DBMS Project

Problem Statement

In the face of the pandemic, we all witnessed a rise in online methods of payment. Wanting to increase its facilities the Zenith National Bank wants to start providing an online system for its customers. It wants to offer some basic functionality of managing accounts and availing loans for the customers. The employees of the Bank should also be part of the database and be able to manage the data for smooth functioning of the Bank.

We are designing a Database for the Online Banking System while following a well-defined scope mentioned in the slides ahead.

Stakeholders

The users of the Banking System are broadly categorized into two – internal and external.

- Internal users are the bank employees, consisting of regular employees, and a manager for each branch. They are responsible for all the workings of the bank and providing approval for the loans.

- The external users are the individual customers of the bank. They can perform transactions, avail an account, transfer funds, make payments etc.

Scope of Project

- The Bank only offers limited online services and allows their customer to basically have a Savings Account, a Current Account or avail a loan(also associated with an account).
- To become customers of the Bank, people are asked to provide their basic details including their Aadhar No., Pan No.,Name, Address, Contact No., Email ID, and Gender. Each Customer of the bank is then associated with a Customer ID, which is uniquely linked to their Pan Card.
- Upon that Customer ID, the customer can open as many accounts and of any type. The Customer can open mainly two types of Accounts - Savings and a Current Account. Each account is associated with the Customer ID and stores the amount in the account along with the its Date of Creation and a compulsory Nominee ID, to be held responsible for the account in case of non-availability of the actual owner. The Nominee however must also belong to the same bank. During the creation of the account, each account is also associated with a branch of the bank.

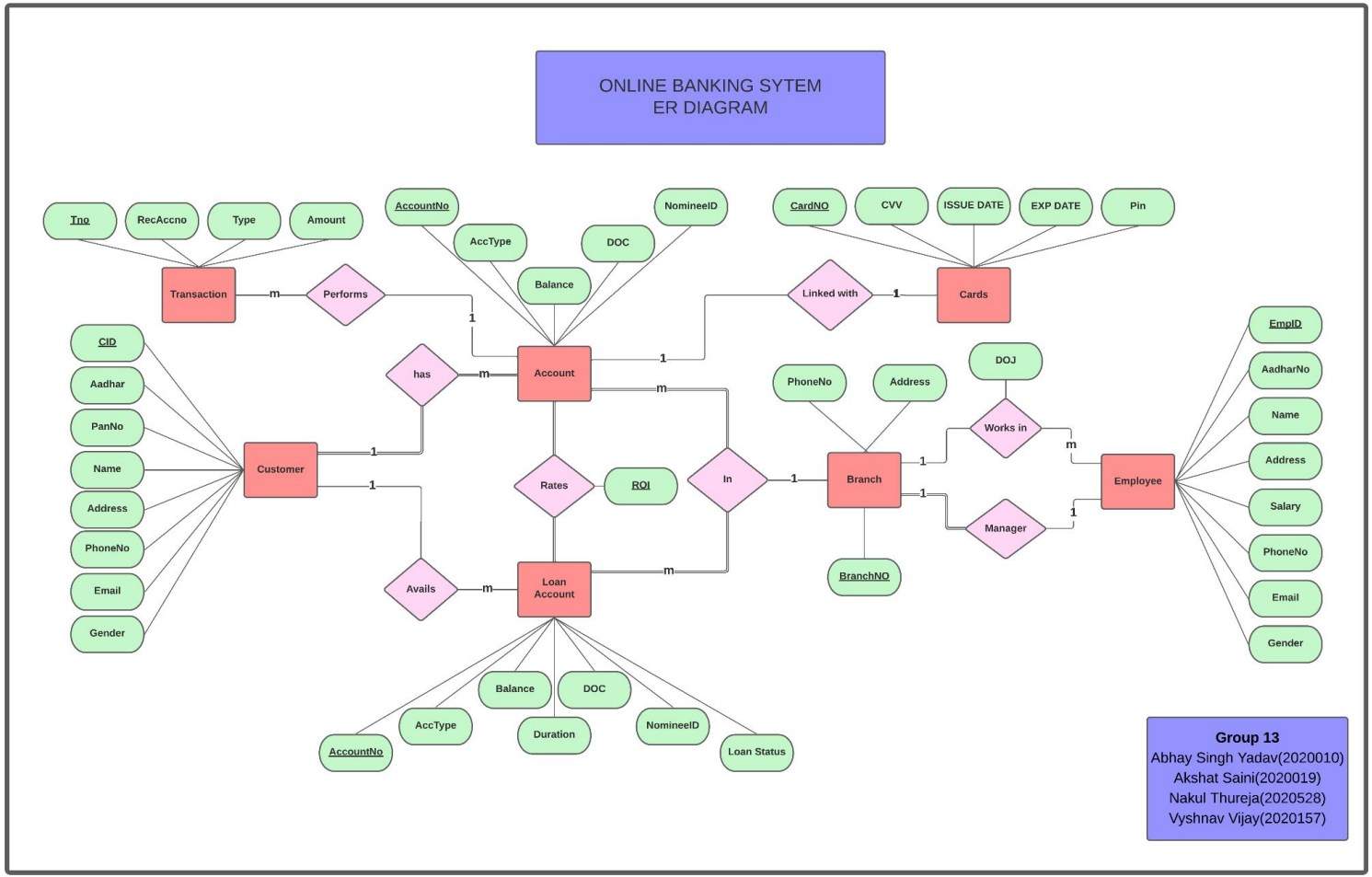
Scope of Project

- A customer who wants a debit card can also avail one on their account. The card is provided with an unique Card Number, a 3-Digit Security Key (CVV), Issue Date and Expiry Date. The card is also associated with a Pin, for security purposes.
- Transactions in the Bank can only be internal and both the sender and the receiver should be existing customers of the Bank. While making a transaction, the transaction number, receiver's account number and the amount are typically required. The type of transaction is also required as they can be made through normal NetBanking method or through the debit card(linked with an account).
- The bank has multiple branches, which have their own phone number and address. Each branch is responsible for approving loans and maintaining the accounts linked with that branch. The branches are also managed by a manager.
- Employees of the bank are of two types - regular employees (clerks) and Branch Managers (one manager per branch). They have their Employee ID for their identification. Their basic information such as their Aadhar No., Name, Address, Salary, Phone No., Email ID and Gender are also required.

ER Diagram

PDF LINK:
https://drive.google.com/file/d/1gt3qjUJkkmskVq03oSSbFLCNM_TBzZqG/view?usp=sharing

(download for better resolution)

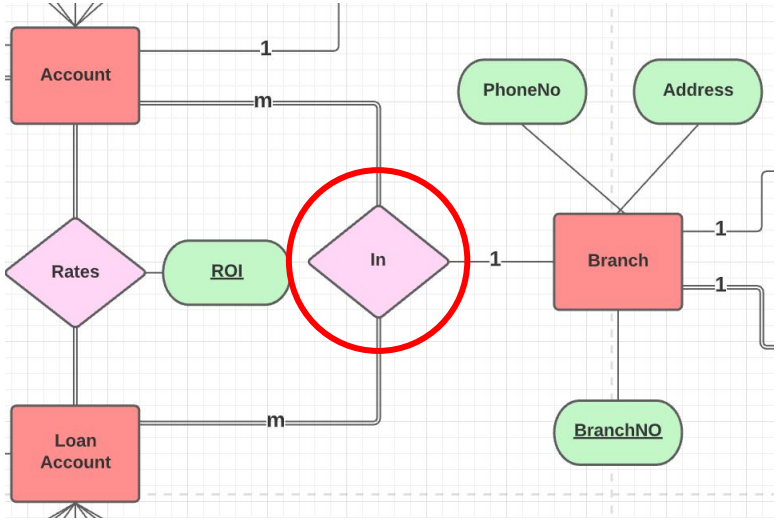


Weak Entities

There exist no Weak Entities in the Database. Every entity can be uniquely identified with their own Primary Key and hence are all Strong.

Ternary Relationship

- **IN** - The relationship between the Account, Loan Account and Branch is a ternary relationship as three separate entities participate in the relationship.



Relational Schema

- **Customer**(CID, Aadhar No, Pan No, Name, DOB, Address, Phone No, Email, Gender)
- **Employee**(Emp ID, Aadhar No, Name, DOB, Address, Phone No, Salary, Email, Gender)
- **Branch**(Branch No, Manager ID, Address, Phone No)
- **Accounts**(AccNo, CID, Branch No, Acc Type, Balance, DOC, Interest Amount, Nominee ID)
- **Loan**(Loan ID, CID, Branch No, Loan Type, Duration, Total Amount, Remaining Amount, Nominee ID, Status)
- **Rates**(Type, ROI)
- **Transactions**(TNo, Transaction Type, Sender AccNo, Amount, DOT, Receiver AccNo)
- **Cards**(Card No, CVV, Acc No, Issue Date, Exp Date, Pin)
- **Works**(Branch No, Emp ID, DOJ)

Customer

CID	BIGINT **(Primary Key)**
AadharNo	Char(12) NOT NULL
PanNo	Char(10) NOT NULL
Name	Name NOT NULL
DOB	Date
Address	Varchar(200)
PhoneNo	Char(10) NOT NULL
Email	Varchar(10) NOT NULL
Gender	Char(1)

Employee

EmpID	Char(12) **(Primary Key)**
AadharNo	Char(12) NOT NULL
Name	Name NOT NULL
DOB	Date
Address	Varchar(200)
PhoneNo	Char(10) NOT NULL
Salary	BIGINT NOT NULL
Email	Varchar(10) NOT NULL
Gender	Char(1)

Accounts

AccNo	BIGINT **(Primary Key)**
CID	BIGINT NOT NULL (Foreign Key)
BranchNo	MEDIUMINT NOT NULL (Foreign Key)
AccType	Varchar(10) NOT NULL
Balance	BIGINT
DOC	Date NOT NULL
Interest Amount	INT NOT NULL
NomineeID	BIGINT NOT NULL (Foreign Key)

Loan Accounts

LoanID	BIGINT **(Primary Key)**
CID	BIGINT NOT NULL (Foreign Key)
BranchNo	MEDIUMINT NOT NULL (Foreign Key)
LoanType	Varchar(10) NOT NULL
Duration	INT
DOC	Date NOT NULL
TotalAmount	BIGINT
RemainingAmount	BIGINT
Status	Varchar(14)
NomineeID	BIGINT NOT NULL (Foreign Key)

Cards

CardNo	INT **(Primary Key)**
CVV	Char(3)
AccNo	BIGINT NOT NULL (Foreign Key)
IssueDate	Date
ExpiryDate	Date
PIN	INT NOT NULL

Branch

BranchNo	MEDIUMINT **(Primary Key)**
ManagerID	Char(12) (Foreign Key)
Address	Varchar(255)
PhoneNo	BIGINT

Rates

Type	Varchar(50) **(Primary Key)**
ROI	Float

Works

BranchNo	MediumInt **(Primary Key)** (Foreign Key)
EmpID	Char(12) **(Primary Key)** (Foreign Key)
DOJ	Date

Transactions

Tno	BIGINT **(Primary Key)**
TransactionType	Varchar(50) NOT NULL
SenderAccNo	BIGINT NOT NULL (Foreign Key)
Amount	BIGINT NOT NULL
DOT	Date
ReceiverAccNo	BIGINT NOT NULL (Foreign Key)

MYSQL - DataBase Creation and Population

We have created a file with all the queries to create and populate the database saved as MASTER.SQL, running it will simply create the database in your system.

If you want to create tables separately we have created files with queries for table creation and data population and Table_Name.SQL.

Data Population done through https://generatedata.com/generator while taking care of the constraints required.

SQL - Queries

1. Query to print the maximum salary of employee branch wise.

```
select B.BranchNo,Max(E.salary) as MaxSalary from Branch B,Employee E,Works W
where W.BranchNo = B.BranchNo and E.EmpID = W.EmpID
group by B.BranchNo;
```

BranchNo	MaxSalary
1	8188532
2	9845541
3	9784332
4	8911578
5	6544686

2. Query to print the customer name having more than 5 Transactions as sender

```
Select C.name,count(*) from Customer C,Accounts A, Transactions T
where A.cid = C.cid and T.SenderAccNo = A.AccNo
group by C.cid
Having count(*)>=5;
```

name	count(*)
Craig Lal	8
Ira Subramani	7
Jaden Shan	7

3. Query to print number of loan applications based on type and status

```
select L.LoanType,L.status,count(*)
from Loan L
group by status,LoanType
order by LoanType,status;
```

LoanType	status	count(*)
Car	Approved	7
Car	Not-Approved	8
Home	Approved	2
Home	Not-Approved	6
Personal	Approved	3
Personal	Not-Approved	4

4. Query to print customer id of customers having Accounts and Loan Account such that both accounts are not in the same branch

```
select C.cid,A.BranchNo as AccBranch,L.BranchNo as
LoanBranch from Customer C,Accounts A,Loan L

where C.cid = A.cid and C.cid = L.cid and A.BranchNo !=
L.BranchNo;
```

cid	AccBranch	LoanBranch
1000000050	3	1
1000000068	1	3
1000000067	3	2
1000000088	4	1
1000000019	3	4
1000000087	5	3
1000000022	2	5
1000000026	3	4
1000000030	3	4
1000000094	3	1
1000000097	4	2
1000000037	3	5
1000000053	1	2
1000000053	1	3
1000000049	4	2
1000000061	1	3
1000000075	3	4
1000000040	4	2
1000000092	3	1
1000000031	4	5
1000000017	2	1

5. Query to print all employees with their branch number and Manager details

```
select
W.EmpID,E.Name,B.ManagerID,B.BranchNo
from Employee E,Branch B,Works W

where W.EmpID = E.EmpID and W.BranchNo =
B.BranchNo and W.EmpID != B.ManagerID;
```

EmpID	Name	ManagerID	BranchNo
100000000019	Basil Herman	100000000001	1
100000000020	Katell Manning	100000000001	1
100000000008	Branden Sloan	100000000002	2
100000000011	Amity Walls	100000000002	2
100000000014	Willa Little	100000000002	2
100000000018	Virginia Wagner	100000000002	2
100000000022	Ray Donaldson	100000000002	2
100000000007	Karly Orr	100000000003	3
100000000009	Eric Webb	100000000003	3
100000000010	Patience Vega	100000000003	3
100000000021	Armand Pollard	100000000003	3
100000000023	Len Andrews	100000000003	3
100000000013	Quinlan Blankensh	100000000004	4
100000000015	Lilah Mendez	100000000004	4
100000000016	Stephen Lawrence	100000000004	4
100000000017	Alec Gates	100000000004	4
100000000024	Ciaran Mullen	100000000004	4
100000000025	Miriam Cooley	100000000004	4
100000000006	Amena Hunter	100000000005	5
100000000012	Cally Mathews	100000000005	5

6. Query to print passbook(All Transactions) of a customer in last 10 years

```
Select T.Tno,T.TransactionType,T.SenderAccNo as AccountNo,T.amount as Withdrwal,"" as Deposit ,T.DOT from
Transactions T,Accounts A

where 1000000007 = A.cid and T.SenderAccNo = A.AccNo

and T.DOT >= date_sub(current_date, INTERVAL 10 YEAR)

UNION

Select T.Tno,T.TransactionType,T.ReceiverAccNo as AccountNo,"" as Withdrwal,T.amount as Deposit,T.DOT from
Transactions T,Accounts A

where 1000000007 = A.cid and T.ReceiverAccNo = A.AccNo

and T.DOT >= date_sub(current_date, INTERVAL 10 YEAR)

order by DOT;
```

Tno	TransactionType	AccountNo	Withdrwal	Deposit	DOT
10000000114	Net-Banking	100000000000007		74973052	2015-12-13
10000000063	Card	100000000000007		80488457	2018-08-29
10000000146	Net-Banking	100000000000007	5116679		2021-11-20
10000000028	Net-Banking	100000000000007		8391636	2022-01-21

7. Query to print interest rates corresponding to different account type

```
select  A.AccNo,A.AccType,R.ROI from Customer C,Accounts A,Rates R

where C.cid = A.cid and A.AccType = R.Type

Union

select  L.LoanID,L.LoanType,R.ROI from Customer C,Loan L,Rates R

where C.cid = L.cid and L.LoanType = R.Type;
```

AccNo	AccType	ROI
100000000000001	Savings	2.22
100000000000002	Savings	2.22
100000000000003	Current	0
100000000000004	Savings	2.22
100000000000005	Current	0
100000000000006	Current	0
100000000000007	Current	0
100000000000008	Savings	2.22
100000000000009	Current	0
100000000000010	Current	0
100000000000011	Savings	2.22
100000000000012	Current	0
100000000000013	Savings	2.22
100000000000014	Savings	2.22
100000000000015	Current	0
100000000000016	Current	0
100000000000017	Current	0
100000000000018	Current	0
100000000000019	Current	0
100000000000020	Current	0
100000000000021	Savings	2.22
100000000000022	Savings	2.22
100000000000023	Current	0
100000000000024	Savings	2.22
100000000000025	Current	0
100000000000026	Savings	2.22

8. Query to print details of customer whose card is expiring in 2023

```
select A.AccNo,c.name,c.Email,cd.CardNo,cd.ExpDate from Accounts A,Customer C, Cards Cd
where c.cid = a.cid and A.AccNo = CD.AccNo  and
Cd.ExpDate between '2023-01-01' and '2024-01-01'
order by cd.ExpDate;
```

AccNo	name	Email	CardNo	ExpDate
100000000000021	Halee Kap	haleekapoor5010@outlook.net	10020	07-03-2023
100000000000042	Ira Subram	irasubramani6488@yahoo.org	10041	10-03-2023
100000000000002	Isaiah Kum	isaiahkumar@yahoo.org	10001	25-03-2023
100000000000068	Chandler S	chandlersudha2593@google.com	10067	28-03-2023
100000000000009	Craig Lal	craiglal5302@outlook.edu	10008	30-03-2023
100000000000026	Karly Chau	karlychaudhary3338@outlook.cor	10025	01-04-2023
100000000000034	Darrel Mel	darrelmehra2278@icloud.net	10033	04-04-2023
100000000000078	Adara Niga	adaranigam@icloud.org	10077	04-04-2023
100000000000028	Logan Sain	logansaini@google.net	10027	08-04-2023
100000000000055	Roth Nagp	rothnagpal4043@yahoo.net	10054	10-04-2023
100000000000043	Xaviera Se	xavierasehgal1312@hotmail.net	10042	08-05-2023
100000000000054	Carolyn Sa	carolynsaini7303@google.net	10053	28-05-2023

9. Query to print branch contact details for a customer id

```
select B.BranchNo,B.PhoneNo,B.Address,E.Name as ManagerName,E.phoneNo as ManagerNumber
from Accounts A, Branch B,Employee E
where A.cid = 1000000006 and A.BranchNo = B.BranchNo and B.ManagerID  = E.EmpID;
```

BranchNo	PhoneNo	Address	ManagerName	ManagerNumber
5	3234051526	3140 Porttitor Rd.	Lawrence Clay	1162171547

10. Query to update(decrease) the RemainingAmount of all Car Loans by 5% as a bonus

```
update Loan L
set RemainingAmount = 0.95*RemainingAmount
where L.LoanId>0 and L.status = "approved" and L.LoanType = "car";
```

Contribution of Members

All work was done together over Gmeet and everyone contributed equally

Thank You

Group 13

Abhay Singh Yadav(2020010)
Akshat Saini(2020019)
Nakul Thureja(2020528)
Vyshnav Vijay(2020157)