BANKING MANAGEMENT SYSTEM

1. PROJECT DESCRIPTION

The Banking Management System is a comprehensive software application designed to manage and streamline core banking operations. The system will handle various customer-related processes, such as account management, loan management, and transaction tracking. It will also provide tools for employees to manage customer interactions, oversee financial activities, and ensure efficient banking operations.

2. BUSINESS REQUIREMENTS

The Bank Management System (BMS) is designed to manage the operations and information associated with customers, bank accounts, loans, transactions, and employees in a banking organization. The key goals are to streamline banking processes, maintain accurate records, ensure secure handling of transactions, and provide detailed reporting for decision-making.

1. Customer Management

- The system will register and maintain customer information, including:
    - Personal details such as Customer ID, Name, Date of Birth (DOB), Address (Street, City, State, Pincode), Phone Number, and Aadhaar Number.
    - The system will calculate the customer's **age** based on DOB and categorize customers as **minor**, **adult**, or **senior citizen** for eligibility (e.g., loans, accounts).
- Customers can update their address or phone number if needed.

> ## 📎 Customer
>
> - **Entity Type**: Strong Entity
> - **Attributes**:
>   - **Customer ID** (Primary Key): A unique identifier for each customer.
>   - **Name**: Full name of the customer.
>   - **Date of Birth (DOB)**: Birth date of the customer, used for identity and age calculations.
>   - **Age** (Derived): Computed based on the DOB.
>   - **Phone Number** (Unique): A unique contact number for the customer.
>   - **Address** (Composite): Includes multiple sub-attributes for storing the full address:
>   - **Street Number** and **Street Name**: Details of the customer's street address.
>   - **City**: City where the customer resides.
>   - **State**: State of residence.
>   - **Pincode**: Postal code for the address.
> - **Keys**:
>   - **Primary Key**: Customer ID.
>   - **Derived Key**: Age.

2. Account Management

- Customers can open one or more types of bank accounts:
  - **Savings Account:** Includes features like a daily withdrawal limit and interest rates.
  - **Current Account:** Includes transaction charges for business transactions.
- Each account will have a unique Account ID and record the current balance.
- Customers can transfer funds between accounts or to other customers' accounts.
- The system maintains transaction logs, capturing details such as Transaction ID, Date, Amount, and Sender/Receiver details.

Account

- **Entity Type**: Strong Entity
- **Description**: Represents bank accounts of various types, storing account details and balances.
- **Attributes**:
  - **Account ID** (Primary Key): A unique identifier for each account.
  - **Balance**: Current balance available in the account.
- **Subtypes**:
  - **Savings Account**:
    - **Rate of Interest**: Interest rate applicable for savings accounts.
    - **Daily Withdrawal Limit**: Maximum allowable daily withdrawal for the account.
  - **Current Account**:
    - **Transaction Charges**: Charges applied for each transaction in a current account.
- **Keys**:
  - **Primary Key**: Account ID.
- **Relationships**:
  - **Deposit**: Links accounts with customers who own them.
  - **Transfers Money**: Represents transactions involving account transfers.

3. Loan Management

- Customers can apply for different loan types (e.g., personal, education, home loans). Each loan will be associated with:
  - Loan Number, Amount, and the branch where it originated.
  - A repayment schedule and payment records to track installments.
- The system ensures that customers meet the loan eligibility criteria based on their income, account balance, or collateral.
- Loan repayment is tracked, and penalties are calculated for delayed payments.

📎 Loan

- **Entity Type**: Strong Entity
- **Description**: Represents loans issued by the bank, storing loan details.
- **Attributes**:
  - **Loan Number** (Primary Key): A unique identifier for each loan.
  - **Amount**: Principal amount of the loan.
- **Keys**:
  - **Primary Key**: Loan Number.
- **Relationships**:
  - **Borrow**: Links loans with customers borrowing them.
  - **Loan Payment**: Tracks payments made toward loans.

4. Branch and Employee Management

- The system maintains details of all branches, including Branch Name, Branch City, Assets, and Liabilities.
- Employees are associated with specific branches and are managed through:
  - Employee ID, Name, Contact Number, Start Date, and Years of Service.
- Employees can serve as bankers for customer accounts and loan processing.

📎 Employee

- **Entity Type**: Strong Entity
- **Description**: Stores information about employees managing customer accounts and services.
- **Attributes**:
  - **Employee ID** (Primary Key): A unique identifier for each employee.
  - **Name**: Full name of the employee.
  - **Contact Number**: Phone number for employee communication.
  - **Start Date**: The date the employee began working at the bank.
  - **Years of Service** (Derived): Computed based on the Start Date.
- **Keys**:
  - **Primary Key**: Employee ID.
  - **Derived Key**: Years of Service.
- **Relationships**:
  - **Managed By**: Links employees with customers and accounts they oversee.

Branch

- **Entity Type**: Strong Entity
- **Description**: Represents the bank's branch offices, detailing their location and financial status.
- **Attributes**:
  - **Branch Name** (Primary Key): A unique name identifying the branch.
  - **Branch City**: The city where the branch is located.
  - **Assets**: Total value of the branch's owned assets.
  - **Liabilities**: Total liabilities or debts of the branch.
- **Keys**:
  - **Primary Key**: Branch Name.
- **Relationships**:
  - **Originated By**: Connects branches with the loans they originate.

5. Transactions

- Customers can perform the following transactions:
  - Deposits, Withdrawals, Transfers, and Loan Payments.
- Transactions are recorded with unique IDs, timestamps, and associated accounts.
- Real-time balance updates are reflected after each transaction.

Payment

- **Entity Type**: Weak Entity (Dependent on Loan)
- **Description**: Represents payments made for loans.
- **Attributes**:
  - **Payment ID** (Primary Key): A unique identifier for each payment.
  - **Payment Date**: The date the payment was made.
  - **Payment Amount**: Amount paid for the loan.
- **Keys**:
  - **Primary Key**: Payment ID.
  - **Foreign Key**: References the **Loan Number** from the Loan entity.
- **Relationships**:
  - Part of the **Loan Payment** relationship.

> 📎 **Transaction**
>
> - **Entity Type**: Weak Entity (Dependent on Account)
> - **Description**: Represents transactions that occur within or between accounts.
> - **Attributes**:
>   - **Transaction ID** (Primary Key): A unique identifier for each transaction.
>   - **Transaction Date**: Date of the transaction.
>   - **Transaction Amount**: Amount involved in the transaction.
> - **Keys**:
>   - **Primary Key**: Transaction ID.
>   - **Foreign Key**: References the **Account ID** from the Account entity.
> - **Relationships**:
>   - Part of the **Transfers Money** relationship.

6. Reporting and Analysis

- The system generates reports for:
    - Total accounts and customers by branch.
    - Loan approvals, repayments, and default rates.
    - Transactions (e.g., deposits, withdrawals, and fund transfers).
    - Employee performance and customer service feedback.
- Categorizes customer segments (e.g., high-value clients) for marketing campaigns.

7. Security and Compliance

- The system ensures customer data security through encrypted storage.
- Follows compliance regulations such as **KYC (Know Your Customer)** and AML (Anti-Money Laundering) requirements.

Relationships and Keys

1. Borrow

- **Type**: Many-to-Many Relationship
- **Description**: Represents the relationship between customers and loans.
- **Keys**:
    - **Composite Primary Key**: Combination of Customer ID and Loan Number.
    - **Foreign Keys**:
        - Customer ID from the Customer entity.
        - Loan Number from the Loan entity.

2. Deposit

- **Type**: Many-to-Many Relationship
- **Description**: Represents the relationship between customers and their accounts.
- **Keys**:
  - **Composite Primary Key**: Combination of Customer ID and Account ID.
  - **Foreign Keys**:
    - Customer ID from the Customer entity.
    - Account ID from the Account entity.

3. Loan Payment

- **Type**: One-to-Many Relationship
- **Description**: Tracks payments associated with specific loans.
- **Keys**:
  - **Primary Key**: Payment ID.
  - **Foreign Key**: Loan Number from the Loan entity.

4. Transfers Money

- **Type**: Many-to-Many Relationship
- **Description**: Represents transactions involving account transfers.
- **Keys**:
  - **Composite Primary Key**: Combination of Account ID and Transaction ID.
  - **Foreign Keys**:
    - Account ID from the Account entity.
   - Transaction ID from the Transaction entity.

5. Managed By

- **Type**: One-to-Many Relationship
- **Description**: Links employees to the customers and accounts they manage.
- **Keys**:
  - **Foreign Key**: Employee ID from the Employee entity.

6. Originated By

- **Type**: One-to-Many Relationship
- **Description**: Links loans to the branches that originate them.
- **Keys**:
  - **Foreign Key**: Branch Name from the Branch entity.

Entity/Relationship	Primary Key	Foreign Key	Derived Key
Customer	Customer ID	None	Age
Employee	Employee ID	None	Years of Service
Branch	Branch Name	None	None
Account	Account ID	None	None
Loan	Loan Number	None	None
Payment	Payment ID	Loan Number	None
Transaction	Transaction ID	Account ID	None
Borrow	Composite of Customer ID, Loan Number	Customer ID, Loan Number	None
Deposit	Composite of Customer ID, Account ID	Customer ID, Account ID	None
Transfers Money	Composite of Account ID, Transaction ID	Account ID, Transaction ID	None
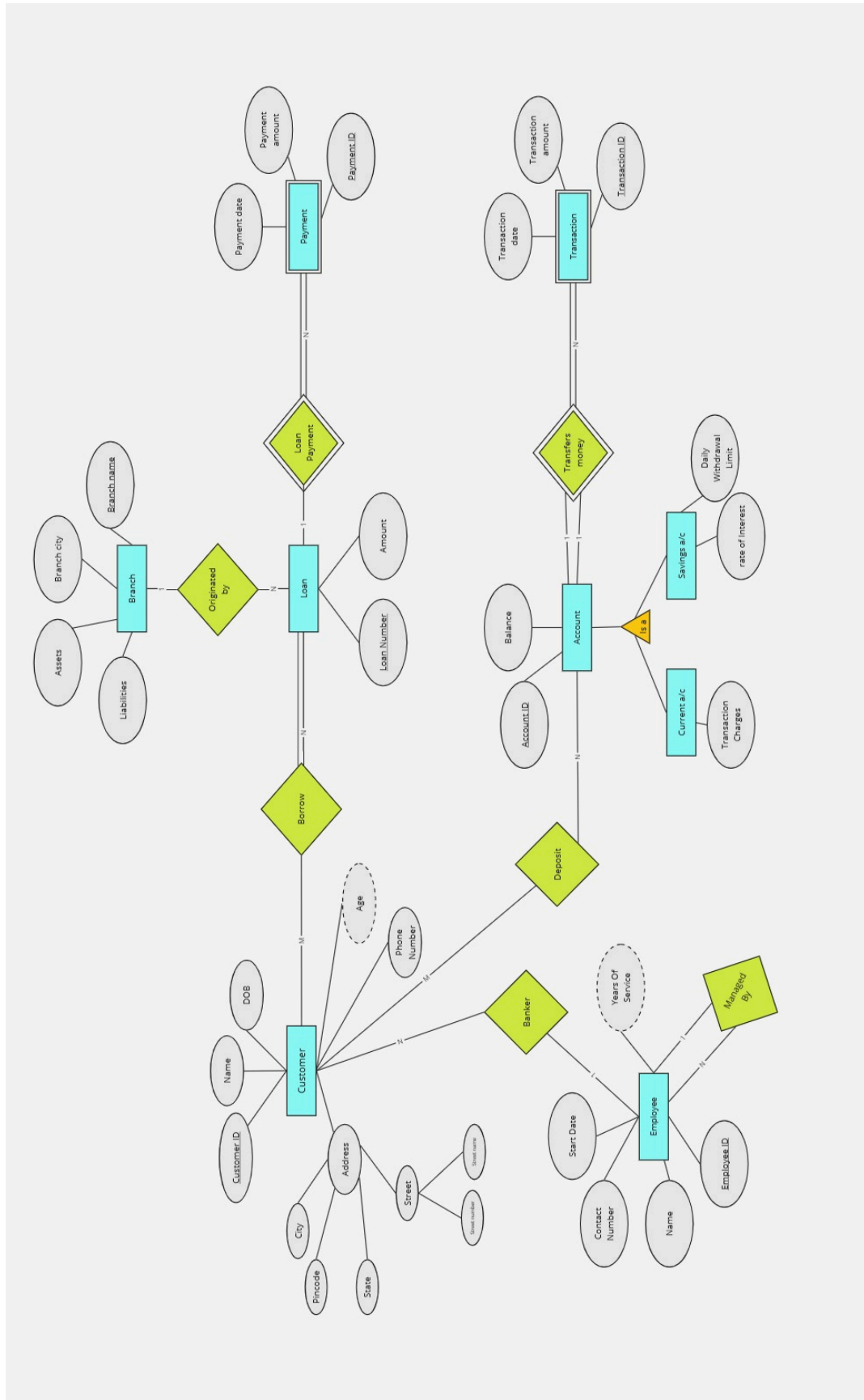
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3. GROUP MEMBERS

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4. REFERENCES

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3. Miro for making the ER-model