RELATIONAL MODEL

This document presents the conversion of the Entity-Relationship (ER) model of a banking system into a relational model. The relational model is designed to capture various aspects of banking operations, including customers, accounts, loans, transactions, payments, and employees.

Relational schema

- **Customer(Customer_ID (PK), Name, DOB, Phone_Number, Street, City, State, Pincode)**

Attribute	Data Type	Constraints
Customer_ID	INT	PRIMARY KEY
Name	VARCHAR(100)	NOT NULL
DOB	DATE	NOT NULL
Phone_Number	VARCHAR(15)	UNIQUE
Street	VARCHAR(255)	NOT NULL
City	VARCHAR(100)	NOT NULL
State	VARCHAR(100)	NOT NULL
Pincode	VARCHAR(10)	NOT NULL

- **Branch(Branch_Name (PK), Branch_City, Assets, Liabilities)**

Attribute	Data Type	Constraints
Branch_Name	VARCHAR(100)	PRIMARY KEY
Branch_City	VARCHAR(100)	NOT NULL
Assets	DECIMAL(15,2)	NOT NULL
Liabilities	DECIMAL(15,2)	NOT NULL

- **Loan(Loan_Number (PK), Amount, Branch_Name (FK))**

Attribute	Data Type	Constraints
Loan_Number	INT	PRIMARY KEY
Amount	DECIMAL(15,2)	NOT NULL
Branch_Name	VARCHAR(100)	FOREIGN KEY → Branch(Branch_Name)

- **Account(Account_ID (PK), Balance, Type)**

Attribute	Data Type	Constraints
Account_ID	INT	PRIMARY KEY
Balance	DECIMAL(15,2)	NOT NULL
Type	ENUM('Savings', 'Current')	NOT NULL

- **Savings_Acc(Account_ID (PK, FK), Daily_Withdrawal_Limit, Rate_of_Interest)**

Attribute	Data Type	Constraints
Account_ID	INT	PRIMARY KEY, FOREIGN KEY → Account(Account_ID)
Daily_Withdrawal_Limit	DECIMAL(10,2)	NOT NULL
Rate_of_Interest	DECIMAL(5,2)	NOT NULL

- **Current_Acc(Account_ID (PK, FK), Transaction_Charges)**

Attribute	Data Type	Constraints
Account_ID	INT	PRIMARY KEY, FOREIGN KEY → Account(Account_ID)
Transaction_Charges	DECIMAL(10,2)	NOT NULL

- **Transaction(Transaction_ID (PK), Transaction_Amount, Transaction_Date, Account_ID (FK))**

Attribute	Data Type	Constraints
Transaction_ID	INT	PRIMARY KEY
Transaction_Amount	DECIMAL(15,2)	NOT NULL
Transaction_Date	DATE	NOT NULL
Account_ID	INT	FOREIGN KEY → Account(Account_ID)

- **Payment(Payment_ID (PK), Payment_Amount, Payment_Date, Loan_Number (FK))**

Attribute	Data Type	Constraints
Payment_ID	INT	PRIMARY KEY
Payment_Amount	DECIMAL(15,2)	NOT NULL
Payment_Date	DATE	NOT NULL
Loan_Number	INT	FOREIGN KEY → Loan(Loan_Number)

- **Employee(Employee_ID (PK), Name, Contact_Number, Start_Date, Manager_ID (FK))**

Attribute	Data Type	Constraints
Employee_ID	INT	PRIMARY KEY
Name	VARCHAR(100)	NOT NULL
Contact_Number	VARCHAR(15)	UNIQUE
Start_Date	DATE	NOT NULL
Manager_ID	INT	FOREIGN KEY → Employee(Employee_ID)

- **Borrow(Customer_ID (PK, FK), Loan_Number (PK, FK))**

Attribute	Data Type	Constraints
Customer_ID	INT	PRIMARY KEY, FOREIGN KEY → Customer(Customer_ID)
Loan_Number	INT	PRIMARY KEY, FOREIGN KEY → Loan(Loan_Number)

- **Deposit(Customer_ID (PK, FK), Account_ID (PK, FK))**

Attribute	Data Type	Constraints
Customer_ID	INT	PRIMARY KEY, FOREIGN KEY → Customer(Customer_ID)
Account_ID	INT	PRIMARY KEY, FOREIGN KEY → Account(Account_ID)

- **Transfer_Money(From_Account_ID (FK), To_Account_ID (FK))**

Attribute	Data Type	Constraints
From_Account_ID	INT	FOREIGN KEY → Account(Account_ID)
To_Account_ID	INT	FOREIGN KEY → Account(Account_ID)

- **Banker(Employee_ID (PK, FK), Customer_ID (PK, FK))**

Attribute	Data Type	Constraints
Employee_ID	INT	PRIMARY KEY, FOREIGN KEY → Employee(Employee_ID)
Customer_ID	INT	PRIMARY KEY, FOREIGN KEY → Customer(Customer_ID)

- **Loan_Payment(Loan_Number (PK, FK), Payment_ID (PK, FK))**

Attribute	Data Type	Constraints
Loan_Number	INT	PRIMARY KEY, FOREIGN KEY → Loan(Loan_Number)
Payment_ID	INT	PRIMARY KEY, FOREIGN KEY → Payment(Payment_ID)

- **Originated_By(Branch_Name (PK, FK), Loan_Number (PK, FK))**

Attribute	Data Type	Constraints
Branch_Name	VARCHAR(100)	PRIMARY KEY, FOREIGN KEY → Branch(Branch_Name)
Loan_Number	INT	PRIMARY KEY, FOREIGN KEY → Loan(Loan_Number)

Integrity Constraints

- **Primary Keys:** Each table has a unique primary key to ensure data integrity.
- **Foreign Keys:** Relationships are enforced using foreign key constraints to maintain referential integrity.
- **Domain Constraints:** Attributes like balance, interest rate, and transaction amount have constraints to prevent invalid values.
- **Unique Constraints:** Customer phone numbers and employee contact numbers are unique.

Group members

S.NO	NAME	ROLL NO
1	Prateek Dhar	2023388
2	Umang Aggarwal	2023567
3	Priyanshu Sharma	2023408
4	Vansh tyagi	2023582