BANK MANAGEMENT SYSTEM

(DBS Lab Project Report)

(Phase 2 & 3)

Submitted To:

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Abstract:

This system is going to be designed for the Management of a Bank system to maintain its total working that circle around the transaction of account, ATM service, bank loan etc.

Description:

We have selected the topic of **"BANK MANAGEMENT SYSTEM"** as the title suggest, as our Lab project of Database Systems. The main theme of this system is to provide ease to the bank worker and its customers as well for the daily tasks they perform in Bank. This system will maintain some static data of the entities like Bank, Branch, Account, Employee and also the dynamic data like transaction etc. The Employee of the Bank includes all types of workers in Bank including cashier, Loan Processor, financial advisor, security guard etc. Similarly, the accounts entity may also have different types of account. Different types of transactions like bill payment, wire transfer, credit card transaction etc. might be performed. Any customer can get loan from Bank for that he will be charged interest. Bank workers will have the facility of quick working through fixed deposit. Hopefully, if this system is deploy in real world then, it will sufficient to full fill all the requirements of the Bank.

Entities & their Attributes:

Here the bold items are entities, first underlined item is primary key while the second one if there is foreign key

1) **Bank:** Code, Name, CEO
2) **Branch:** Branch_ID, Name, Address, Manager_ID, No_of_Employee
3) **Customer:** Customer_ID, Name, PhoneNo, email, extra_note, Cust_type_code, date_became_cust
4) **Customer_type:** Cust_type_code, type_description
5) **Accounts:** Acc_ID, Name, date_opened, balance, extra_note, type_code, Customer_ID
6) **Account_type:** Acc_type_code, type_description
7) **Transactions:** Transaction_ID, T_date, amount, extra_note, account_ID, tran_type_code
8) **Transaction_type:** trans_type_code, type_description
9) **ATM_Card:** Account_No, card_number, address
10) **Loan:** Account_No, loan_type, loan_amount, interest,
11) **Employee:** Employee_ID, branch, status, email_ID, phone_No, nationality, gender, salary
12) **Manager:** Manager_ID, Employee_ID, Branch_Code
13) **Reports:** Account_No, Report_ID, Report_name, Trans_ID, Report_Date

Relationships:

- **Bank** has 1 to many **Branches**
- **Branch** has many to many **Customers**
- **Customer** has 1 to 1 **Customers_type**
- **Account** has many to 1 **Customer**
- **Account** has 1 to 1 **Account_type**

- **Customer** gets 1 to 1 **Loan**
- **Customer** can 1 to many **Transactions**
- **Bank** has 1 to many **Accounts**
- **ATM_Card** has 1 to 1 **Account**
- **Branch** has 1 to 1 **Manager**
- **Branch** has 1 to many **Employee**
- **Employee** gives many to many **Loan**
- **Employee** deals many to many **Customers**
- **Manager** deals 1 to many **Employee**
- **Employee** deals 1 to many **Accounts**

DDL Commands

```
CREATE Table Bank(
Code int NOT NULL,
Name varchar(50) NOT NULL,
CEO varchar(25) NOT NULL
);

-----------------------------------------------------------------------
CREATE Table Branch(
Branch_ID int NOT NULL UNIQUE,
Name varchar(25) NOT NULL,
Address varchar(50),
Manager_ID int NOT NULL UNIQUE,
No_of_Employee int,
Primary key(Branch_ID)
);

-----------------------------------------------------------------------
CREATE Table Employee(
Employee_ID int NOT NULL Primary Key Identity(3001,1),
Name varchar(25) NOT NULL,
branch_ID int,
Email varchar(25) Default('abc@xyz.com'),
E_Status varchar(25),
Phone_No varchar(15) default('0300123456'),
Gender varchar(7),
Salary decimal(9,2),
Nationality varchar(15)
);
```

```
-----------------------------------------------------------------------
CREATE Table Manager(
Manager_ID int NOT NULL IDENTITY(1001,1),
Employee_ID int NOT NULL,
Branch_code int,
Primary key(Manager_ID),
FOREIGN KEY(Employee_ID) References Employee(Employee_ID),
FOREIGN KEY(Branch_code) References Branch(Branch_ID)
);

-----------------------------------------------------------------------
CREATE Table Customer_type(
Cust_type_code int IDENTITY(201,1) Primary Key,
type_description varchar(25)
);

-----------------------------------------------------------------------
CREATE Table Customer(
Customer_ID int NOT NULL IDENTITY(10001,1) Primary key,
Name varchar(25) NOT NULL,
Phone_No varchar(15) Default('0300012345'),
Email varchar(15) Default('xyz@abc.com'),
Cust_type_code int,
date_became_cust date,
extra_note varchar(50) NULL,
FOREIGN Key(Cust_type_code) References Customer_type(Cust_type_code)
);

-----------------------------------------------------------------------
CREATE Table Account_type(
Acc_type_code int IDENTITY(301,1) Primary Key,
type_description varchar(50)
);

-----------------------------------------------------------------------
CREATE Table Account(
Account_ID int IDENTITY(1111111,1) Primary Key,
Customer_ID int,
acc_type_code int,
balance decimal(15,2) Default(0.00),
date_opened date,
extra_note varchar(50) NULL,
FOREIGN Key(Customer_ID) References Customer(Customer_ID),
FOREIGN Key(acc_type_code) References Account_type(Acc_type_code)
);
```

```
-----------------------------------------------------------------------
CREATE Table ATM_Card(
Card_No int NOT NULL IDENTITY(701,1) Primary Key,
Acc_No int,
ATM_Password varchar(15),
FOREIGN KEY(Acc_No) References Account(Account_ID)
);

-----------------------------------------------------------------------
CREATE Table Loan(
Account_No int,
Loan_type varchar(100),
amount decimal(15,2) default(0.00),
interest_rate decimal(5,4),
FOREIGN KEY(Account_No) References Account(Account_ID)
);

-----------------------------------------------------------------------
CREATE Table Transaction_type(
Trans_type_code int IDENTITY(401,1) Primary Key,
type_description varchar(25)
);

-----------------------------------------------------------------------
CREATE Table Transactions(
Transaction_ID int IDENTITY(501,1) Primary Key,
Trans_type_code int,
Account_ID int,
T_date date,
amount decimal(15,2) Default(0.00),
extra_note varchar(50),
FOREIGN KEY(Account_ID) References Account(Account_ID),
FOREIGN KEY(Trans_type_code) References
Transaction_type(Trans_type_code)
);

-----------------------------------------------------------------------
CREATE Table Reports(
Report_ID int Not NULL IDENTITY(901,1) Primary Key,
trans_ID int,
Acc_No int,
Report_name varchar(50) NOT NULL,
Report_date date,
FOREIGN KEY(Acc_No) References Account(Account_ID),
FOREIGN KEY(trans_ID) References Transactions(Transaction_ID)
);
```

DML Commands

```
Insert into Bank
values(1,'National Bank of Pakistan','Arif Usmani');

-------------------------------------------------------------------------------
INSERT into Branch
values(2001,'Airport Branch','Karachi',1001,36),
        (2002,'Shahdra Branch','Lahore',1002,45),
        (2003,'Cantt Branch','Islamabad',1003,57),
        (2004,'Canal Road Branch','Faislabad',1004,70),
        (2005,'Muslim town Branch','Lahore',1005,42),
        (2006,'Mall Road','Lahore',1006,50),
        (2007,'cliffton Branch','Karachi',1007,29),
        (2008,'Airport Branch','Karachi',1008,55),
        (2009,'Shahdra Branch','Lahore',1009,60),
        (2010,'Behria Town','Islamabad',1010,48);

-------------------------------------------------------------------------------
INSERT into Employee
values('Usama',2001,'abc@abc.com','Manager',03001111111,'Male',50000,'Pakista
ni'),
      ('adrees',2002,'abc@abc.com','Manager',03002222222,'Male',50000,'Pakist
ani'),

('zaid',2003,'abc@abc.com','Manager',03003333333,'Male',50000,'Pakistani'),

('ukasha',2004,'abc@abc.com','Manager',03004444444,'Male',40000,'Pakistani'),

('Minahil',2005,'abc@abc.com','Manager',03005555555,'Female',50000,'Pakistani
'),

('Akabar',2006,'abc@abc.com','Manager',03006666666,'Male',50000,'Pakistani'),

('Hina',2007,'abc@abc.com','Manager',03007777777,'Female',60000,'Pakistani'),

('Hamza',2008,'abc@abc.com','Manager',03008888888,'Male',70000,'Pakistani'),

('Hassan',2009,'abc@abc.com','Manager',03009999999,'Male',40000,'Pakistani'),

('Ali',2010,'abc@abc.com','Manager',03010000000,'Male',50000,'Pakistani'),

('Imran',2011,'abc@abc.com','Cashier',03001234567,'Male',40000,'Pakistani'),

('Arshad',2012,'abc@abc.com','Cashier',03007654321,'Male',30000,'Pakistani'),
```

```
('Awais',2013,'abc@abc.com','Cashier',03023456789,'Male',40000,'Pakistani'),
        ('Zahra',2014,'abc@abc.com','Loan
processor',03012346754,'Female',30000,'Pakistani'),
        ('Aleem',2015,'abc@abc.com','Internal
Auditor',03002233445,'Male',40000,'Pakistani'),
        ('Daud',2016,'abc@abc.com','Loan
Officer',03006669984,'Male',40000,'Pakistani'),
        ('Noor',2017,'abc@abc.com','Bank
Teller',03111166455,'Female',50000,'Pakistani'),
        ('Usman',2018,'abc@abc.com','Bank
Advisor',03228896755,'Male',35000,'Pakistani'),
        ('Abu Bakar',2019,'abc@abc.com','Marketing
Officer',03356666677,'Male',45000,'Pakistani'),
        ('Talha',2020,'abc@abc.com','Security
Gaurd',030227998655,'Male',30000,'Pakistani'),
        ('Akhtar',2021,'mvc@abc.com','Security
Gaurd',030227995432,'Male',30000,'Pakistani'),
        ('Qasim',2022,'kgf@abc.com','Security
Gaurd',030227998655,'Male',30000,'Pakistani');

--------------------------------------------------------------------------------
INSERT into Manager
values(3001,2001),
        (3002,2002),
        (3003,2003),
        (3004,2004),
        (3005,2005),
        (3006,2006),
        (3007,2007),
        (3008,2008),
        (3009,2009),
        (3010,2010);

--------------------------------------------------------------------------------
INSERT into Customer_Type
values('Teacher'),
      ('Student'),
        ('Labour'),
        ('Service'),
        ('Professor'),
        ('Entrepreneur'),
        ('Policeman'),
        ('Property dealer'),
        ('Teacher'),
        ('Artist');

--------------------------------------------------------------------------------
INSERT into Customer
values('Ali',03001111111,'abc@abc.com',202,'2017-06-17','Lahore'),
```

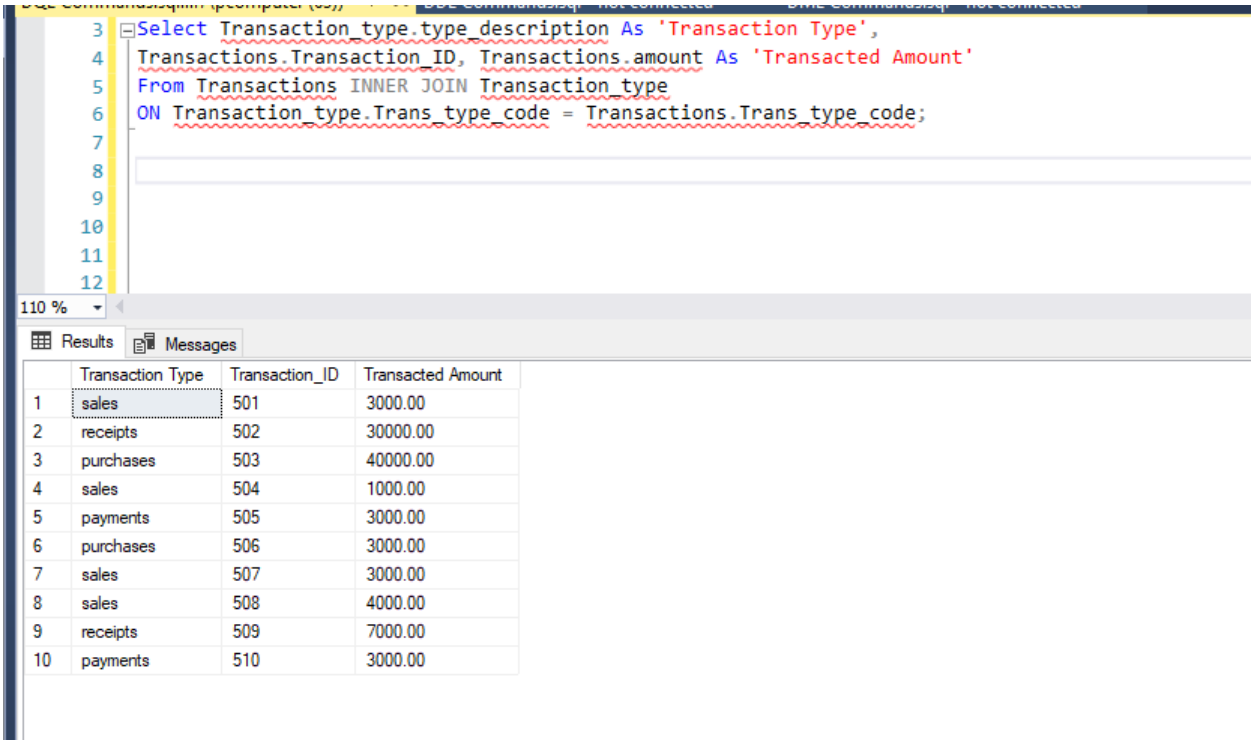
```
        ('Imran',03002222222,'xyz@abc.com',206,'2017-06-19','Islamabad'),
        ('Talha',03003333333,'rst@abc.com',201,'2018-02-18','Karachi'),
        ('Ahsan',03004444444,'uvw@abc.com',204,'2018-07-17','Faislabad'),
        ('Nabeel',03005555555,'mno@abc.com',202,'2019-09-16','Lahore'),
        ('Zuljlal',03006666666,'kfc@abc.com',205,'2017-02-17','Karachi'),
        ('Fazeel',03007777777,'nbp@abc.com',208,'2018-05-15','Lahore'),
        ('Umer',03008888888,'pkr@abc.com',201,'2019-07-20','Peshawar'),
        ('Sohail',03009999999,'hsy@abc.com',205,'2018-03-17','Multan'),
        ('Usman',03014444444,'rhs@abc.com',202,'2019-08-15','Sialkot');

--------------------------------------------------------------------------------
INSERT into Account_Type
values('Checking Account'),
        ('Saving Account'),
        ('Certificate of Deposite'),
        ('Brokage Account');

--------------------------------------------------------------------------------
INSERT into Account
values(10001,301,400000,'2018-08-18',NULL),
        (10002,301,300000,'2016-06-19',NULL),
        (10006,302,350000,'2017-07-17',NULL),
        (10003,304,700000,'2016-03-16',NULL),
        (10007,301,500000,'2017-05-15',NULL),
        (10004,301,900000,'2019-07-19',NULL),
        (10009,303,800000,'2020-08-20',NULL),
        (10005,301,450000,'2018-03-18',NULL),
        (10008,301,650000,'2019-02-19',NULL),
        (10009,302,760000,'2018-01-21',NULL);

--------------------------------------------------------------------------------
Insert into ATM_Card
values(1111111,'ali1234'),
        (1111113,'ali12345'),
        (1111114,'ali1200'),
        (1111112,'soh1234'),
        (1111117,'ali6664'),
        (1111119,'dd123'),
        (1111120,'kok9090'),
        (1111116,'ll9000'),
        (1111115,'nbl1234'),
        (1111118,'kll1234');

--------------------------------------------------------------------------------
Insert into Loan
values(1111117,'for paying fees of my child',50000.00,0.02),
        (1111112,'for shopping',1000.00,0.002),
        (1111115,'for runninig my business',600000.00,0.07),
        (1111114,'for sister marriage',100000.00,0.015),
        (1111113,'for son education',30000.00,0.012),
```

```
        (1111120,'for buying house',700000.00,0.055),
        (1111111,'for family support',70000.00,0.03),
        (1111116,'for runninig my business',400000.00,0.066),
        (1111118,'for runninig my business',90000.00,0.095),
        (1111119,'for going europe for study',800000.00,0.087);

-------------------------------------------------------------------------------
-------
Insert into Transaction_type
values('sales'),
        ('purchases'),
        ('receipts'),
        ('sales'),
        ('payments'),
        ('sales'),
        ('purchases'),
        ('receipts'),
        ('sales'),
        ('payments');

-------------------------------------------------------------------------------
--------
Insert into Transactions
values(401,1111120,'2000-03-21',3000.00,'this transaction goes well'),
        (403,1111119,'2000-03-22',30000.00,'this transaction goes well'),
        (402,1111111,'2000-03-23',40000.00,'this transaction goes well'),
        (404,1111112,'2000-03-24',1000.00,'this transaction goes not well'),
        (405,1111118,'2000-03-21',3000.00,'this transaction goes well'),
        (407,1111113,'2000-04-21',3000.00,null),
        (406,1111114,'2000-04-21',3000.00,null),
        (409,1111115,'2000-04-21',4000.00,null),
        (408,1111117,'2000-04-21',7000.00,null),
        (410,1111116,'2000-07-21',3000.00,'in an excellent way');

-------------------------------------------------------------------------------
Insert into Reports
values(501,1111120,'loan report','2000-03-21'),
        (503,1111119,'transcation report','2000-03-22'),
        (502,1111111,'loan report','2000-03-23'),
        (504,1111112,'loan report','2000-03-24'),
        (505,1111118,'transaction report','2000-03-21'),
        (507,1111113,'loan report','2000-04-21'),
        (506,1111114,'loan report','2000-04-21'),
        (509,1111115,'loan report','2000-04-21'),
        (508,1111117,'loan report','2000-04-21'),
        (510,1111116,'loan report','2000-07-21');
```

Questions

Question No.1:

INNER JOIN: This query will show the Transaction Type, Transaction_ID and Transacted Amount of different kinds of Transactions performed.



```
Select Transaction_type.type_description As 'Transaction Type',
Transactions.Transaction_ID, Transactions.amount As 'Transacted Amount'
From Transactions INNER JOIN Transaction_type
ON Transaction_type.Trans_type_code = Transactions.Trans_type_code;
```

110 %

Results | Messages

	Transaction Type	Transaction_ID	Transacted Amount
1	sales	501	3000.00
2	receipts	502	30000.00
3	purchases	503	40000.00
4	sales	504	1000.00
5	payments	505	3000.00
6	purchases	506	3000.00
7	sales	507	3000.00
8	sales	508	4000.00
9	receipts	509	7000.00
10	payments	510	3000.00

Question No. 2:

LEFT JOIN: This query will show the all the data from Customer_type table and some partial data from Customer Table if against some record there exists no record.

```
Select Customer_type.type_description, Customer.Name As 'Customer Name'
From Customer_type LEFT JOIN Customer
ON Customer_type.Cust_type_code = Customer.Cust_type_code;
```

121 %

Results | Messages

	type_description	Customer Name
1	Teacher	Talha
2	Teacher	Umer
3	Student	Ali
4	Student	Nabeel
5	Student	Usman
6	Labour	NULL
7	Service	Ahsan
8	Professor	Zuljlal
9	Professor	Sohail
10	Entrepreneur	Imran
11	Policeman	NULL
12	Property dealer	Fazeel
13	Teacher	NULL
14	Artist	NULL

Question No. 3:

Right Join: This query will display all the records from Customer table and some partial records from Customer_type.

```
Customer.Email As 'Cusotmer Email Address'
From Customer_type RIGHT JOIN Customer
ON Customer_type.Cust_type_code = Customer.Cust_type_code;
```

21 %

Results | Messages

	type_description	Customer Name	Cusotmer Email Address
1	Student	Ali	abc@abc.com
2	Entrepreneur	Imran	xyz@abc.com
3	Teacher	Talha	rst@abc.com
4	Service	Ahsan	uvw@abc.com
5	Student	Nabeel	mno@abc.com
6	Professor	Zuljlal	kfc@abc.com
7	Property dealer	Fazeel	nbp@abc.com
8	Teacher	Umer	pkr@abc.com
9	Professor	Sohail	hsy@abc.com
10	Student	Usman	rhs@abc.com

Question No.4:

FULL JOIN: This query will display all the records from Customer and Customer_type table. Missing data will show NULL.

```
Customer.Email As 'Cusotmer Email Address'
From Customer_type FULL JOIN Customer
ON Customer_type.Cust_type_code = Customer.Cust_type_code;
```

Results | Messages

	type_description	Customer Name	Cusotmer Email Address
1	Teacher	Talha	rst@abc.com
2	Teacher	Umer	pkr@abc.com
3	Student	Ali	abc@abc.com
4	Student	Nabeel	mno@abc.com
5	Student	Usman	rhs@abc.com
6	Labour	NULL	NULL
7	Service	Ahsan	uvw@abc.com
8	Professor	Zuljlal	kfc@abc.com
9	Professor	Sohail	hsy@abc.com
10	Entrepreneur	Imran	xyz@abc.com
11	Policeman	NULL	NULL
12	Property dealer	Fazeel	nbp@abc.com
13	Teacher	NULL	NULL
14	Artist	NULL	NULL

Questions No.5:

Write a query to print the Name of Account Type of Account No. 1111114, Date of Opening his account, he takes total loan from Bank and the total amount he has to return to bank with interest.

```
Select Account_type.type_description As 'Type of Account',
date_opened As 'Date of Opening Account',
amount As 'Loan Taken',
amount-(amount*interest_rate) As 'Amount to return with interest'
From Account, Loan, Account_type
Where Account.Account_ID = 1111114 AND Loan.Account_No=Account.Account_ID AND
Account.Acc_type_code = Account_type.Acc_type_code;
```

Results | Messages

	Type of Account	Date of Opening Account	Loan Taken	Amount to return with interest
1	Brokage Account	2016-03-16	100000.00	98500.000000

Question No. 6:

Write a query to print the Manager Name and it's Salary of 'Mall Road' Branch.

```
16  Select Employee.Name As 'Manager Name', Employee.Salary
17  From Branch, Employee, Manager
18  Where Branch.Name = 'Mall Road' AND Manager.Employee_ID = Employee.Employee_ID AND
19  Manager.Manager_ID = Branch.Manager_ID;
20
21
22
```

121 %

Results | Messages

	Manager Name	Salary
1	Akabar	50000.00

Nested Query:

Select all the Branches Name and their Address in Lahore and Karachi City.

```
52  Select Branch.Name + ' ' + Address As 'Full Branch Name'
53  From Branch
54  WHERE Address IN ('Lahore', 'Karachi');
55
```

10 %

Results | Messages

	Full Branch Name
1	Airport Branch Karachi
2	Shahdra Branch Lahore
3	Muslim town Branch Lahore
4	Mall Road Lahore
5	cliffton Branch Karachi
6	Airport Branch Karachi
7	Shahdra Branch Lahore

Another Query: Find Average No of Employees from all branches whose Manager_ID is greater than equal to 1005.

```
60 SELECT AVG(No_of_Employee)
61 FROM Branch
62 WHERE Manager_ID IN (
63     SELECT Manager_ID
64     FROM Manager
65     WHERE Manager_ID >= 1005);
```

110 %

Results | Messages

	(No column name)
1	47

Delete Record:

Delete the record of Report with Account No 1111118.

```
66
67 Delete From Reports
68 Where Acc_No = 1111118;
```

110 %

Messages

```
(1 row affected)

Completion time: 2021-07-15T09:26:25.7733036+05:00
```

Update Record:

```
70 Update Loan
71 SET Loan_type = 'For Foreign Study' WHERE Account_No = 1111111;
```

110 %

Messages

```
(1 row affected)

Completion time: 2021-07-15T09:32:51.1048335+05:00
```