BANK DATABASE

/04/2021
CS105.3
DATABASE MANAGEMENT SYSTEM
20.3 BATCH
GROUP B
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Scenario

A ‘Bank’ requires a database to store its information conveniently in order to have access to a certain account holder’s details when needed while doing transaction across the other accounts of customers. A certain bank has a chain of branches throughout the cities. The customers registered under a branch of a certain bank can be uniquely identified using the **NIC** number of the customer. One customer can have either one or more accounts in a bank. Also, an account can be uniquely identified by its **account number**. Bank loans may exist under some customers or maybe several debts under one customer, also several customers may exist under one loan facility. Each and every account and loan facility has a specific branch mentioned. A customer is given a pin number to verify before getting access to one’s holdings to do a transaction in a account.

The following are the attributes of the entities of the above scenario.

Bank
(unique) name, (unique)number, E-mail, Address,
telephone number

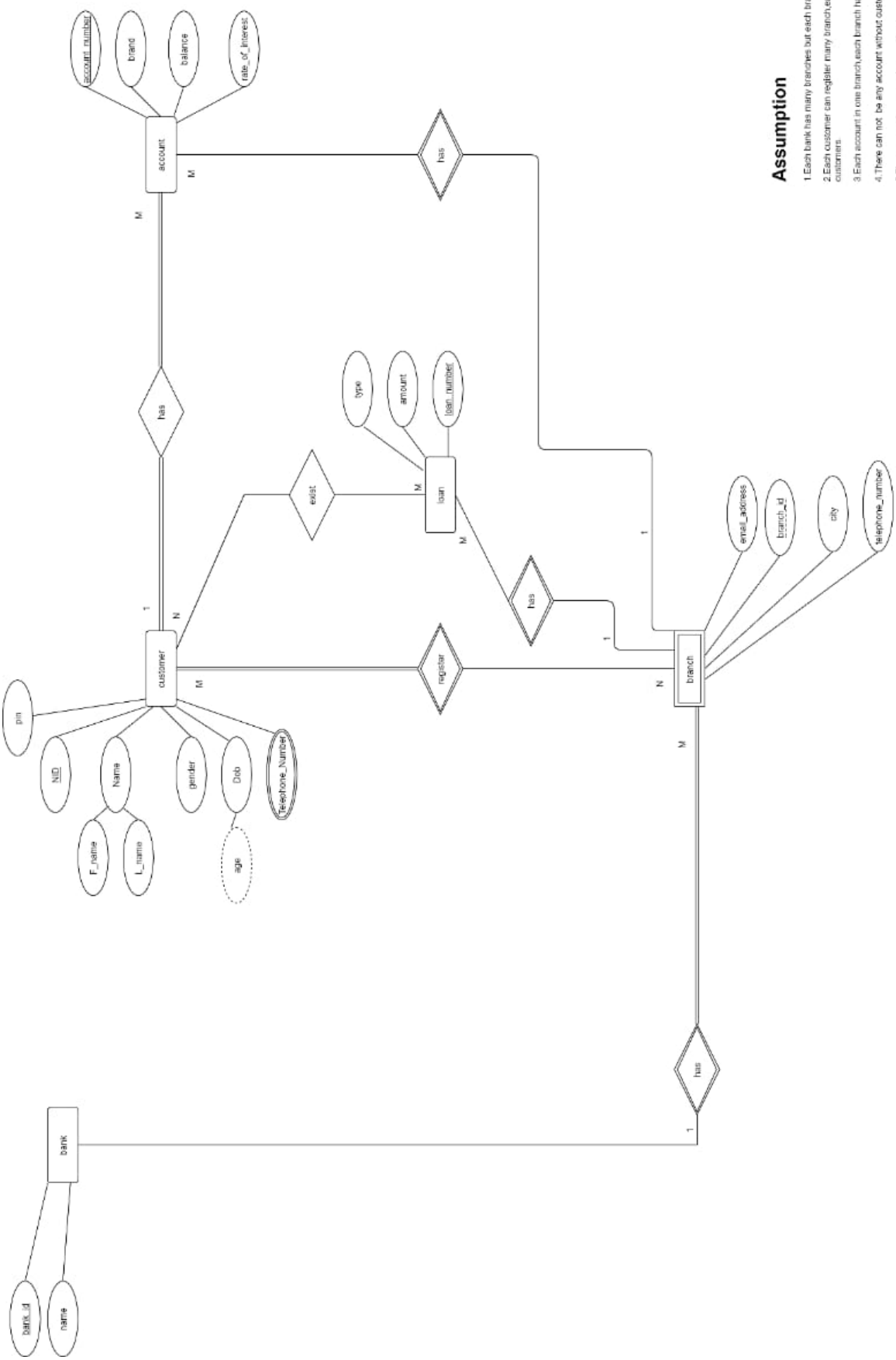
Customer
Name, (unique)Id, DOB, Gender, Occupation, Salary, Pin, telephone number

Account
Account type, Balance, Interest rate

Loan
Loan type, Amount, Loan account number

Branch
E-mail, branch number, telephone number, city

State any assumptions relevant to the scenario in order to proceed with the ER diagram.



Assumption

1.Each bank has many branches but each branch have one bank.

2.Each customer can register many branch,each branch have many customers.

3.Each account in one branch,each branch have many accounts

4.There can not be any account without customer

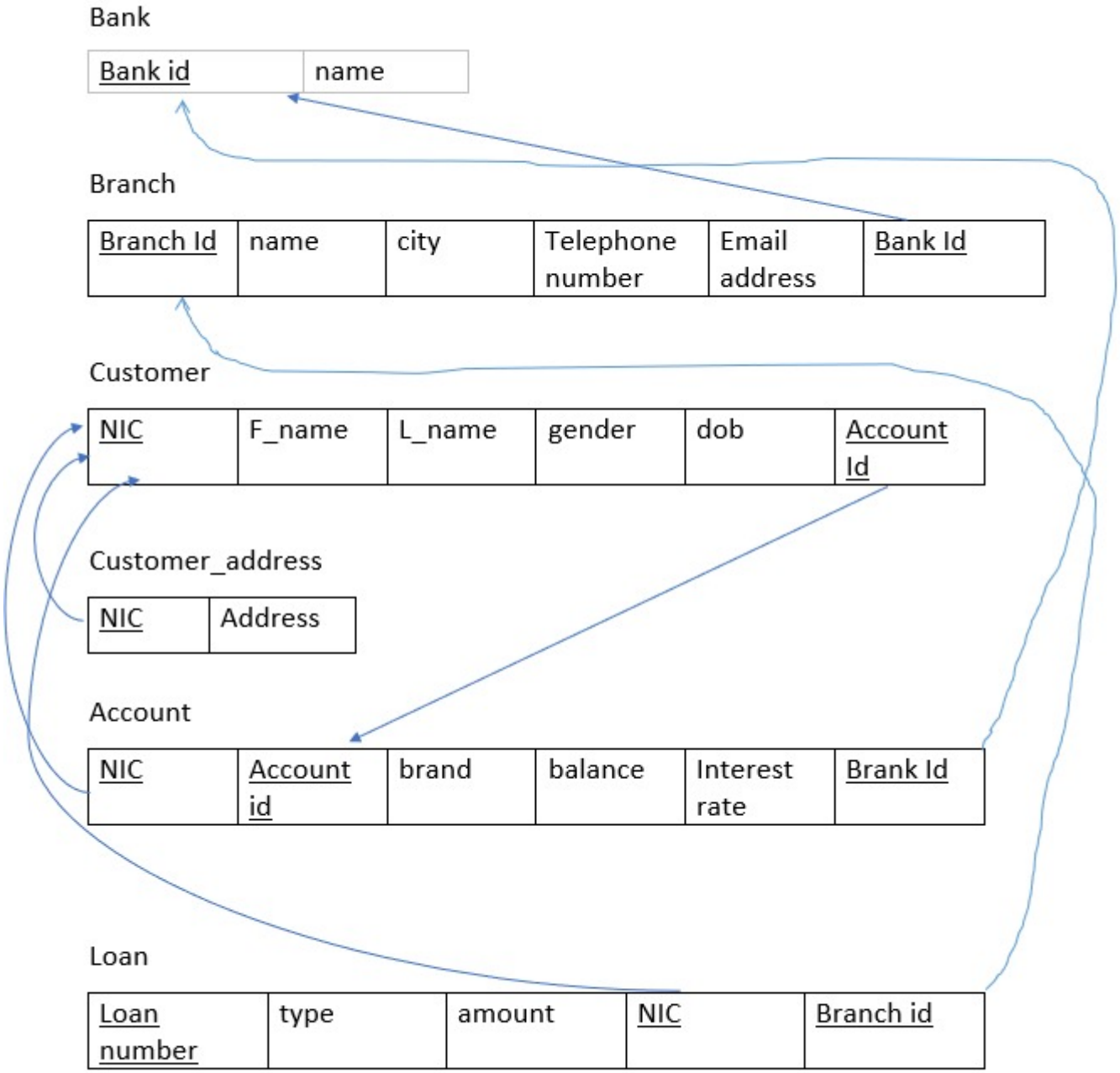
5.There cannot be any customer without account

6.There cannot be any customer without branch

7.There can be be branch without customer

8.There can not be branch without bank

9.There can be bank without branch


Bank
Bank id
name
Branch
Branch Id
name
city
Telephone number
Email address
Bank Id
Customer
NIC
F_name
L_name
gender
dob
Account Id
Customer_address
NIC
Address
Account
NIC
Account id
brand
balance
Interest rate
Brank Id
Loan
Loan number
type
amount
NIC
Branch id

NORMALIZATION

0 NF

Customer Table

NIC	Name	Sex	D.O.B.	Tel_No.	Pin	Occupation	Salary	A/C_No.
199620005V	Isuru Jayasinghe	M	1986/03/21	0718661001	1126	Civil_ Engineer	400,000/=	5684211839
199628890V	Shashini Perera	F	1996/08/30	0777012231 0776811248	2284	Event_ Manager	500,000/=	6680230091
200150001189	Devin Weerasekara	M	2001/07/01	0726450811	3869	Software_ Engineer	600,000/=	8744426990

- Since the above customer table is in the 0^{th} Normalization form, in order to convert it to the 1^{st} Normalization form all the **'Multi- valued attributes',' Composite attributes' and the' Nested relations are being removed.**

1st NF

Customer Table

NIC	First_Name	Surname	Sex	D.O.B.	Tel_No.	Pin	Occupation	Salary	A/C_No.
199620005V	Isuru	Jayasinghe	M	1986/03/21	0718661001	1126	Civil_ Engineer	400,000/=	5684211839
199628890V	Shashini	Perera	F	1996/08/30	0777012231	2284	Event_ Manager	500,000/=	6680230091
200150001189	Devin	Weerasekara	M	2001/07/01	0726450811	3869	Software_ Engineer	600,000/=	8744426990

Extra information account table

NIC	First_Name	Surname	Sex	D.O.B.	Tel_No.	Pin	Occupation	Salary	**A/C_No.**

199628890V	Shashini	Perera	F	1996/08/30	0776811248	2284	Event_ Manager	500,000/=	6680230091

- The above table is in 1NF where all the multi valued attributes, composite attributes are being removed.
- To convert it to the 2NF the **'Partial dependencies'** must be eradicated from the above table.
- Where the partial dependency means when only one key/one prime attribute (primary key) determines **one or more** '**non-prime'** attributes in the table, while full functional dependency means when primary key and the foreign key (All the '**prime'** attributes) determines the all the non-prime attributes.

2 NF ------> Partial dependency

Customer_Reference

NIC	**Occupation**	**First_Name**	**Surname**	**Tel_No.**	**Salary**	**Sex**	**D.O.B.**
199620005V	Civil_Engineer	Isuru	Jayasinghe	0718661001	400,000/=	M	1986/03/21
199628890V	Event_ Manager	Shashini	Perera	0777012231	500,000/=	F	1996/08/30
200150001189	Software_ Engineer	Devin	Weerasekara	0726450811	600,000/=	M	2001/07/01

Extra information account table

NIC	**Tel_No.**
199628890V	0776811248

2 NF ----> Full Functional Dependency

Account_for_Customer

NIC	**Pin**	**Occupation**	**Salary**	**A/C_No.**
199620005V	1126	Civil_ Engineer	400,000/=	5684211839

199628890V	2284	Event_ Manager	500,000/=	6680230091
200150001189	3869	Software_ Engineer	600,000/=	8744426990

- Since the partial dependencies are clearly identified separately the above tables are in 2NF.

3 NF -------> Transitive Dependency

Salary account

Pin	**Salary**
1126	400,000/=
2284	500,000/=
3869	600,000/=

Customer_table

NIC	**Occupation**	**First_Name**	**Surname**	**Sex**	**D.O.B.**	**Tel_No.**
199620005V	Civil_Engineer	Isuru	Jayasinghe	M	1986/03/21	0718661001
199628890V	Event_ Manager	Shashini	Perera	F	1996/08/30	0776811248
200150001189	Software_ Engineer	Devin	Weerasekara	M	2001/07/01	0726450811

Extra information of customer table

NIC	Tel_No.
199628890V	0776811248

- When it comes to the 3NF all the transitive dependencies should be removed. Which means all the non-prime attributes determining other non-prime should be removed.

  Note: Tables which are in 3NF is in 1NF and 2NF as well.

SQL

```
| test               |
| universitydb       |
+--------------------+
7 rows in set (0.253 sec)

MariaDB [(none)]> use bankdb;
Database changed
MariaDB [bankdb]> select * from bank;
+--------+---------+------------------+-----------+
| bankid | name    | email            | teleNo    |
+--------+---------+------------------+-----------+
|   1105 | Sampath | sampath@cus.lk   | 112340924 |
|   2067 | Sampath | Sampath@Cmb.lk   | 112008745 |
|   3004 | Sampath | Samapth@kandy.lk | 112897653 |
+--------+---------+------------------+-----------+
3 rows in set (0.235 sec)

MariaDB [bankdb]> select * from branch;
+------------+--------+
| branchName | bankId |
+------------+--------+
| Ragama     |   1105 |
| Colombo    |   2067 |
| Kandy      |   3004 |
+------------+--------+
3 rows in set (0.040 sec)
```

```
MariaDB [bankdb]> select * from customer;
+--------------+----------+-------------+--------+------------+-----------+-------------------+--------+
| Nic          | FName    | LName       | gender | dob        | accountId | occupation        | salary |
+--------------+----------+-------------+--------+------------+-----------+-------------------+--------+
| 199620005v   | Isuru    | Jayasinghe  | M      | 1986-03-21 | 568421183 | Civil Engineer    | 450000 |
| 1996288900v  | Shashini | Perera      | F      | 1996-08-30 | 668023009 | Event Manager     | 500000 |
| 20015000118v | Devin    | Weerasekara | M      | 2001-07-01 | 874442699 | Software Engineer | 600000 |
+--------------+----------+-------------+--------+------------+-----------+-------------------+--------+
3 rows in set (0.001 sec)

MariaDB [bankdb]> select * from loan;
+------------+----------+--------+--------+
| loannumber | type     | amount | bankid |
+------------+----------+--------+--------+
|       5001 | Personal | 500000 |   1105 |
|       5002 | Housing  | 800000 |   2067 |
|       5003 | student  | 600000 |   3004 |
+------------+----------+--------+--------+
3 rows in set (0.001 sec)
```

```
MariaDB [bankdb]> select * from account;
+---------------+---------------+---------+--------------+
| Accountaccess | brand         | balance | interestrate |
+---------------+---------------+---------+--------------+
|          1154 | Savings       |   40000 |            1 |
|          2331 | Current       |   70000 |            2 |
|          6772 | Fixed deposit |   90000 |            1 |
+---------------+---------------+---------+--------------+
3 rows in set (0.002 sec)
```