Table of content

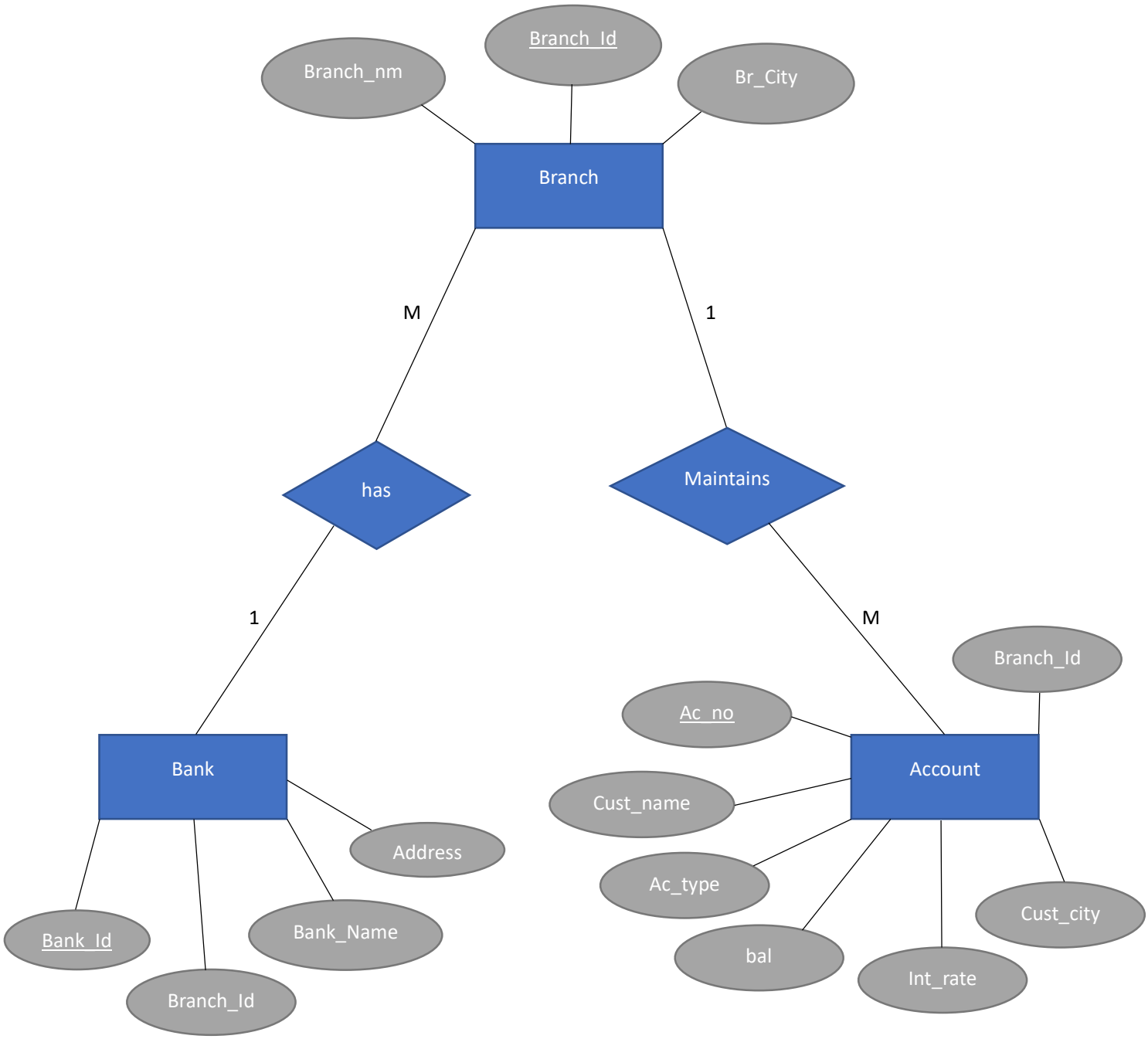
Introduction

This software project is aimed to keep record of customer transactions in the bank and to build organic and optimal system of interaction between the elements of banking mechanism with a view to profit.

Successful optimization of the "profitability-risk" ratio in a bank lending operations is largely determined by the use of effective methods of bank management.

This system can be used for building application that stores data of various banks, their branches and clients and can help to keep track of various transactions in a secured manner.

E-R DIAGRAM


Branch_Id
Branch_nm
Br_City
Branch
M
1
has
Maintains
1
M
Branch_Id
Ac_no
Bank
Account
Cust_name
Address
Ac_type
Cust_city
Bank_Id
Bank_Name
bal
Int_rate
Branch_Id

Queries to use Create Update, Drop, Truncate, Insert, Delete, Alter statements

- Create Database

```
mysql> create database Bank;
Query OK, 1 row affected (0.43 sec)

mysql> use bank;
Database changed
```

- Create Table

Table 1:

```
mysql> CREATE TABLE ACCOUNT(AC_NO INT PRIMARY KEY, CUST_NAME VARCHAR(20) NOT NULL,
AC_TYPE VARCHAR(10) NOT NULL, BAL INT, INT_RATE INT, CUST_CITY VARCHAR(20) NOT NULL,
BRANCH_ID VARCHAR(5) NOT NULL, FOREIGN KEY(BRANCH_ID)   REFERENCES BRANCH(B_ID));
Query OK, 0 rows affected (0.10 sec)
```

Table 2:

```
mysql> create table Bank(BANK_ID VARCHAR(5) PRIMARY KEY,
BANK_NAME CHAR(20) NOT NULL, ADDRESS VARCHAR(30));
Query OK, 0 rows affected (0.11 sec)
```

Table 3:

```
mysql> create table Branch(B_ID char(5) PRIMARY KEY, B_NAME VARCHAR(20) NOT NULL,
B_CITY VARCHAR(20) NOT NULL, BANK_ID VARCHAR(5) NOT NULL,
FOREIGN KEY(BANK_ID) REFERENCES BANK(BANK_ID));
Query OK, 0 rows affected (0.10 sec)
```

- Table Structure

Table 1:

```
mysql> DESC ACCOUNT;
+-----------+-------------+------+-----+---------+-------+
| Field     | Type        | Null | Key | Default | Extra |
+-----------+-------------+------+-----+---------+-------+
| AC_NO     | int         | NO   | PRI | NULL    |       |
| CUST_NAME | varchar(20) | NO   |     | NULL    |       |
| AC_TYPE   | varchar(10) | NO   |     | NULL    |       |
| BAL       | int         | YES  |     | NULL    |       |
| INT_RATE  | int         | YES  |     | NULL    |       |
| CUST_CITY | varchar(20) | NO   |     | NULL    |       |
| BRANCH_ID | varchar(5)  | NO   | MUL | NULL    |       |
+-----------+-------------+------+-----+---------+-------+
7 rows in set (0.00 sec)
```

Table 2:

```
mysql> DESC BANK;
+-----------+-------------+------+-----+---------+-------+
| Field     | Type        | Null | Key | Default | Extra |
+-----------+-------------+------+-----+---------+-------+
| BANK_ID   | varchar(5)  | NO   | PRI | NULL    |       |
| BANK_NAME | char(20)    | NO   |     | NULL    |       |
| ADDRESS   | varchar(30) | YES  |     | NULL    |       |
+-----------+-------------+------+-----+---------+-------+
4 rows in set (0.00 sec)
```

Table 3:

```
mysql> DESC BRANCH;
+---------+-------------+------+-----+---------+-------+
| Field   | Type        | Null | Key | Default | Extra |
+---------+-------------+------+-----+---------+-------+
| B_ID    | char(5)     | NO   | PRI | NULL    |       |
| B_NAME  | varchar(20) | NO   |     | NULL    |       |
| B_CITY  | varchar(20) | NO   |     | NULL    |       |
| BANK_ID | varchar(5)  | NO   | MUL | NULL    |       |
+---------+-------------+------+-----+---------+-------+
4 rows in set (0.00 sec)
```

- Insert Values

Table 1:

```
mysql> INSERT INTO ACCOUNT VALUES(01,"VAMIT","SAVINGS",15690,7,"DUNGARPUR","PNB03");
Query OK, 1 row affected (0.05 sec)
mysql> INSERT INTO ACCOUNT VALUES(02,"RAJVEER","SAVINGS",29578,9,"DUNGARPUR","SBI03");
Query OK, 1 row affected (0.02 sec)
mysql> INSERT INTO ACCOUNT VALUES(03,"SHIVAM","CURRENT",21856,13,"UDAIPUR","BOB01");
Query OK, 1 row affected (0.03 sec)
mysql> INSERT INTO ACCOUNT VALUES(04,"SANJAY","SAVINGS",8932,7,"UDAIPUR","BOB02");
Query OK, 1 row affected (0.02 sec)
mysql> INSERT INTO ACCOUNT VALUES(05,"ANJALI","CURRENT",16943,7,"UDAIPUR","PNB01");
Query OK, 1 row affected (0.04 sec)
mysql> INSERT INTO ACCOUNT VALUES(06,"PRANJAL","SAVINGS",NULL,NULL,"UDAIPUR","PNB02");
Query OK, 1 row affected (0.03 sec)
mysql> INSERT INTO ACCOUNT VALUE(07,"SARTHAK","CURRENT",4569,NULL,"JODHPUR","SBI02");
Query OK, 1 rows affected (0.03 sec)
mysql> INSERT INTO ACCOUNT VALUES(08,"RANVEER","CURRENT",NULL,NULL,"JODHPUR","SBI02");
Query OK, 1 rows affected (0.05 sec)
mysql> INSERT INTO ACCOUNT VALUE(09,"NIDHI","SAVINGS",NULL,NULL,"DUNGARPUR","SBI03");
Query OK, 1 rows affected (0.02 sec)
mysql> INSERT INTO ACCOUNT VALUES(10,"PRIYANKA","CURRENT",NULL,NULL,"JAIPUR","SBI03");
Query OK, 1 rows affected (0.02 sec)
```

Table 2:

```
mysql> INSERT INTO BANK VALUES("B01","BANK OF BARODA","UNIVERSITY ROAD");
Query OK, 1 row affected (0.02 sec)
mysql> INSERT INTO BANK VALUES("B02","PUNJAB NATIONAL BANK","RATANPUR ROAD");
Query OK, 1 row affected (0.01 sec)
mysql> INSERT INTO BANK VALUES("B03","STATE BANK OF INDIA","COLLEGE ROAD");
Query OK, 1 row affected (0.01 sec)
```

Table 3:

```
mysql> INSERT INTO BRANCH VALUES("BOB01","BAPU_BAZAR","UDAIPUR","B01");
Query OK, 1 row affected (0.09 sec)
mysql> INSERT INTO BRANCH VALUES("BOB02","UNIVERSITY ROAD","UDAIPUR","B01");
Query OK, 1 row affected (0.03 sec)
mysql> INSERT INTO BRANCH VALUES("PNB01","MAIN","UDAIPUR","B02");
Query OK, 1 row affected (0.03 sec)
mysql> INSERT INTO BRANCH VALUES("PNB02","SHOBHAGPURA","UDAIPUR","B02");
Query OK, 1 row affected (0.02 sec)
mysql> INSERT INTO BRANCH VALUES("PNB03","MITRA NIWAS","DUNGARPUR","B02");
Query OK, 1 row affected (0.02 sec)
mysql> INSERT INTO BRANCH VALUES("SBI01","BAJAJ NAGAR","JAIPUR","B03");
Query OK, 1 row affected (0.02 sec)
mysql> INSERT INTO BRANCH VALUES("SBI02","BALAJI NAGAR","JODHPUR","B03");
Query OK, 1 row affected (0.02 sec)
mysql> INSERT INTO BRANCH VALUES("SBI03","COLLEGE ROAD","DUNGARPUR","B03");
Query OK, 1 row affected (0.04 sec)
```

- Show tables

```
mysql> SHOW TABLES;
+----------------+
| Tables_in_bank |
+----------------+
| account        |
| bank           |
| branch         |
+----------------+
3 rows in set (0.04 sec)
```

- Drop table

```
mysql> drop table branch;
Query OK, 0 rows affected (0.08 sec)
```

- Update table

```
mysql> UPDATE ACCOUNT SET CUST_CITY="JAIPUR"  WHERE AC_NO=8;
Query OK, 1 row affected (0.03 sec)
Rows matched: 1  Changed: 1  Warnings: 0

mysql> UPDATE ACCOUNT SET BRANCH_ID="SBI03" WHERE AC_NO=8;
Query OK, 1 row affected (0.01 sec)
Rows matched: 1  Changed: 1  Warnings: 0

mysql> SELECT * FROM ACCOUNT;
+-------+-----------+---------+-------+----------+-----------+-----------+
| AC_NO | CUST_NAME | AC_TYPE | BAL   | INT_RATE | CUST_CITY | BRANCH_ID |
+-------+-----------+---------+-------+----------+-----------+-----------+
|     1 | VAMIT     | SAVINGS | 15690 |        7 | DUNGARPUR | PNB03     |
|     2 | RAJVEER   | SAVINGS | 29578 |        9 | DUNGARPUR | SBI03     |
|     3 | SHIVAM    | CURRENT | 21856 |       13 | UDAIPUR   | BOB01     |
|     4 | SANJAY    | SAVINGS |  8932 |        7 | UDAIPUR   | BOB02     |
|     5 | ANJALI    | CURRENT | 16943 |        7 | UDAIPUR   | PNB01     |
|     6 | PRANJAL   | SAVINGS |  NULL |     NULL | UDAIPUR   | PNB02     |
|     7 | SARTHAK   | CURRENT |  4569 |     NULL | JODHPUR   | SBI02     |
|     8 | RANVEER   | CURRENT |  NULL |     NULL | JAIPUR    | SBI03     |
|     9 | NIDHI     | SAVINGS |  NULL |     NULL | DUNGARPUR | SBI03     |
|    10 | PRIYANKA  | CURRENT |  NULL |     NULL | JAIPUR    | SBI03     |
+-------+-----------+---------+-------+----------+-----------+-----------+
10 rows in set (0.00 sec)
```

- Tables

Table 1: Account

```
mysql> SELECT * FROM ACCOUNT;
+-------+-----------+---------+-------+----------+-----------+-----------+
| AC_NO | CUST_NAME | AC_TYPE | BAL   | INT_RATE | CUST_CITY | BRANCH_ID |
+-------+-----------+---------+-------+----------+-----------+-----------+
|     1 | VAMIT     | SAVINGS | 15690 |        7 | DUNGARPUR | PNB03     |
|     2 | RAJVEER   | SAVINGS | 29578 |        9 | DUNGARPUR | SBI03     |
|     3 | SHIVAM    | CURRENT | 21856 |       13 | UDAIPUR   | BOB01     |
|     4 | SANJAY    | SAVINGS |  8932 |        7 | UDAIPUR   | BOB02     |
|     5 | ANJALI    | CURRENT | 16943 |        7 | UDAIPUR   | PNB01     |
|     6 | PRANJAL   | SAVINGS |  NULL |     NULL | UDAIPUR   | PNB02     |
|     7 | SARTHAK   | CURRENT |  4569 |     NULL | JODHPUR   | SBI02     |
|     8 | RANVEER   | CURRENT |  NULL |     NULL | JODHPUR   | SBI02     |
|     9 | NIDHI     | SAVINGS |  NULL |     NULL | DUNGARPUR | SBI03     |
|    10 | PRIYANKA  | CURRENT |  NULL |     NULL | JAIPUR    | SBI03     |
+-------+-----------+---------+-------+----------+-----------+-----------+
10 rows in set (0.01 sec)
```

Table 2: Bank

```
mysql> SELECT*FROM BANK;
+---------+----------------------+-----------------+
| BANK_ID | BANK_NAME            | ADDRESS         |
+---------+----------------------+-----------------+
| B01     | BANK OF BARODA       | UNIVERSITY ROAD |
| B02     | PUNJAB NATIONAL BANK | RATANPUR ROAD   |
| B03     | STATE BANK OF INDIA  | COLLEGE ROAD    |
+---------+----------------------+-----------------+
3 rows in set (0.00 sec)
```

Table 3: Branch

```
mysql> SELECT *FROM BRANCH;
+-------+-----------------+-----------+---------+
| B_ID  | B_NAME          | B_CITY    | BANK_ID |
+-------+-----------------+-----------+---------+
| BOB01 | BAPU_BAZAR      | UDAIPUR   | B01     |
| BOB02 | UNIVERSITY ROAD | UDAIPUR   | B01     |
| PNB01 | MAIN            | UDAIPUR   | B02     |
| PNB02 | SHOBHAGPURA     | UDAIPUR   | B02     |
| PNB03 | MITRA NIWAS     | DUNGARPUR | B02     |
| SBI01 | BAJAJ NAGAR     | JAIPUR    | B03     |
| SBI02 | BALAJI NAGAR    | JODHPUR   | B03     |
| SBI03 | COLLEGE ROAD    | DUNGARPUR | B03     |
+-------+-----------------+-----------+---------+
8 rows in set (0.00 sec)
```

To perform SQL Queries by using Between, In, Like

- Between

```
mysql> SELECT AC_NO,CUST_NAME,BAL,BRANCH_ID
FROM ACCOUNT WHERE BAL BETWEEN 15000 AND 25000;
+-------+-----------+-------+-----------+
| AC_NO | CUST_NAME | BAL   | BRANCH_ID |
+-------+-----------+-------+-----------+
|     1 | VAMIT     | 15690 | PNB03     |
|     3 | SHIVAM    | 21856 | BOB01     |
|     5 | ANJALI    | 16943 | PNB01     |
+-------+-----------+-------+-----------+
3 rows in set (0.01 sec)
```

- In

Example 1:

```
mysql> SELECT AC_NO,CUST_NAME,BAL,BRANCH_ID FROM
ACCOUNT WHERE INT_RATE IN(7);
+-------+-----------+-------+-----------+
| AC_NO | CUST_NAME | BAL   | BRANCH_ID |
+-------+-----------+-------+-----------+
|     1 | VAMIT     | 15690 | PNB03     |
|     4 | SANJAY    |  8932 | BOB02     |
|     5 | ANJALI    | 16943 | PNB01     |
+-------+-----------+-------+-----------+
3 rows in set (0.00 sec)
```

Example 2:

```
mysql> SELECT AC_NO,CUST_NAME,BAL,BRANCH_ID FROM
ACCOUNT WHERE INT_RATE IN(7,13);
+-------+-----------+-------+-----------+
| AC_NO | CUST_NAME | BAL   | BRANCH_ID |
+-------+-----------+-------+-----------+
|     1 | VAMIT     | 15690 | PNB03     |
|     3 | SHIVAM    | 21856 | BOB01     |
|     4 | SANJAY    |  8932 | BOB02     |
|     5 | ANJALI    | 16943 | PNB01     |
+-------+-----------+-------+-----------+
4 rows in set (0.00 sec)
```

Example 3:

```
mysql> SELECT AC_NO,CUST_NAME,BAL,BRANCH_ID FROM
ACCOUNT WHERE INT_RATE NOT IN(7,13);
+-------+-----------+-------+-----------+
| AC_NO | CUST_NAME | BAL   | BRANCH_ID |
+-------+-----------+-------+-----------+
|     2 | RAJVEER   | 29578 | SBI03     |
+-------+-----------+-------+-----------+
1 row in set (0.00 sec)
```

- Like

Example 1:

```
mysql> select * from account where CUST_NAME LIKE "%S";
Empty set (0.00 sec)

mysql> select * from account where CUST_NAME LIKE "S%";
+-------+-----------+---------+-------+----------+-----------+-----------+
| AC_NO | CUST_NAME | AC_TYPE | BAL   | INT_RATE | CUST_CITY | BRANCH_ID |
+-------+-----------+---------+-------+----------+-----------+-----------+
|     3 | SHIVAM    | CURRENT | 21856 |       13 | UDAIPUR   | BOB01     |
|     4 | SANJAY    | SAVINGS |  8932 |        7 | UDAIPUR   | BOB02     |
|     7 | SARTHAK   | CURRENT |  4569 |     NULL | JODHPUR   | SBI02     |
+-------+-----------+---------+-------+----------+-----------+-----------+
3 rows in set (0.00 sec)
```

Example 2:

```
mysql> select * from account where BAL IS NULL;
+-------+-----------+---------+------+----------+-----------+-----------+
| AC_NO | CUST_NAME | AC_TYPE | BAL  | INT_RATE | CUST_CITY | BRANCH_ID |
+-------+-----------+---------+------+----------+-----------+-----------+
|     6 | PRANJAL   | SAVINGS | NULL |     NULL | UDAIPUR   | PNB02     |
|     8 | RANVEER   | CURRENT | NULL |     NULL | JAIPUR    | SBI03     |
|     9 | NIDHI     | SAVINGS | NULL |     NULL | DUNGARPUR | SBI03     |
|    10 | PRIYANKA  | CURRENT | NULL |     NULL | JAIPUR    | SBI03     |
+-------+-----------+---------+------+----------+-----------+-----------+
4 rows in set (0.00 sec)
```

Example 3:

```
mysql> select * from account where CUST_NAME LIKE "%N%";
+-------+-----------+---------+-------+----------+-----------+-----------+
| AC_NO | CUST_NAME | AC_TYPE | BAL   | INT_RATE | CUST_CITY | BRANCH_ID |
+-------+-----------+---------+-------+----------+-----------+-----------+
|     4 | SANJAY    | SAVINGS |  8932 |        7 | UDAIPUR   | BOB02     |
|     5 | ANJALI    | CURRENT | 16943 |        7 | UDAIPUR   | PNB01     |
|     6 | PRANJAL   | SAVINGS |  NULL |     NULL | UDAIPUR   | PNB02     |
|     8 | RANVEER   | CURRENT |  NULL |     NULL | JAIPUR    | SBI03     |
|     9 | NIDHI     | SAVINGS |  NULL |     NULL | DUNGARPUR | SBI03     |
|    10 | PRIYANKA  | CURRENT |  NULL |     NULL | JAIPUR    | SBI03     |
+-------+-----------+---------+-------+----------+-----------+-----------+
6 rows in set (0.00 sec)
```

Example 4:

```
mysql> select * from account where CUST_NAME LIKE "%A%N%";
+-------+-----------+---------+-------+----------+-----------+-----------+
| AC_NO | CUST_NAME | AC_TYPE | BAL   | INT_RATE | CUST_CITY | BRANCH_ID |
+-------+-----------+---------+-------+----------+-----------+-----------+
|     4 | SANJAY    | SAVINGS |  8932 |        7 | UDAIPUR   | BOB02     |
|     5 | ANJALI    | CURRENT | 16943 |        7 | UDAIPUR   | PNB01     |
|     6 | PRANJAL   | SAVINGS |  NULL |     NULL | UDAIPUR   | PNB02     |
|     8 | RANVEER   | CURRENT |  NULL |     NULL | JAIPUR    | SBI03     |
|    10 | PRIYANKA  | CURRENT |  NULL |     NULL | JAIPUR    | SBI03     |
+-------+-----------+---------+-------+----------+-----------+-----------+
5 rows in set (0.00 sec)
```

Example 5:

```
mysql> select * from account where CUST_NAME LIKE "R_____";
+-------+-----------+---------+-------+----------+-----------+-----------+
| AC_NO | CUST_NAME | AC_TYPE | BAL   | INT_RATE | CUST_CITY | BRANCH_ID |
+-------+-----------+---------+-------+----------+-----------+-----------+
|     2 | RAJVEER   | SAVINGS | 29578 |        9 | DUNGARPUR | SBI03     |
|     8 | RANVEER   | CURRENT |  NULL |     NULL | JAIPUR    | SBI03     |
+-------+-----------+---------+-------+----------+-----------+-----------+
2 rows in set (0.00 sec)
```

To perform SQL Queries by using Distinct, Where, Order by, Group by, Having

- Distinct

Example 1:

```
mysql> SELECT DISTINCT AC_TYPE FROM ACCOUNT;
+---------+
| AC_TYPE |
+---------+
| SAVINGS |
| CURRENT |
+---------+
2 rows in set (0.01 sec)
```

Example 2:

```
mysql> SELECT COUNT(DISTINCT AC_TYPE) FROM ACCOUNT;
+-------------------------+
| COUNT(DISTINCT AC_TYPE) |
+-------------------------+
|                       2 |
+-------------------------+
1 row in set (0.02 sec)
```

Example 3:

```
mysql> SELECT COUNT(DISTINCT INT_RATE) FROM ACCOUNT;
+--------------------------+
| COUNT(DISTINCT INT_RATE) |
+--------------------------+
|                        3 |
+--------------------------+
1 row in set (0.00 sec)
```

Example 4:

```
mysql> SELECT COUNT(*) DISTINCT_CITY FROM
(SELECT DISTINCT CUST_CITY FROM ACCOUNT)AS SUBQUERYALIAS;
+---------------+
| DISTINCT_CITY |
+---------------+
|             4 |
+---------------+
1 row in set (0.02 sec)
```

- Where

Example 1:

```
mysql> select * from account WHERE CUST_CITY="UDAIPUR";
+-------+-----------+---------+-------+----------+-----------+-----------+
| AC_NO | CUST_NAME | AC_TYPE | BAL   | INT_RATE | CUST_CITY | BRANCH_ID |
+-------+-----------+---------+-------+----------+-----------+-----------+
|     3 | SHIVAM    | CURRENT | 21856 |       13 | UDAIPUR   | BOB01     |
|     4 | SANJAY    | SAVINGS |  8932 |        7 | UDAIPUR   | BOB02     |
|     5 | ANJALI    | CURRENT | 16943 |        7 | UDAIPUR   | PNB01     |
|     6 | PRANJAL   | SAVINGS |  NULL |     NULL | UDAIPUR   | PNB02     |
+-------+-----------+---------+-------+----------+-----------+-----------+
4 rows in set (0.00 sec)
```

Example 2:

```
mysql> select * from account WHERE CUST_CITY="UDAIPUR" AND AC_TYPE="SAVINGS";
+-------+-----------+---------+------+----------+-----------+-----------+
| AC_NO | CUST_NAME | AC_TYPE | BAL  | INT_RATE | CUST_CITY | BRANCH_ID |
+-------+-----------+---------+------+----------+-----------+-----------+
|     4 | SANJAY    | SAVINGS | 8932 |        7 | UDAIPUR   | BOB02     |
|     6 | PRANJAL   | SAVINGS | NULL |     NULL | UDAIPUR   | PNB02     |
+-------+-----------+---------+------+----------+-----------+-----------+
2 rows in set (0.00 sec)
```

- Order By

```
mysql> select * from account ORDER BY CUST_NAME;
+-------+-----------+---------+-------+----------+-----------+-----------+
| AC_NO | CUST_NAME | AC_TYPE | BAL   | INT_RATE | CUST_CITY | BRANCH_ID |
+-------+-----------+---------+-------+----------+-----------+-----------+
|     5 | ANJALI    | CURRENT | 16943 |        7 | UDAIPUR   | PNB01     |
|     9 | NIDHI     | SAVINGS |  NULL |     NULL | DUNGARPUR | SBI03     |
|     6 | PRANJAL   | SAVINGS |  NULL |     NULL | UDAIPUR   | PNB02     |
|    10 | PRIYANKA  | CURRENT |  NULL |     NULL | JAIPUR    | SBI03     |
|     2 | RAJVEER   | SAVINGS | 29578 |        9 | DUNGARPUR | SBI03     |
|     8 | RANVEER   | CURRENT |  NULL |     NULL | JAIPUR    | SBI03     |
|     4 | SANJAY    | SAVINGS |  8932 |        7 | UDAIPUR   | BOB02     |
|     7 | SARTHAK   | CURRENT |  4569 |     NULL | JODHPUR   | SBI02     |
|     3 | SHIVAM    | CURRENT | 21856 |       13 | UDAIPUR   | BOB01     |
|     1 | VAMIT     | SAVINGS | 15690 |        7 | DUNGARPUR | PNB03     |
+-------+-----------+---------+-------+----------+-----------+-----------+
10 rows in set (0.00 sec)
```

- Order By Desc

```
mysql> select * from account ORDER BY CUST_NAME DESC;
+-------+-----------+---------+-------+----------+-----------+-----------+
| AC_NO | CUST_NAME | AC_TYPE | BAL   | INT_RATE | CUST_CITY | BRANCH_ID |
+-------+-----------+---------+-------+----------+-----------+-----------+
|     1 | VAMIT     | SAVINGS | 15690 |        7 | DUNGARPUR | PNB03     |
|     3 | SHIVAM    | CURRENT | 21856 |       13 | UDAIPUR   | BOB01     |
|     7 | SARTHAK   | CURRENT |  4569 |     NULL | JODHPUR   | SBI02     |
|     4 | SANJAY    | SAVINGS |  8932 |        7 | UDAIPUR   | BOB02     |
|     8 | RANVEER   | CURRENT |  NULL |     NULL | JAIPUR    | SBI03     |
|     2 | RAJVEER   | SAVINGS | 29578 |        9 | DUNGARPUR | SBI03     |
|    10 | PRIYANKA  | CURRENT |  NULL |     NULL | JAIPUR    | SBI03     |
|     6 | PRANJAL   | SAVINGS |  NULL |     NULL | UDAIPUR   | PNB02     |
|     9 | NIDHI     | SAVINGS |  NULL |     NULL | DUNGARPUR | SBI03     |
|     5 | ANJALI    | CURRENT | 16943 |        7 | UDAIPUR   | PNB01     |
+-------+-----------+---------+-------+----------+-----------+-----------+
10 rows in set (0.00 sec)
```

- Group By

```
mysql> select COUNT(AC_TYPE),CUST_CITY
from account GROUP BY CUST_CITY;
+----------------+-----------+
| COUNT(AC_TYPE) | CUST_CITY |
+----------------+-----------+
|              3 | DUNGARPUR |
|              4 | UDAIPUR   |
|              1 | JODHPUR   |
|              2 | JAIPUR    |
+----------------+-----------+
4 rows in set (0.00 sec)
```

- Group By and Order By together

```
mysql> select COUNT(AC_TYPE),CUST_CITY from account
GROUP BY CUST_CITY ORDER BY COUNT(AC_TYPE);
+----------------+-----------+
| COUNT(AC_TYPE) | CUST_CITY |
+----------------+-----------+
|              1 | JODHPUR   |
|              2 | JAIPUR    |
|              3 | DUNGARPUR |
|              4 | UDAIPUR   |
+----------------+-----------+
4 rows in set (0.00 sec)
```

- Having

Example 1:

```
mysql> select COUNT(AC_TYPE),CUST_CITY from account
GROUP BY CUST_CITY HAVING COUNT(AC_TYPE)>4;
Empty set (0.00 sec)

mysql> select COUNT(AC_TYPE),CUST_CITY from account
GROUP BY CUST_CITY HAVING COUNT(AC_TYPE)<4;
+----------------+-----------+
| COUNT(AC_TYPE) | CUST_CITY |
+----------------+-----------+
|              3 | DUNGARPUR |
|              1 | JODHPUR   |
|              2 | JAIPUR    |
+----------------+-----------+
3 rows in set (0.00 sec)
```

Example 2:

```
mysql> select COUNT(AC_TYPE),CUST_CITY from account
GROUP BY CUST_CITY HAVING COUNT(AC_TYPE)<4 ORDER BY COUNT(AC_TYPE);
+----------------+-----------+
| COUNT(AC_TYPE) | CUST_CITY |
+----------------+-----------+
|              1 | JODHPUR   |
|              2 | JAIPUR    |
|              3 | DUNGARPUR |
+----------------+-----------+
3 rows in set (0.00 sec)
```

To create the view, execute and verify the various operations as view

- Create view

```
mysql> CREATE VIEW BRVIEW AS SELECT B_ID,B_NAME,BANK_ID FROM BRANCH;
Query OK, 0 rows affected (0.04 sec)

mysql> DESC BRVIEW;
+---------+-------------+------+-----+---------+-------+
| Field   | Type        | Null | Key | Default | Extra |
+---------+-------------+------+-----+---------+-------+
| B_ID    | char(5)     | NO   |     | NULL    |       |
| B_NAME  | varchar(20) | NO   |     | NULL    |       |
| BANK_ID | varchar(5)  | NO   |     | NULL    |       |
+---------+-------------+------+-----+---------+-------+
3 rows in set (0.01 sec)
```

- Insert view

```
mysql> INSERT INTO BRVIEW VALUES("HDFC1","HDFC","B04");
Query OK, 1 row affected (0.04 sec)

mysql> SELECT * FROM BRVIEW;
+-------+----------------+---------+
| B_ID  | B_NAME         | BANK_ID |
+-------+----------------+---------+
| BOB01 | BAPU_BAZAR     | B01     |
| BOB02 | UNIVERSITY ROAD | B01     |
| PNB01 | MAIN           | B02     |
| PNB02 | SHOBHAGPURA    | B02     |
| PNB03 | MITRA NIWAS    | B02     |
| SBI01 | BAJAJ NAGAR    | B03     |
| SBI02 | BALAJI NAGAR   | B03     |
| SBI03 | COLLEGE ROAD   | B03     |
| HDFC1 | HDFC           | B04     |
+-------+----------------+---------+
8 rows in set (0.00 sec)
```

- Delete from view

```
mysql> DELETE FROM BRVIEW WHERE BANK_ID=04;
Query OK, 1 row affected (0.04 sec)

mysql> SELECT * FROM BRVIEW;
+-------+-----------------+---------+
| B_ID  | B_NAME          | BANK_ID |
+-------+-----------------+---------+
| BOB01 | BAPU_BAZAR      | B01     |
| BOB02 | UNIVERSITY ROAD | B01     |
| PNB01 | MAIN            | B02     |
| PNB02 | SHOBHAGPURA     | B02     |
| PNB03 | MITRA NIWAS     | B02     |
| SBI01 | BAJAJ NAGAR     | B03     |
| SBI02 | BALAJI NAGAR    | B03     |
| SBI03 | COLLEGE ROAD    | B03     |
+-------+-----------------+---------+
8 rows in set (0.00 sec)
```

- Drop view

```
mysql> SHOW TABLES;
+----------------+
| Tables_in_bank |
+----------------+
| account        |
| bank           |
| branch         |
| brview         |
+----------------+
4 rows in set (0.00 sec)

mysql> DROP VIEW BRVIEW;
Query OK, 0 rows affected (0.03 sec)

mysql> SHOW TABLES;
+----------------+
| Tables_in_bank |
+----------------+
| account        |
| bank           |
| branch         |
+----------------+
3 rows in set (0.00 sec)
```

To execute and verify the SQL commands for various join operation

- Equi Join

Example 1:

```
mysql> SELECT AC_NO,CUST_NAME,B_ID,BANK_ID
FROM ACCOUNT,BRANCH WHERE ACCOUNT.BRANCH_ID=BRANCH.B_ID;
+-------+-----------+-------+---------+
| AC_NO | CUST_NAME | B_ID  | BANK_ID |
+-------+-----------+-------+---------+
|     1 | VAMIT     | PNB03 | B02     |
|     2 | RAJVEER   | SBI03 | B03     |
|     3 | SHIVAM    | BOB01 | B01     |
|     4 | SANJAY    | BOB02 | B01     |
|     5 | ANJALI    | PNB01 | B02     |
|     6 | PRANJAL   | PNB02 | B02     |
|     7 | SARTHAK   | SBI02 | B03     |
|     8 | RANVEER   | SBI03 | B03     |
|     9 | NIDHI     | SBI03 | B03     |
|    10 | PRIYANKA  | SBI03 | B03     |
+-------+-----------+-------+---------+
10 rows in set (0.00 sec)
```

Example 2:

```
mysql> SELECT AC_NO,CUST_NAME,B_ID,BANK_ID
FROM ACCOUNT,BRANCH WHERE ACCOUNT.BRANCH_ID=
BRANCH.B_ID AND BAL>15000;
+-------+-----------+-------+---------+
| AC_NO | CUST_NAME | B_ID  | BANK_ID |
+-------+-----------+-------+---------+
|     1 | VAMIT     | PNB03 | B02     |
|     2 | RAJVEER   | SBI03 | B03     |
|     3 | SHIVAM    | BOB01 | B01     |
|     5 | ANJALI    | PNB01 | B02     |
+-------+-----------+-------+---------+
4 rows in set (0.00 sec)
```

- Cartesian Product

```
mysql> SELECT BR.B_ID,B.BANK_ID,B.BANK_NAME
FROM BANK B,BRANCH BR;
+-------+---------+----------------------+
| B_ID  | BANK_ID | BANK_NAME            |
+-------+---------+----------------------+
| BOB01 | B03     | STATE BANK OF INDIA  |
| BOB01 | B02     | PUNJAB NATIONAL BANK |
| BOB01 | B01     | BANK OF BARODA       |
| BOB02 | B03     | STATE BANK OF INDIA  |
| BOB02 | B02     | PUNJAB NATIONAL BANK |
| BOB02 | B01     | BANK OF BARODA       |
| PNB01 | B03     | STATE BANK OF INDIA  |
| PNB01 | B02     | PUNJAB NATIONAL BANK |
| PNB01 | B01     | BANK OF BARODA       |
| PNB02 | B03     | STATE BANK OF INDIA  |
| PNB02 | B02     | PUNJAB NATIONAL BANK |
| PNB02 | B01     | BANK OF BARODA       |
| PNB03 | B03     | STATE BANK OF INDIA  |
| PNB03 | B02     | PUNJAB NATIONAL BANK |
| PNB03 | B01     | BANK OF BARODA       |
| SBI01 | B03     | STATE BANK OF INDIA  |
| SBI01 | B02     | PUNJAB NATIONAL BANK |
| SBI01 | B01     | BANK OF BARODA       |
| SBI02 | B03     | STATE BANK OF INDIA  |
| SBI02 | B02     | PUNJAB NATIONAL BANK |
| SBI02 | B01     | BANK OF BARODA       |
| SBI03 | B03     | STATE BANK OF INDIA  |
| SBI03 | B02     | PUNJAB NATIONAL BANK |
| SBI03 | B01     | BANK OF BARODA       |
+-------+---------+----------------------+
24 rows in set (0.00 sec)
```

- Inner Join

```
mysql> SELECT B.BANK_ID,B.BANK_NAME,BR.B_ID,BR.B_NAME FROM
BANK B INNER JOIN BRANCH BR ON (B.BANK_ID=BR.BANK_ID);
+---------+----------------------+-------+-----------------+
| BANK_ID | BANK_NAME            | B_ID  | B_NAME          |
+---------+----------------------+-------+-----------------+
| B01     | BANK OF BARODA       | BOB01 | BAPU_BAZAR      |
| B01     | BANK OF BARODA       | BOB02 | UNIVERSITY ROAD |
| B02     | PUNJAB NATIONAL BANK | PNB01 | MAIN            |
| B02     | PUNJAB NATIONAL BANK | PNB02 | SHOBHAGPURA     |
| B02     | PUNJAB NATIONAL BANK | PNB03 | MITRA NIWAS     |
| B03     | STATE BANK OF INDIA  | SBI01 | BAJAJ NAGAR     |
| B03     | STATE BANK OF INDIA  | SBI02 | BALAJI NAGAR    |
| B03     | STATE BANK OF INDIA  | SBI03 | COLLEGE ROAD    |
+---------+----------------------+-------+-----------------+
8 rows in set (0.00 sec)
```

- Natural Join

```
mysql> SELECT B.BANK_ID,B.BANK_NAME,BR.B_ID,BR.B_NAME FROM
BANK B NATURAL JOIN BRANCH BR;
+---------+---------------------+-------+-----------------+
| BANK_ID | BANK_NAME           | B_ID  | B_NAME          |
+---------+---------------------+-------+-----------------+
| B01     | BANK OF BARODA      | BOB01 | BAPU_BAZAR      |
| B01     | BANK OF BARODA      | BOB02 | UNIVERSITY ROAD |
| B02     | PUNJAB NATIONAL BANK | PNB01 | MAIN            |
| B02     | PUNJAB NATIONAL BANK | PNB02 | SHOBHAGPURA     |
| B02     | PUNJAB NATIONAL BANK | PNB03 | MITRA NIWAS     |
| B03     | STATE BANK OF INDIA | SBI01 | BAJAJ NAGAR     |
| B03     | STATE BANK OF INDIA | SBI02 | BALAJI NAGAR    |
| B03     | STATE BANK OF INDIA | SBI03 | COLLEGE ROAD    |
+---------+---------------------+-------+-----------------+
8 rows in set (0.00 sec)
```

- Cross Join

```
mysql> SELECT B.BANK_ID,B.BANK_NAME,BR.B_ID,BR.B_NAME FROM
BANK B CROSS JOIN BRANCH BR;
+---------+---------------------+-------+-----------------+
| BANK_ID | BANK_NAME           | B_ID  | B_NAME          |
+---------+---------------------+-------+-----------------+
| B03     | STATE BANK OF INDIA | BOB01 | BAPU_BAZAR      |
| B02     | PUNJAB NATIONAL BANK | BOB01 | BAPU_BAZAR      |
| B01     | BANK OF BARODA      | BOB01 | BAPU_BAZAR      |
| B03     | STATE BANK OF INDIA | BOB02 | UNIVERSITY ROAD |
| B02     | PUNJAB NATIONAL BANK | BOB02 | UNIVERSITY ROAD |
| B01     | BANK OF BARODA      | BOB02 | UNIVERSITY ROAD |
| B03     | STATE BANK OF INDIA | PNB01 | MAIN            |
| B02     | PUNJAB NATIONAL BANK | PNB01 | MAIN            |
| B01     | BANK OF BARODA      | PNB01 | MAIN            |
| B03     | STATE BANK OF INDIA | PNB02 | SHOBHAGPURA     |
| B02     | PUNJAB NATIONAL BANK | PNB02 | SHOBHAGPURA     |
| B01     | BANK OF BARODA      | PNB02 | SHOBHAGPURA     |
| B03     | STATE BANK OF INDIA | PNB03 | MITRA NIWAS     |
| B02     | PUNJAB NATIONAL BANK | PNB03 | MITRA NIWAS     |
| B01     | BANK OF BARODA      | PNB03 | MITRA NIWAS     |
| B03     | STATE BANK OF INDIA | SBI01 | BAJAJ NAGAR     |
| B02     | PUNJAB NATIONAL BANK | SBI01 | BAJAJ NAGAR     |
| B01     | BANK OF BARODA      | SBI01 | BAJAJ NAGAR     |
| B03     | STATE BANK OF INDIA | SBI02 | BALAJI NAGAR    |
| B02     | PUNJAB NATIONAL BANK | SBI02 | BALAJI NAGAR    |
| B01     | BANK OF BARODA      | SBI02 | BALAJI NAGAR    |
| B03     | STATE BANK OF INDIA | SBI03 | COLLEGE ROAD    |
| B02     | PUNJAB NATIONAL BANK | SBI03 | COLLEGE ROAD    |
| B01     | BANK OF BARODA      | SBI03 | COLLEGE ROAD    |
+---------+---------------------+-------+-----------------+
24 rows in set (0.00 sec)
```

- Right Outer Join

```
mysql> SELECT B.BANK_ID,B.BANK_NAME,BR.B_ID,BR.B_NAME FROM BANK B
RIGHT OUTER JOIN BRANCH BR ON (B.BANK_ID=BR.BANK_ID);
+---------+----------------------+-------+-----------------+
| BANK_ID | BANK_NAME            | B_ID  | B_NAME          |
+---------+----------------------+-------+-----------------+
| B01     | BANK OF BARODA       | BOB01 | BAPU_BAZAR      |
| B01     | BANK OF BARODA       | BOB02 | UNIVERSITY ROAD |
| B02     | PUNJAB NATIONAL BANK | PNB01 | MAIN            |
| B02     | PUNJAB NATIONAL BANK | PNB02 | SHOBHAGPURA     |
| B02     | PUNJAB NATIONAL BANK | PNB03 | MITRA NIWAS     |
| B03     | STATE BANK OF INDIA  | SBI01 | BAJAJ NAGAR     |
| B03     | STATE BANK OF INDIA  | SBI02 | BALAJI NAGAR    |
| B03     | STATE BANK OF INDIA  | SBI03 | COLLEGE ROAD    |
+---------+----------------------+-------+-----------------+
8 rows in set (0.00 sec)
```

- Left Outer Join

```
mysql> SELECT B.BANK_ID,B.BANK_NAME,BR.B_ID,BR.B_NAME FROM BANK B
LEFT OUTER JOIN BRANCH BR ON (B.BANK_ID=BR.BANK_ID);
+---------+----------------------+-------+-----------------+
| BANK_ID | BANK_NAME            | B_ID  | B_NAME          |
+---------+----------------------+-------+-----------------+
| B01     | BANK OF BARODA       | BOB01 | BAPU_BAZAR      |
| B01     | BANK OF BARODA       | BOB02 | UNIVERSITY ROAD |
| B02     | PUNJAB NATIONAL BANK | PNB01 | MAIN            |
| B02     | PUNJAB NATIONAL BANK | PNB02 | SHOBHAGPURA     |
| B02     | PUNJAB NATIONAL BANK | PNB03 | MITRA NIWAS     |
| B03     | STATE BANK OF INDIA  | SBI01 | BAJAJ NAGAR     |
| B03     | STATE BANK OF INDIA  | SBI02 | BALAJI NAGAR    |
| B03     | STATE BANK OF INDIA  | SBI03 | COLLEGE ROAD    |
+---------+----------------------+-------+-----------------+
8 rows in set (0.00 sec)
```