EX.NO: 1 **DDL and DML commands**

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;
```

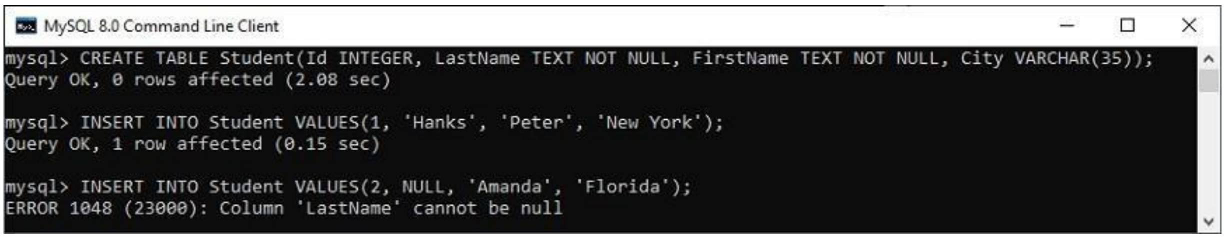
```
Name                                       Null?          Type
--------------------------------------------- --------- ----------------

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, FirstNameTEXT 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:


MySQL 8.0 Command Line Client

```
mysql> CREATE TABLE Student(Id INTEGER, LastName TEXT NOT NULL, FirstName TEXT NOT NULL, City VARCHAR(35));
Query OK, 0 rows affected (2.08 sec)

mysql> INSERT INTO Student VALUES(1, 'Hanks', 'Peter', 'New York');
Query OK, 1 row affected (0.15 sec)

mysql> INSERT INTO Student VALUES(2, NULL, 'Amanda', 'Florida');
ERROR 1048 (23000): Column 'LastName' cannot be null
```

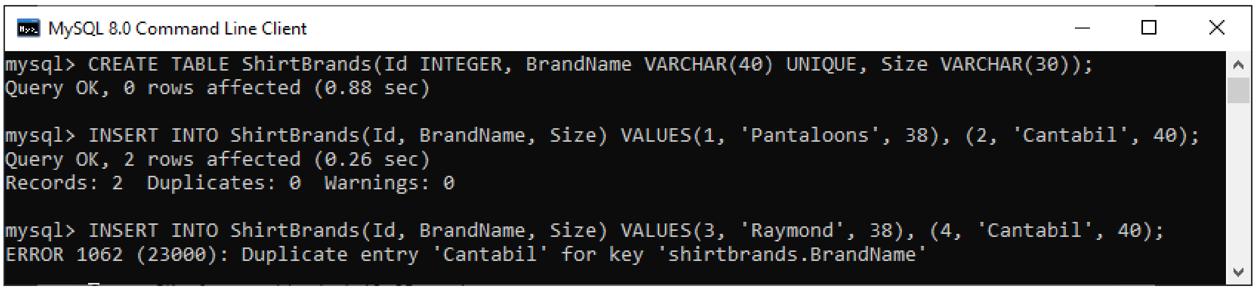
UNIQUE Constraint

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:


MySQL 8.0 Command Line Client

```
mysql> CREATE TABLE ShirtBrands(Id INTEGER, BrandName VARCHAR(40) UNIQUE, Size VARCHAR(30));
Query OK, 0 rows affected (0.88 sec)

mysql> INSERT INTO ShirtBrands(Id, BrandName, Size) VALUES(1, 'Pantaloons', 38), (2, 'Cantabil', 40);
Query OK, 2 rows affected (0.26 sec)
Records: 2  Duplicates: 0  Warnings: 0

mysql> INSERT INTO ShirtBrands(Id, BrandName, Size) VALUES(3, 'Raymond', 38), (4, 'Cantabil', 40);
ERROR 1062 (23000): Duplicate entry 'Cantabil' for key 'shirtbrands.BrandName'
```

CHECK CONSTRAINT

CHECK (expr)

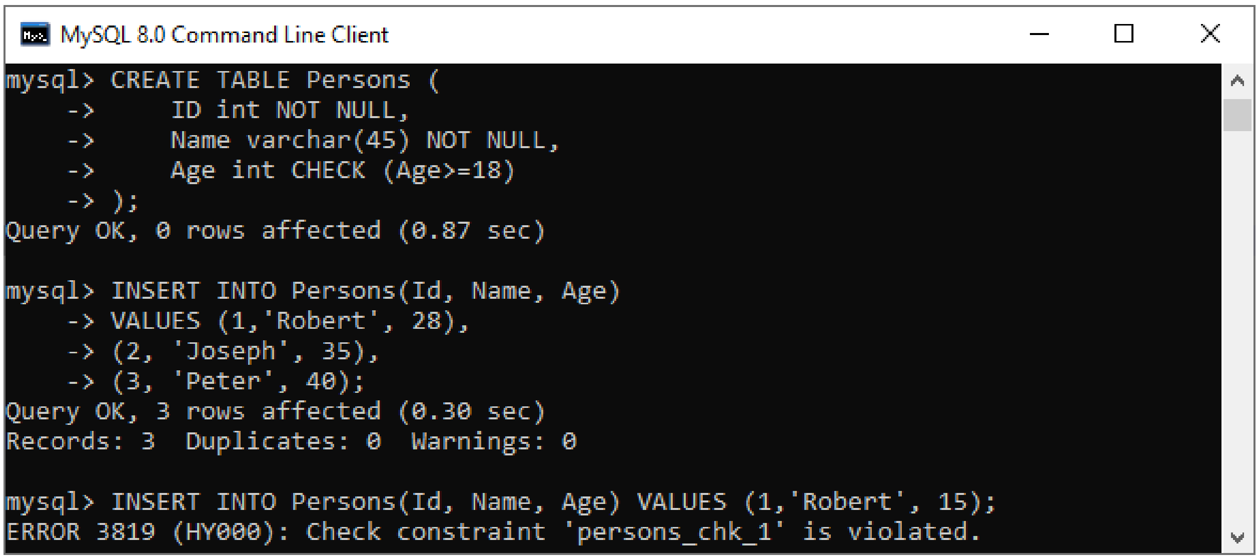
MySQL> CREATE TABLE Persons (ID int NOT NULL,Name varchar(45) NOT NULL, Ageint CHECK (Age>=18));

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 secondstatement fails and gives an error that says: CHECK constraint is violated for key Age.


MySQL 8.0 Command Line Client

```
mysql> CREATE TABLE Persons (
    ->     ID int NOT NULL,
    ->     Name varchar(45) NOT NULL,
    ->     Age int CHECK (Age>=18)
    -> );
Query OK, 0 rows affected (0.87 sec)

mysql> INSERT INTO Persons(Id, Name, Age)
    -> VALUES (1,'Robert', 28),
    -> (2, 'Joseph', 35),
    -> (3, 'Peter', 40);
Query OK, 3 rows affected (0.30 sec)
Records: 3  Duplicates: 0  Warnings: 0

mysql> INSERT INTO Persons(Id, Name, Age) VALUES (1,'Robert', 15);
ERROR 3819 (HY000): Check constraint 'persons_chk_1' is violated.
```

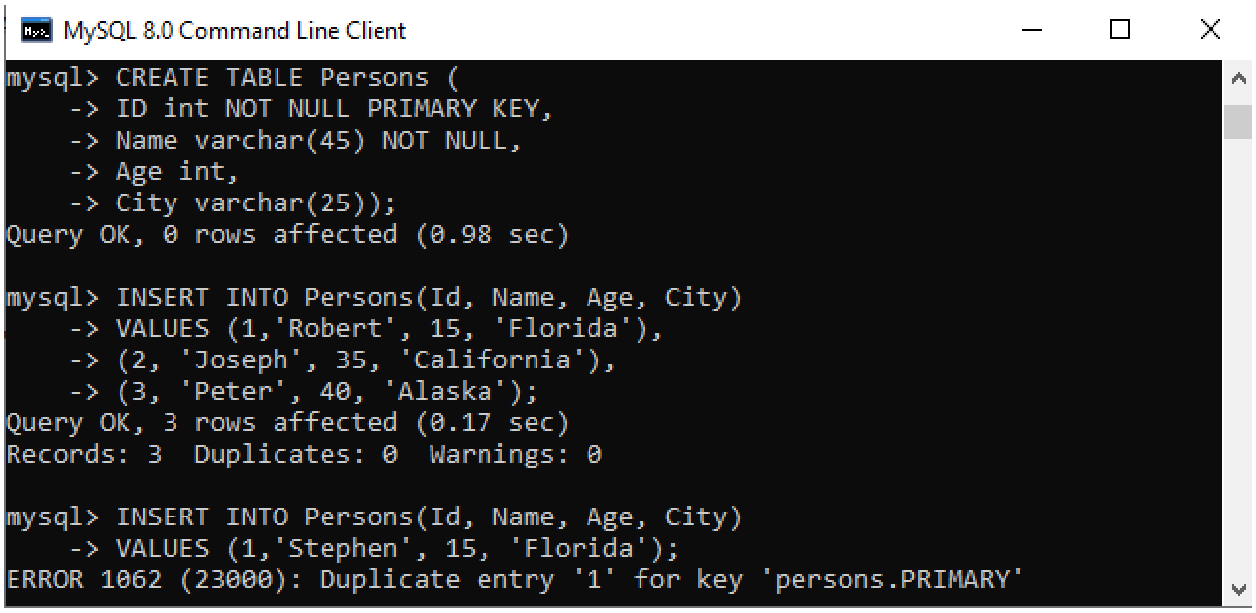
PRIMARY KEY CONSTRAINT

CREATE TABLE Persons (ID **int** NOT NULL **PRIMARY KEY**,   **Name** **varchar**(45) NOT 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:


MySQL 8.0 Command Line Client

```
mysql> CREATE TABLE Persons (
    -> ID int NOT NULL PRIMARY KEY,
    -> Name varchar(45) NOT NULL,
    -> Age int,
    -> City varchar(25));
Query OK, 0 rows affected (0.98 sec)

mysql> INSERT INTO Persons(Id, Name, Age, City)
    -> VALUES (1,'Robert', 15, 'Florida'),
    -> (2, 'Joseph', 35, 'California'),
    -> (3, 'Peter', 40, 'Alaska');
Query OK, 3 rows affected (0.17 sec)
Records: 3  Duplicates: 0  Warnings: 0

mysql> INSERT INTO Persons(Id, Name, Age, City)
    -> VALUES (1,'Stephen', 15, 'Florida');
ERROR 1062 (23000): Duplicate entry '1' for key 'persons.PRIMARY'
```

EX.NO:2 FOREIGN KEY AND REFERENTIAL INTEGRITY CONSTRAINT

QUERY:

DEPARTMENT

CREATE TABLE Department(Id INT PRIMARY KEY, Name NVARCHAR(50));
-- Insert some test data in Department TableInsert 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:

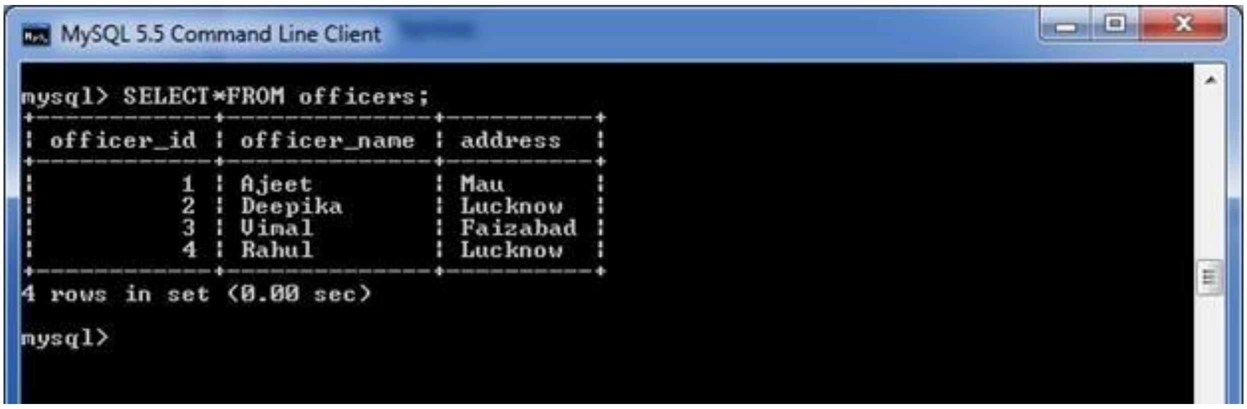
```
SQL> DELETE from Department where Id=10;
ERROR 1451 (23000): Cannot delete or update a parent row: a foreign key constraint fails
(`db2`.`employees`, CONSTRAINT `employees_ibfk_1` FOREIGN KEY (`DepartmentID`)
REFERENCES `department` (`Id`))
```

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

QUERY

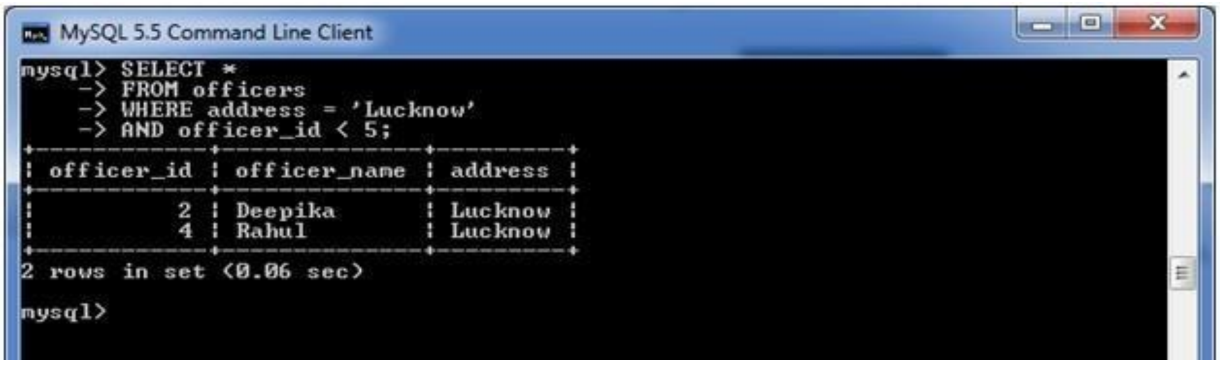
MySQL WHERE ClauseSyntax:

Select * from Tablename WHERE conditions;



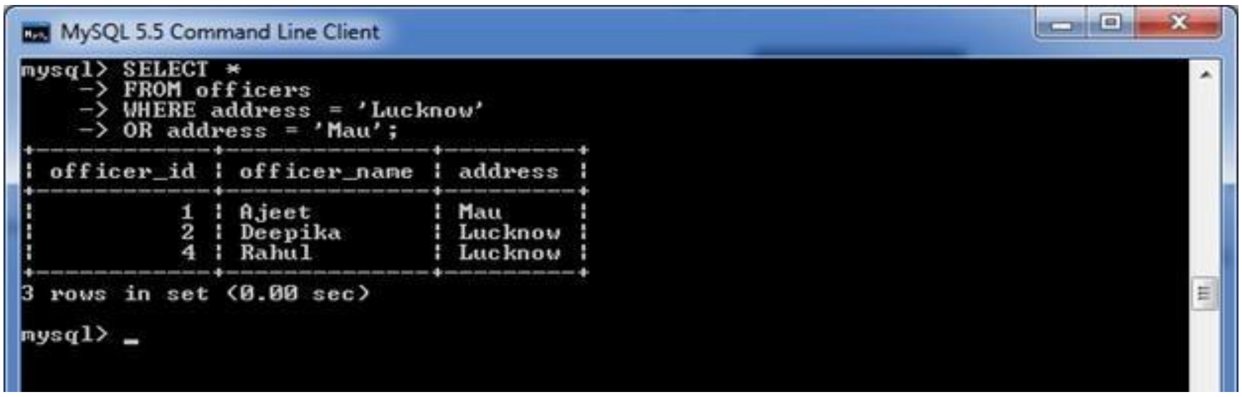
```
mysql> SELECT*FROM officers;
+------------+--------------+----------+
| officer_id | officer_name | address  |
+------------+--------------+----------+
|          1 | Ajeet        | Mau      |
|          2 | Deepika      | Lucknow  |
|          3 | Vimal        | Faizabad |
|          4 | Rahul        | Lucknow  |
+------------+--------------+----------+
4 rows in set (0.00 sec)

mysql>
```

MySQL WHERE Clause with AND condition
SELECT * FROM officers WHERE address = 'Lucknow' AND officer_id < 5;



```
mysql> SELECT *
    -> FROM officers
    -> WHERE address = 'Lucknow'
    -> AND officer_id < 5;
+------------+--------------+---------+
| officer_id | officer_name | address |
+------------+--------------+---------+
|          2 | Deepika      | Lucknow |
|          4 | Rahul        | Lucknow |
+------------+--------------+---------+
2 rows in set (0.06 sec)

mysql>
```

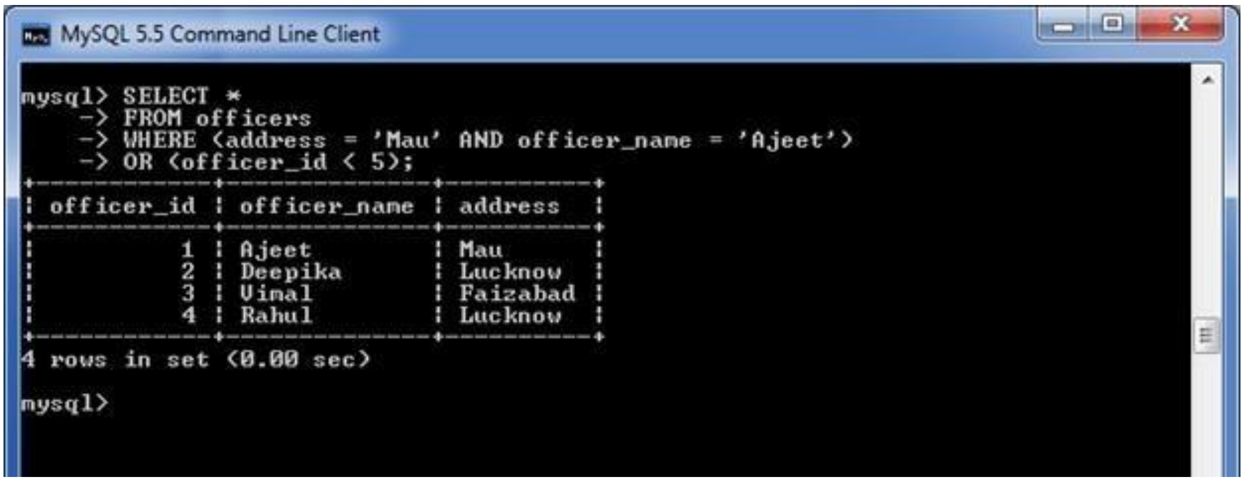
WHERE Clause with OR condition
SELECT * FROM officers WHERE address = 'Lucknow' OR address = 'Mau';



```
mysql> SELECT *
    -> FROM officers
    -> WHERE address = 'Lucknow'
    -> OR address = 'Mau';
+------------+--------------+---------+
| officer_id | officer_name | address |
+------------+--------------+---------+
|          1 | Ajeet        | Mau     |
|          2 | Deepika      | Lucknow |
|          4 | Rahul        | Lucknow |
+------------+--------------+---------+
3 rows in set (0.00 sec)

mysql> _
```

MySQL WHERE Clause with combination of AND & OR conditionsSELECT * FROM officers

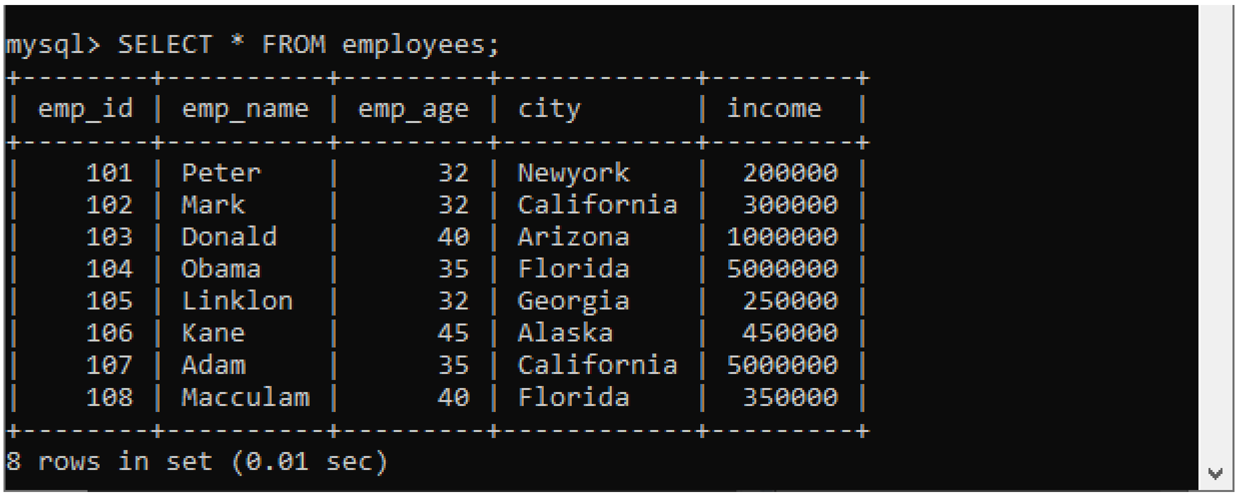
WHERE (address = 'Mau' AND officer_name = 'Ajeet')OR (officer_id < 5);



```
mysql> SELECT *
    -> FROM officers
    -> WHERE (address = 'Mau' AND officer_name = 'Ajeet')
    -> OR (officer_id < 5);
+------------+--------------+-----------+
| officer_id | officer_name | address   |
+------------+--------------+-----------+
|          1 | Ajeet        | Mau       |
|          2 | Deepika      | Lucknow   |
|          3 | Vimal        | Faizabad  |
|          4 | Rahul        | Lucknow   |
+------------+--------------+-----------+
4 rows in set (0.00 sec)

mysql>
```

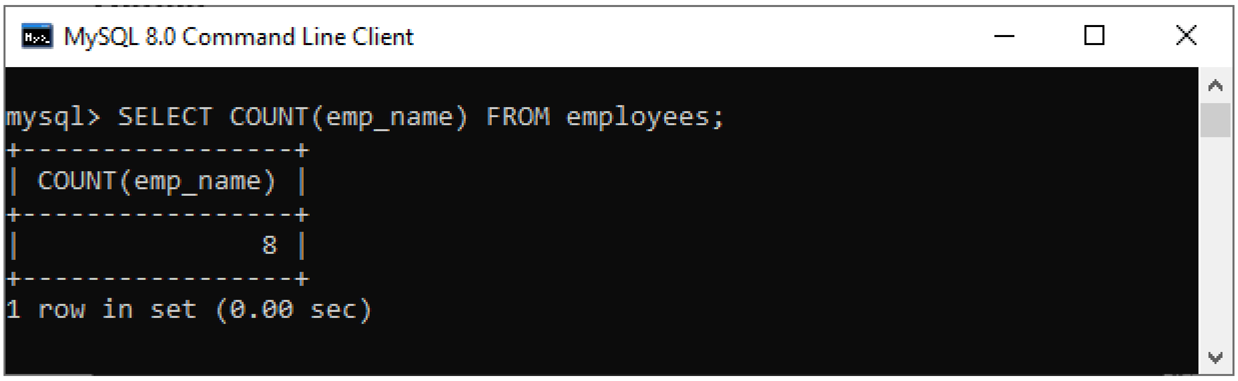
<u>AGGREGATE FUNCTIONS</u>

Consider a table named "employees" that contains the following data.
MySQL> **SELECT** COUNT(emp_name) **FROM** employees;



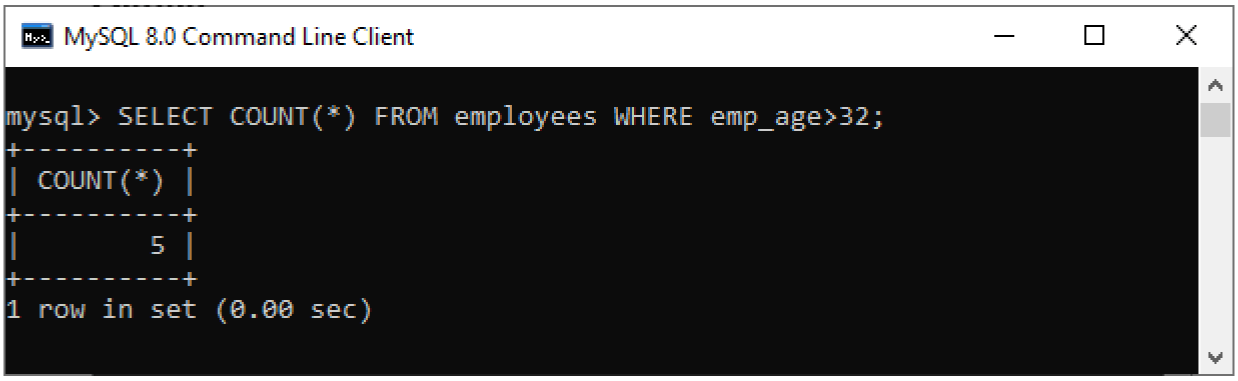
```
mysql> SELECT * FROM employees;
+--------+----------+---------+------------+---------+
| emp_id | emp_name | emp_age | city       | income  |
+--------+----------+---------+------------+---------+
|    101 | Peter    |      32 | Newyork    |  200000 |
|    102 | Mark     |      32 | California |  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 |
+--------+----------+---------+------------+---------+
8 rows in set (0.01 sec)
```

OUTPUT::



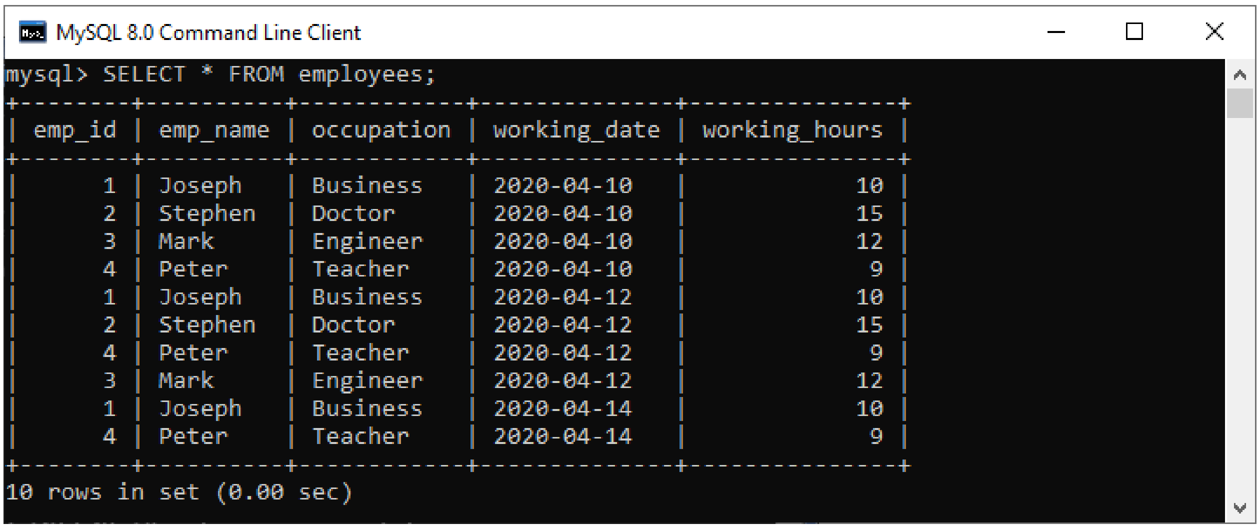
```
mysql> SELECT COUNT(emp_name) FROM employees;
+-----------------+
| COUNT(emp_name) |
+-----------------+
|               8 |
+-----------------+
1 row in set (0.00 sec)
```

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



```
mysql> SELECT COUNT(*) FROM employees WHERE emp_age>32;
+----------+
| COUNT(*) |
+----------+
|        5 |
+----------+
1 row in set (0.00 sec)
```

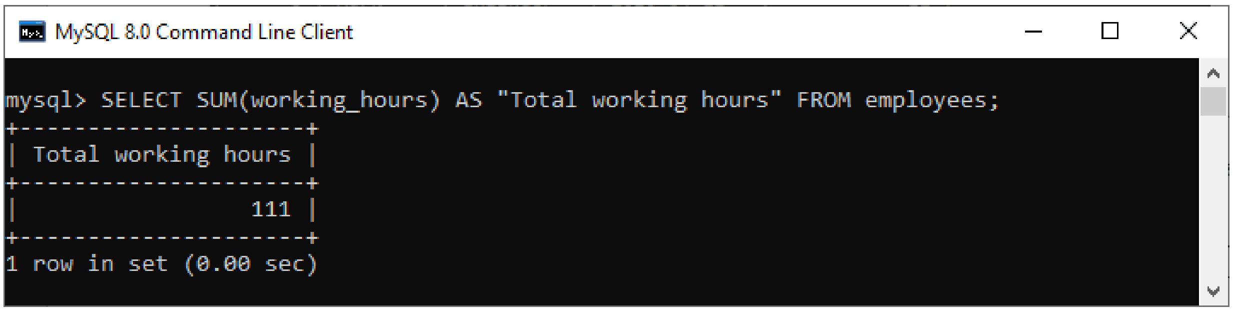
Consider our database has a table named **employees**, having the following data. Now, we are goingto understand this function with various examples:



```
mysql> SELECT * FROM employees;
+--------+----------+------------+--------------+---------------+
| emp_id | emp_name | occupation | working_date | working_hours |
+--------+----------+------------+--------------+---------------+
|      1 | Joseph   | Business   | 2020-04-10   |            10 |
|      2 | Stephen  | Doctor     | 2020-04-10   |            15 |
|      3 | Mark     | Engineer   | 2020-04-10   |            12 |
|      4 | Peter    | Teacher    | 2020-04-10   |             9 |
|      1 | Joseph   | Business   | 2020-04-12   |            10 |
|      2 | Stephen  | Doctor     | 2020-04-12   |            15 |
|      4 | Peter    | Teacher    | 2020-04-12   |             9 |
|      3 | Mark     | Engineer   | 2020-04-12   |            12 |
|      1 | Joseph   | Business   | 2020-04-14   |            10 |
|      4 | Peter    | Teacher    | 2020-04-14   |             9 |
+--------+----------+------------+--------------+---------------+
10 rows in set (0.00 sec)
```

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

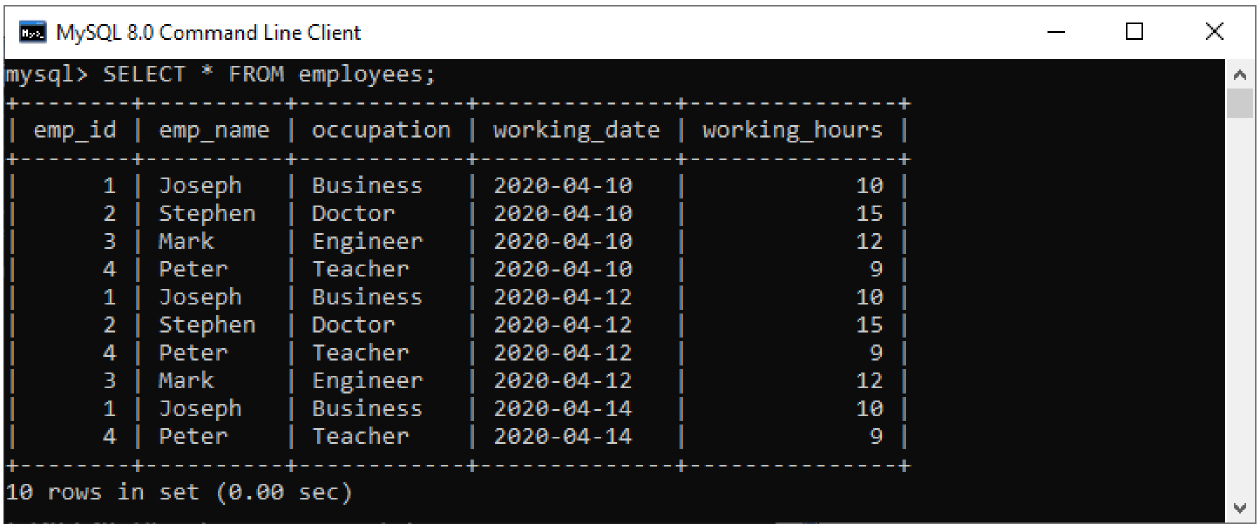
OUTPUT:



```
mysql> SELECT SUM(working_hours) AS "Total working hours" FROM employees;
+---------------------+
| Total working hours |
+---------------------+
|                 111 |
+---------------------+
1 row in set (0.00 sec)
```

MySQL avg() function example

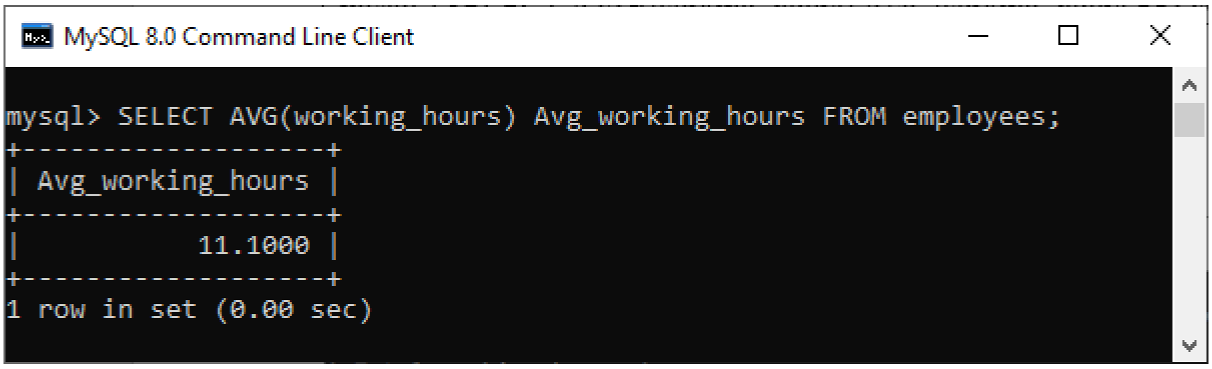
Consider our database has a table named **employees**, having the following data. Now, we are goingto understand this function with various examples:



```
mysql> SELECT * FROM employees;
+--------+----------+------------+--------------+---------------+
| emp_id | emp_name | occupation | working_date | working_hours |
+--------+----------+------------+--------------+---------------+
|      1 | Joseph   | Business   | 2020-04-10   |            10 |
|      2 | Stephen  | Doctor     | 2020-04-10   |            15 |
|      3 | Mark     | Engineer   | 2020-04-10   |            12 |
|      4 | Peter    | Teacher    | 2020-04-10   |             9 |
|      1 | Joseph   | Business   | 2020-04-12   |            10 |
|      2 | Stephen  | Doctor     | 2020-04-12   |            15 |
|      4 | Peter    | Teacher    | 2020-04-12   |             9 |
|      3 | Mark     | Engineer   | 2020-04-12   |            12 |
|      1 | Joseph   | Business   | 2020-04-14   |            10 |
|      4 | Peter    | Teacher    | 2020-04-14   |             9 |
+--------+----------+------------+--------------+---------------+
10 rows in set (0.00 sec)
```

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

OUTPUT:
We will get the result as below:

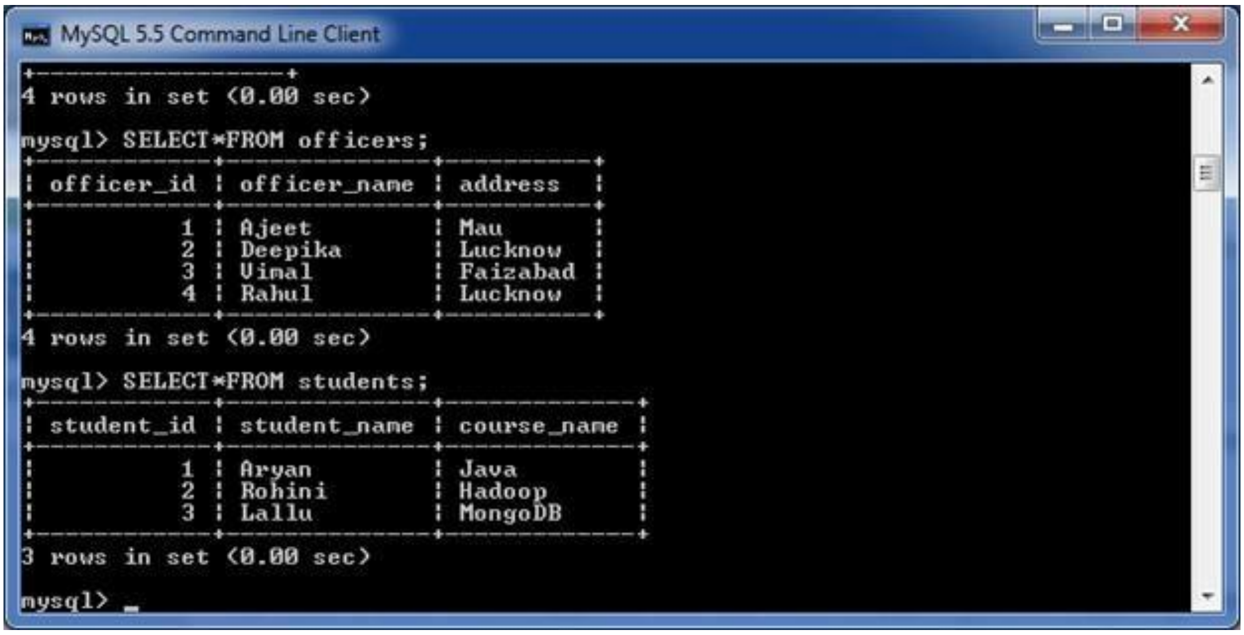


```
mysql> SELECT AVG(working_hours) Avg_working_hours FROM employees;
+-------------------+
| Avg_working_hours |
+-------------------+
|           11.1000 |
+-------------------+
1 row in set (0.00 sec)
```

EX.NO:4 SIMPLE JOIN AND SUB QUERIES

MYSQL INNER JOIN (SIMPLE JOIN)

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

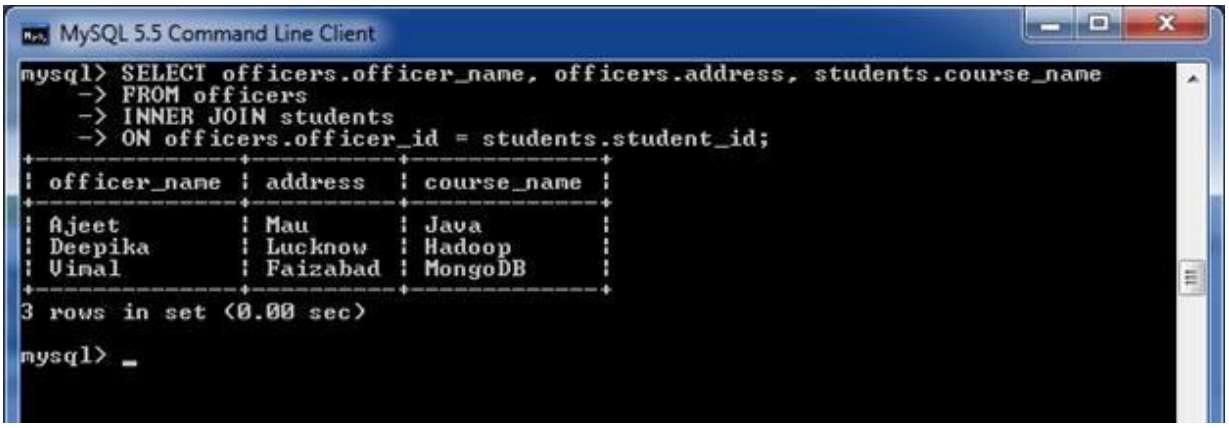


MySQL 5.5 Command Line Client

```
+------------------+
4 rows in set (0.00 sec)

mysql> SELECT*FROM officers;
+------------+--------------+----------+
| officer_id | officer_name | address  |
+------------+--------------+----------+
|          1 | Ajeet        | Mau      |
|          2 | Deepika      | Lucknow  |
|          3 | Vimal        | Faizabad |
|          4 | Rahul        | Lucknow  |
+------------+--------------+----------+
4 rows in set (0.00 sec)

mysql> SELECT*FROM students;
+------------+--------------+-------------+
| student_id | student_name | course_name |
+------------+--------------+-------------+
|          1 | Aryan        | Java        |
|          2 | Rohini       | Hadoop      |
|          3 | Lallu        | MongoDB     |
+------------+--------------+-------------+
3 rows in set (0.00 sec)

mysql> _
```

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

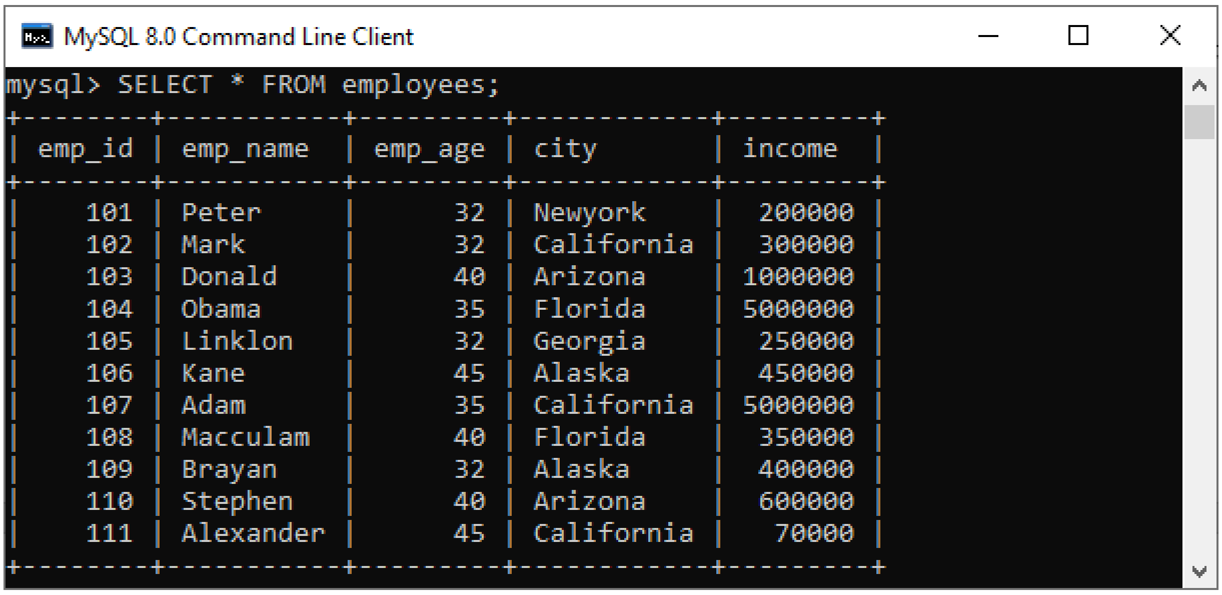
<u>OUTPUT:</u>



MySQL 5.5 Command Line Client

```
mysql> SELECT officers.officer_name, officers.address, students.course_name
    -> FROM officers
    -> INNER JOIN students
    -> ON officers.officer_id = students.student_id;
+--------------+----------+-------------+
| officer_name | address  | course_name |
+--------------+----------+-------------+
| Ajeet        | Mau      | Java        |
| Deepika      | Lucknow  | Hadoop      |
| Vimal        | Faizabad | MongoDB     |
+--------------+----------+-------------+
3 rows in set (0.00 sec)

mysql> _
```

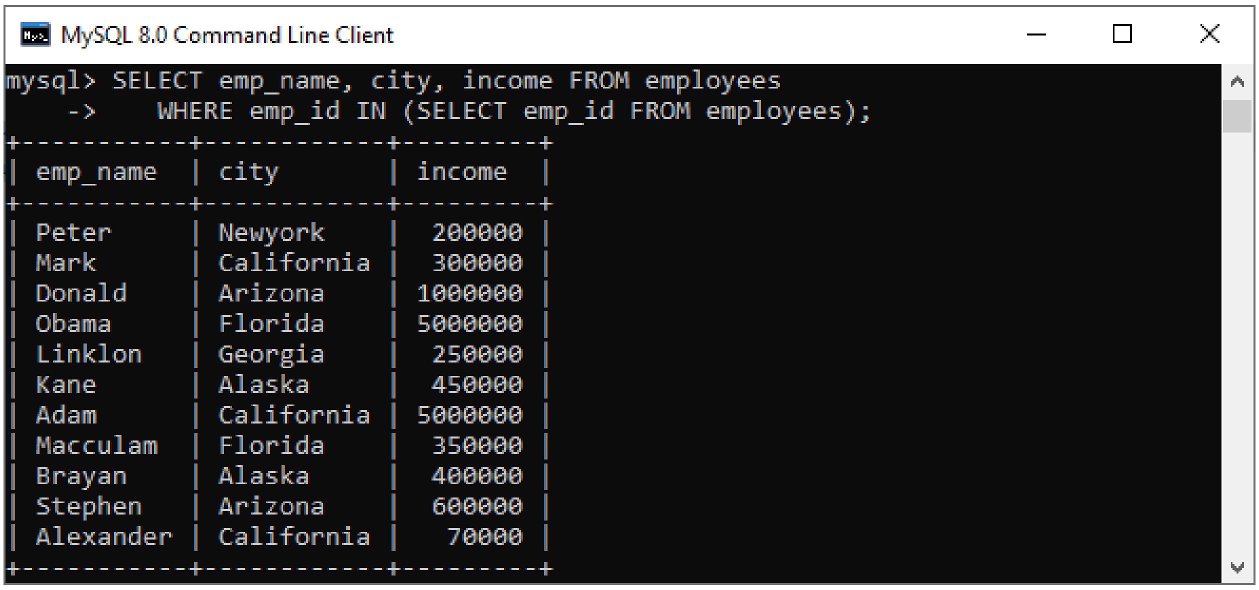
MYSQL SUBQUERY



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** emp_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 |
+-----------+------------+---------+
```

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

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));

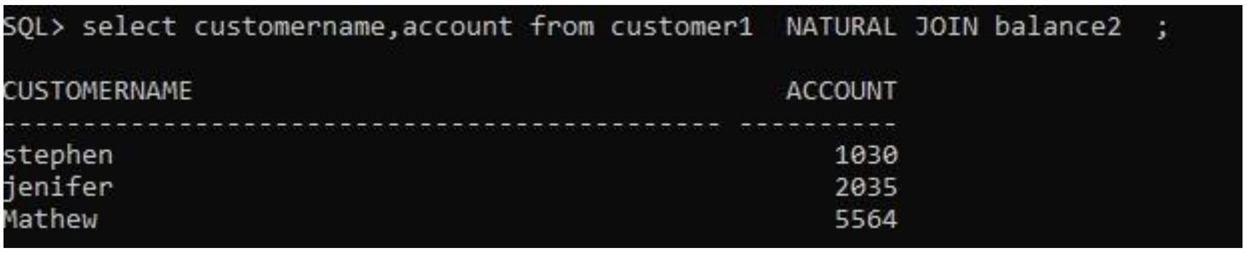
/* -- Table name: balance -*/
CREATE TABLE balance (id **INT** AUTO_INCREMENT **PRIMARY KEY**,
account **int**, balance **FLOAT**(10, 2));

/* -- 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 customername,account from customer1 NATURAL JOIN balance2 ;**



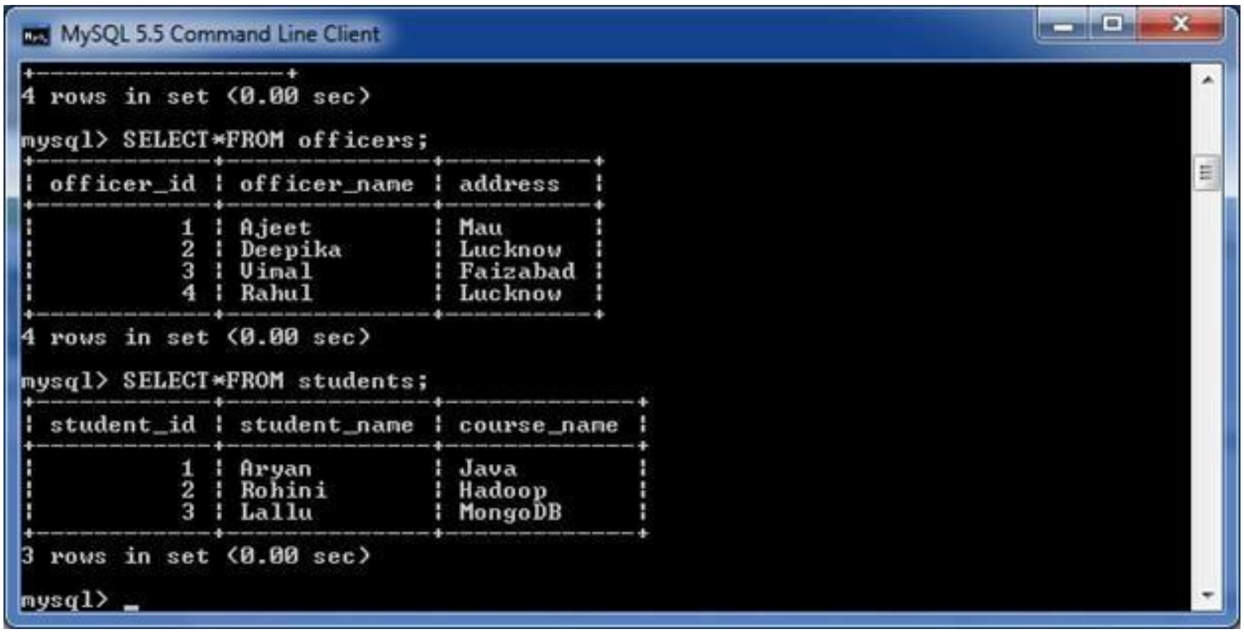
```
SQL> select customername,account from customer1  NATURAL JOIN balance2  ;

CUSTOMERNAME                                        ACCOUNT
-------------------------------------------------- ----------
stephen                                                  1030
jenifer                                                  2035
Mathew                                                   5564
```

MYSQL RIGHT OUTER JOIN

Syntax:

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

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

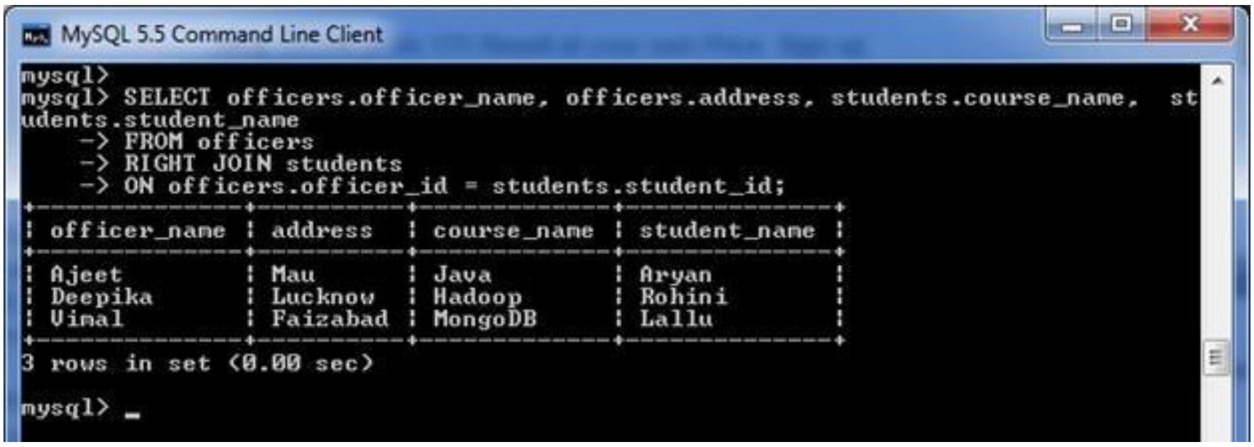


MySQL 5.5 Command Line Client

```
+-------------------+
4 rows in set (0.00 sec)

mysql> SELECT*FROM officers;
+------------+--------------+----------+
| officer_id | officer_name | address  |
+------------+--------------+----------+
|          1 | Ajeet        | Mau      |
|          2 | Deepika      | Lucknow  |
|          3 | Vimal        | Faizabad |
|          4 | Rahul        | Lucknow  |
+------------+--------------+----------+
4 rows in set (0.00 sec)

mysql> SELECT*FROM students;
+------------+--------------+-------------+
| student_id | student_name | course_name |
+------------+--------------+-------------+
|          1 | Aryan        | Java        |
|          2 | Rohini       | Hadoop      |
|          3 | Lallu        | MongoDB     |
+------------+--------------+-------------+
3 rows in set (0.00 sec)

mysql> _
```

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:__

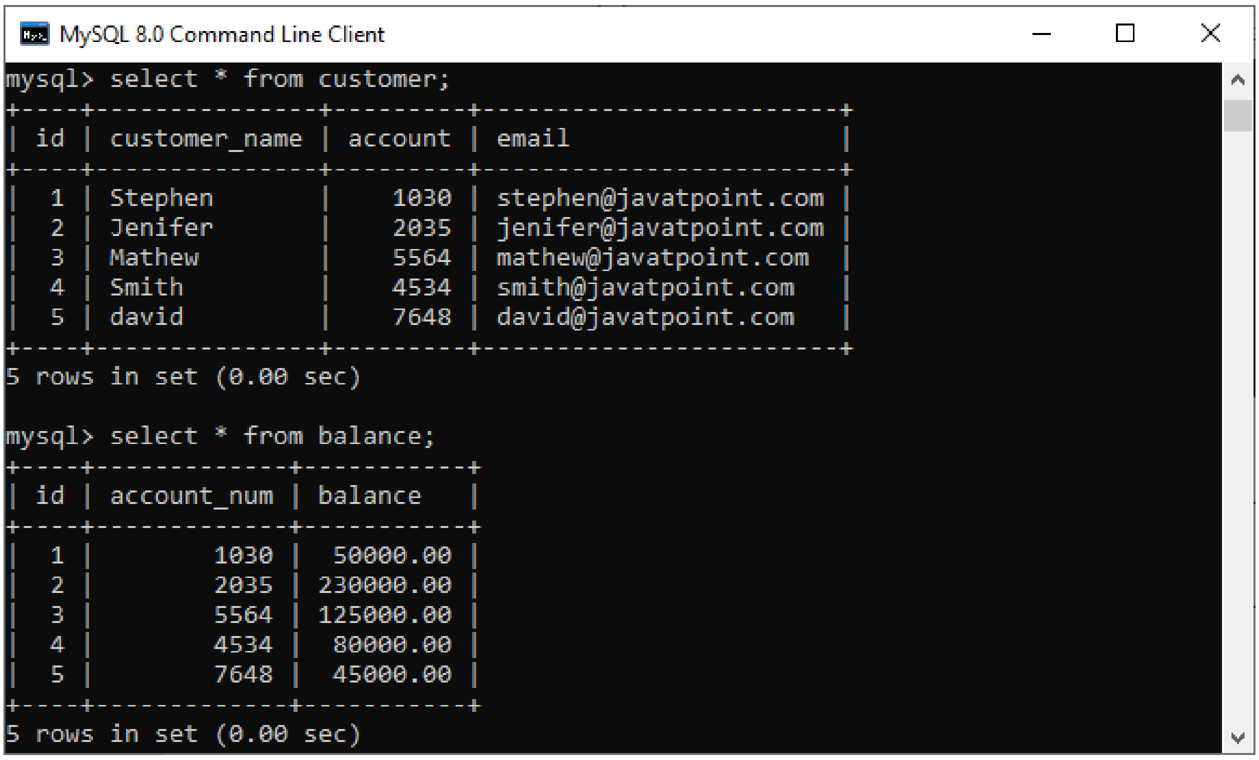


MySQL 5.5 Command Line Client

```
mysql>
mysql> SELECT officers.officer_name, officers.address, students.course_name,  st
udents.student_name
    -> FROM officers
    -> RIGHT JOIN students
    -> ON officers.officer_id = students.student_id;
+--------------+----------+-------------+--------------+
| officer_name | address  | course_name | student_name |
+--------------+----------+-------------+--------------+
| Ajeet        | Mau      | Java        | Aryan        |
| Deepika      | Lucknow  | Hadoop      | Rohini       |
| Vimal        | Faizabad | MongoDB     | Lallu        |
+--------------+----------+-------------+--------------+
3 rows in set (0.00 sec)

mysql> _
```

EQUI JOIN

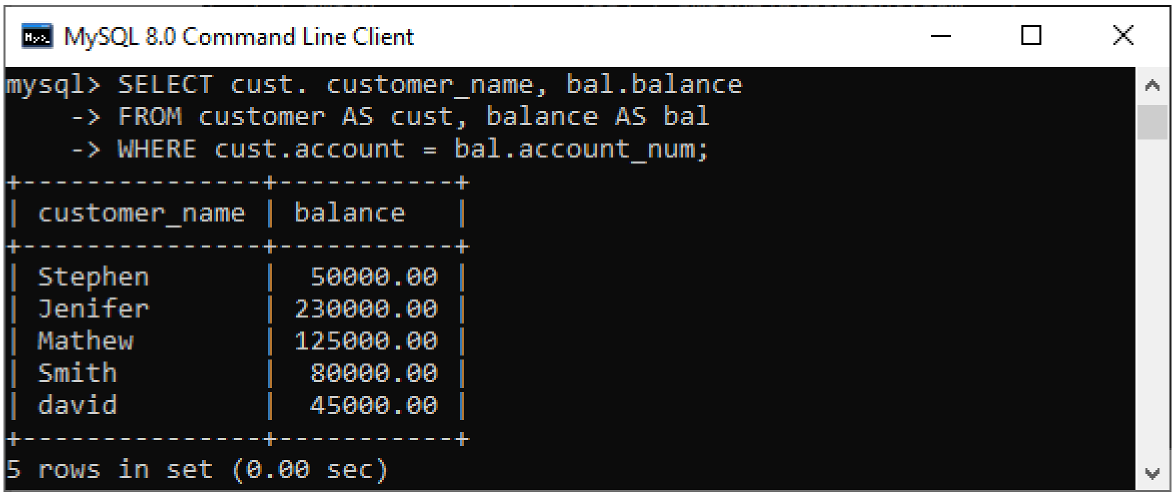
SELECT column_name (s) FROM table_name1, table_name2, ..., table_nameN WHERE table_name1.column_name = table_name2.column_name;Consider two tables named **customer** and **balance**



```
mysql> select * from customer;
+----+---------------+---------+-----------------------+
| id | customer_name | account | email                 |
+----+---------------+---------+-----------------------+
|  1 | Stephen       |    1030 | stephen@javatpoint.com |
|  2 | Jenifer       |    2035 | jenifer@javatpoint.com |
|  3 | Mathew        |    5564 | mathew@javatpoint.com  |
|  4 | Smith         |    4534 | smith@javatpoint.com   |
|  5 | david         |    7648 | david@javatpoint.com   |
+----+---------------+---------+-----------------------+
5 rows in set (0.00 sec)

mysql> select * from balance;
+----+-------------+-----------+
| id | account_num | balance   |
+----+-------------+-----------+
|  1 |        1030 |  50000.00 |
|  2 |        2035 | 230000.00 |
|  3 |        5564 | 125000.00 |
|  4 |        4534 |  80000.00 |
|  5 |        7648 |  45000.00 |
+----+-------------+-----------+
5 rows in set (0.00 sec)
```

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

WHERE cust.account = bal.account_num;



```
mysql> SELECT cust. customer_name, bal.balance
    -> FROM customer AS cust, balance AS bal
    -> WHERE cust.account = bal.account_num;
+---------------+-----------+
| customer_name | balance   |
+---------------+-----------+
| Stephen       |  50000.00 |
| Jenifer       | 230000.00 |
| Mathew        | 125000.00 |
| Smith         |  80000.00 |
| david         |  45000.00 |
+---------------+-----------+
5 rows in set (0.00 sec)
```

EX.NO:6 PROCEDURE AND FUNCTIONS

SETTING SERVEROUTPUT: ON:

```
SQL> SET SERVEROUTPUT: ON
```

PROGRAM:

PROCEDURE USING POSITIONAL PARAMETERS:

```
SQL> SET SERVEROUTPUT: ON
SQL> CREATE OR REPLACE PROCEDURE
PROC AS  BEGIN
DBMS_OUTPUT:.PUT_LINE('Hello from procedure...');
END;
```

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),
mark2number(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

ave number(5,2);
tot number(3);
cursor c_mark is select*from student where mark1>=40 and mark2>=40 and
mark3>=40 and mark4>=40 and mark5>=40;
```

```
begin
dbms_

output:.put_line('regno name mark1 mark2 mark3 mark4 mark4 mark5 total
average');
dbms_output:.put_line('___________________________________________________');
10  for student in c_mark
loop
tot:=student.mark1+student.mark2+student.mark3+student.mark4+student.mark5;
ave:=tot/5;
dbms_output:.put_line(student.regno||rpad(student.name,15)
||rpad(student.mark1,6)||rpad(student.mark2,6)||rpad(student.mark3,6)
||rpad(student.mark4,6)||rpad(student.mark5,6)||rpad(tot,8)||rpad(ave,5));
end loop;
end;
```

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

```
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','NGOcolony','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
phonebookwhere phone_no=phone;
return
address
;
excepti
on
when no_data_found then return 'address not found';
```

end;

```
Function

created.

SQL>dec

lare
address varchar2(100);
begin
address:=findaddress(20312);
```

dbms_**OUTPUT:**.put_line(address);
end;

<u>OUTPUT:</u>

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

EX.NO:7 DCL AND TCL COMMANDS

DCL COMMAND 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(TRANSACTION 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.
```

EX.NO:8 CREATION OF DATABASE TRIGGERS

SYNTAX

create or replace trigger trigger name [before/after] {DML statements} on [table name] [for each row/statement] begin

```
----------------------------

----------------------------
except
ion
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 declare
rno poo.rno%type
cursor   c   is   select   rno
from poo; begin
open c;
loop;
fetch c into rno;
if:new.rno=rno then
raise_application_error(20005,‟rnoalready exist‟);
end if;
exit           when
c%NOTFOUND
end loop;
close c;
end;

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
```

EX.NO:9 **VIEWS AND INDEX**

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 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
DROPE

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

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)
```

EX.NO:10 XML DATABASE CREATION AND VALIDATION

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

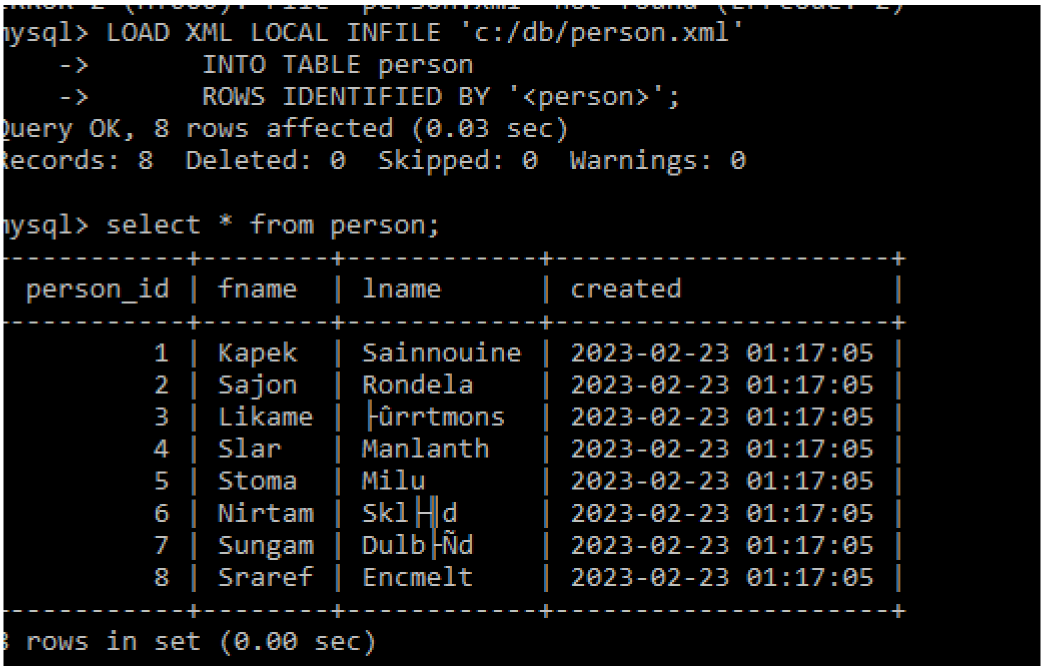
```
<list>
<personperson_id="1"fname="Kapek"lname="Sainnouine"/>
<personperson_id="2"fname="Sajon"lname="Rondela"/>
<personperson_id="3"><fname>Likame</fname><lname>Örrtmons</lname></person>
<personperson_id="4"><fname>Slar</fname><lname>Manlanth</lname></person>
<person><fieldname="person_id">5</field><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 fileINTO TABLE person

ROWS IDENTIFIED BY '<person>
```

OUTPUT:

MySQL>Select * from person;

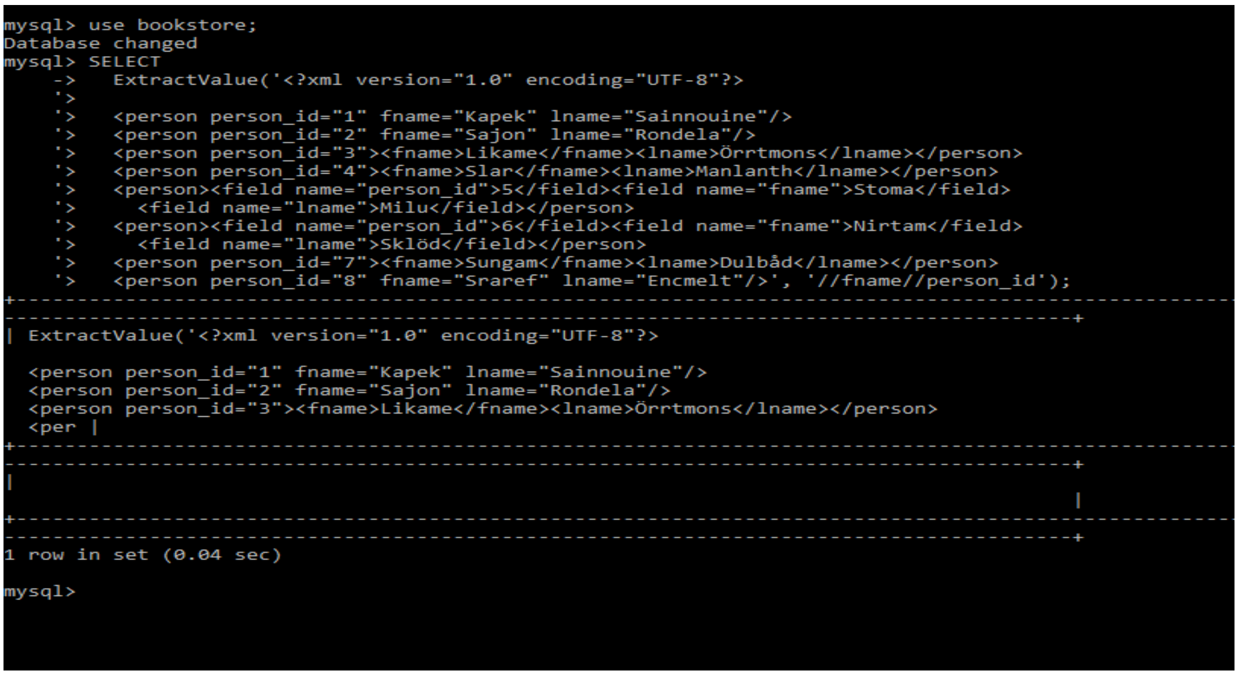


```
ysql> LOAD XML LOCAL INFILE 'c:/db/person.xml'
    ->       INTO TABLE person
    ->       ROWS IDENTIFIED BY '<person>';
uery OK, 8 rows affected (0.03 sec)
ecords: 8  Deleted: 0  Skipped: 0  Warnings: 0

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"?>



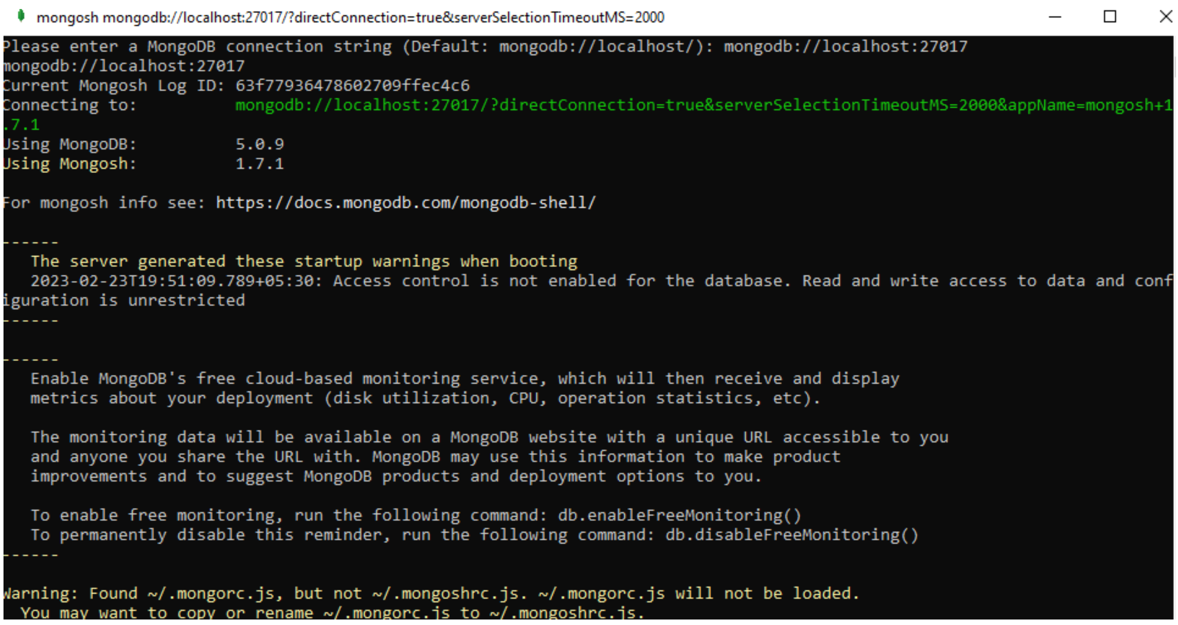
```
mysql> use bookstore;
Database changed
mysql> SELECT
    ->   ExtractValue('<?xml version="1.0" encoding="UTF-8"?>
    '>
    '>   <person person_id="1" fname="Kapek" lname="Sainnouine"/>
    '>   <person person_id="2" fname="Sajon" lname="Rondela"/>
    '>   <person person_id="3"><fname>Likame</fname><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>
```

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

Create database in mongodb

>Install Mongodb shell
>Connect with localhost
>Connection string:
mongodb://localhos
t:27017

OUTPUT::

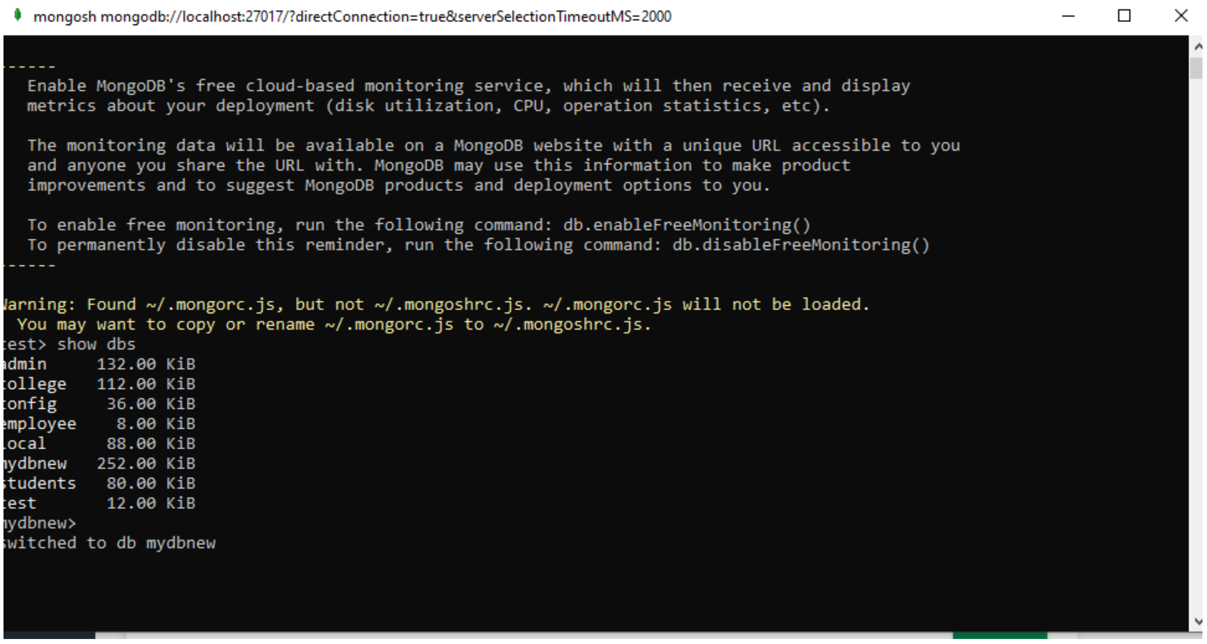


```
mongosh mongodb://localhost:27017/?directConnection=true&serverSelectionTimeoutMS=2000
Please enter a MongoDB connection string (Default: mongodb://localhost/): mongodb://localhost:27017
mongodb://localhost:27017
Current Mongosh Log ID: 63f77936478602709ffec4c6
Connecting to:          mongodb://localhost:27017/?directConnection=true&serverSelectionTimeoutMS=2000&appName=mongosh+1
.7.1
Using MongoDB:          5.0.9
Using Mongosh:          1.7.1

For mongosh info see: https://docs.mongodb.com/mongodb-shell/

------
   The server generated these startup warnings when booting
   2023-02-23T19:51:09.789+05:30: Access control is not enabled for the database. Read and write access to data and conf
iguration is unrestricted
------

------
   Enable MongoDB's free cloud-based monitoring service, which will then receive and display
   metrics about your deployment (disk utilization, CPU, operation statistics, etc).

   The monitoring data will be available on a MongoDB website with a unique URL accessible to you
   and anyone you share the URL with. MongoDB may use this information to make product
   improvements and to suggest MongoDB products and deployment options to you.

   To enable free monitoring, run the following command: db.enableFreeMonitoring()
   To permanently disable this reminder, run the following command: db.disableFreeMonitoring()
------

Warning: Found ~/.mongorc.js, but not ~/.mongoshrc.js. ~/.mongorc.js will not be loaded.
  You may want to copy or rename ~/.mongorc.js to ~/.mongoshrc.js.
```

Create collection in mongodb

use <database_name> command

OUTPUT::

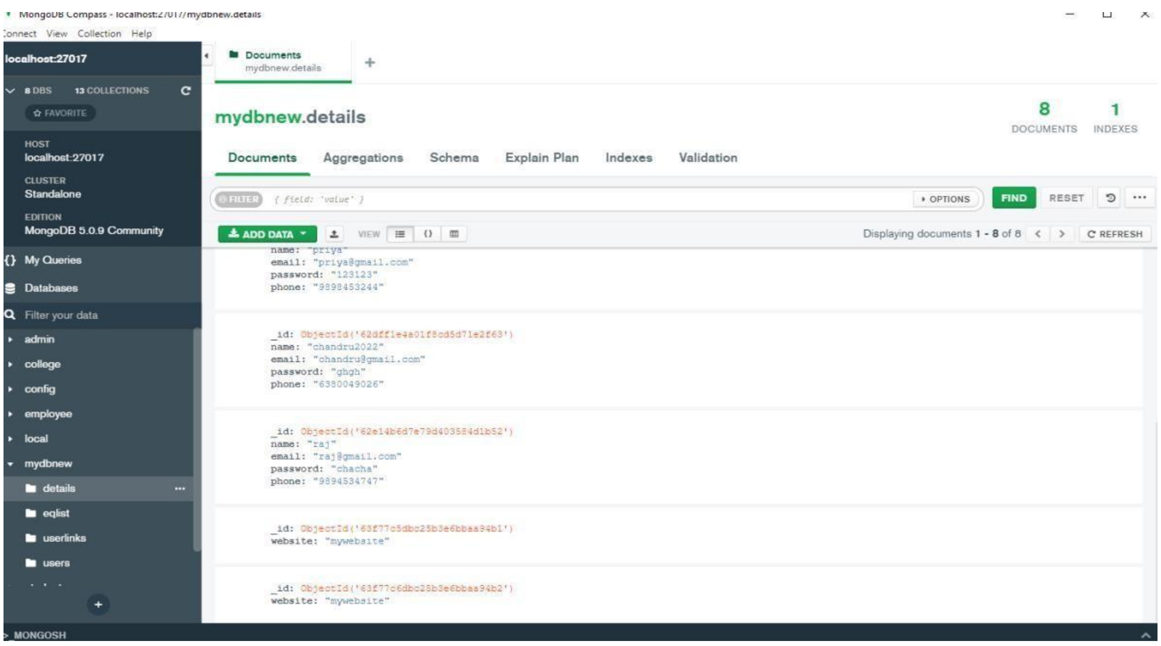


```
mongosh mongodb://localhost:27017/?directConnection=true&serverSelectionTimeoutMS=2000
------
   Enable MongoDB's free cloud-based monitoring service, which will then receive and display
   metrics about your deployment (disk utilization, CPU, operation statistics, etc).

   The monitoring data will be available on a MongoDB website with a unique URL accessible to you
   and anyone you share the URL with. MongoDB may use this information to make product
   improvements and to suggest MongoDB products and deployment options to you.

   To enable free monitoring, run the following command: db.enableFreeMonitoring()
   To permanently disable this reminder, run the following command: db.disableFreeMonitoring()
------

Warning: Found ~/.mongorc.js, but not ~/.mongoshrc.js. ~/.mongorc.js will not be loaded.
  You may want to copy or rename ~/.mongorc.js to ~/.mongoshrc.js.
est> show dbs
dmin     132.00 KiB
ollege   112.00 KiB
onfig     36.00 KiB
mployee    8.00 KiB
ocal      88.00 KiB
ydbnew   252.00 KiB
tudents   80.00 KiB
est       12.00 KiB
ydbnew>
witched to db mydbnew
```

Create document in mongodb

mydbnew>db.details.insertOne({"website":"mywebsit
e})

OUTPUT::

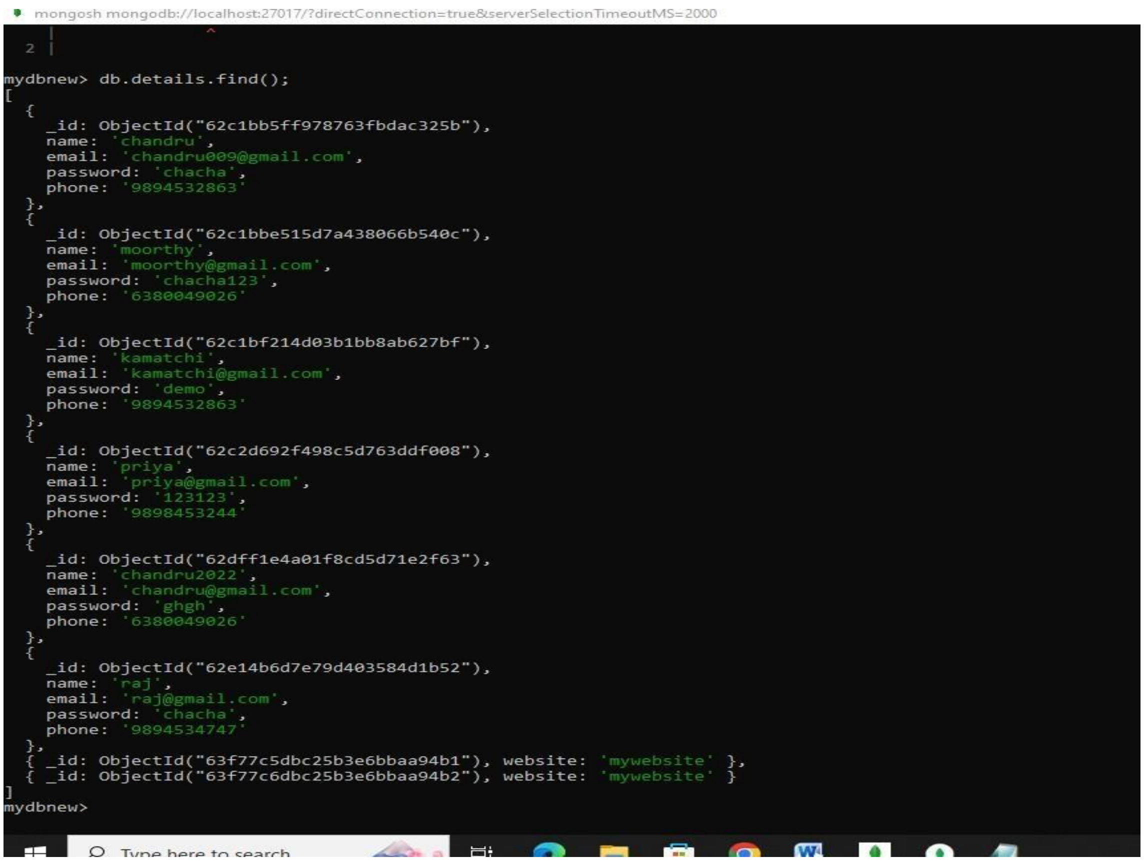


```
name: "priya"
email: "priya@gmail.com"
password: "123123"
phone: "9898453244"

_id: ObjectId('62dff1e4a01f8cd5d71e2f63')
name: "chandru2022"
email: "chandru@gmail.com"
password: "ghgh"
phone: "6380049026"

_id: ObjectId('62e14b6d7e79d403584d1b52')
name: "raj"
email: "raj@gmail.com"
password: "chacha"
phone: "9894534747"

_id: ObjectId('63f77c5dbc25b3e6bbaa94b1')
website: "mywebsite"

_id: ObjectId('63f77c6dbc25b3e6bbaa94b2')
website: "mywebsite"
```

<u>Display all documents</u>

Db.details.find()

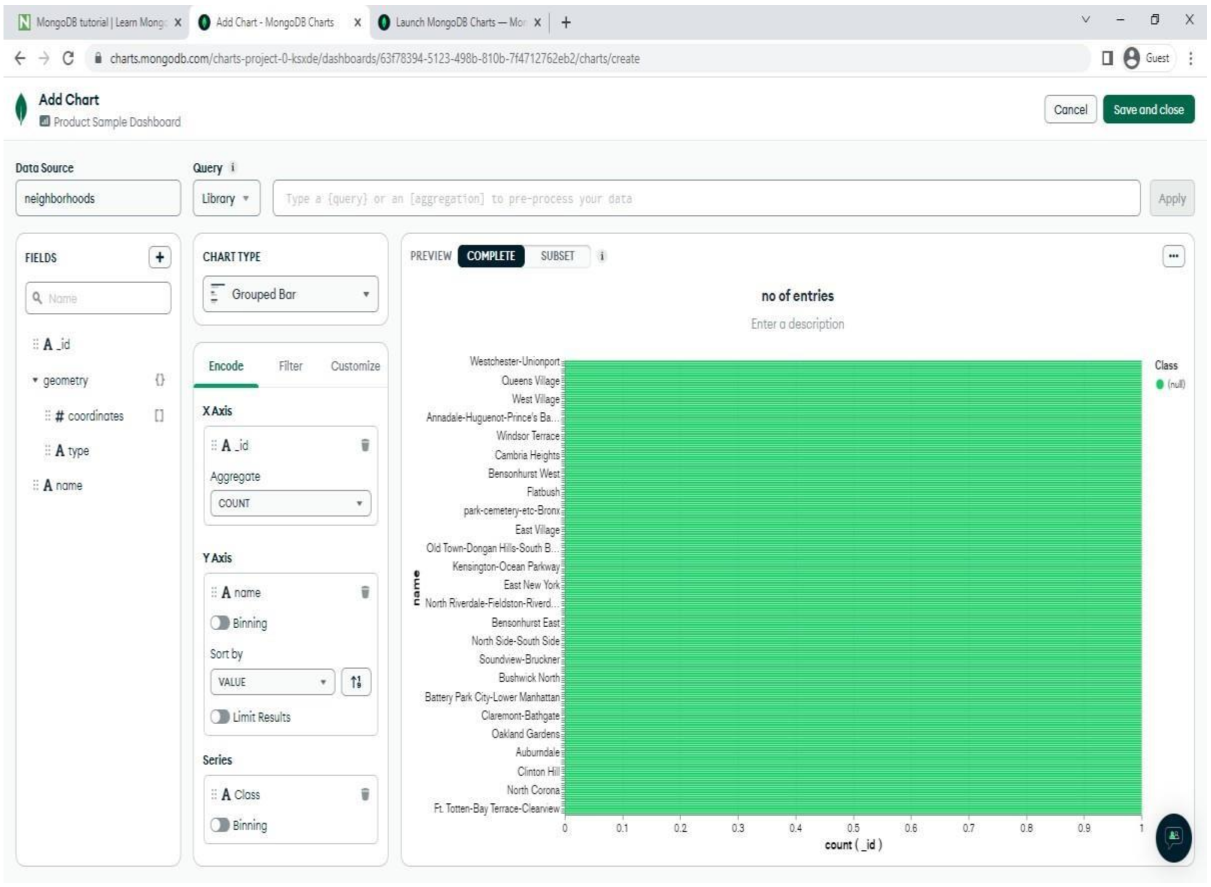
OUTPUT:


mongosh mongodb://localhost:27017/?directConnection=true&serverSelectionTimeoutMS=2000
Type here to search

```
mydbnew> db.details.find();
[
  {
    _id: ObjectId("62c1bb5ff978763fbdac325b"),
    name: 'chandru',
    email: 'chandru009@gmail.com',
    password: 'chacha',
    phone: '9894532863'
  },
  {
    _id: ObjectId("62c1bbe515d7a438066b540c"),
    name: 'moorthy',
    email: 'moorthy@gmail.com',
    password: 'chacha123',
    phone: '6380049026'
  },
  {
    _id: ObjectId("62c1bf214d03b1bb8ab627bf"),
    name: 'kamatchi',
    email: 'kamatchi@gmail.com',
    password: 'demo',
    phone: '9894532863'
  },
  {
    _id: ObjectId("62c2d692f498c5d763ddf008"),
    name: 'priya',
    email: 'priya@gmail.com',
    password: '123123',
    phone: '9898453244'
  },
  {
    _id: ObjectId("62dff1e4a01f8cd5d71e2f63"),
    name: 'chandru2022',
    email: 'chandru@gmail.com',
    password: 'ghgh',
    phone: '6380049026'
  },
  {
    _id: ObjectId("62e14b6d7e79d403584d1b52"),
    name: 'raj',
    email: 'raj@gmail.com',
    password: 'chacha',
    phone: '9894534747'
  },
  { _id: ObjectId("63f77c5dbc25b3e6bbaa94b1"), website: 'mywebsite' },
  { _id: ObjectId("63f77c6dbc25b3e6bbaa94b2"), website: 'mywebsite' }
]
mydbnew>
```

CREATING CHART USING SAMPLE DATA

OUTPUT:


MongoDB tutorial | Learn Mongo
Add Chart - MongoDB Charts
Launch MongoDB Charts — Mo
charts.mongodb.com/charts-project-0-ksxde/dashboards/63f78394-5123-498b-810b-7f4712762eb2/charts/create
Guest
Add Chart
Product Sample Dashboard
Cancel
Save and close
Apply
PREVIEW
COMPLETE
SUBSET
no of entries
Enter a description
Class
● (null)
name
count (_id)

Data Source: neighborhoods

Query: Library — Type a {query} or an [aggregation] to pre-process your data

FIELDS: A _id; geometry {}; # coordinates []; A type; A name

CHART TYPE: Grouped Bar

Encode | Filter | Customize

X Axis: A _id — Aggregate: COUNT

Y Axis: A name — Binning — Sort by: VALUE — Limit Results

Series: A Class — Binning

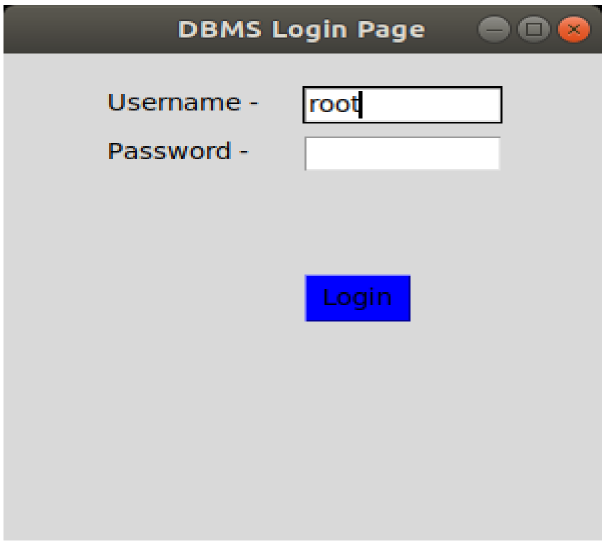
EX.NO:12 SIMPLE GUI APPLICATION USING DATABASE

PROGRAM

```
import tkinter
as tk import
MySQL.connec
torfromtkinter
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::



EX.NO:13 CASE STUDY USING REALTIME DATABASE APPLICATIONS

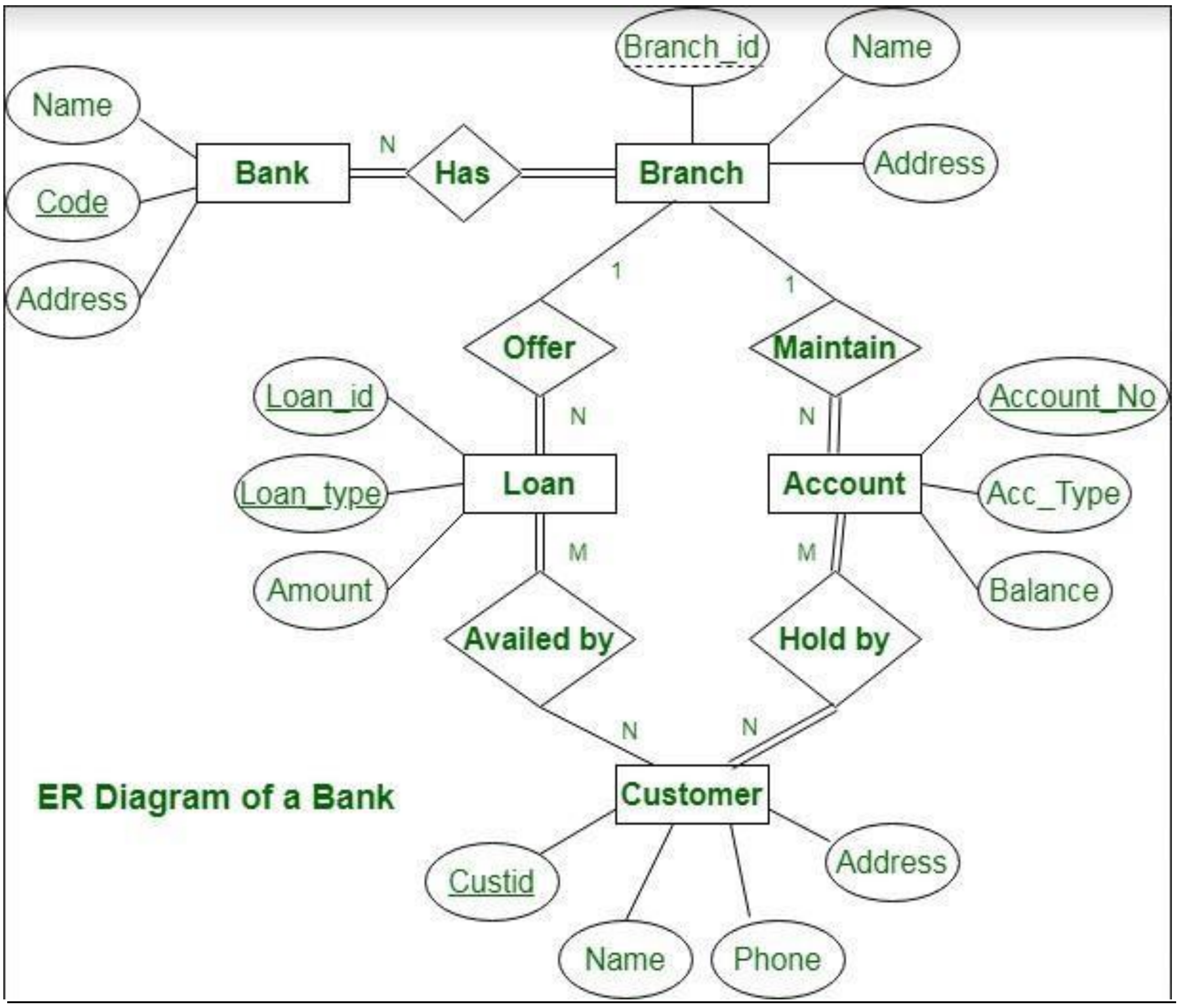
ER diagram of Bank Management System
ER diagram is known as Entity-Relationship diagram. It is used to analyze to structure of the Database. It shows relationships between entities and their attributes. An ER model provides a means of communication.

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 :

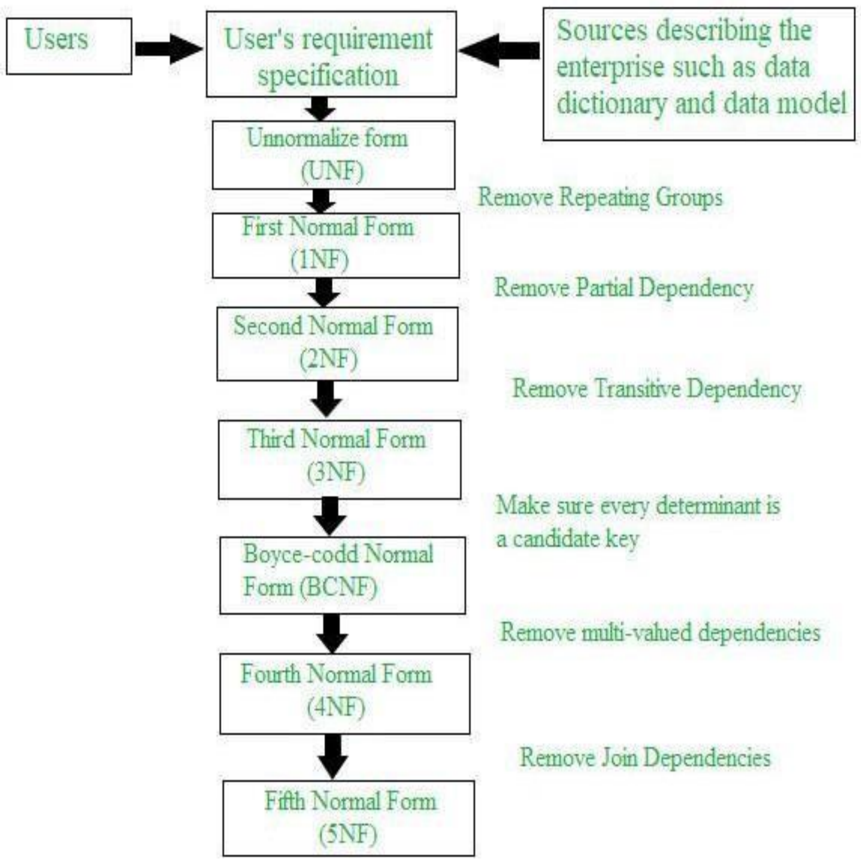


<u>Relationships are:</u>

Bank has Branches => 1 : N
One Bank can have many Branches but one Branch can not belong to many Banks, sothe 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, sothe relationship between Branch and Loan is one to many relationship.


Users
User's requirement specification
Sources describing the enterprise such as data dictionary and data model
Unnormalize form (UNF)
Remove Repeating Groups
First Normal Form (1NF)
Remove Partial Dependency
Second Normal Form (2NF)
Remove Transitive Dependency
Third Normal Form (3NF)
Make sure every determinant is a candidate key
Boyce-codd Normal Form (BCNF)
Remove multi-valued dependencies
Fourth Normal Form (4NF)
Remove Join Dependencies
Fifth Normal Form (5NF)

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 oneor 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 attributesof 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 situationsthat 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 boththe 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 madeby 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 examplemaintains 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 & Cboth. 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 correctbalance 300$ (before debiting 100$) once the first transaction went successful.

Durability

Once a transaction completes successfully, the **changes it has made into the database shouldbe 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
A
S

B
```

```
E
G
I
N
-- 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
@EndDateEND
```

Second, here's the EXEC statment:

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

Conclusion:

The case study was analyzed and find out problem statement of banking System, 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 among the various modules in banking system with database connectivity was established.