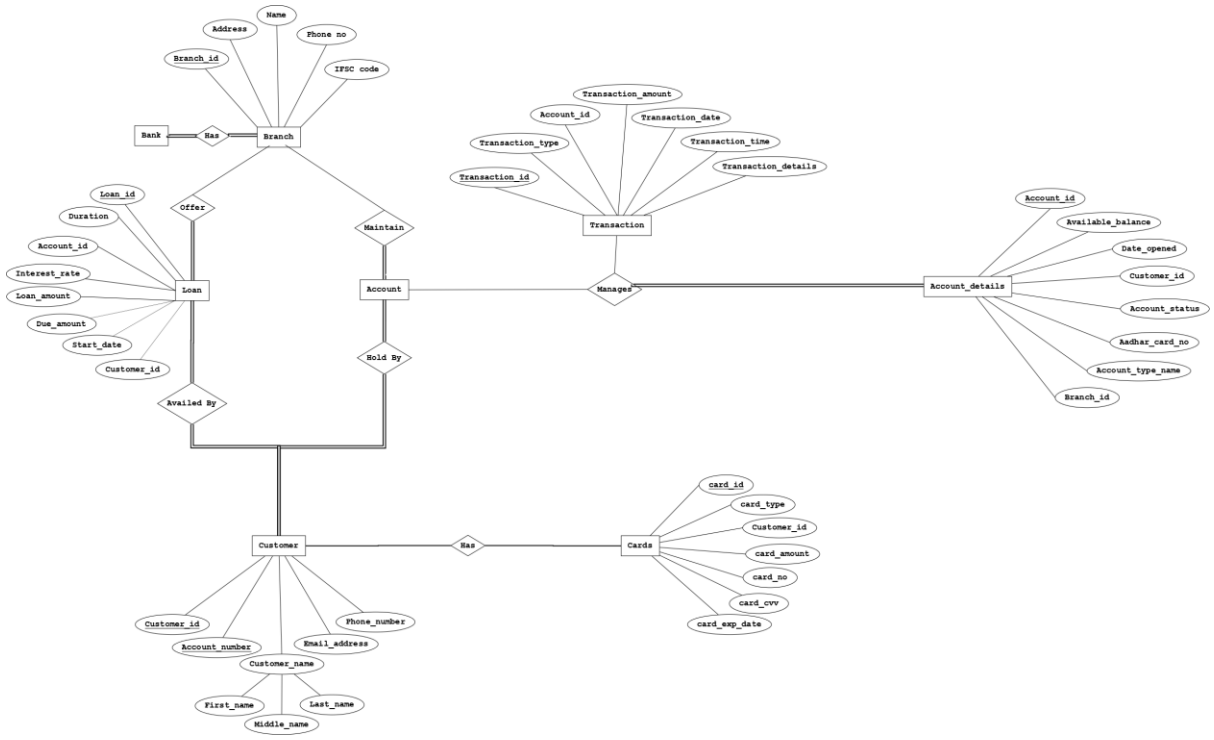
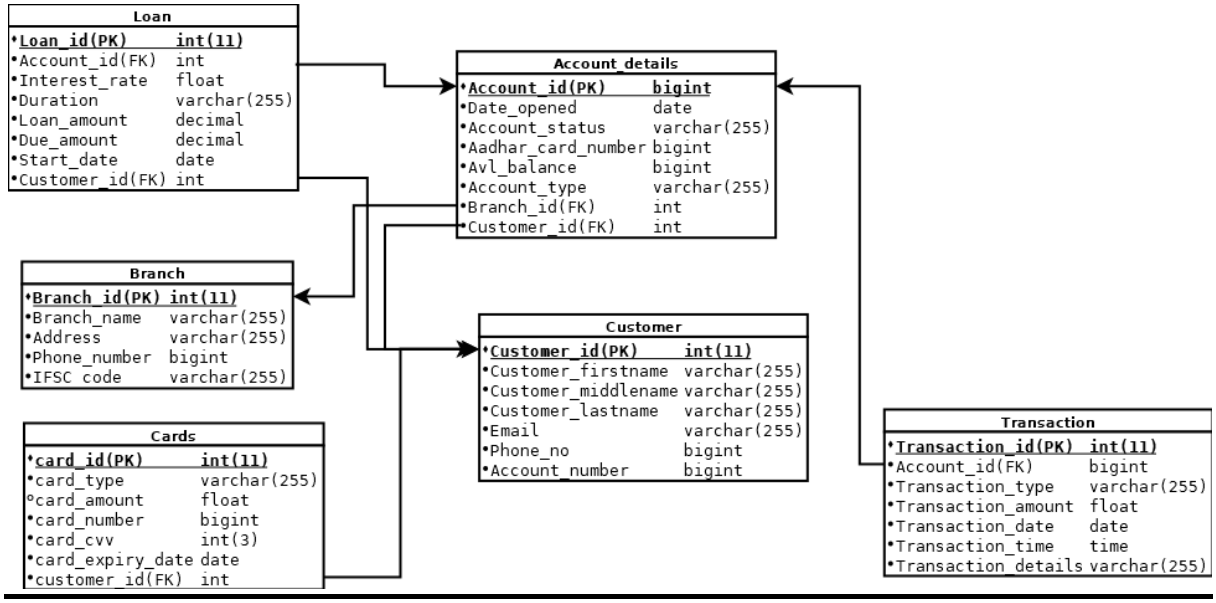
Group 24 - Banking Management System

ER-DIAGRAM



RELATIONAL SCHEMA



FUNCTIONAL DEPENDENCIES AND CONSTRAINTS CLASSIFICATION

1. Table Name : branch (branch_id, branch_name, address, phone_no, ifsc_code)

   - Primary Key : branch_id
   - Functional Dependencies :

     branchi_id → branch_name

     branch_id → address

     branch_id → phone_no

     branch_id → ifsc_code

   - Constraints :
     - Primary Key : branch_id
     - Foreign Key : none
     - Referential : account_details
     - Domains :

```
BRANCH_ID INTEGER NOT NULL,
BRANCH_NAME VARCHAR(255) NOT NULL,
ADDRESS VARCHAR(255) NOT NULL,
PHONE_NO BIGINT NOT NULL,
IFSC_CODE VARCHAR(255) NOT NULL UNIQUE,
PRIMARY KEY (BRANCH_ID)
```

   - Candidate Key : branch_id
   - Here, as we have branch_id as candidate key which defines all the attributes, so our relation is in BCNF Form.

2. Table Name : Loan (loan_id, interest_rate, duration, loan_amount, due_amount, start_date, account_id, customer_id)

   - Primary Key : loan_id
   - Functional Dependencies :

loan_id → interest_rate

loan_id → duration

loan_id → loan_amount

loan_id → due_amount

loan_id → start_date

- Constraints :
  - Primary Key : loan_id
  - Foreign Key : account_id, customer_id
  - Referential : none
  - Domains :

```
LOAN_ID INTEGER PRIMARY KEY,
    ACCOUNT_ID INTEGER ,
    INTEREST_RATE FLOAT NOT NULL,
    DURATION VARCHAR(255) NOT NULL,
    LOAN_AMOUNT DECIMAL NOT NULL,
    DUE_AMOUNT  DECIMAL NOT NULL,
    START_DATE DATE NOT NULL,
    CUSTOMER_ID INTEGER ,
    FOREIGN KEY (CUSTOMER_ID) REFERENCES CUSTOMER(CUSTOMER_ID) ON DELETE SET DEFAULT ON UPDATE CASCADE,
    FOREIGN KEY (ACCOUNT_ID) REFERENCES ACCOUNT_DETAILS(ACCOUNT_ID) ON DELETE SET DEFAULT ON UPDATE CASCADE
```

- Candidate Key : loan_id
- Here, as we have loan_id as candidate key which defines all the attributes, so our relation is in BCNF Form.

3. Table Name : Customers (customer_id, account_no, customer_firstname, coustomer_middlename, customer_lastname, emai ,phone_no)

- Primary Key : customer_id
- Functional Dependencies :

customer_id → account_no

customer_id → customer_firstname

customer_id → coustomer_middlename

customer_id → customer_lastname

customer_id → email

customer_id → phone_no

- Constraints :
  - Primary Key : customer_id
  - Foreign Key : none
  - Referential : loan, cards, account_details
  - Domains :

```
CUSTOMER_ID INTEGER PRIMARY KEY,

ACCOUNT_NO BIGINT NOT NULL UNIQUE,

CUSTOMER_FIRSTNAME VARCHAR(255) NOT NULL,

CUSTOMER_MIDDLENAME VARCHAR(255) NOT NULL,

CUSTOMER_LASTNAME VARCHAR(255) NOT NULL,

EMAIL VARCHAR(255) NOT NULL CHECK (EMAIL LIKE '%@%.%' AND EMAIL
NOT LIKE '@%' AND EMAIL NOT LIKE '%@%@%'),

PHONE_NO BIGINT NOT NULL
```

- Candidate Key : customer_id, account_no
- Here, as we have customer_id and account_no as candidate keys which defines all the attributes, so our relation is in BCNF Form.

4. Table Name : Cards (card_id, card_number, card_type, card_amount, card_CVV, card_expiry_date, customer_id)

- Primary Key : card_id
- Functional Dependencies :

card_id →card_number

card_id →card_type

card_id →card_amount

card_id →card_CVV

card_id →card_expiry_date

- Constraints :
  - Primary Key : card_id
  - Foreign Key : customer_id
  - Referential : none
  - Domains :

```
CARD_ID INTEGER PRIMARY KEY,
    CARD_TYPE VARCHAR(255) NOT NULL,
    CARD_AMOUNT FLOAT,
    CARD_NUMBER BIGINT NOT NULL,
    CARD_CVV INTEGER NOT NULL,
    CARD_EXPIRYDATE DATE NOT NULL,
    CUSTOMER_ID INTEGER,
    FOREIGN KEY (CUSTOMER_ID) REFERENCES CUSTOMER(CUSTOMER_ID) ON DELETE SET DEFAULT ON UPDATE CASCADE
```

- Candidate Key : card_id
- Here, as we have card_id as candidate keys which defines all the attributes, so our relation is in BCNF Form.

5. Table Name : Account_details (account_id, date_opened, , aadhar_card_number, account _satus, account _type, customer_id, branch_id)

- Primary Key : account_id
- Functional Dependencies :

  account_id → date_opened

  account_id → accout_status

  account_id → aadhar_card_number

  account_id → avl_balance

  account_id → account_type

- Constraints :
  - Primary Key : account_id
  - Foreign Key : customer_id, branch_id
  - Referential : loan, transaction

- Domains :

ACCOUNT_ID BIGINT PRIMARY KEY,

DATE_OPENED DATE NOT NULL,

ACCOUNT_STATUS VARCHAR(255) NOT NULL,

AADHAR_CARD_NUMBER BIGINT NOT NULL,

AVL_BALANCE BIGINT DEFAULT 5000,

ACCOUNT_TYPE VARCHAR(255) NOT NULL,

CUSTOMER_ID INTEGER ,

FOREIGN KEY (CUSTOMER_ID) REFERENCES CUSTOMER(CUSTOMER_ID) ON DELETE SET DEFAULT ON UPDATE CASCADE,

BRANCH_ID INTEGER ,

FOREIGN KEY (BRANCH_ID) REFERENCES BRANCH(BRANCH_ID) ON DELETE SET DEFAULT ON UPDATE CASCADE

- Candidate Key : account_id
- Here, as we have account_id as candidate keys which defines all the attributes, so our relation is in BCNF Form.

6. Table Name : Transactions(transaction_id, transaction _type, transaction_amount, transaction_date, transaction_time, transaction_details, account_id)

- Primary Key : transaction_id
- Functional Dependencies :

transaction _id → transaction_id

transaction _id → transaction_type

transaction _id → transaction _amount

transaction _id → transaction _date

transaction _id → transaction _time

- Constraints :
  - Primary Key : transaction_id
  - Foreign Key : account_id
  - Referential : none
  - Domains :

TRANSACTION_ID INTEGER PRIMARY KEY,

```
ACCOUNT_ID BIGINT,

TRANSACTION_TYPE VARCHAR(255) NOT NULL ,

TRANSACTION_AMOUNT FLOAT NOT NULL CHECK
(TRANSACTION_AMOUNT>0),

TRANSACTION_DATE DATE NOT NULL ,

TRANSACTION_TIME TIME NOT NULL,

TRANSACTION_DETAILS VARCHAR(255) NOT NULL ,

FOREIGN KEY (ACCOUNT_ID) REFERENCES
ACCOUNT_DETAILS(ACCOUNT_ID) ON DELETE SET DEFAULT ON UPDATE CASCADE
```

- Candidate Key : transaction_id
- Here, as we have transaction _id as candidate keys which defines all the attributes, so our relation is in BCNF Form.

⇒ As all the attributes are directly dependent on the key, the relation is in BCNF. As it is in BCNF it also confirms 3NF, 2NF and 1NF.