King Saud University College of Computer and Information Sciences Computer Science Department	
CSC380 Fundamentals Of Database Systems	Second Semester 1443

CSC 380 Project

Bank management System

Team#1

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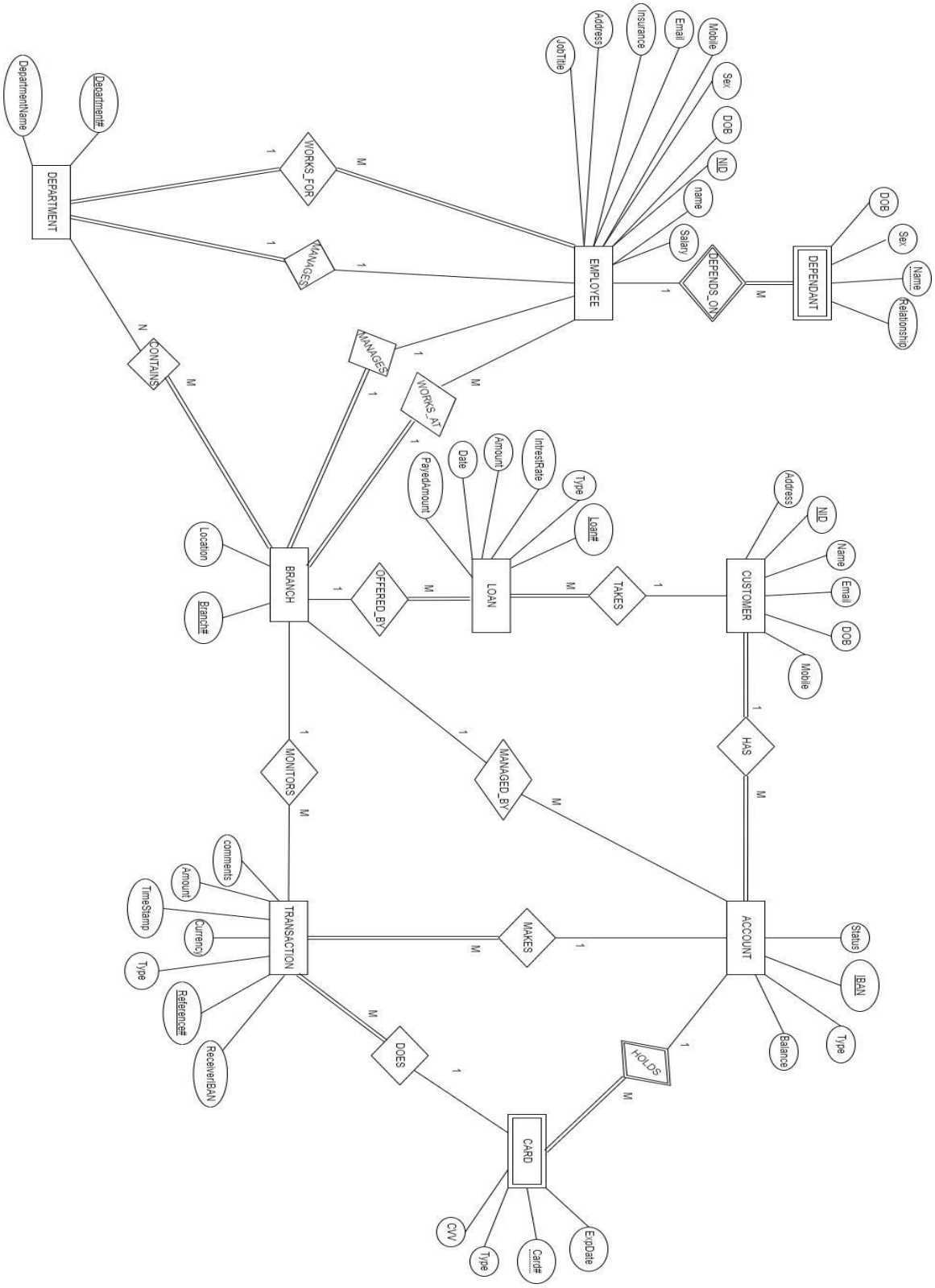
1. Overview

A bank management system (BMS) is a database system for managing the functioning of a bank. BMS stores different Bank details such as bank branches, employees, customers, departments, money transactions, and customers' accounts and loans, and BMS can add, delete or alter information about the mentioned bank details.

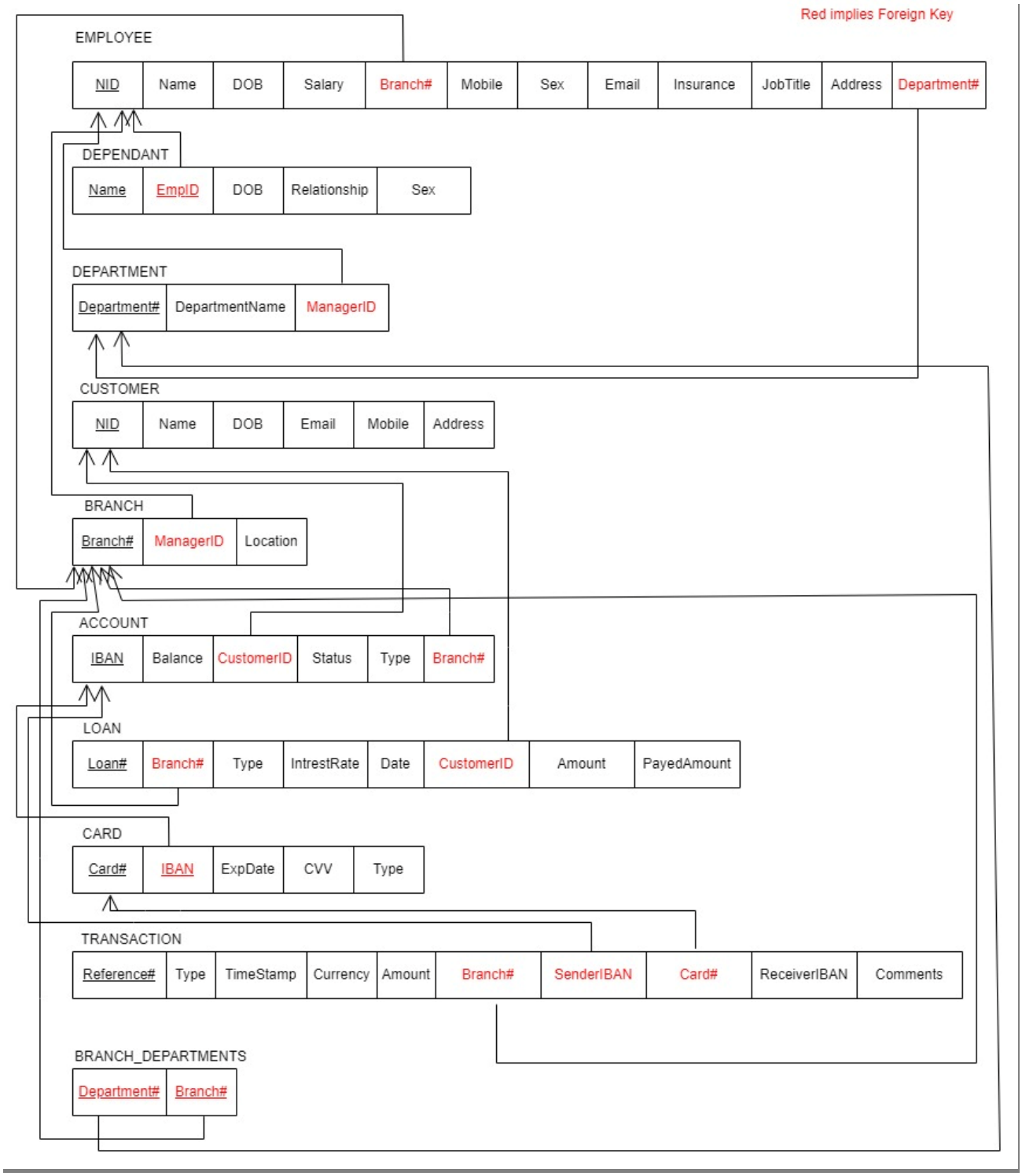
2. Requirement Specification

- A Bank shall have a bank identification number BIN, a name, a headquarter location, a **CEO**, **Department managers**, and multiple branches.
- Each branch should have a **branch manager**, branch number as a unique identifier, **employees**, and location, the location describes neighborhood, and country.
- Branch manager manages all branch-related issues such as employees, customers, etc., and other branch information.
- System shall save **bank customers**' information, such as customer's full name, National identifier as a unique identifier, date of birth, signature, contact information (mobile number, email address, address), jobs, and their bank accounts.
- Bank customers can have multiple accounts, each account has an account type (current, saving, investment, etc.), and IBAN as a unique identifier, balance, status, and set of cards.
- Each card is associated with a customer and an account and contains a unique number, expiration date, a CVV, a card type (credit, debit, etc.), and associated account number IBAN.
- Customers can open accounts, issue cards, take loans, and handle transactions either through the bank's website or by visiting customer service at one of the bank branches.
- The system shall save bank employees' information, employee's full name, National identifier as a unique ID, job title, employee's wage, the branch number where she/he works, their department, contact information (mobile number, email address, address), medical insurance, and dependents information.
- System shall save all transactions, each transaction has a reference number, a type (deposit, withdrawal, or transfer), parties associated with the transaction, card information –depending on the type of transaction-, date and time, currency, and amount of transaction.
- customer Loans are saved on contracts, each has a unique number, loan type, date of the loan, and loan amount. a customer can have multiple loans and each loan is associated with a single customer.

3. Entity-Relationship Diagram



4. Database's Relational Schema



5. System users

In the bank system database, there are different kinds of users, some are:

- **Financial Department managers**
- **IT Department managers**
- **Human Resources Department managers**
- **Customer Service Department managers**
  - Each department manager is responsible for overseeing all administrative aspects of their department. Department managers have access to all department employees' public information.

- **Employees of customer service department**
- **Employees of human resources department**
- **Employees of IT department**
- **Employees of financial department**
  - Each employee has different views and operations in the database depending on their job title and department, i.e., customer service employees can access customers' public information, add and delete loans, cards, or accounts, and human resources employees are responsible for hiring/firing employees, giving them raises, and changing their job titles, financial department employees are responsible for monitoring and reporting transactions and loans made and taken by the bank branches.

- **Dependents**
  - Employee dependents can access their data, along with the insurance number related to their Sponsor.

- **Branch managers**
  - Branch managers are responsible for overseeing all administrative aspects of their Branch, Branch managers have access to all branch employees' public information.

- **Customers**
  - Bank customers can access all their related data in the database system, mainly their accounts, cards, loans, and transactions, they can take new loans via a customer service representative, issue/delete cards and accounts either directly or via a customer service representative, and only make new transactions either directly or via a customer service representative.

We chose three types of users to explain the views and the operations they have access to:

1- Customers

Customers are regular bank database users, an average bank customer access the system almost daily, and so they can retrieve the IBAN number, Balance, Status, and Type of any of their accounts. All information related to account cards, loans information if any, and transaction information if any. Customers can update their email, mobile number, and address. customers can request a loan by visiting one of the bank branches, can make a transaction by adding transaction type, currency, amount, card number and receiver IBAN -depending on the type of transaction-. and can add or delete card or account information related to them.

- View

  Customers can access data that are related to them, and them alone, they can access tables customer, account, card, loan and transaction.

NID	NAME	DOB	EMAIL	MOBILE	ADDRESS
8888555533	Khalid Saad	1995-02-17	khalid@gmail.com	966505123474	AL MANAR - Dammam

IBAN	Balance	Customer ID	STATUS	TYPE	BRANCH#
BA3234554343545832145676	70000	8888555533	ACTIVE	CURRENT	1330

CARD#	IBAN	Expiration Date	CVV	TYPE
6744345512345328	BA3234554343545832145676	2024-11-03	896	DEPIT

LOAN#	BRANCH#	TYPE	Interest Rate	DATE	Customer ID	Amount	Paid Amount
8	1330	Car Loan	0.30	2020-03-03	8888555533	50000.00	15000.00

Reference#	TYPE	TIME STAMP	Currency	Amount	BRANCH#	Sender IBAN	CARD#	Receiver IBAN	COMMENTS
4	online payment	2022-02-11 11:20:40	SAR	1000.00	1330	BA3234554343545832145676	6744345512345328	BA88343246676553885662 25	NULL

- Operations

- Examples on:
- Insertion: new transaction and new card.

```
mysql> insert into `transaction`
    -> (`Reference#`, `TYPE`, `TIME STAMP`,`Currency`,
    -> `Amount` , `Sender IBAN` , `CARD#` ,`Receiver IBAN`,`COMMENTS`)
    -> values (default , 'deposits' , '2019-01-12 12:43:55' ,'SAR',
    -> '15000.00' , 'SA3782224631005321655489','3742454553400126',
    -> 'SA4365007753545000065353', 'personal deposits');
Query OK, 1 row affected (0.01 sec)

mysql> insert into `CARD`
    -> values ('3745637213400126' , 'SA3782224631005321655489',
    -> '2026-01-08' , '101' , 'DEPIT' );
Query OK, 1 row affected (0.01 sec)
```

- Deletion: deleting a card and an account.

```
mysql> delete from `CARD`
    -> where  `Card#` = '2786650764435305';
Query OK, 1 row affected (0.01 sec)

mysql> delete from  `ACCOUNT`
    -> where `IBAN` = 'SA3234554343545832145676';
Query OK, 1 row affected (0.02 sec)
```

- Update: updating address and mobile information.

```
mysql> update `CUSTOMER`
    -> set `ADDRESS` = 'AL SAHAFA - Riyadh'
    -> where `NID` = '7777888811';
Query OK, 1 row affected (0.01 sec)
Rows matched: 1  Changed: 1  Warnings: 0

mysql> update `CUSTOMER`
    -> set `MOBILE` = '966500273498'
    -> where `NID` = '7777888811';
Query OK, 1 row affected (0.01 sec)
Rows matched: 1  Changed: 1  Warnings: 0
```

- Retrieval from one table: retrieving account and transaction information.

```
mysql> select `IBAN`, `BALANCE`
    -> from `ACCOUNT`
    -> where `customer ID` = '4444333322';
+----------------------------+---------+
| IBAN                       | BALANCE |
+----------------------------+---------+
| SA3782224631005321655489 | 1000000 |
| SA4365007753545000065353 |   60000 |
+----------------------------+---------+
2 rows in set (0.00 sec)

mysql> select `Reference#`, `Time Stamp`
    -> from `TRANSACTION`
    -> where `Sender IBAN` = 'SA3782212367758321231579';
+------------+---------------------+
| Reference# | Time Stamp          |
+------------+---------------------+
|          2 | 2022-01-04 11:36:10 |
+------------+---------------------+
1 row in set (0.00 sec)
```

- Retrieval from more than two tables:
- retrieving customer's ID, customer's name, IBAN, card number. that customer's ID is `444333322`
- retrieving customer's ID, customer's name, IBAN, card number, transaction's type and amount that related together.

```
mysql> SELECT `CUSTOMER`.`NID` , `CUSTOMER`.`NAME` , `ACCOUNT`.`IBAN`  , `CARD`.`CARD#`
    -> FROM ((`CUSTOMER` JOIN `ACCOUNT` ON `CUSTOMER`.`NID` = `ACCOUNT`.`Customer ID`)
    -> JOIN `CARD` ON `ACCOUNT`.`IBAN` = `CARD`.`IBAN`)
    -> where `nid` = '4444333322';
+------------+---------------+----------------------------+------------------+
| NID        | NAME          | IBAN                       | CARD#            |
+------------+---------------+----------------------------+------------------+
| 4444333322 | Sara Abdullah | SA4365007753545000065353 | 1245434124527657 |
| 4444333322 | Sara Abdullah | SA3782224631005321655489 | 3742454553400126 |
| 4444333322 | Sara Abdullah | SA3782224631005321655489 | 3745637213400126 |
+------------+---------------+----------------------------+------------------+
3 rows in set (0.00 sec)

mysql> SELECT `CUSTOMER`.`NID` , `CUSTOMER`.`NAME` , `ACCOUNT`.`IBAN`  ,
    -> `TRANSACTION`.`CARD#`, `TRANSACTION`.`TYPE` , `TRANSACTION`.`Amount`
    -> FROM `CUSTOMER` JOIN `ACCOUNT`
    -> ON `CUSTOMER`.`NID` = `ACCOUNT`.`Customer ID`
    -> JOIN `TRANSACTION`
    -> ON `ACCOUNT`.`IBAN` = `TRANSACTION`.`Sender IBAN`
    -> where `nid` = '4444333322';
+------------+---------------+----------------------------+------------------+------------+----------+
| NID        | NAME          | IBAN                       | CARD#            | TYPE       | Amount   |
+------------+---------------+----------------------------+------------------+------------+----------+
| 4444333322 | Sara Abdullah | SA3782224631005321655489 | 3742454553400126 | withdrawal |  1200.00 |
| 4444333322 | Sara Abdullah | SA3782224631005321655489 | 3742454553400126 | deposits   | 15000.00 |
+------------+---------------+----------------------------+------------------+------------+----------+
2 rows in set (0.00 sec)
```

2- customer service employees

Customer service employees are also regular system users, they can access and retrieve the customer information, which is national ID, name, date of birth, email mobile number, and address. Account information which is IBAN number, balance, account status, and account type. Loan information, which is loan number, loan type, interest rate, date, amount paid amount. Transaction information, which is reference number, transaction type, time stamp, currency, amount, sender IBAN, card number, receiver IBAN. And add new customer, card, account, transaction, loans. delete accounts. And update customer's email/mobile/address, account state.

- View

  Customer service employees' personal information is accessible by them on tables employee and dependent, and can also access Customers' public information on tables customer, account, loan, transactions.

NID	NAME	DOB	SALARY	MOBILE	SEX	EMAIL	INSURANCE	JOB TITLE	ADDRESS	BRANCH#	DEPARTMENT#
0055551111	Shahad abdullah	1998-03-23	10000.00	966534663732	F	sha@gmail.com	81276238874	Customer service representative	AL BALAD - JEDDAH	1420	1125

NAME	Employee ID	DOB	Relationship	SEX
Dina	0044443333	2016-03-02	Child	F
Haifa	0022224444	2008-08-09	Child	F

NID	NAME	DOB	EMAIL	MOBILE	ADDRESS
1111222244	Ali Ahmed	2000-02-03	ali@gmail.com	966505433911	AL AZIZAIH - Jeddah
2222666655	Bader Turki	1999-06-08	bader@hotmail.com	966546775681	AL AZIZAIH - Dammam
3333888866	Hind Faleh	2001-10-23	hind@gmail.com	966564566488	ALFALAH - Jeddah
4444333322	Sara Abdullah	1997-01-05	sara@gmail.com	966503456741	ALMALQA - Riyadh

IBAN	Balance	Customer ID	STATUS	TYPE	BRANCH#
BA112345575185544398947 3	10000	3333888866	ACTIVE	FIXED DEPOSITS	1420
BA2112223451877659053566	20000	9999111155	ACTIVE	INVESTMENT	1230
BA3234554343545832145676	70000	8888555533	ACTIVE	CURRENT	1330

LOAN#	BRANCH#	TYPE	Interest Rate	DATE	Customer ID	Amount	Paid Amount
1	1210	Personal Finance	0.10	2020-03-20	4444333322	500000.00	100000.00
2	1220	Personal Finance	0.30	2022-04-20	5555999944	70000.00	NULL
3	1230	Personal Finance	0.50	2021-09-20	9999111155	50000.00	15000.00
4	1240	Home Equity Loan	0.20	2019-01-10	6666222211	450000.00	200000.00

Reference#	TYPE	TIME STAMP	Currency	Amount	BRANCH#	Sender IBAN	CARD#	Receiver IBAN	COMMENTS
1	withdrawal	2021-08-09 13:57:40	SAR	1200.00	1210	SA3782224631005321655489	3742454553400126	NULL	NULL
2	deposits	2022-01-04 11:36:10	SAR	700.00	1220	SA3782212367758321231579	6744345553754432	SA4365007753545000065353	salary
3	transfer	2021-08-10 12:13:44	JPY	50000.00	1230	SA8834324667885439202466	5200533989552126	JP6010096000505719826457	eida

- Operations

- Examples on:

- Insertion: new customer and new loan.

```
mysql> insert into `CUSTOMER`
    -> values ('1234567890','Nasser Ali', '2000-02-2' ,
    -> 'Ali@gmail.com','966501234567','Alolya - Riyadh' );
Query OK, 1 row affected (0.01 sec)

mysql> insert into `LOAN`
    -> values ( default ,  '1210'    ,  'Car Loan'   , '0.25' ,
    ->  '2020-01-15', '1111222244' , '50000.00'  , '10000.00');
Query OK, 1 row affected (0.01 sec)
```

- Deletion: deleting paid loans and customer account.

```
mysql> delete from `LOAN`
    -> where `Amount` = `Paid Amount`;
Query OK, 1 row affected (0.01 sec)

mysql> delete from `ACCOUNT`
    -> where  `CUSTOMER ID` = '2222666655';
Query OK, 1 row affected (0.02 sec)
```

- Update: updating account status and account paid loan.

```
mysql> update `ACCOUNT`
    -> set `STATUS` = 'INACTIVE'
    -> where `CUSTOMER ID` = '7777888811';
Query OK, 1 row affected (0.01 sec)
Rows matched: 1  Changed: 1  Warnings: 0

mysql> update `LOAN`
    -> set `Paid Amount` = '6000.0'
    -> where `LOAN#` = '2';
Query OK, 1 row affected (0.01 sec)
Rows matched: 1  Changed: 1  Warnings: 0
```

- Retrieval from one table: retrieving specific customer information.

```
mysql> select `customer`.`name`, `customer`.`mobile`
    -> from `CUSTOMER`
    -> where `NID` = '4444333322';
+---------------+--------------+
| name          | mobile       |
+---------------+--------------+
| Sara Abdullah | 966503456741 |
+---------------+--------------+
1 row in set (0.00 sec)

mysql>
mysql> select `customer`.`name`, `customer`.`mobile`
    -> from `customer`, `account`
    -> where `nid`=`customer id` and `account`.`type` = 'investment';
+-------------+--------------+
| name        | mobile       |
+-------------+--------------+
| Asma Salem  | 966502345678 |
| Norah Fahad | 966503456789 |
| Ali Omar    | 966505434567 |
+-------------+--------------+
3 rows in set (0.00 sec)
```

- Retrieval from more than two tables; retrieving customer's name and mobile, account's type and balance that related together
- retrieving customer's name, loan's amount and type, that loan's type is refinance

```
mysql> select `NAME` , `MOBILE` , `BALANCE` as `account balance` , `ACCOUNT`.`Type` as `account type`
    -> from ((`CUSTOMER` join `ACCOUNT` on `CUSTOMER`.`NID` = `account`.`Customer ID` )
    ->  join `CARD` on `CARD`.`IBAN`=`ACCOUNT`.`IBAN`);
+---------------+--------------+-----------------+----------------+
| NAME          | MOBILE       | account balance | account type   |
+---------------+--------------+-----------------+----------------+
| Sara Abdullah | 966503456741 |           60000 | FIXED DEPOSITS |
| Ali Ahmed     | 966505433911 |          500000 | SAVING         |
| Norah Fahad   | 966503456789 |            3000 | INVESTMENT     |
| Hind Faleh    | 966564566488 |           10000 | FIXED DEPOSITS |
| Sara Abdullah | 966503456741 |         1000000 | SAVING         |
| Rand Ali      | 966505433556 |           50000 | FIXED DEPOSITS |
| Asma Salem    | 966502345678 |           20000 | INVESTMENT     |
| Ali Omar      | 966505434567 |            2000 | INVESTMENT     |
| Khalid Saad   | 966505123474 |           70000 | CURRENT        |
| Ahmed Fahad   | 966523455911 |          100000 | CURRENT        |
| Ahmed Fahad   | 966523455911 |           40000 | CURRENT        |
+---------------+--------------+-----------------+----------------+
11 rows in set (0.01 sec)

mysql> select `NAME`, `LOAN`.`Amount` as `loan amount`, `LOAN`.`TYPE` as `loan type`
    -> from ((`CUSTOMER` join `LOAN` on `customer`.`NID` = `loan`.`Customer ID` and `TYPE` = 'Refinance' )
    ->  join `ACCOUNT` on `customer`.`NID` = `account`.`Customer ID`);
+-------------+-------------+-----------+
| NAME        | loan amount | loan type |
+-------------+-------------+-----------+
| Khalid Saad |   100000.00 | Refinance |
+-------------+-------------+-----------+
1 row in set (0.00 sec)
```

3- Bank CEO

Bank CEO is a casual system user, she/he have the highest level of access permissions in the database, CEO can add/delete and update info on branches, departments, employees, dependents, and access public customers' information in the system.

- View

  CEO can access customers' and employees' public information, they can access tables employee, dependent, customer, branch, department, account, and loan.

NID	NAME	DOB	SALARY	MOBILE	SEX	EMAIL	INSURANCE	JOB TITLE	ADDRESS	BRANCH#	DEPARTMENT#
0022221111	Sami ali	1997-10-02	20000.00	966537654532	M	sam@gmail.com	67314673249	Accountant	AL MANAR - Dammam	1310	1121
0022224444	Mohammed khalid	1981-03-20	70000.00	966559951555	M	moh@gmail.com	12327541121	Branch Manager	AL GHADIR - Riyadh	1210	0001
0022226666	Badr kareem	1990-03-21	70000.00	966565466532	M	bad1@gmail.com	29726976143	Branch Manager	AL THAALBAH - JEDDAH	1430	0001
0022227777	Hamad abdullah	1991-06-23	50000.00	966597765649	M	ham3@gmail.com	66432534432	Retail Banking Manager	AL OLAYA - Riyadh	1210	1123
0033331111	Abdullah ahmad	1989-07-23	20000.00	966544322344	M	abd1@gmail.com	76367326235	human resources administrator	AL AQIQ - Riyadh	1220	1126
0033334444	Maha salem	1999-11-04	10000.00	966543526794	F	mah1@gmail.com	47632987893	Financial Analyst	AL BALAD - Jeddah	1410	1121
0033335555	Maram ahmad	1993-11-04	70000.00	966521955544	F	mar@gmail.com	12345878653	Branch Manager	AL WAHAH - Riyadh	1240	0001
0033336666	Mariwa fahad	1993-11-04	70000.00	966521955544	F	mar@gmail.com	87254635975	Branch Manager	ASH SHULAH - DAMMAM	1320	0001
0033337777	Abdullah badr	1988-07-24	70000.00	966534255123	M	abd@gmail.com	87654798675	Branch Manager	AL MURUJ - Riyadh	1220	0001
0033339999	Maha aziz	1997-02-17	15000.00	966565355132	F	mah@gmail.com	82683637823	Security systems administrator	KING FAHAD - Dammam	1320	1122

NAME	Employee ID	DOB	Relationship	SEX
Dina	0044443333	2016-03-02	Child	F
Haifa	0022224444	2008-08-09	Child	F
Hessa	0022227777	1960-12-09	parent	F

NID	NAME	DOB	EMAIL	MOBILE	ADDRESS
1111222244	Ali Ahmed	2000-02-03	ali@gmail.com	966505433911	AL AZIZAIH - Jeddah
2222666655	Bader Turki	1999-06-08	bader@hotmail.com	966546775681	AL AZIZAIH - Dammam
3333888866	Hind Faleh	2001-10-23	hind@gmail.com	966564566488	ALFALAH - Jeddah
4444333322	Sara Abdullah	1997-01-05	sara@gmail.com	966503456741	ALMALQA - Riyadh

IBAN	Balance	Customer ID	STATUS	TYPE	BRANCH#
BA1123455751855443989473	10000	3333888866	ACTIVE	FIXED DEPOSITS	1420
BA2112223451877659053566	20000	9999111155	ACTIVE	INVESTMENT	1230
BA3234554343545832145676	70000	8888555533	ACTIVE	CURRENT	1330

LOAN#	BRANCH#	TYPE	Interest Rate	DATE	Customer ID	Amount	Paid Amount
1	1210	Personal Finance	0.10	2020-03-20	4444333322	500000.00	100000.00
2	1220	Personal Finance	0.30	2022-04-20	5555999944	70000.00	NULL
3	1230	Personal Finance	0.50	2021-09-20	9999111155	50000.00	15000.00
4	1240	Home Equity Loan	0.20	2019-01-10	6666222211	450000.00	200000.00

DEPARTMENT#	DEPARTMENT NAME	Manager ID
0001	HEADQUARTERS	0055555432
1121	Financial DEPARTMENT	0066669999
1122	IT DEPARTMENT	0044443333

BRANCH#	Manager ID	LOCATION
1210	0022224444	AL SAHAFA - Riyadh
1220	0033337777	IRQAH - Riyadh

DEPARTMENT#	BRANCH#
1121	1210
1122	1210
1123	1210

```
mysql> create view `branch employees` as
    -> select count(*) as `number of employees`, `branch`.`branch#`
    -> from employee, branch
    -> where  `branch`.`branch#`=`employee`.`branch#`
    -> group by `branch`.`branch#`;
Query OK, 0 rows affected (0.04 sec)

mysql> select * from `branch employees`;
+---------------------+---------+
| number of employees | branch# |
+---------------------+---------+
|                   6 | 1210    |
|                   2 | 1220    |
|                   3 | 1230    |
|                   3 | 1240    |
|                   3 | 1310    |
|                   2 | 1320    |
|                   1 | 1330    |
|                   3 | 1410    |
|                   4 | 1420    |
|                   1 | 1430    |
+---------------------+---------+
10 rows in set (0.01 sec)
```

- Operations

- Examples on:

- Insertion: new employee and new branch.

```
mysql> insert into `EMPLOYEE`
    -> values('2222222222' , 'Layla abdullah', '1999-09-27' ,
    -> '150000.00','966550173846' ,'F', 'lll456@gmail.com' , '66666666666' ,
    ->  'Actuary' , 'AL NADA - RIYADH'  ,'1420','1126');
Query OK, 1 row affected (0.01 sec)

mysql> insert into `BRANCH`
    -> values( '4444' ,  '0055554444' , 'AL SAHAFA - Riyadh');
Query OK, 1 row affected (0.01 sec)

mysql>
```

- Deletion: deleting a dependent and an employee.

```
mysql> delete from `DEPENDANT`
    -> where `Employee ID` = '0066668888' and `name` = 'Turki';
Query OK, 1 row affected (0.01 sec)
```

```
mysql> delete from `EMPLOYEE`
    -> where `NID` = '0044443333';
Query OK, 1 row affected (0.02 sec)

mysql> select * from department;
+-------------+----------------------+------------+
| DEPARTMENT# | DEPARTMENT NAME      | Manager ID |
+-------------+----------------------+------------+
| 0001        | HEADQUARTERS         | 0055555432 |
| 1121        | Financial DEPARTMENT | 0066669999 |
| 1122        | IT DEPARTMENT        | NULL       |
| 1123        | Retail Banking       | 0022227777 |
| 1124        | Insurance DEPARTMENT | 0066661111 |
| 1125        | Customer Service     | 0066665555 |
| 1126        | Human Resources      | 0066667777 |
+-------------+----------------------+------------+
7 rows in set (0.00 sec)
```

- Update: giving an employee a raise.

```
mysql> update `EMPLOYEE`
    -> set `Job Title` = 'IT manager'
    -> where `NID` = '0055554444';
Query OK, 1 row affected (0.01 sec)
Rows matched: 1  Changed: 1  Warnings: 0

mysql> update `EMPLOYEE`
    -> set `Department#` = '1122'
    -> where `NID` = '0055554444';
Query OK, 1 row affected (0.01 sec)
Rows matched: 1  Changed: 1  Warnings: 0

mysql> update `EMPLOYEE`
    -> set `SALARY` = '35000.00'
    -> where `NID` = '0055554444';
Query OK, 1 row affected (0.01 sec)
Rows matched: 1  Changed: 1  Warnings: 0

mysql> update `DEPARTMENT`
    -> set `MANAGER ID` = '0055554444'
    -> where `DEPARTMENT#` = '1122';
Query OK, 1 row affected (0.01 sec)
Rows matched: 1  Changed: 1  Warnings: 0
```

- Retrieval from one table: retrieving specific branch customers' information.

```
mysql> select `name`,`Customer ID`
    -> from `ACCOUNT`, `customer`
    -> where `Branch#` = '1320' and `NID`=`Customer ID`;
+----------+-------------+
| name     | Customer ID |
+----------+-------------+
| Ali Omar | 6666333377  |
+----------+-------------+
1 row in set (0.00 sec)

mysql> select `Customer ID`, `date` as `loan date`
    -> from `loan`
    -> where `interest rate` > 0.25;
+-------------+------------+
| Customer ID | loan date  |
+-------------+------------+
| 5555999944  | 2022-04-20 |
| 9999111155  | 2021-09-20 |
| 3333888866  | 2019-07-10 |
| 6666333377  | 2021-12-20 |
| 8888555533  | 2020-03-03 |
| 1111222244  | 2021-08-03 |
| 8888555533  | 2019-01-11 |
+-------------+------------+
7 rows in set (0.01 sec)
```

- Retrieval from more than two tables: retrieving employee's name, job title, debendant's name, relationship and department name that have the number 0001
- retrieving customer's ID and mobile, loan's amount and date and the branch location that gives a loan

```
mysql> select `EMPLOYEE`.`NAME`, `Job Title`, `DEPENDANT`.`NAME` as `dependant name`, `Relationship`, `Department Name`
    -> from ((`EMPLOYEE` join `DEPENDANT` on `NID` = `Employee ID` )
    -> join `DEPARTMENT` on `DEPARTMENT`.`Department#` = `EMPLOYEE`.`Department#` and `DEPARTMENT`.`Department#` = '0001' );
+----------------+----------------+----------------+--------------+-----------------+
| NAME           | Job Title      | dependant name | Relationship | Department Name |
+----------------+----------------+----------------+--------------+-----------------+
| Mohammed khalid | Branch Manager | Haifa          | Child        | HEADQUARTERS    |
| Norah turki    | IT manager     | Rami           | spouse       | HEADQUARTERS    |
| Mohammed khalid | Branch Manager | Saad           | Child        | HEADQUARTERS    |
+----------------+----------------+----------------+--------------+-----------------+
3 rows in set (0.01 sec)
```

```
mysql> select `loan`.`CUSTOMER ID`, `AMOUNT` as `loan amount`, `DATE` as `loan date`, `LOCATION` as `branch location` , `MOBILE`
    -> from ((`CUSTOMER` join `LOAN` on `NID` = `loan`.`CUSTOMER ID`)
    -> join `BRANCH` on `LOAN`.`Branch#` = `branch`.`Branch#`) ;
+-------------+-------------+------------+--------------------+--------------+
| CUSTOMER ID | loan amount | loan date  | branch location    | MOBILE       |
+-------------+-------------+------------+--------------------+--------------+
| 4444333322  |   500000.00 | 2020-03-20 | AL SAHAFA - Riyadh | 966503456741 |
| 1111222244  |    50000.00 | 2020-01-15 | AL SAHAFA - Riyadh | 966505433911 |
| 5555999944  |    70000.00 | 2022-04-20 | IRQAH - Riyadh     | 966523455911 |
| 9999111155  |    50000.00 | 2021-09-20 | AR RABWAH - Riyadh | 966502345678 |
| 6666222211  |   450000.00 | 2019-01-10 | AS SUWAIDI - Riyadh | 966505433556 |
| 3333888866  |   100000.00 | 2019-07-10 | AL MANAR - DAMMAM  | 966564566488 |
| 6666333377  |   200000.00 | 2021-12-20 | AL MANAR - DAMMAM  | 966505434567 |
| 8888555533  |   100000.00 | 2019-01-11 | AL MANAR - DAMMAM  | 966505123474 |
| 8888555533  |    50000.00 | 2020-03-03 | AN NADA - DAMMAM   | 966505123474 |
| 1111222244  |    70000.00 | 2021-08-03 | AL SAFA - JEDDAH   | 966505433911 |
| 3333888866  |    15000.00 | 2021-06-08 | AL THAGAR - JEDDAH | 966564566488 |
| 7777888811  |   500000.00 | 2018-03-20 | AN NASEEM - JEDDAH | 966500273498 |
+-------------+-------------+------------+--------------------+--------------+
12 rows in set (0.01 sec)
```

Data on tables before selected-users' queries:

```
mysql>  select `Reference#`, `time stamp`, `type`, `currency`, `amount`, `sender IBAN`, `comments` from `transaction`;
+------------+--------------------+-------------------+----------+----------+-------------------------+----------------+
| Reference# | time stamp         | type              | currency | amount   | sender IBAN             | comments       |
+------------+--------------------+-------------------+----------+----------+-------------------------+----------------+
|          1 | 2021-08-09 13:57:40 | withdrawal        | SAR      |  1200.00 | SA3782224631005321655489 | NULL           |
|          2 | 2022-01-04 11:36:10 | deposits          | SAR      |   700.00 | SA3782212367758321231579 | salary         |
|          3 | 2021-08-10 12:13:44 | transfer          | JPY      | 50000.00 | SA8834324667885439202466 | eidia          |
|          4 | 2022-02-11 11:20:40 | online payment    | USD      |  1000.00 | SA3234554343545832145676 | online shpping |
|          5 | 2022-03-09 10:50:41 | debit card charges | SAR      |  5000.00 | SA6632146660573218888485 | NULL           |
+------------+--------------------+-------------------+----------+----------+-------------------------+----------------+
5 rows in set (0.00 sec)
```

```
Database changed
mysql> select * from `CUSTOMER`;
+------------+---------------+------------+-------------------+--------------+----------------------+
| NID        | NAME          | DOB        | EMAIL             | MOBILE       | ADDRESS              |
+------------+---------------+------------+-------------------+--------------+----------------------+
| 1111222244 | Ali Ahmed     | 2000-02-03 | ali@gmail.com     | 966505433911 | AL AZIZAIH - Jeddah  |
| 2222666655 | Bader Turki   | 1999-06-08 | bader@hotmail.com | 966546775681 | AL AZIZAIH - Dammam  |
| 3333888866 | Hind Faleh    | 2001-10-23 | hind@gmail.com    | 966564566488 |  ALFALAH - Jeddah    |
| 4444333322 | Sara Abdullah | 1997-01-05 | sara@gmail.com    | 966503456741 | ALMALQA - Riyadh     |
| 5555999944 | Ahmed Fahad   | 1991-11-02 | ahmad@yahoo.com   | 966523455911 | AN NADA - Riyadh     |
| 6666222211 | Rand Ali      | 1991-04-13 | rand@hotmail.com  | 966505433556 | AL OLAYA - Riyadh    |
| 6666333377 | Ali Omar      | 1981-09-04 | aliq@hotmail.com  | 966505434567 | AL FAISALIH - Dammam |
| 7777888811 | Norah Fahad   | 2002-07-08 | norah@yahoo.com   | 966503456789 | AL BALAD - Jeddah    |
| 8888555533 | Khalid Saad   | 1995-02-17 | khalid@gmail.com  | 966505123474 | AL MANAR - Dammam    |
| 9999111155 | Asma Salem    | 2000-03-03 | asma@gmail.com    | 966502345678 | ALAQIQ - Riyadh      |
+------------+---------------+------------+-------------------+--------------+----------------------+
10 rows in set (0.00 sec)

mysql> select * from `BRANCH`;
+---------+------------+------------------------+
| BRANCH# | Manager ID | LOCATION               |
+---------+------------+------------------------+
| 1210    | 0022224444 | AL SAHAFA - Riyadh     |
| 1220    | 0033337777 | IRQAH - Riyadh         |
| 1230    | 0055554444 | AR RABWAH - Riyadh     |
| 1240    | 0033335555 | AS SUWAIDI - Riyadh    |
| 1310    | 0066664444 | AL FAISALIYAH - DAMMAM |
| 1320    | 0033336666 | AL MANAR - DAMMAM      |
| 1330    | 0066668888 | AN NADA - DAMMAM       |
| 1410    | 0055552222 | AL SAFA - JEDDAH       |
| 1420    | 0099997777 | AL THAGAR - JEDDAH     |
| 1430    | 0022226666 | AN NASEEM - JEDDAH     |
+---------+------------+------------------------+
10 rows in set (0.00 sec)

mysql> select * from `DEPARTMENT`;
+-------------+---------------------+------------+
| DEPARTMENT# | DEPARTMENT NAME     | Manager ID |
+-------------+---------------------+------------+
| 0001        | HEADQUARTERS        | 0055555432 |
| 1121        | Financial DEPARTMENT | 0066669999 |
| 1122        | IT DEPARTMENT       | 0044443333 |
| 1123        | Retail Banking      | 0022227777 |
| 1124        | Insurance DEPARTMENT | 0066661111 |
| 1125        | Customer Service    | 0066665555 |
| 1126        | Human Resources     | 0066667777 |
+-------------+---------------------+------------+
7 rows in set (0.00 sec)
```

```
mysql> select * from `ACCOUNT`;
+---------------------------+---------+-------------+----------+----------------+---------+
| IBAN                      | Balance | Customer ID | STATUS   | TYPE           | BRANCH# |
+---------------------------+---------+-------------+----------+----------------+---------+
| SA1123455751855443989473  |   10000 | 3333888866  | ACTIVE   | FIXED DEPOSITS | 1420    |
| SA2112223451877659053566  |   20000 | 9999111155  | ACTIVE   | INVESTMENT     | 1230    |
| SA3234554343545832145676  |   70000 | 8888555533  | ACTIVE   | CURRENT        | 1330    |
| SA3782212367758321231579  |  100000 | 5555999944  | ACTIVE   | CURRENT        | 1220    |
| SA3782224631005321655489  | 1000000 | 4444333322  | ACTIVE   | SAVING         | 1210    |
| SA4365007753545000065353  |   60000 | 4444333322  | INACTIVE | FIXED DEPOSITS | 1210    |
| SA4432876888847783345855  |    3000 | 7777888811  | ACTIVE   | INVESTMENT     | 1430    |
| SA5367548431015458765327  |   50000 | 6666222211  | ACTIVE   | FIXED DEPOSITS | 1240    |
| SA5432267431012468655487  |  120000 | 2222666655  | ACTIVE   | SAVING         | 1310    |
| SA6632146660573218888485  |  500000 | 1111222244  | ACTIVE   | SAVING         | 1410    |
| SA8834324667655388566225  |    2000 | 6666333377  | INACTIVE | INVESTMENT     | 1320    |
| SA8834324667885439202466  |   40000 | 5555999944  | ACTIVE   | CURRENT        | NULL    |
+---------------------------+---------+-------------+----------+----------------+---------+
12 rows in set (0.00 sec)

mysql> select * from `CARD`;
+------------------+---------------------------+-----------------+-----+----------+
| CARD#            | IBAN                      | Expiration Date | CVV | TYPE     |
+------------------+---------------------------+-----------------+-----+----------+
| 1245434124527657 | SA4365007753545000065353  | 2022-11-08      | 875 | TRAVELER |
| 1742450054231686 | SA6632146660573218888485  | 2022-07-20      | 762 | CREDIT   |
| 2786650764435305 | SA4432876888847783345855  | 2022-12-01      | 697 | DEPIT    |
| 3300065455753279 | SA1123455751855443989473  | 2023-07-22      | 196 | TRAVELER |
| 3742454553400126 | SA3782224631005321655489  | 2024-07-08      | 272 | CREDIT   |
| 4917484589875443 | SA5367548431015458765327  | 2024-03-20      | 773 | DEPIT    |
| 5200533989552126 | SA2112223451877659053566  | 2023-01-18      | 112 | CREDIT   |
| 6453275539813478 | SA8834324667655388566225  | 2023-05-08      | 842 | PREPAID  |
| 6643454594320129 | SA5432267431012468655487  | 2023-04-02      | 333 | CREDIT   |
| 6744345512345328 | SA3234554343545832145676  | 2024-11-03      | 896 | DEPIT    |
| 6744345553754432 | SA3782212367758321231579  | 2024-10-08      | 854 | DEPIT    |
| 7864755238133423 | SA8834324667885439202466  | 2023-06-11      | 122 | PREPAID  |
+------------------+---------------------------+-----------------+-----+----------+
12 rows in set (0.00 sec)
```

```
mysql> select * from `LOAN`;
+-------+---------+--------------------+---------------+------------+-------------+-----------+-------------+
| LOAN# | BRANCH# | TYPE               | Interest Rate | DATE       | Customer ID | Amount    | Paid Amount |
+-------+---------+--------------------+---------------+------------+-------------+-----------+-------------+
|     1 | 1210    | Personal  Finance  |          0.10 | 2020-03-20 | 4444333322  | 500000.00 |   100000.00 |
|     2 | 1220    | Personal  Finance  |          0.30 | 2022-04-20 | 5555999944  |  70000.00 |        0.00 |
|     3 | 1230    | Personal  Finance  |          0.50 | 2021-09-20 | 9999111155  |  50000.00 |    15000.00 |
|     4 | 1240    | Home Equity Loan   |          0.20 | 2019-01-10 | 6666222211  | 450000.00 |   252347.50 |
|     5 | 1310    | Home Equity Loan   |          0.20 | 2019-01-10 | 2222666655  | 600000.00 |   600000.00 |
|     6 | 1320    | Mortgage Loan      |          0.40 | 2019-07-10 | 3333888866  | 100000.00 |       50.00 |
|     7 | 1320    | Small Business Loan |         0.65 | 2021-12-20 | 6666333377  | 200000.00 |    50000.00 |
|     8 | 1330    | Car Loan           |          0.30 | 2020-03-03 | 8888555533  |  50000.00 |    15000.00 |
|     9 | 1410    | Car Loan           |          0.30 | 2021-08-03 | 1111222244  |  70000.00 |        0.00 |
|    10 | 1420    | Benevolent Loan    |          0.00 | 2021-06-08 | 3333888866  |  15000.00 |     9300.00 |
|    11 | 1320    | Refinance          |          0.75 | 2019-01-11 | 8888555533  | 100000.00 |        0.00 |
|    12 | 1430    | Real Estate Loan   |          0.25 | 2018-03-20 | 7777888811  | 500000.00 |   252650.00 |
+-------+---------+--------------------+---------------+------------+-------------+-----------+-------------+
12 rows in set (0.00 sec)
```

```
mysql>
mysql> select `name`, `nid`, `DOB`, `salary`, `mobile`, `job title` from `employee`;
+------------------+------------+------------+-----------+--------------+--------------------------------+
| name             | nid        | DOB        | salary    | mobile       | job title                      |
+------------------+------------+------------+-----------+--------------+--------------------------------+
| Sami ali         | 0022221111 | 1997-10-02 |  20000.00 | 966537654532 | Accountant                     |
| Mohammed khalid  | 0022224444 | 1981-03-20 |  70000.00 | 966559951555 | Branch Manager                 |
| Badr kareem      | 0022226666 | 1990-03-21 |  70000.00 | 966565466532 | Branch Manager                 |
| Hamad abdullah   | 0022227777 | 1991-06-23 |  50000.00 | 966597765649 | Retail Banking Manager         |
| Abdullah ahmad   | 0033331111 | 1989-07-23 |  20000.00 | 966544322344 | human resources administrator  |
| Maha salem       | 0033334444 | 1999-11-04 |  10000.00 | 966543526794 | Financial Analyst              |
| Maram ahmad      | 0033335555 | 1993-11-04 |  70000.00 | 966521955544 | Branch Manager                 |
| Marwa fahad      | 0033336666 | 1993-11-04 |  70000.00 | 966521955544 | Branch Manager                 |
| Abdullah badr    | 0033337777 | 1988-07-24 |  70000.00 | 966534255123 | Branch Manager                 |
| Maha aziz        | 0033339999 | 1997-02-17 |  15000.00 | 966565355132 | Security systems administrator |
| Turki yasir      | 0044441111 | 1991-02-24 |  20000.00 | 966556797569 | Accountant                     |
| Mishal ahmad     | 0044443333 | 1998-04-24 |  50000.00 | 966756565798 | IT Manager                     |
| Shahad abdullah  | 0055551111 | 1998-03-23 |  10000.00 | 966534663732 | Customer service representative |
| Mohammed tariq   | 0055552222 | 1994-02-22 |  70000.00 | 966653676555 | Branch Manager                 |
| Norah turki      | 0055554444 | 1992-12-12 |  70000.00 | 966533258532 | Branch Manager                 |
| fatimah abdullah | 0055555432 | 1995-09-23 | 100000.00 | 966523463342 | CEO                            |
| Talal muhammad   | 0066661111 | 1999-02-28 |  50000.00 | 966598867699 | Insurance Manager              |
| Mohanad fares    | 0066664444 | 1991-06-22 |  70000.00 | 966559951555 | Branch Manager                 |
| Yaser faisal     | 0066665555 | 1981-02-07 |  50000.00 | 966535678999 | Customer Service Manager       |
| Hind adbulrahman | 0066667777 | 1994-05-24 |  50000.00 | 966556565854 | Human Resources Manager        |
| Fahad abdullah   | 0066668888 | 1989-03-11 |  70000.00 | 966534255532 | Branch Manager                 |
| Turki khalaf     | 0066669999 | 1991-02-24 |  50000.00 | 966577776454 | Financial Manager              |
| Fahad fares      | 0077772222 | 1992-11-10 |  20000.00 | 966535225762 | Database administrator         |
| Noha khalid      | 0077774444 | 1994-10-12 |  10000.00 | 966533887557 | human resources administrator  |
| Saad muhammad    | 0088881111 | 1999-08-12 |  15000.00 | 966532115532 | Customer service representative |
| Mazen rashed     | 0099991111 | 1994-05-18 |  20000.00 | 966599255232 | IT support specialist          |
| Danah tariq      | 0099995555 | 1996-01-01 |  15000.00 | 966531243432 | Actuary                        |
| Sara shareef     | 0099997777 | 1993-10-04 |  70000.00 | 966521865589 | Branch Manager                 |
| Fahad muhamad    | 0099998888 | 1989-03-15 |  10000.00 | 966554378732 | Finance Assistant              |
+------------------+------------+------------+-----------+--------------+--------------------------------+
29 rows in set (0.00 sec)
```

Data on tables after selected-users' queries:

```
mysql> select name, nid, DOB, salary, mobile, `job title` from employee;
+------------------+------------+------------+-----------+--------------+-------------------------------+
| name             | nid        | DOB        | salary    | mobile       | job title                     |
+------------------+------------+------------+-----------+--------------+-------------------------------+
| Sami ali         | 0022221111 | 1997-10-02 |  20000.00 | 966537654532 | Accountant                    |
| Mohammed khalid  | 0022224444 | 1981-03-20 |  70000.00 | 966559951555 | Branch Manager                |
| Badr kareem      | 0022226666 | 1990-03-21 |  70000.00 | 966565466532 | Branch Manager                |
| Hamad abdullah   | 0022227777 | 1991-06-23 |  50000.00 | 966597765649 | Retail Banking Manager        |
| Abdullah ahmad   | 0033331111 | 1989-07-23 |  20000.00 | 966544322344 | human resources administrator |
| Maha salem       | 0033334444 | 1999-11-04 |  10000.00 | 966543526794 | Financial Analyst             |
| Maram ahmad      | 0033335555 | 1993-11-04 |  70000.00 | 966521955544 | Branch Manager                |
| Marwa fahad      | 0033336666 | 1993-11-04 |  70000.00 | 966521955544 | Branch Manager                |
| Abdullah badr    | 0033337777 | 1988-07-24 |  70000.00 | 966534255123 | Branch Manager                |
| Maha aziz        | 0033339999 | 1997-02-17 |  15000.00 | 966565355132 | Security systems administrator |
| Turki yasir      | 0044441111 | 1991-02-24 |  20000.00 | 966556797569 | Accountant                    |
| Shahad abdullah  | 0055551111 | 1998-03-23 |  10000.00 | 966534663732 | Customer service representative |
| Mohammed tariq   | 0055552222 | 1994-02-22 |  70000.00 | 966653676555 | Branch Manager                |
| Norah turki      | 0055554444 | 1992-12-12 |  35000.00 | 966533258532 | IT manager                    |
| fatimah abdullah | 0055555432 | 1995-09-23 | 100000.00 | 966523463342 | CEO                           |
| Talal muhammad   | 0066661111 | 1999-02-28 |  50000.00 | 966598867699 | Insurance Manager             |
| Mohanad fares    | 0066664444 | 1991-06-22 |  70000.00 | 966559951555 | Branch Manager                |
| Yaser faisal     | 0066665555 | 1981-02-07 |  50000.00 | 966535678999 | Customer Service Manager      |
| Hind adbulrahman | 0066667777 | 1994-05-24 |  50000.00 | 966556565854 | Human Resources Manager       |
| Fahad abdullah   | 0066668888 | 1989-03-11 |  70000.00 | 966534255532 | Branch Manager                |
| Turki khalaf     | 0066669999 | 1991-02-24 |  50000.00 | 966577776454 | Financial Manager             |
| Fahad fares      | 0077772222 | 1992-11-10 |  20000.00 | 966535225762 | Database administrator        |
| Noha khalid      | 0077774444 | 1994-10-12 |  10000.00 | 966533887557 | human resources administrator |
| Saad muhammad    | 0088881111 | 1999-08-12 |  15000.00 | 966532115532 | Customer service representative |
| Mazen rashed     | 0099991111 | 1994-05-18 |  20000.00 | 966599255232 | IT support specialist         |
| Danah tariq      | 0099995555 | 1996-01-01 |  15000.00 | 966531243432 | Actuary                       |
| Sara shareef     | 0099997777 | 1993-10-04 |  70000.00 | 966521865589 | Branch Manager                |
| Fahad muhamad    | 0099998888 | 1989-03-15 |  10000.00 | 966554378732 | Finance Assistant             |
| Layla abdullah   | 2222222222 | 1999-09-27 | 150000.00 | 966550173846 | Actuary                       |
+------------------+------------+------------+-----------+--------------+-------------------------------+
29 rows in set (0.00 sec)
```

```
Database changed
mysql>  select `Reference#`, `time stamp`, `type`, `currency`, `amount`, `sender IBAN`, `comments` from `transaction`;
+------------+---------------------+--------------------+----------+----------+--------------------------+----------------+
| Reference# | time stamp          | type               | currency | amount   | sender IBAN              | comments       |
+------------+---------------------+--------------------+----------+----------+--------------------------+----------------+
|          1 | 2021-08-09 13:57:40 | withdrawal         | SAR      |  1200.00 | SA3782224631005321655489 | NULL           |
|          2 | 2022-01-04 11:36:10 | deposits           | SAR      |   700.00 | SA3782212367758321231579 | salary         |
|          3 | 2021-08-10 12:13:44 | transfer           | JPY      | 50000.00 | SA8834324667885439202466 | eidia          |
|          4 | 2022-02-11 11:20:40 | online payment     | USD      |  1000.00 | SA3234554343545832145676 | online shpping |
|          5 | 2022-03-09 10:50:41 | debit card charges | SAR      |  5000.00 | SA6632146660573218888485 | NULL           |
+------------+---------------------+--------------------+----------+----------+--------------------------+----------------+
5 rows in set (0.00 sec)

mysql> use bank
Database changed
mysql> select * from `CUSTOMER`;
+------------+---------------+------------+-------------------+--------------+---------------------+
| NID        | NAME          | DOB        | EMAIL             | MOBILE       | ADDRESS             |
+------------+---------------+------------+-------------------+--------------+---------------------+
| 1111222244 | Ali Ahmed     | 2000-02-03 | ali@gmail.com     | 966505433911 | AL AZIZAIH - Jeddah |
| 1234567890 | Nasser Ali    | 2000-02-02 | Ali@gmail.com     | 966501234567 | AlOlya - Riyadh     |
| 2222666655 | Bader Turki   | 1999-06-08 | bader@hotmail.com | 966546775681 | AL AZIZAIH - Dammam |
| 3333888866 | Hind Faleh    | 2001-10-23 | hind@gmail.com    | 966564566488 |  ALFALAH - Jeddah   |
| 4444333322 | Sara Abdullah | 1997-01-05 | sara@gmail.com    | 966503456741 | ALMALQA - Riyadh    |
| 5555999944 | Ahmed Fahad   | 1991-11-02 | ahmad@yahoo.com   | 966523455911 | AN NADA - Riyadh    |
| 6666222211 | Rand Ali      | 1991-04-13 | rand@hotmail.com  | 966505433556 | AL OLAYA - Riyadh   |
| 6666333377 | Ali Omar      | 1981-09-04 | aliq@hotmail.com  | 966505434567 | AL FAISALIH - Dammam |
| 7777888811 | Norah Fahad   | 2002-07-08 | norah@yahoo.com   | 966500273498 | AL SAHAFA - Riyadh  |
| 8888555533 | Khalid Saad   | 1995-02-17 | khalid@gmail.com  | 966505123474 | AL MANAR - Dammam   |
| 9999111155 | Asma Salem    | 2000-03-03 | asma@gmail.com    | 966502345678 | ALAQIQ - Riyadh     |
+------------+---------------+------------+-------------------+--------------+---------------------+
11 rows in set (0.00 sec)

mysql> select * from `BRANCH`;
+---------+------------+-----------------------+
| BRANCH# | Manager ID | LOCATION              |
+---------+------------+-----------------------+
| 1210    | 0022224444 | AL SAHAFA - Riyadh    |
| 1220    | 0033337777 | IRQAH - Riyadh        |
| 1230    | 0055554444 | AR RABWAH - Riyadh    |
| 1240    | 0033335555 | AS SUWAIDI - Riyadh   |
| 1310    | 0066664444 | AL FAISALIYAH - DAMMAM |
| 1320    | 0033336666 | AL MANAR - DAMMAM     |
| 1330    | 0066668888 | AN NADA - DAMMAM      |
| 1410    | 0055552222 | AL SAFA - JEDDAH      |
| 1420    | 0099997777 | AL THAGAR - JEDDAH    |
| 1430    | 0022226666 | AN NASEEM - JEDDAH    |
| 4444    | 0055554444 | AL SAHAFA - Riyadh    |
+---------+------------+-----------------------+
11 rows in set (0.00 sec)
```

```
mysql> select * from `DEPARTMENT`;
+-------------+----------------------+------------+
| DEPARTMENT# | DEPARTMENT NAME      | Manager ID |
+-------------+----------------------+------------+
| 0001        | HEADQUARTERS         | 0055555432 |
| 1121        | Financial DEPARTMENT | 0066669999 |
| 1122        | IT DEPARTMENT        | 0055554444 |
| 1123        | Retail Banking       | 0022227777 |
| 1124        | Insurance DEPARTMENT | 0066661111 |
| 1125        | Customer Service     | 0066665555 |
| 1126        | Human Resources      | 0066667777 |
+-------------+----------------------+------------+
7 rows in set (0.00 sec)

mysql> select * from `ACCOUNT`;
+---------------------------+---------+-------------+----------+----------------+---------+
| IBAN                      | Balance | Customer ID | STATUS   | TYPE           | BRANCH# |
+---------------------------+---------+-------------+----------+----------------+---------+
| SA1123455751855443989473  |   10000 | 3333888866  | ACTIVE   | FIXED DEPOSITS | 1420    |
| SA2112223451877659053566  |   20000 | 9999111155  | ACTIVE   | INVESTMENT     | 1230    |
| SA3782212367758321231579  |  100000 | 5555999944  | ACTIVE   | CURRENT        | 1220    |
| SA3782224631005321655489  | 1000000 | 4444333322  | ACTIVE   | SAVING         | 1210    |
| SA4365007753545000065353  |   60000 | 4444333322  | INACTIVE | FIXED DEPOSITS | 1210    |
| SA4432876888847783345855  |    3000 | 7777888811  | INACTIVE | INVESTMENT     | 1430    |
| SA5367548431015458765327  |   50000 | 6666222211  | ACTIVE   | FIXED DEPOSITS | 1240    |
| SA6632146660573218888485  |  500000 | 1111222244  | ACTIVE   | SAVING         | 1410    |
| SA8834324667655388566225  |    2000 | 6666333377  | INACTIVE | INVESTMENT     | 1320    |
| SA8834324667885439202466  |   40000 | 5555999944  | ACTIVE   | CURRENT        | NULL    |
+---------------------------+---------+-------------+----------+----------------+---------+
10 rows in set (0.00 sec)

mysql> select * from `CARD`;
+------------------+---------------------------+-----------------+-----+----------+
| CARD#            | IBAN                      | Expiration Date | CVV | TYPE     |
+------------------+---------------------------+-----------------+-----+----------+
| 1245434124527657 | SA4365007753545000065353  | 2022-11-08      | 875 | TRAVELER |
| 1742450054231686 | SA6632146660573218888485  | 2022-07-20      | 762 | CREDIT   |
| 3300065455753279 | SA1123455751855443989473  | 2023-07-22      | 196 | TRAVELER |
| 3742454553400126 | SA3782224631005321655489  | 2024-07-08      | 272 | CREDIT   |
| 3745637213400126 | SA3782224631005321655489  | 2026-01-08      | 101 | DEPIT    |
| 4917484589875443 | SA5367548431015458765327  | 2024-03-20      | 773 | DEPIT    |
| 5200533989552126 | SA2112223451877659053566  | 2023-01-18      | 112 | CREDIT   |
| 6453275539813478 | SA8834324667655388566225  | 2023-05-08      | 842 | PREPAID  |
| 6643454594320129 | SA5432267431012468655487  | 2023-04-02      | 333 | CREDIT   |
| 6744345512345328 | SA3234554343545832145676  | 2024-11-03      | 896 | DEPIT    |
| 6744345553754432 | SA3782212367758321231579  | 2024-10-08      | 854 | DEPIT    |
| 7864755238133423 | SA8834324667885439202466  | 2023-06-11      | 122 | PREPAID  |
+------------------+---------------------------+-----------------+-----+----------+
12 rows in set (0.00 sec)
```

```
mysql> select * from `DEPENDANT`;
+-------+-------------+------------+--------------+------+
| NAME  | Employee ID | DOB        | Relationship | SEX  |
+-------+-------------+------------+--------------+------+
| Haifa | 0022224444  | 2008-08-09 | Child        | F    |
| Hessa | 0022227777  | 1960-12-09 | parent       | F    |
| Norah | 0066665555  | 1970-11-09 | spouse       | F    |
| Nuha  | 0066661111  | 1970-11-09 | parent       | F    |
| Omar  | 0099995555  | 1970-11-09 | parent       | M    |
| Rami  | 0055554444  | 1987-08-09 | spouse       | M    |
| Saad  | 0022224444  | 2010-03-09 | Child        | M    |
| Sara  | 0066667777  | 1985-02-09 | spouse       | F    |
+-------+-------------+------------+--------------+------+
8 rows in set (0.00 sec)

mysql> select * from `LOAN`;
+-------+---------+--------------------+---------------+------------+-------------+-----------+-------------+
| LOAN# | BRANCH# | TYPE               | Interest Rate | DATE       | Customer ID | Amount    | Paid Amount |
+-------+---------+--------------------+---------------+------------+-------------+-----------+-------------+
|     1 | 1210    | Personal  Finance  |          0.10 | 2020-03-20 | 4444333322  | 500000.00 |   100000.00 |
|     2 | 1220    | Personal  Finance  |          0.30 | 2022-04-20 | 5555999944  |  70000.00 |     6000.00 |
|     3 | 1230    | Personal  Finance  |          0.50 | 2021-09-20 | 9999111155  |  50000.00 |    15000.00 |
|     4 | 1240    | Home Equity Loan   |          0.20 | 2019-01-10 | 6666222211  | 450000.00 |   252347.50 |
|     6 | 1320    | Mortgage Loan      |          0.40 | 2019-07-10 | 3333888866  | 100000.00 |       50.00 |
|     7 | 1320    | Small Business Loan |         0.65 | 2021-12-20 | 6666333377  | 200000.00 |    50000.00 |
|     8 | 1330    | Car Loan           |          0.30 | 2020-03-03 | 8888555533  |  50000.00 |    15000.00 |
|     9 | 1410    | Car Loan           |          0.30 | 2021-08-03 | 1111222244  |  70000.00 |        0.00 |
|    10 | 1420    | Benevolent Loan    |          0.00 | 2021-06-08 | 3333888866  |  15000.00 |     9300.00 |
|    11 | 1320    | Refinance          |          0.75 | 2019-01-11 | 8888555533  | 100000.00 |        0.00 |
|    12 | 1430    | Real Estate Loan   |          0.25 | 2018-03-20 | 7777888811  | 500000.00 |   252650.00 |
|    13 | 1210    | Car Loan           |          0.25 | 2020-01-15 | 1111222244  |  50000.00 |    10000.00 |
+-------+---------+--------------------+---------------+------------+-------------+-----------+-------------+
12 rows in set (0.00 sec)
```

6- UI Implementation

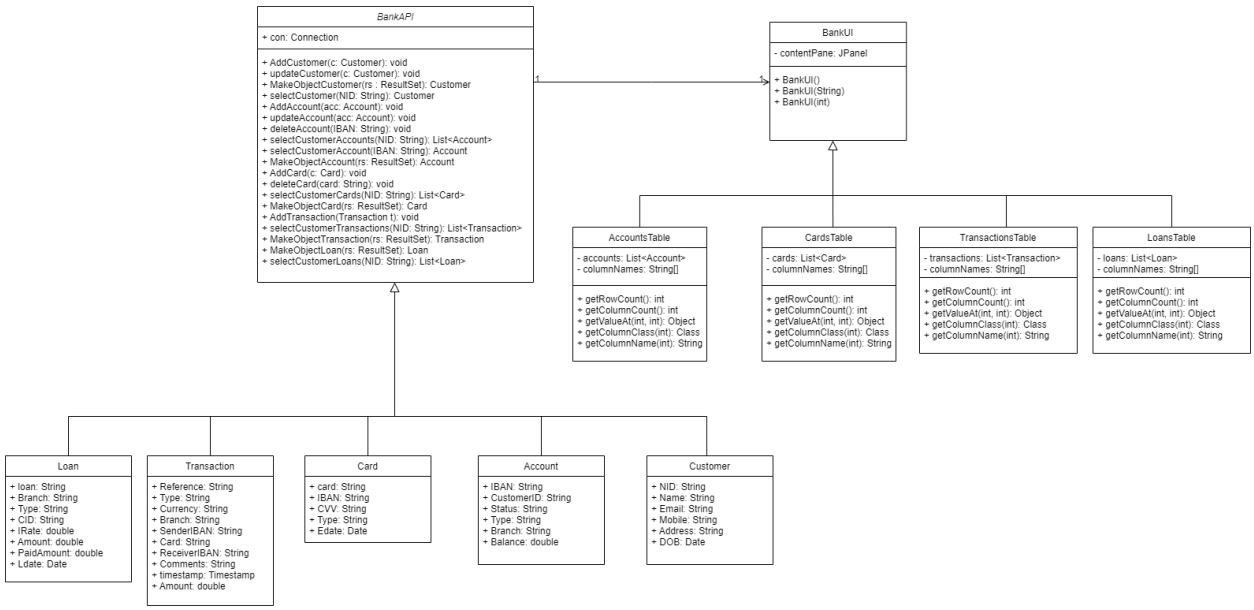
- **programing language used: JAVA**

  - **Connection Code**:

```
try {
    con = DriverManager.getConnection("jdbc:mysql://localhost:3306/bank", "root", "1234");
}
catch (SQLException e) {
      e.printStackTrace();
}
```

  - **Graphical User Interface:**

  - Bank Program Class Diagram:



  - **BankAPI class:**

    -this class was created to connect and contact with the database, we wrote all queries needed, and made the connection using java.sql library.

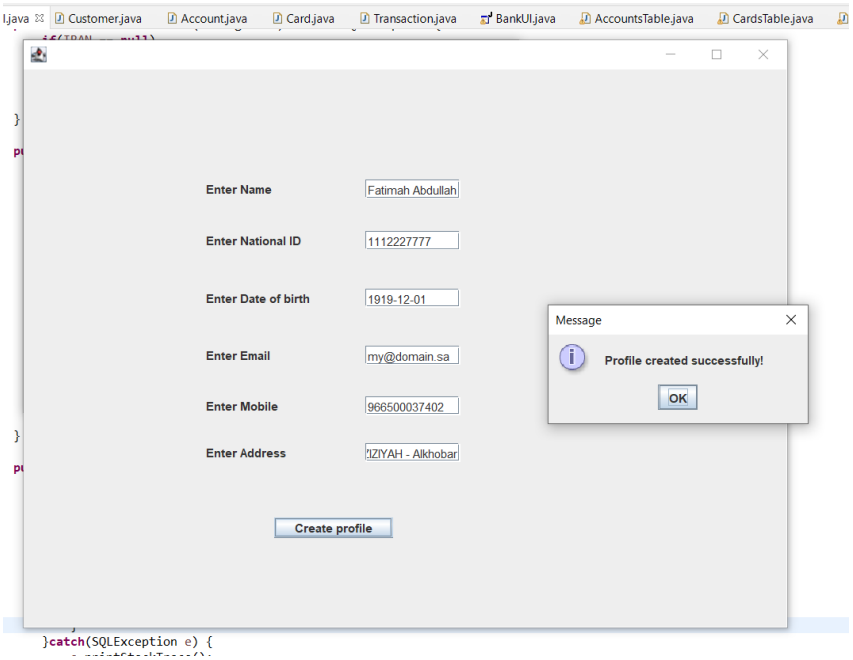
    BankUI class

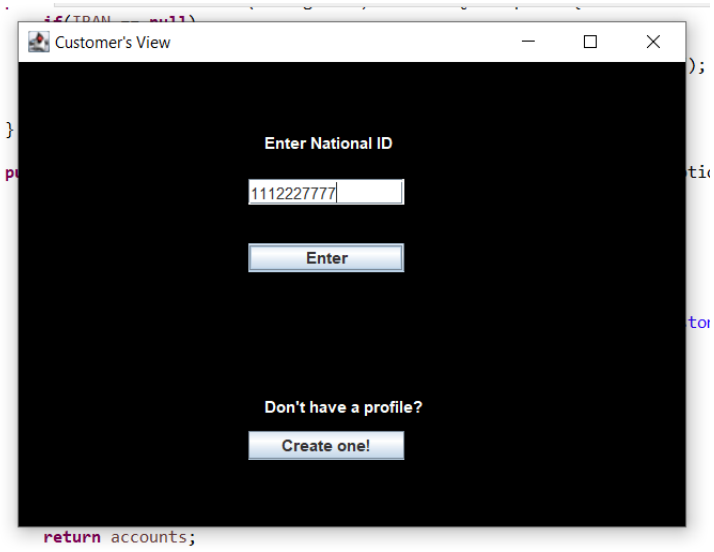
    -this class was created to make the program's user interface.

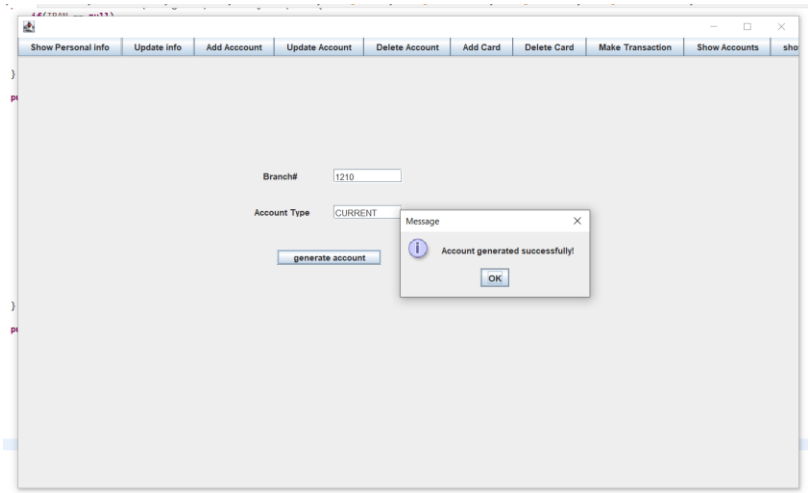
- **User: Customer:**

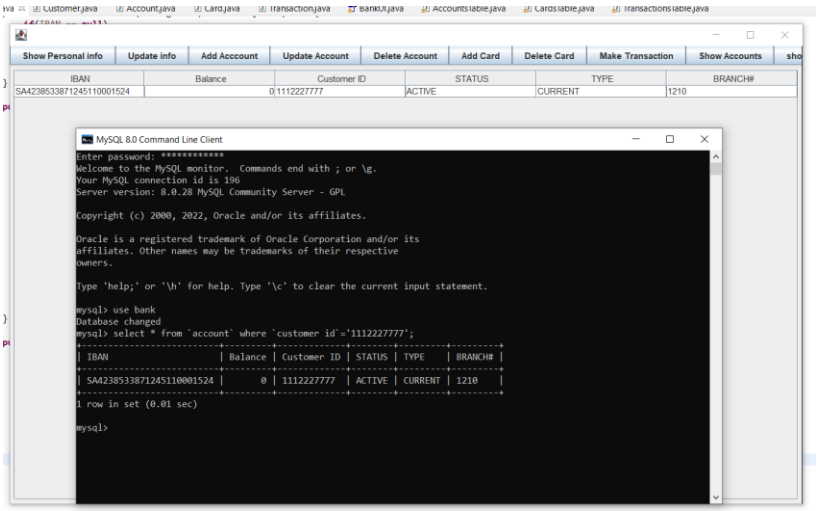
1- Insert:

-creating a profile and a bank account:



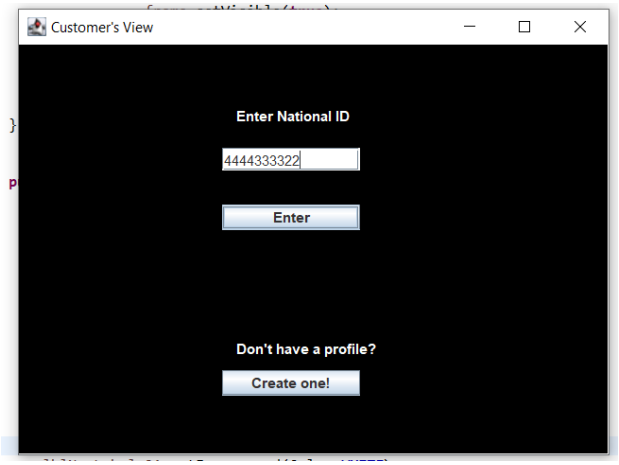


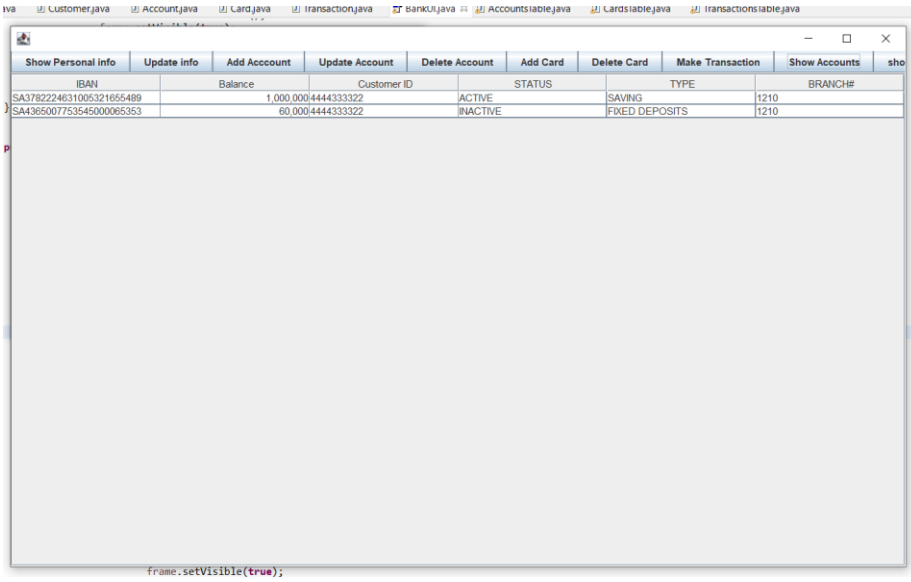


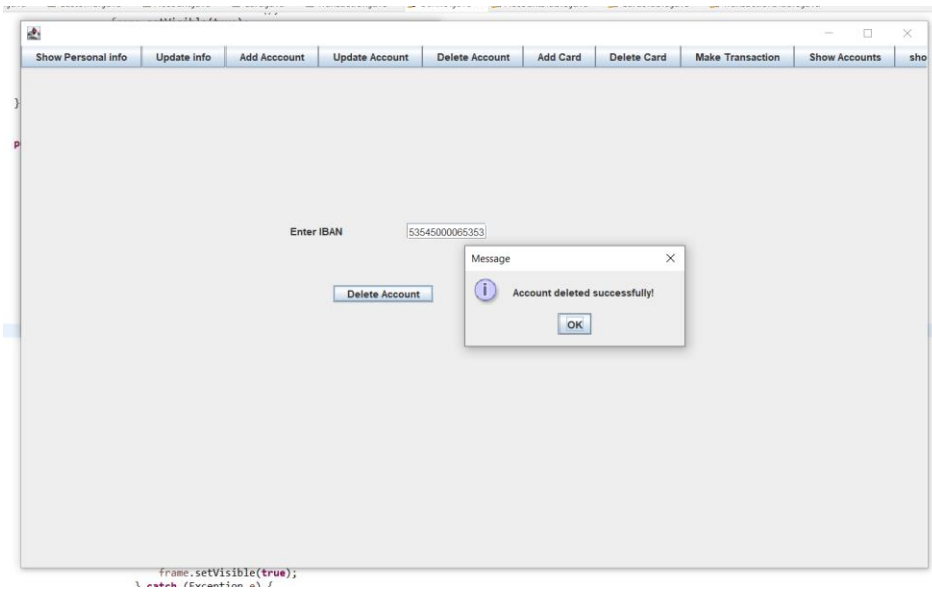


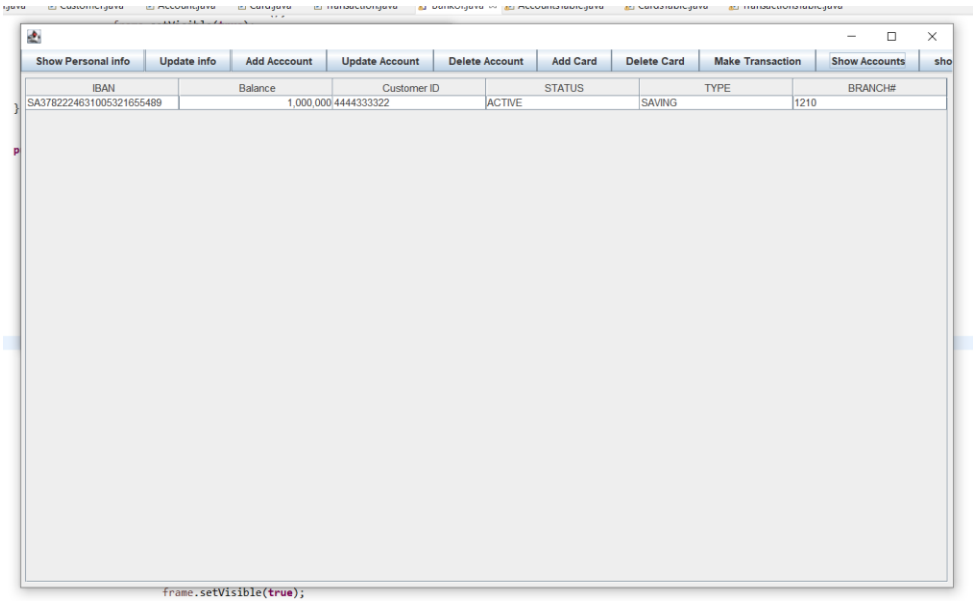
2- Delete:

-deleting an account:

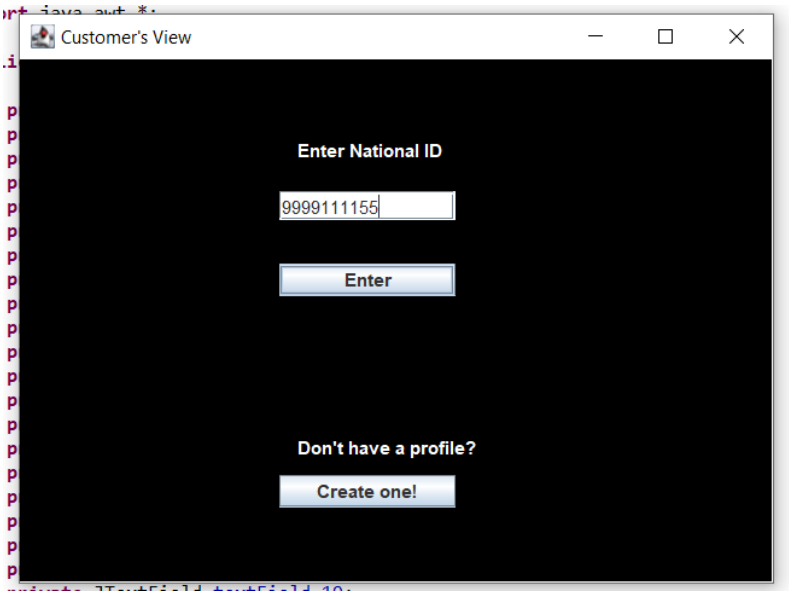


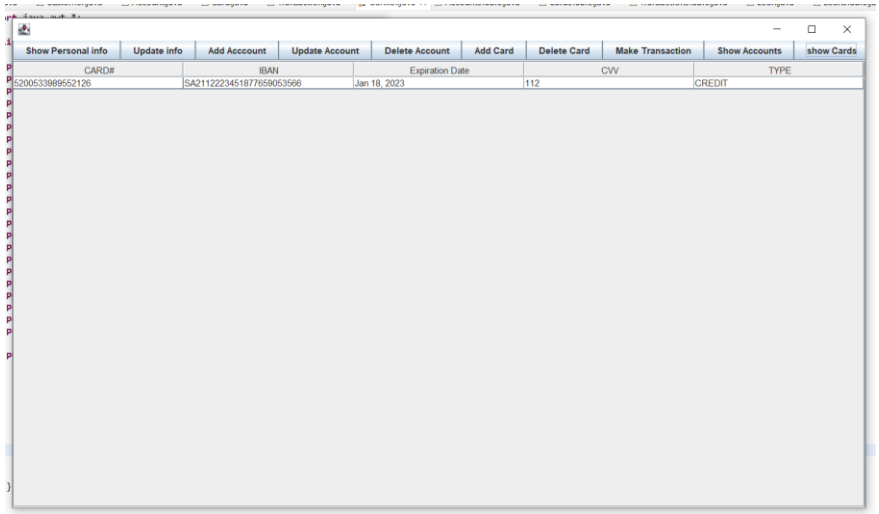

Show Personal info
Update info
Add Acccount
Update Account
Delete Account
Add Card
Delete Card
Make Transaction
Show Accounts
sho
IBAN
Balance
Customer ID
STATUS
TYPE
BRANCH#
SA3782224631005321655489
1,000,000
4444333322
ACTIVE
SAVING
1210
SA4365007753545000065353
60,000
4444333322
INACTIVE
FIXED DEPOSITS
1210
frame.setVisible(true);

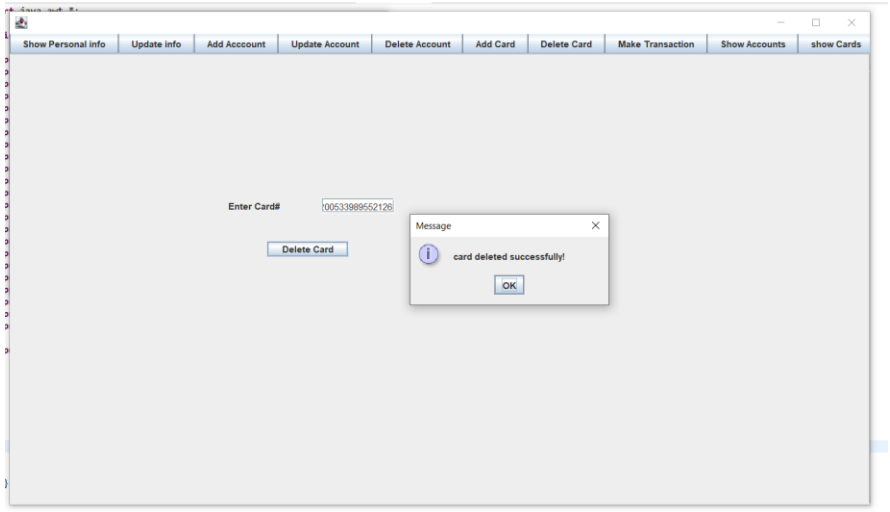

Show Personal info
Update info
Add Acccount
Update Account
Delete Account
Add Card
Delete Card
Make Transaction
Show Accounts
sho
Enter IBAN
53545000065353
Delete Account
Message
Account deleted successfully!
OK
frame.setVisible(true);

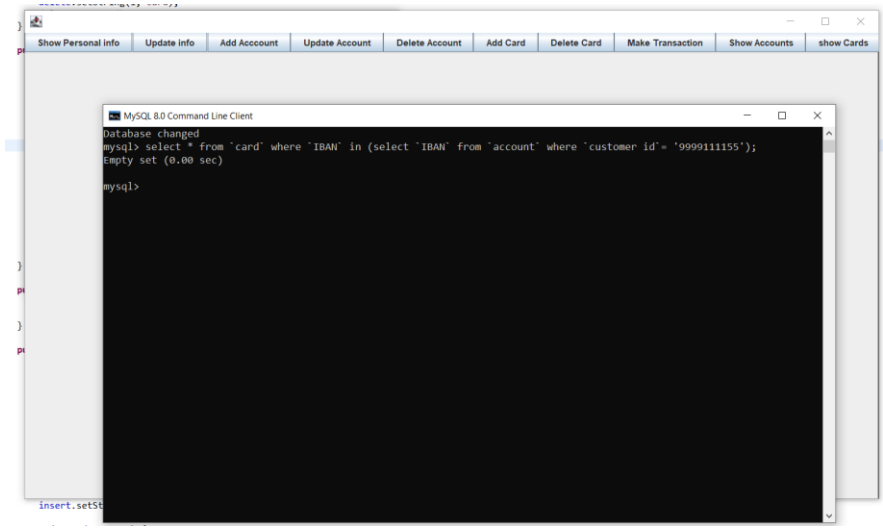


-delete a card:



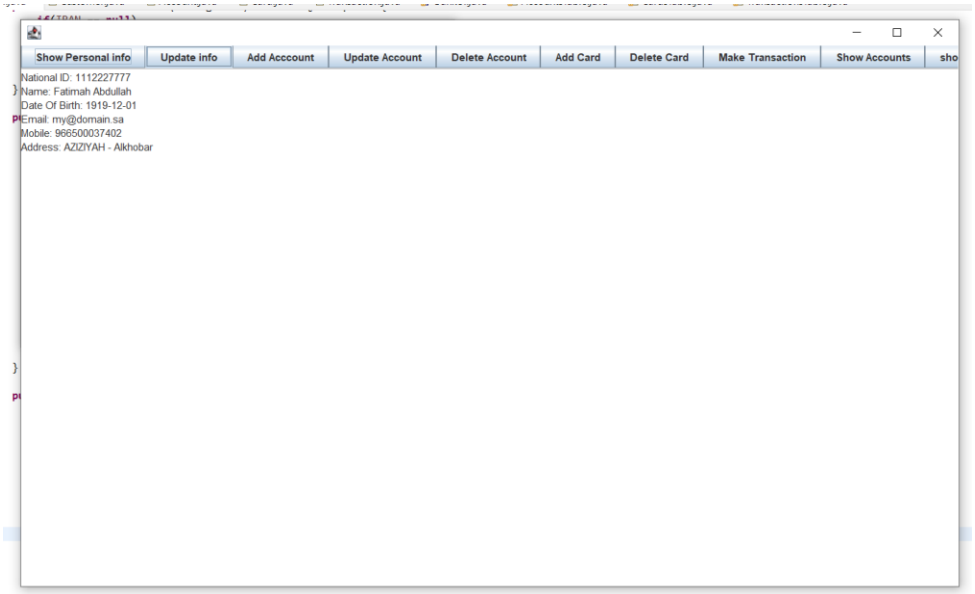

Show Personal info
Update info
Add Acccount
Update Account
Delete Account
Add Card
Delete Card
Make Transaction
Show Accounts
show Cards
CARD#
IBAN
Expiration Date
CVV
TYPE
5200533989552126
SA2112223451877659053566
Jan 18, 2023
112
CREDIT

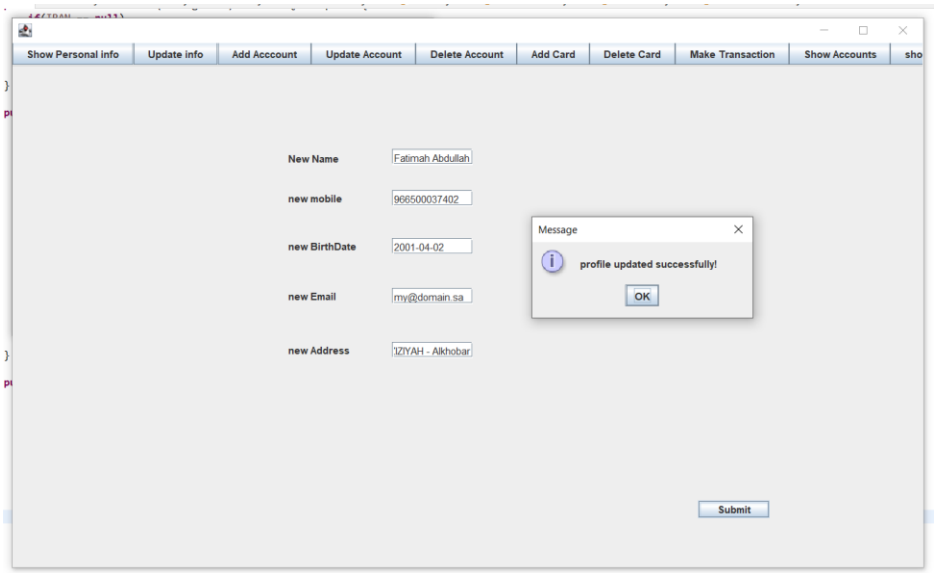

Show Personal info
Update info
Add Acccount
Update Account
Delete Account
Add Card
Delete Card
Make Transaction
Show Accounts
show Cards
Enter Card#
100533989552126
Delete Card
Message
card deleted successfully!
OK


Show Personal info
Update info
Add Acccount
Update Account
Delete Account
Add Card
Delete Card
Make Transaction
Show Accounts
show Cards
MySQL 8.0 Command Line Client
Database changed
mysql> select * from `card` where `IBAN` in (select `IBAN` from `account` where `customer id`= '9999111155');
Empty set (0.00 sec)
mysql>
insert.setSt

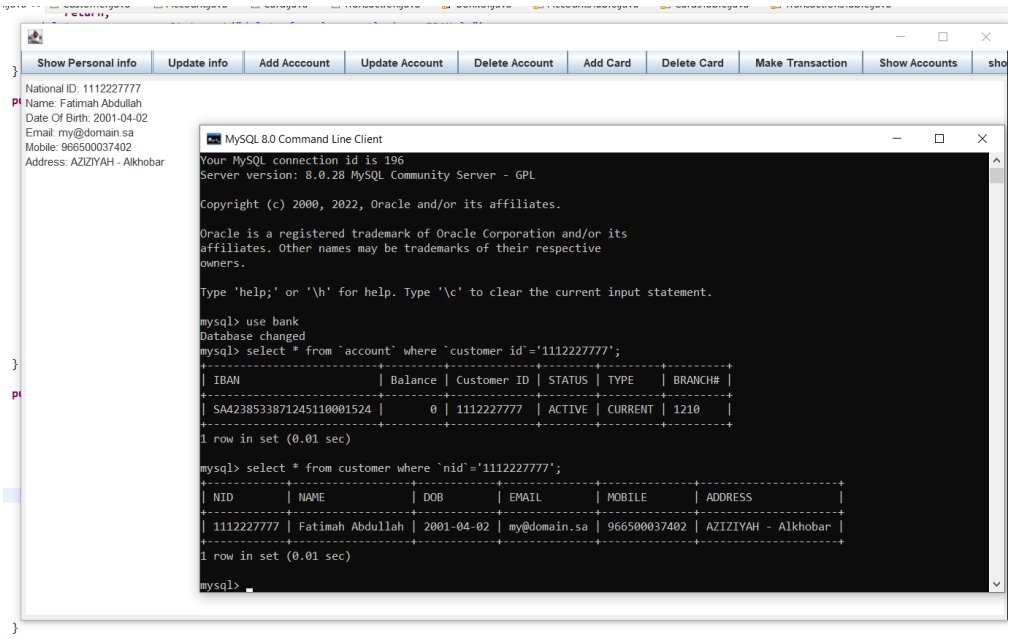
3- Update:

-updating a customer's birthdate:

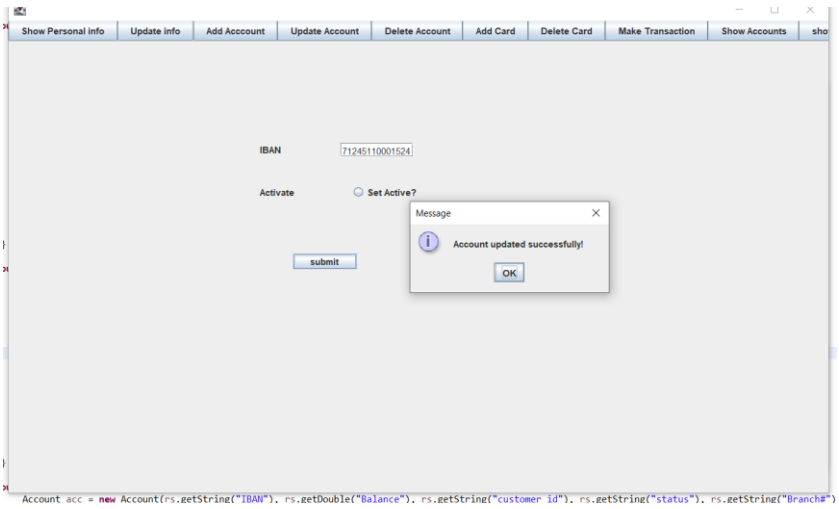


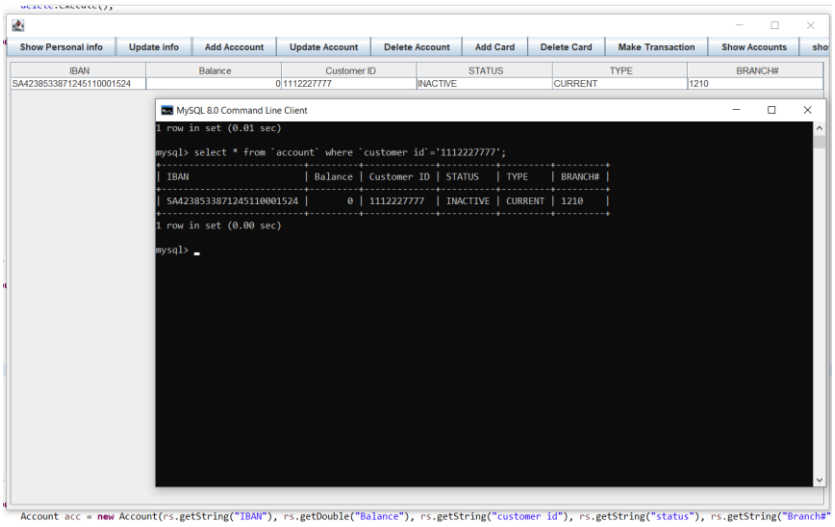


Information fields are filled automatically, and user can change them as convenient.



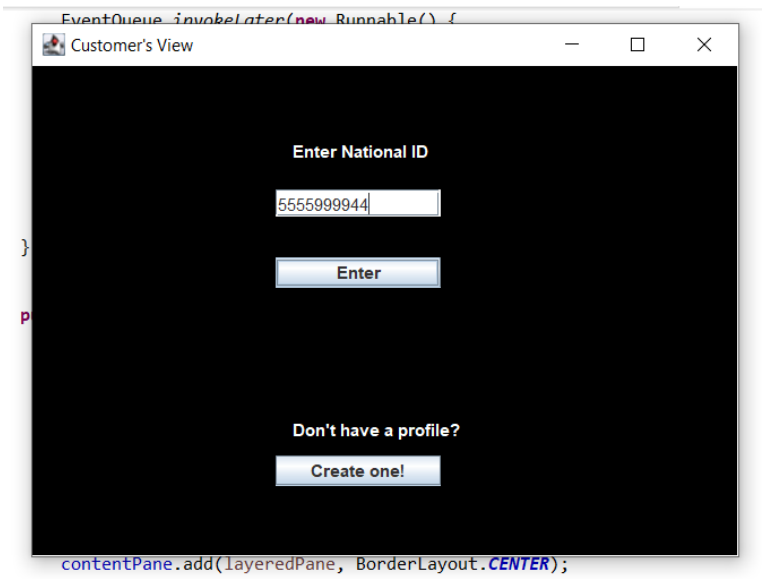
Deactivating an account:

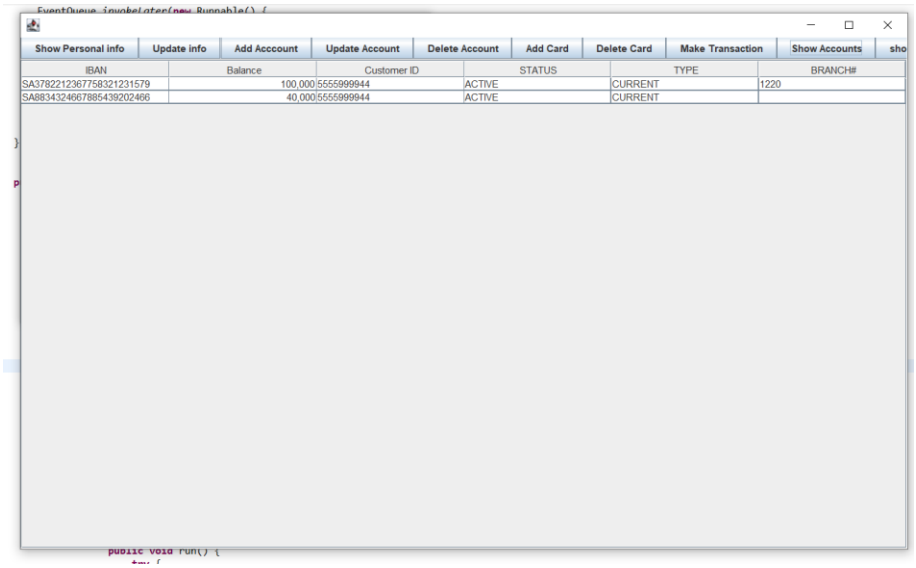




4- Retrieve from one table:

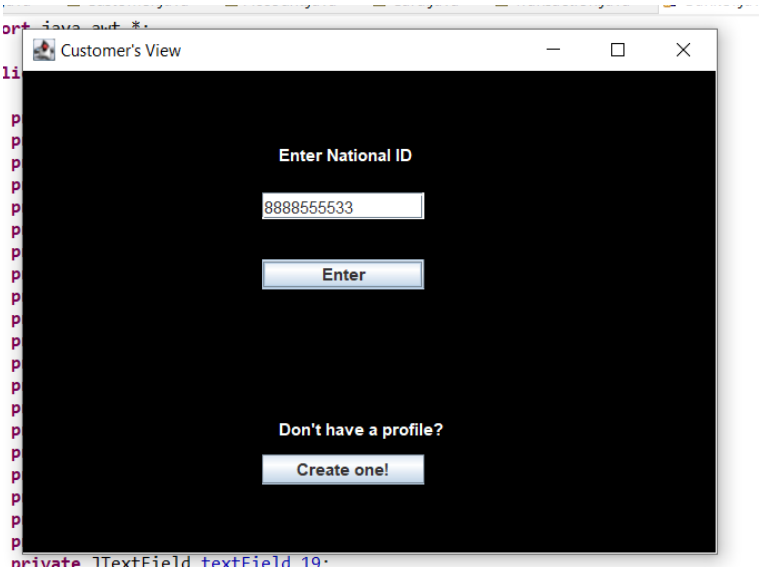
-retrieving a customer's accounts:

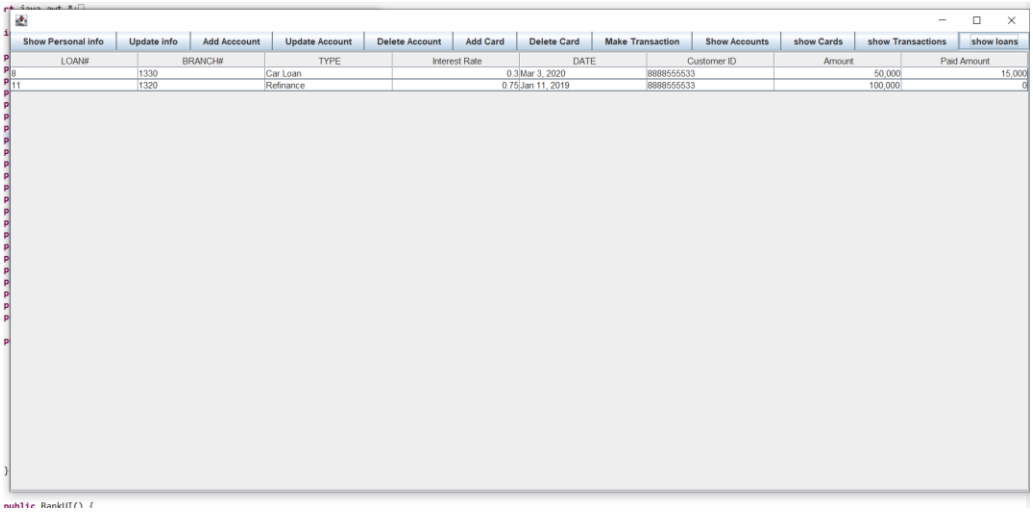





```java
    public List<Account> selectCustomerAccounts(String NID) throws SQLException {
        List<Account> accounts = new ArrayList<Account>();
        Statement query;
        ResultSet result;

        try {
            query = con.createStatement();
            result = query.executeQuery("select * from `account` where `customer id`= '" + NID + "';");
            while(result.next()) {
                Account acc = MakeObjectAccount(result);
                accounts.add(acc);

            }
        }catch(SQLException e) {
            e.printStackTrace();
        }

        return accounts;
    }
```

- Retrieving customer's loans:

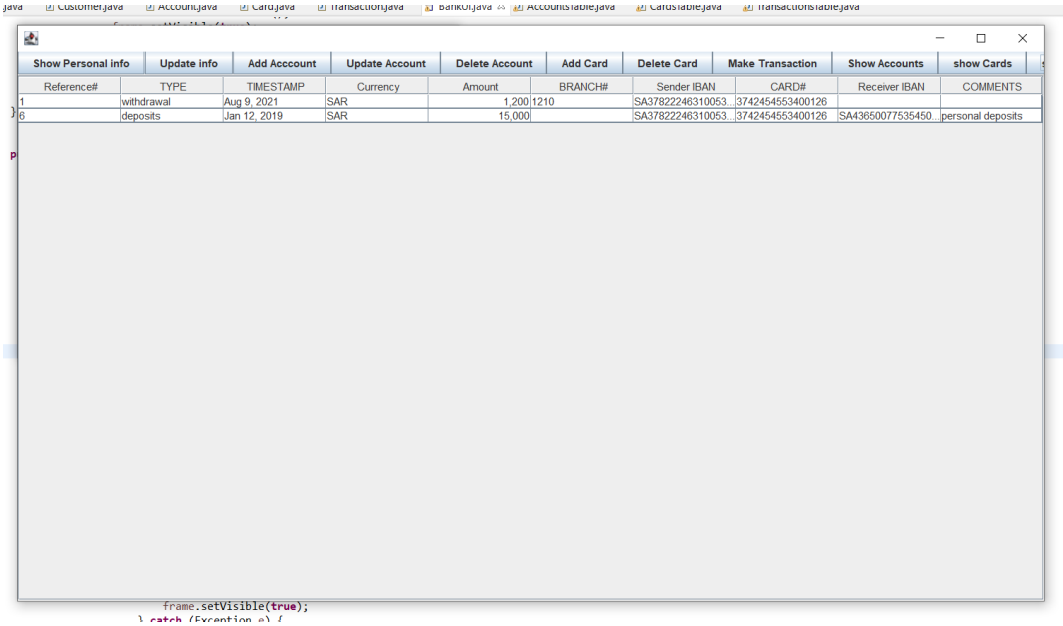





```java
    public List<Loan> selectCustomerLoans(String NID) throws SQLException{
        List<Loan> loans = new ArrayList<Loan>();
        Statement query;
        ResultSet result;

        try {
            query = con.createStatement();
            result = query.executeQuery("select * from `loan` where `customer id`='" + NID + "';");
            while(result.next()) {
                Loan l = MakeObjectLoan(result);
                loans.add(l);

            }
        }catch(SQLException e) {
            e.printStackTrace();
        }

        return loans;
    }
```

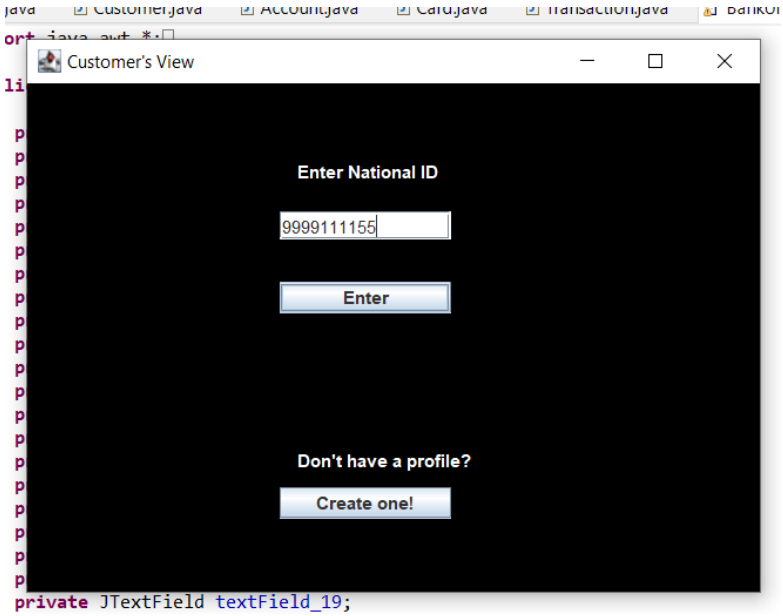
5- Retrieve from more than two tables:

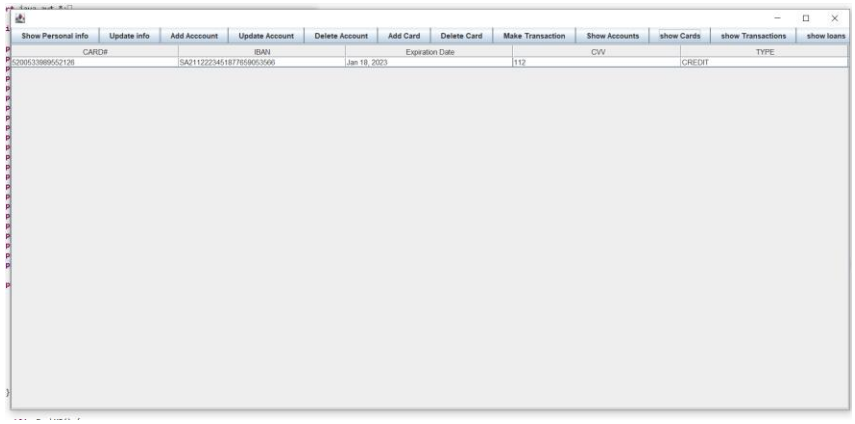
- retrieving a customer's transactions:



```java
public List<Transaction> selectCustomerTransactions(String NID) throws SQLException {
    List<Transaction> transaction = new ArrayList<Transaction>();
    Statement query;
    ResultSet result;

    try {
        query = con.createStatement();
        result = query.executeQuery("select * from `transaction` where `Sender IBAN` in (select `IBAN` from `account` where `customer id`= '" + NID + "');");
        while(result.next()) {
            Transaction t = MakeObjectTransaction(result);
            transaction.add(t);

        }
    }catch(SQLException e) {
        e.printStackTrace();
    }

    return transaction;
}
```

- retrieving customer's cards:

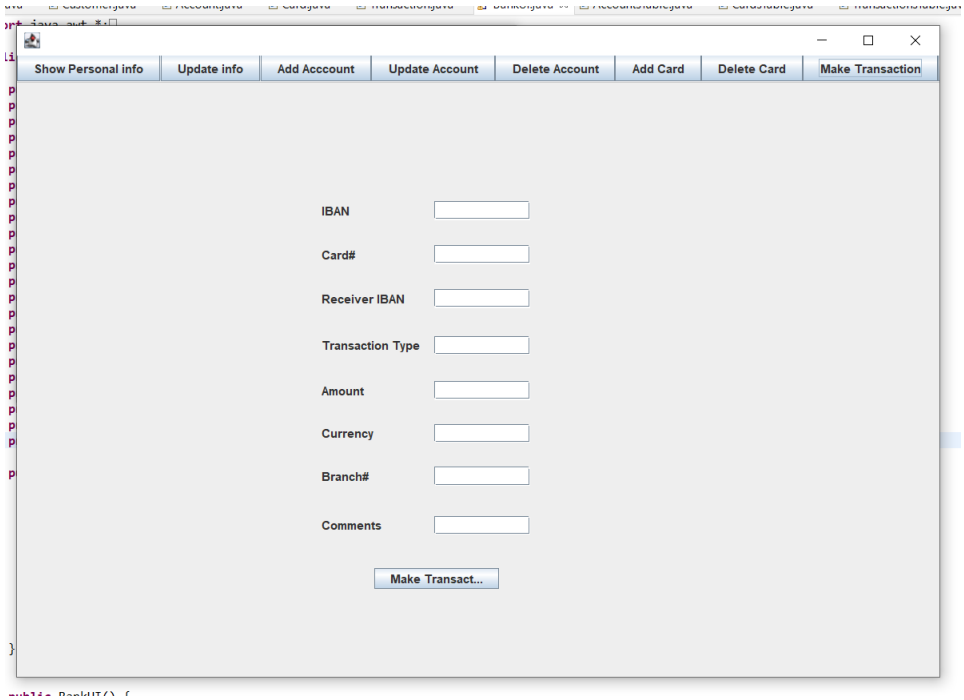
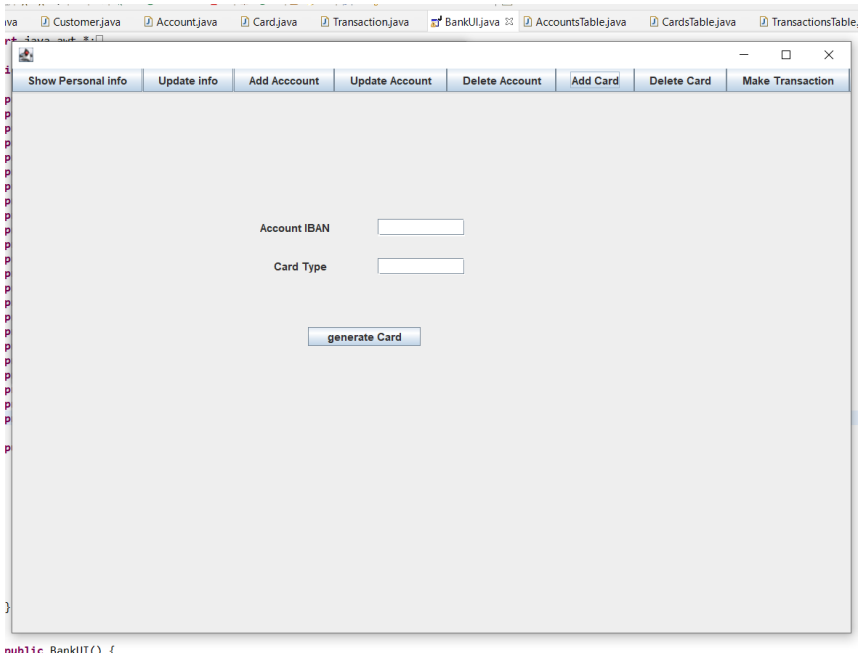





```java
public List<Card> selectCustomerCards(String NID) throws SQLException {
    List<Card> card = new ArrayList<Card>();
    Statement query;
    ResultSet result;

    try {
        query = con.createStatement();
        result = query.executeQuery("select * from `card` where `IBAN` in (select `IBAN` from `account` where `customer id`= '" + NID + "');");
        while(result.next()) {
            Card c = MakeObjectCard(result);
            card.add(c);

        }
    }catch(SQLException e) {
        e.printStackTrace();
    }

    return card;
}
```

- More on user interface:

-insert transaction:



-insert card: