
-----------------------------------------------------------------------------------------+
| ExtractValue('<?xml version="1.0" encoding="UTF-8"?>

  <person person_id="1" fname="Kapek" lname="Sainnouine"/>
  <person person_id="2" fname="Sajon" lname="Rondela"/>
  <person person_id="3"><fname>Likame</fname><lname>Örrtmons</lname></person>
  <per |
+------------------------------------------------------------------------------------------------
-----------------------------------------------------------------------------------------+
|
                                                                                          |
+------------------------------------------------------------------------------------------------
-----------------------------------------------------------------------------------------+
1 row in set (0.04 sec)

mysql>
```

VIVA QUESTIONS:

Result

Thus the XML Database is created and Validated

EX.NO:11 CREATING DOCUMENT, COLUMNS & GRAPH USING NOSQL

Aim

To Create Document,column and Graph using NOSQL Tools.

Algorithm

Step 1:Start

Step 2:Create Database in MongoDB

Step 3:Create Collection and Document in MongoDB

Step 4:Display all document

Step 5:Stop

Create database in mongodb

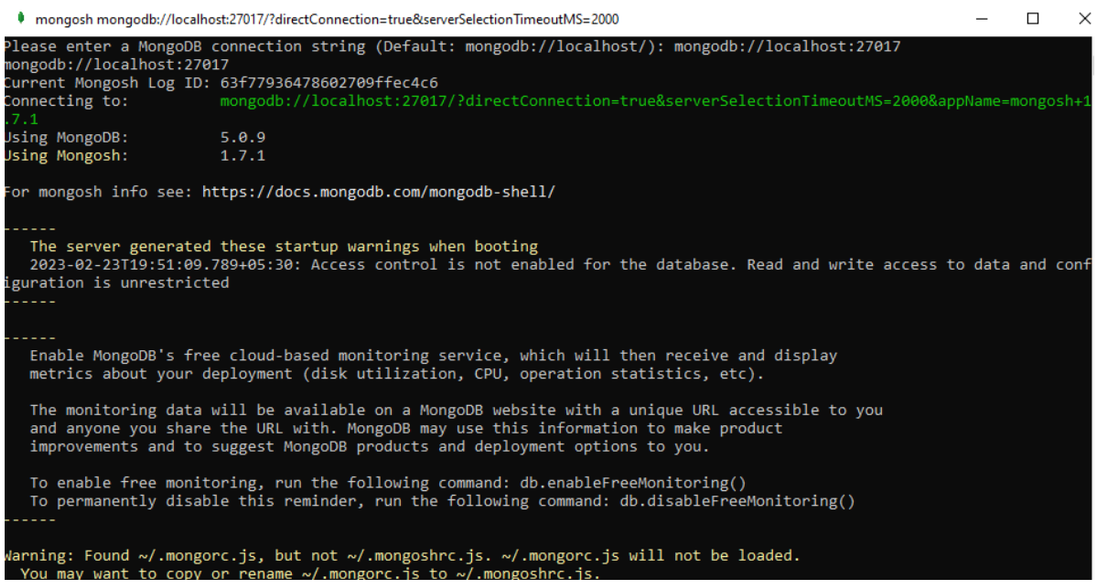
>Install Mongodb shell

>Connect with localhost

>Connection string:

mongodb://localhost:27017

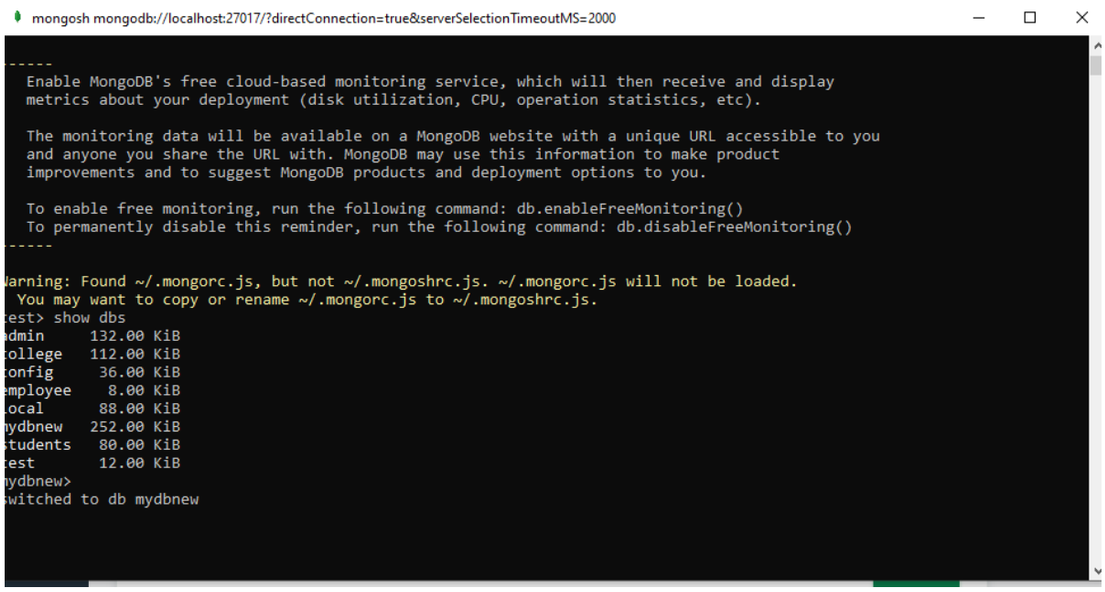
output:



Create collection in mongodb

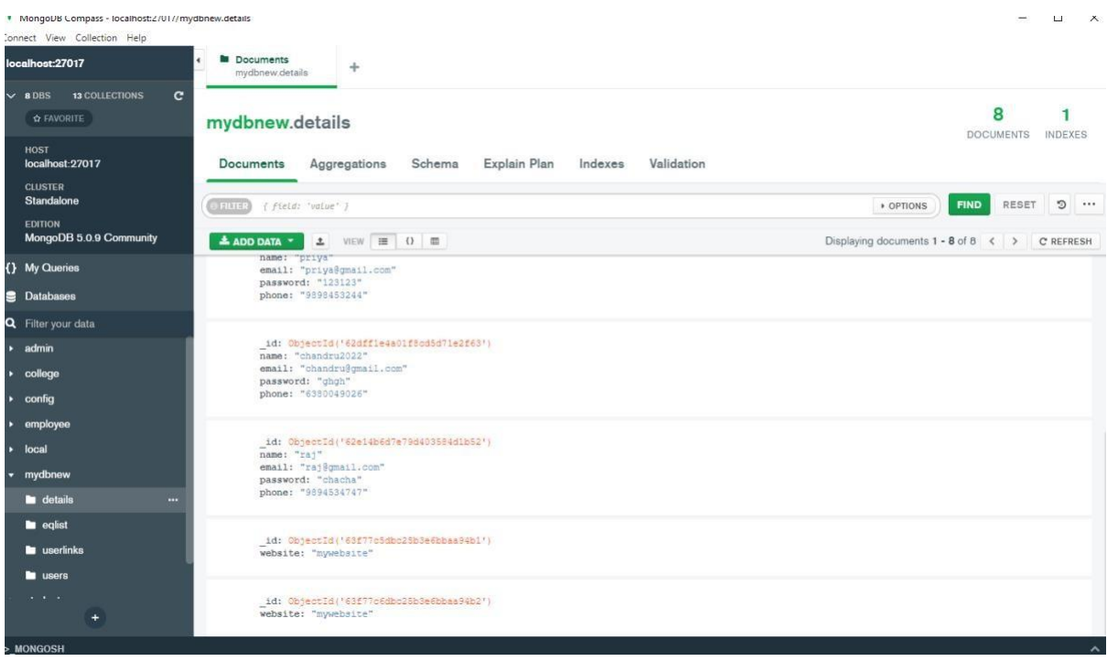
use <database_name> command

OUTPUT:



Create document in mongodb

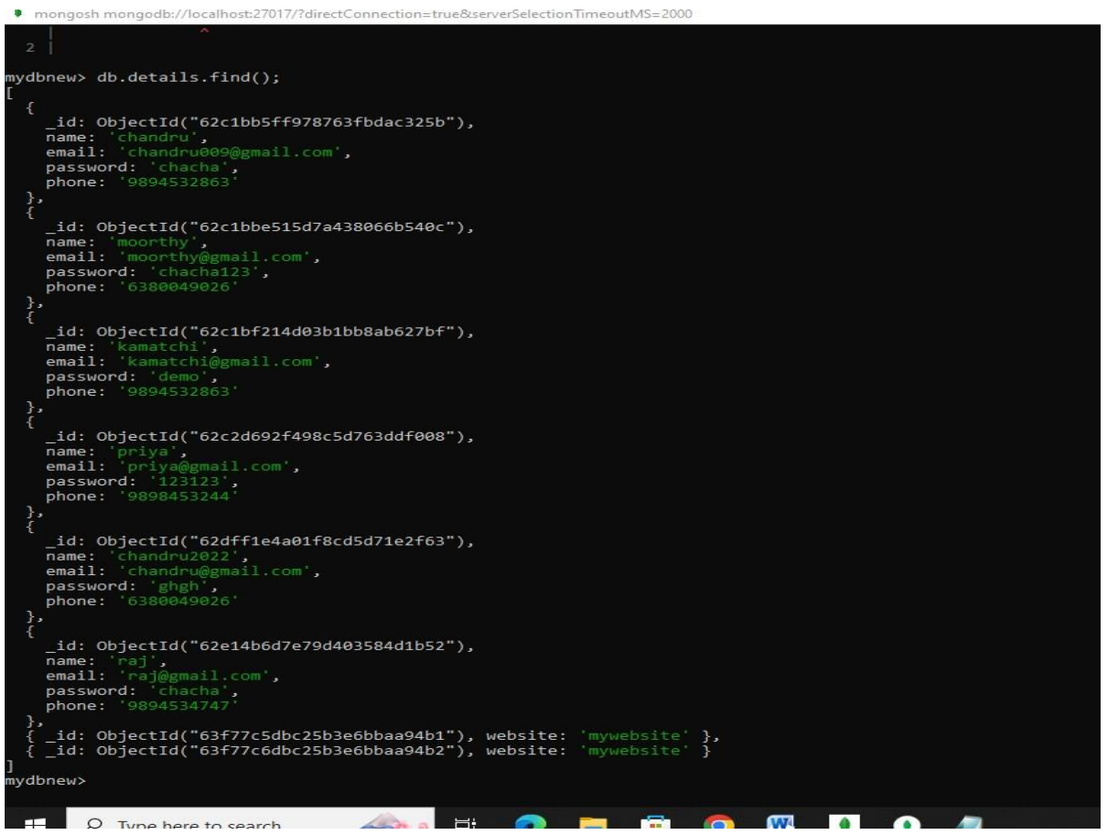
mydbnew>db.details.insertOne({"website":"mywebsite"})
Output:



Display all documents

Db.details.find()

Output



CREATING CHART USING SAMPLE DATA

PROCEDURE:

Step 1: Log into MongoDB Atlas.

To access the MongoDB Charts application, you must be logged into Atlas

Step 2: Select your desired Atlas project, or create a new project.

If you have an Atlas Project with clusters containing data you wish to visualize,

Step 3: Select the project from the Context dropdown in the left navigation pane.

Step 4: Create an Atlas cluster. The MongoDB Charts application makes it easy to connect

Collections in your cluster asdata sources. Data sources reference specific collections and

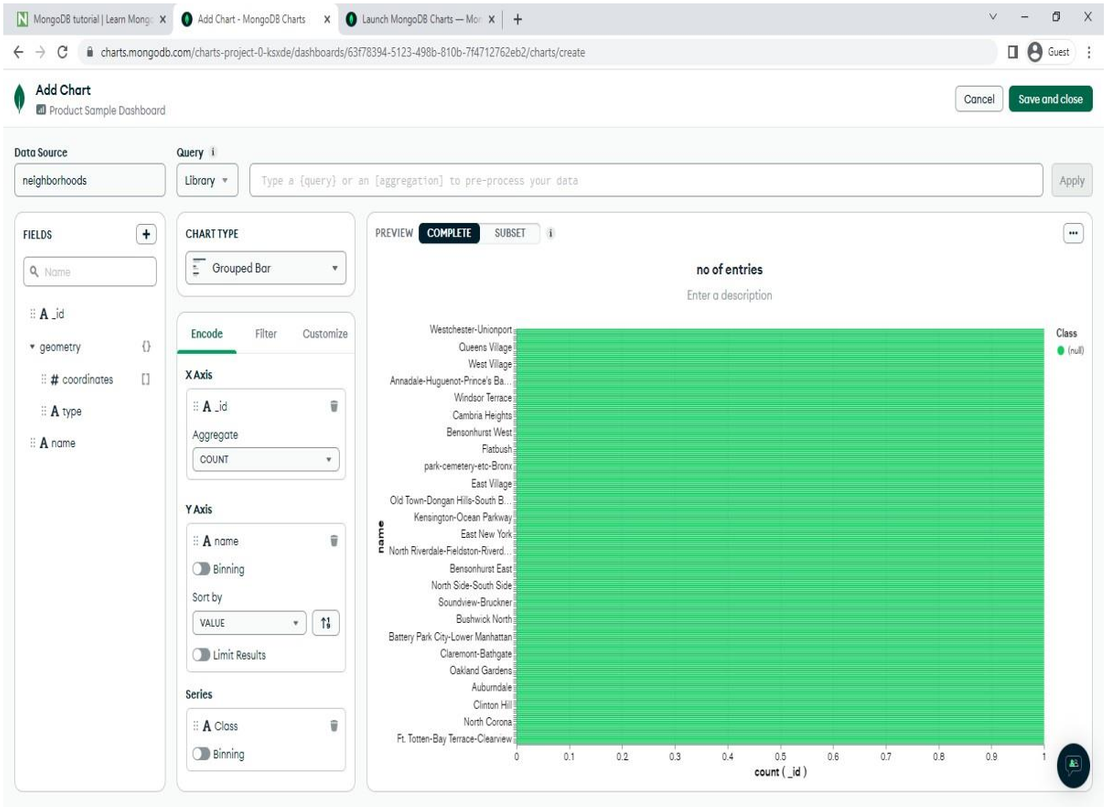
charts views that you can access in the Chart Builder to visualize the data in those collections

or charts views.

Step 5: Launch the MongoDB Charts application. In Atlas, click Charts in the navigation bar.

Step 6: Choose data from clusters

OUTPUT



VIVA QUESTIONS:

Result

Thus the Document and Graph is created.

EX.NO:12 SIMPLE GUI APPLICATION USING DATABASE

Aim

To develop a program in python to implement the GUI based application

Algorithm

Step 1: Start

Step 2: Import necessary files to perform database operations

Step 3:Design Login Screen with User Name and Password fields.

Step 4: Check with appropriate conditions to login.

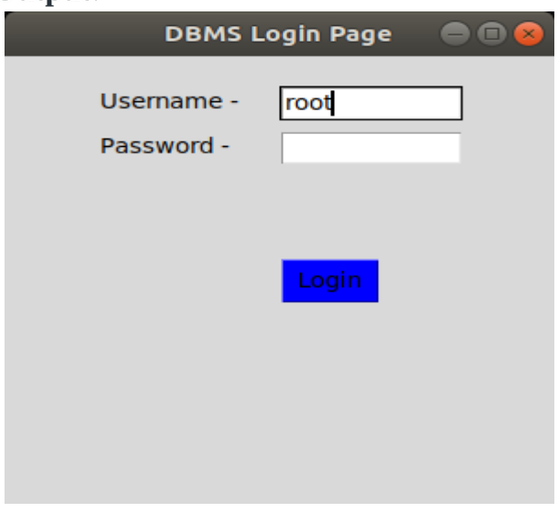
Step 5: Stop

PROGRAM

```
import tkinter as tk
import
MySQL.connectorfrom
tkinter import *

 def submitact():

    user = Username.get()
    passw = password.get()

    print(f"The name entered by you is {user} {passw}")

    logintodb(user, passw)


def logintodb(user, passw):

    # If password is enetered by the
    # user
    if passw:
        db = MySQL.connector.connect(host ="localhost",
                                     user = user,
                                     password = passw,
                                     db ="College")
        cursor = db.cursor()

    # If no password is enetered by the
    # user
    else:
        db = MySQL.connector.connect(host ="localhost",
                                     user = user,
                                     db ="College")
        cursor = db.cursor()

    # A Table in the database
    savequery = "select * from STUDENT"

    try:
        cursor.execute(savequery)
        myresult = cursor.fetchall()
```

```
        # Printing the result of the
        # query
        for x in myresult:
            print(x)
        print("Query Executed successfully")
    except:
        db.rollback()
        print("Error occurred")
root = tk.Tk()
root.geometry("300x300")
root.title("DBMS Login Page")

# Defining the first row
lblfrstrow = tk.Label(root, text ="Username -", )
lblfrstrow.place(x = 50, y = 20)

Username = tk.Entry(root, width = 35)
Username.place(x = 150, y = 20, width = 100)

lblsecrow = tk.Label(root, text ="Password -")
lblsecrow.place(x = 50, y = 50)

password = tk.Entry(root, width = 35)
password.place(x = 150, y = 50, width = 100)

submitbtn = tk.Button(root, text ="Login",
                      bg ='blue', command = submitact)
submitbtn.place(x = 150, y = 135, width = 55)

root.mainloop()
```

Output:



VIVA QUESTIONS:

Result

Thus the GUI application program executed successfully.

EX.NO:13 CASE STUDY USING REALTIME DATABASE APPLICATIONS

ER diagram of Bank Management System

ER diagram is known as Entity-Relationship diagram. It is used to analyze to structure of the Database. It shows relationships between entities and their attributes. An ER model provides a means of communication.

ER diagram of Bank has the following description :

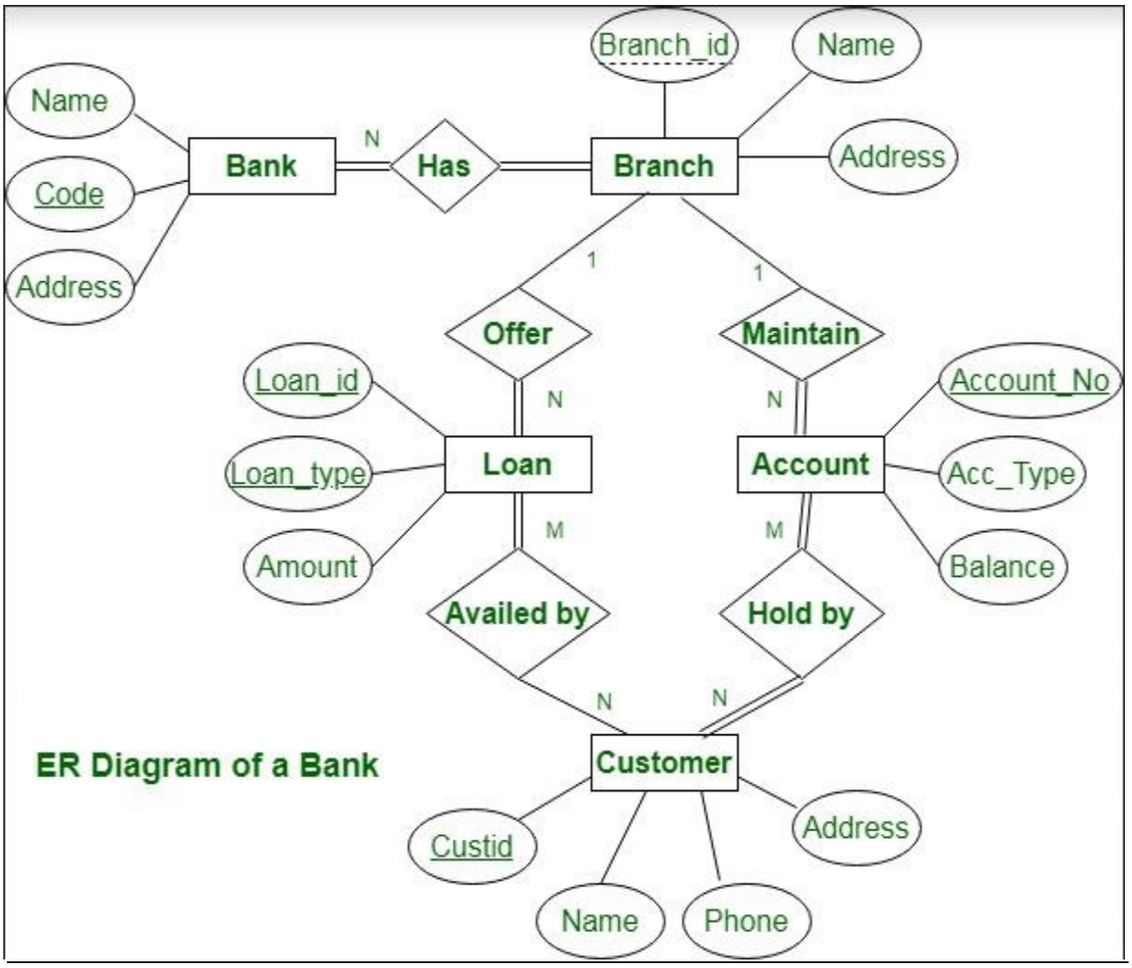
- Banks are identified by a name, code, address of main office.
- Bank have Customer
- Banks have branches.
- Branches are identified by a branch_no., branch_name, address.
- Customers are identified by name, cust-id, phone number, address.
- Customer can have one or more accounts.
- Accounts are identified by account_no., acc_type, balance.
- Customer can avail loans.
- Loans are identified by loan_id, loan_type and amount.
- Account and loans are related to bank's branch.

Entities and their **Attributes** are :

- **Bank Entity :** Attributes of Bank Entity are Bank Name, Code and Address.
  Code is Primary Key for Bank Entity.
- **Customer Entity :** Attributes of Customer Entity are Customer_id, Name, Phone Number and Address.
  Customer_id is Primary Key for Customer Entity.
- **Branch Entity :** Attributes of Branch Entity are Branch_id, Name and Address.
  Branch_id is Primary Key for Branch Entity.
- **Account Entity :** Attributes of Account Entity are Account_number, Account_Type and Balance.
  Account_number is Primary Key for Account Entity.
- **Loan Entity :** Attributes of Loan Entity are Loan_id, Loan_Type and Amount.
  Loan_id is Primary Key for Loan Entity.

This bank ER diagram illustrates key information about bank, including entities such as branches, customers, accounts, and loans. It allows us to understand the relationships between entities.

ER Diagram of Bank Management System :



Relationships are :

- **Bank has Branches => 1 : N**

  One Bank can have many Branches but one Branch can not belong to many Banks, so the relationship between Bank and Branch is one to many relationship.

- **Branch maintain Accounts => 1 : N**

  One Branch can have many Accounts but one Account can not belong to many Branches, so the relationship between Branch and Account is one to many relationship.

- **Branch offer Loans => 1 : N**

  One Branch can have many Loans but one Loan can not belong to many Branches, so the relationship between Branch and Loan is one to many relationship.

- **Account held by Customers => M : N**

  One Customer can have more than one Accounts and also One Account can be held by one or more Customers, so the relationship between Account and Customers is many to many relationship.

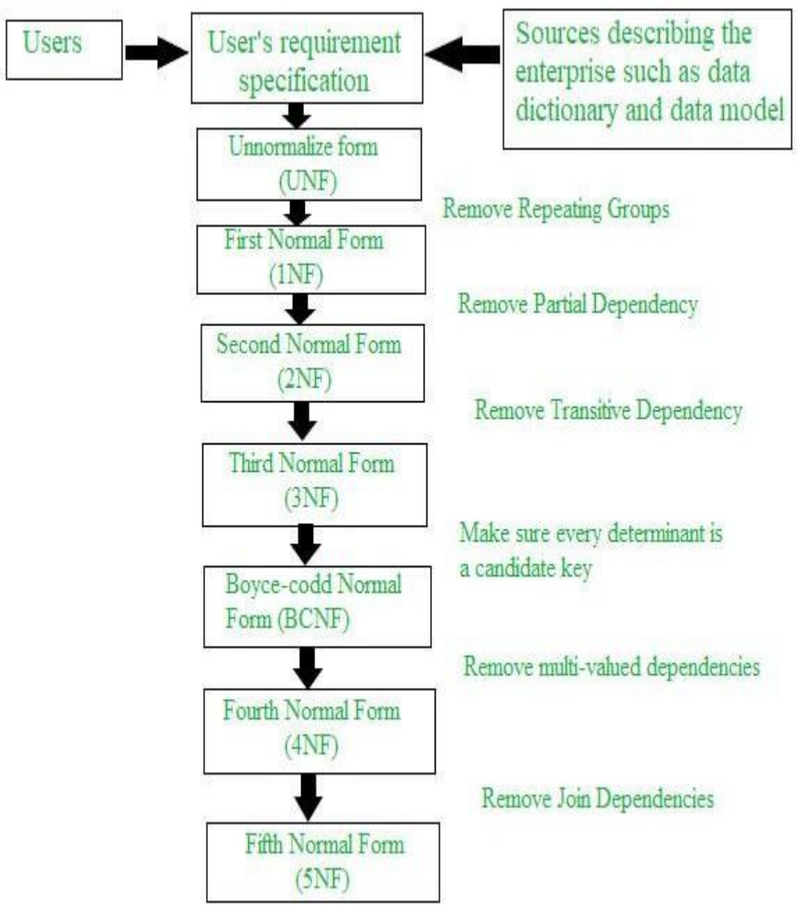
- **Loan availed by Customer => M : N**

  (Assume loan can be jointly held by many Customers).

  One Customer can have more than one Loans and also One Loan can be availed by one or more Customers, so the relationship between Loan and Customers is many to many relationship.

NORMALIZATION PROCESS

Database normalization is a stepwise formal process that allows us to decompose database tables in such a way that both data dependency and update anomalies are minimized. It makes use of functional dependency that exists in the table and primary key or candidate key in analyzing the tables. Normal forms were initially proposed called First Normal Form (INF), Second Normal Form (2NF), and Third Normal Form (3NF). Subsequently, R, Boyce, and E. F. Codd introduced a stronger definition of 3NF called Boyce-Codd Normal Form. With the exception of 1NF, all these normal forms are based on functional dependency among the attributes of a table. Higher normal forms that go beyond BCNF were introduced later such as Fourth Normal Form (4NF) and Fifth Normal Form (5NF). However, these later normal forms deal with situations that are very rare.



TRIGGERS

CREATE TRIGGER update_account AFTER INSERTON transactionsBEGIN

```
UPDATE accounts a SETa.balance=
   (CASE WHEN new.withdrawal=1 THEN a.balance-new.amount ELSE
a.balance+new.amountEND) WHERE a.id = new.accountID;
END;
```

pseudocode, Represents

- If the transaction is a deposit, add the money
- If the transaction is a withdrawal, check if it is discretionary
- If it is discretionary, remove from the balance and the allowance remaining
- If it is not, remove only from the balance.

ACID properties in DBMS

To ensure the **integrity and consistency of data** during a transaction (A transaction is a unit of program that updates various data items, read more about it here), the database system maintains **four properties**. These properties are widely known as **ACID properties.**

Atomicity

This property ensures that **either all the operations of a transaction reflect in database or none**. The logic here is simple, transaction is a single unit, it can't execute partially. Either it executes completely or it doesn't, there shouldn't be a partial execution.

Let's take an example of banking system to understand this: Suppose Account A has a balance of 400$ & B has 700$. Account A is transferring 100$ to Account B.

This is a transaction that has two operations
a) Debiting 100$ from A's balance
b) Creating 100$ to B's balance.

Let's say first operation passed successfully while second failed, in this case A's balance would be 300$ while B would be having 700$ instead of 800$. This is unacceptable in a banking system. Either the transaction should fail without executing any of the operation or it should process both the operations. The Atomicity property ensures that.

There are **two key operations are involved** in a transaction to maintain the atomicity of the transaction.

Abort: If there is a failure in the transaction, abort the execution and rollback the changes made by the transaction.

Commit: If transaction executes successfully, commit the changes to the database.

Consistency

Database must be in consistent state **before and after the execution of the transaction**. This ensures that there are no errors in the database at any point of time. Application programmer is responsible for maintaining the consistency of the database.

Example:
A transferring 1000 dollars to B. A's initial balance is 2000 and B's initial balance is 5000.

Before the transaction:
Total of A+B = 2000 + 5000 = 7000$

After the transaction:
Total of A+B = 1000 + 6000 = 7000$

The data is consitendct before and after the execution of the transaction so this example maintains the consistency property of the database.

Isolation

A transaction **shouldn't interfere with the execution of another transaction**. To preserve the consistency of database, the execution of transaction should take place in isolation (that means no other transaction should run concurrently when there is a transaction already running).

For example account A is having a balance of 400$ and it is transferring 100$ to account B & C both. So we have two transactions here. Let's say these transactions run concurrently and both the transactions read 400$ balance, in that case the final balance of A would be 300$ instead of 200$. This is wrong.

If the transaction were to run in isolation then the second transaction would have read the correct balance 300$ (before debiting 100$) once the first transaction went successful.

Durability

Once a transaction completes successfully, the **changes it has made into the database should be permanent even if there is a system failure**. The recovery-management component of database systems ensures the durability of transaction.

STORED PROCEDURE

```
CREATE PROCEDURE [bank].[GetTransactions]
        -- Add the parameters for the stored procedure here
        @AccountID int = 0,
        @StartDate datetime = 0,
        @EndDate datetime = 0
AS
BEGIN
        -- SET NOCOUNT ON added to prevent extra result sets from
        -- interfering with SELECT statements.
        SET NOCOUNT ON;

    -- Insert statements for procedure here
        SELECT * from bank.Transactions
    WHERE AccountID = @AccountID AND [Date] BETWEEN @StartDate AND @EndDate
END
```

Second, here's the EXEC statment:

```
EXEC bank.GetTransactions
        @AccountID = 100000,
        @StartDate = '4/1/2007',
        @EndDate = '4/30/2007'
```