

# **Title: Online Bank Management System**

- **Subtitle:** Ex. 3 Requirement modelling using Entity Relationship Diagram (Structural Modeling) using StarUML
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# 1. Entities and Attributes

## 1. Customer

- Attributes: **CustomerID (PK)**, Name, Email, PhoneNumber, Address, DateOfBirth, AccountType, RegistrationDate, Password.

## 2. Account

- Attributes: **AccountID (PK)**, **CustomerID (FK)**, **BranchID (FK)**, AccountType, Balance, OpeningDate, Status.

## 3. Transaction

- Attributes: **TransactionID (PK)**, **AccountID (FK)**, TransactionDate, Amount, TransactionType, BalanceAfterTransaction, TransactionMode, TransactionDescription.

## 4. Branch

- Attributes: **BranchID (PK)**, BranchName, BranchAddress, PhoneNumber, **ManagerID (FK)**.

## 5. Manager

- Attributes: **ManagerID (PK)**, Name, Email, PhoneNumber, **AssignedBranchID (FK)**.

## 6. Loan

- Attributes: **LoanID (PK)**, **CustomerID (FK)**, **BranchID (FK)**, LoanType, LoanAmount, InterestRate, ApprovalDate, Status, PaymentSchedule.

## 7. Employee

- Attributes: **EmployeeID (PK)**, Name, Email, PhoneNumber, **BranchID (FK)**, Role, JoiningDate, Salary.

## 8. Service Request

- Attributes: **RequestID (PK)**, **CustomerID (FK)**, RequestDate, RequestType, Status, **AssignedEmployeeID (FK)**.

## 9. Card

- Attributes: CardID (PK), CustomerID (FK), CardType, CardNumber, ExpiryDate, CVV, IssueDate, Status.

## 10. Payment Gateway

- Attributes: GatewayID (PK), GatewayName, TransactionID (FK), GatewayStatus, ProcessingFee.

## 2. Relationships and Cardinality

### 1. Customer - Account

- **Relationship:** A customer can have one or more accounts. Each account belongs to one customer.
- **Cardinality:** 1:N.

### 2. Account - Transaction

- **Relationship:** An account can have multiple transactions. Each transaction is associated with one account.
- **Cardinality:** 1:N.

### 3. Customer - Loan

- **Relationship:** A customer can have one or more loans. Each loan belongs to one customer.
- **Cardinality:** 1:N.

### 4. Branch - Account

- **Relationship:** A branch can host multiple accounts. Each account is associated with one branch.
- **Cardinality:** 1:N.

### 5. Branch - Loan

- **Relationship:** A branch can issue multiple loans. Each loan is associated with one branch.
- **Cardinality:** 1:N.

### 6. Branch - Manager

- **Relationship:** A branch is managed by one manager. A manager can be assigned to one branch.
- **Cardinality:** 1:1.

### 7. Branch - Employee

- **Relationship:** A branch can employ multiple employees. Each employee is assigned to one branch.
- **Cardinality:** 1:N.

### 8. Customer - Service Request

- **Relationship:** A customer can raise one or more service requests. Each request is linked to one customer.

- **Cardinality:** 1:N.

## **9. Service Request - Employee**

- **Relationship:** A service request can be assigned to one employee. An employee can handle multiple service requests.
- **Cardinality:** N:1.

## **10. Customer - Card**

- **Relationship:** A customer can have multiple cards (credit, debit). Each card is issued to one customer.
- **Cardinality:** 1:N.

## **11. Transaction - Payment Gateway**

- **Relationship:** A transaction can be processed through one payment gateway. A payment gateway handles multiple transactions.
- **Cardinality:** 1:N.

### 3. Final ER Diagram Details

#### Primary Keys (PK):

- CustomerID for **Customer**.
- AccountID for **Account**.
- TransactionID for **Transaction**.
- BranchID for **Branch**.
- ManagerID for **Manager**.
- LoanID for **Loan**.
- EmployeeID for **Employee**.
- RequestID for **Service Request**.
- CardID for **Card**.
- GatewayID for **Payment Gateway**.

#### Foreign Keys (FK):

- CustomerID in **Account, Loan, Service Request, Card**.
- BranchID in **Account, Loan, Employee**.
- AccountID in **Transaction**.
- TransactionID in **Payment Gateway**.
- AssignedEmployeeID in **Service Request**.
- ManagerID in **Branch**.

# E-R Diagram

