2025

DATABASE DESIGN CASE-STUDY ARTICLE

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FEB 3RD

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MISSION

To design and maintain a reliable, efficient, secure database system for Ekpache Nkome Micro-Finance Bank to serve all banking operations in handling customer data, financial transactions, and business processes for optimal service delivery, regulatory compliance, and decision-making.

OBJECTIVES

Centralized Data Management: Ensure all customer, account, and transaction data is stored in a unified and easily accessible system to avoid redundancy and maintain data integrity.

Enhance Transaction Accuracy and Security: Automate the recording and tracking of deposits, withdrawals, and transfers while safeguarding sensitive data against unauthorized access.

Improve Operational Efficiency: Automate routine tasks such as account management, transaction recording, and loan processing to minimize errors and save time.

Enable Data-Driven Decision-Making: Use the database to generate insights through analytics, such as identifying trends in customer behavior, evaluating loan performance, and optimizing branch operations for strategic growth.

CONSTRAINTS

- A transaction must be fully completed or fully rolled back if any part fails.
- Transactions must maintain data integrity and follow banking constraints
- An account must exist and be active before any transaction can be made.
- Transactions should expire if not completed within a certain time
- Transactions above a certain limit must trigger an automatic security check**.**
- Transactions should be processed in real-time for customer satisfaction.

PRELIMINARY LIST OF TABLES

Branch

Accounts

Customers

~~Bankers~~

Loan

~~Borrowers~~

Transactions

~~Loan Payments~~

Credit Cards

FINAL LIST OF TABLES

Branch

Accounts

Customers

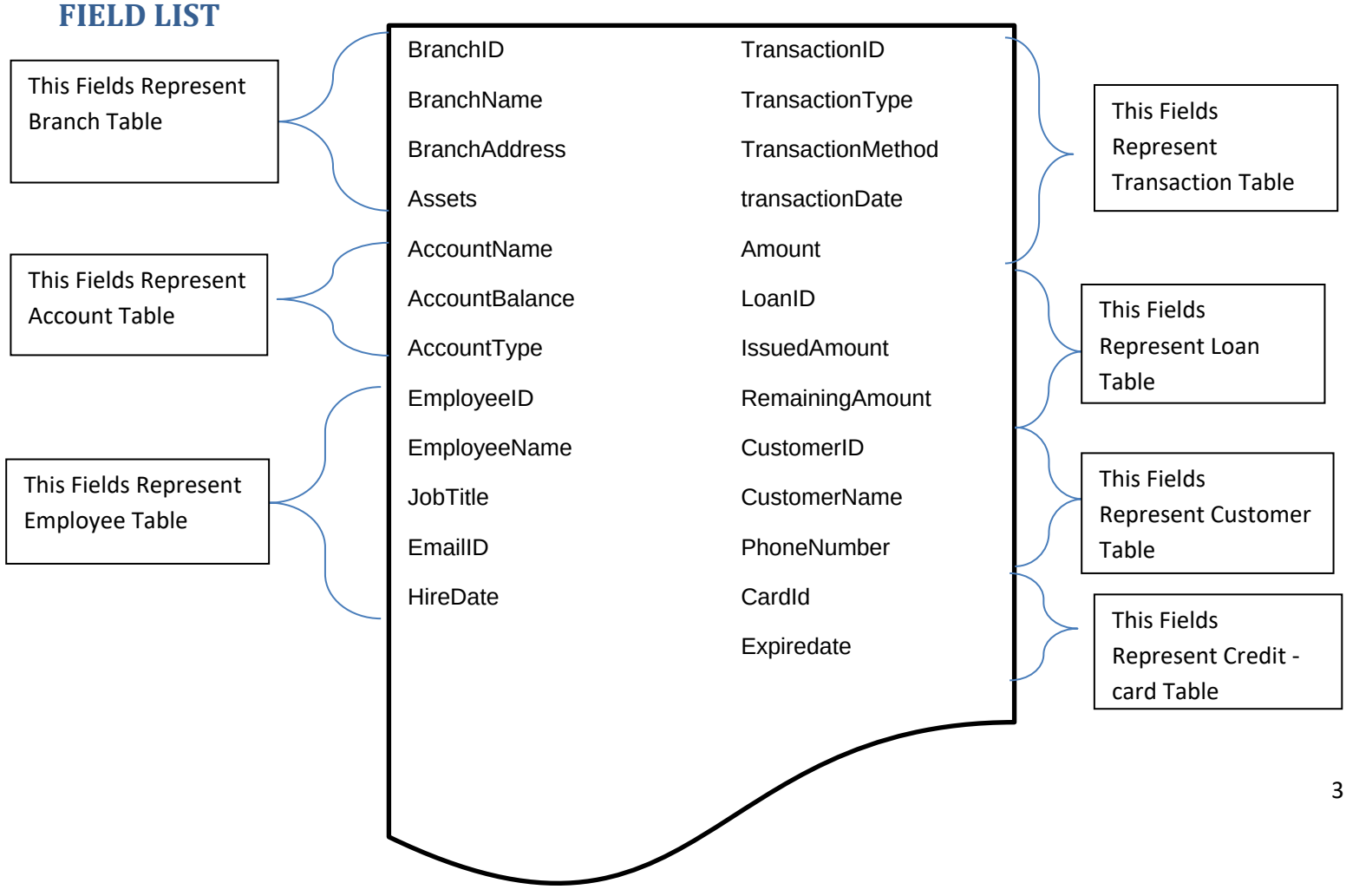
Employees

Loan

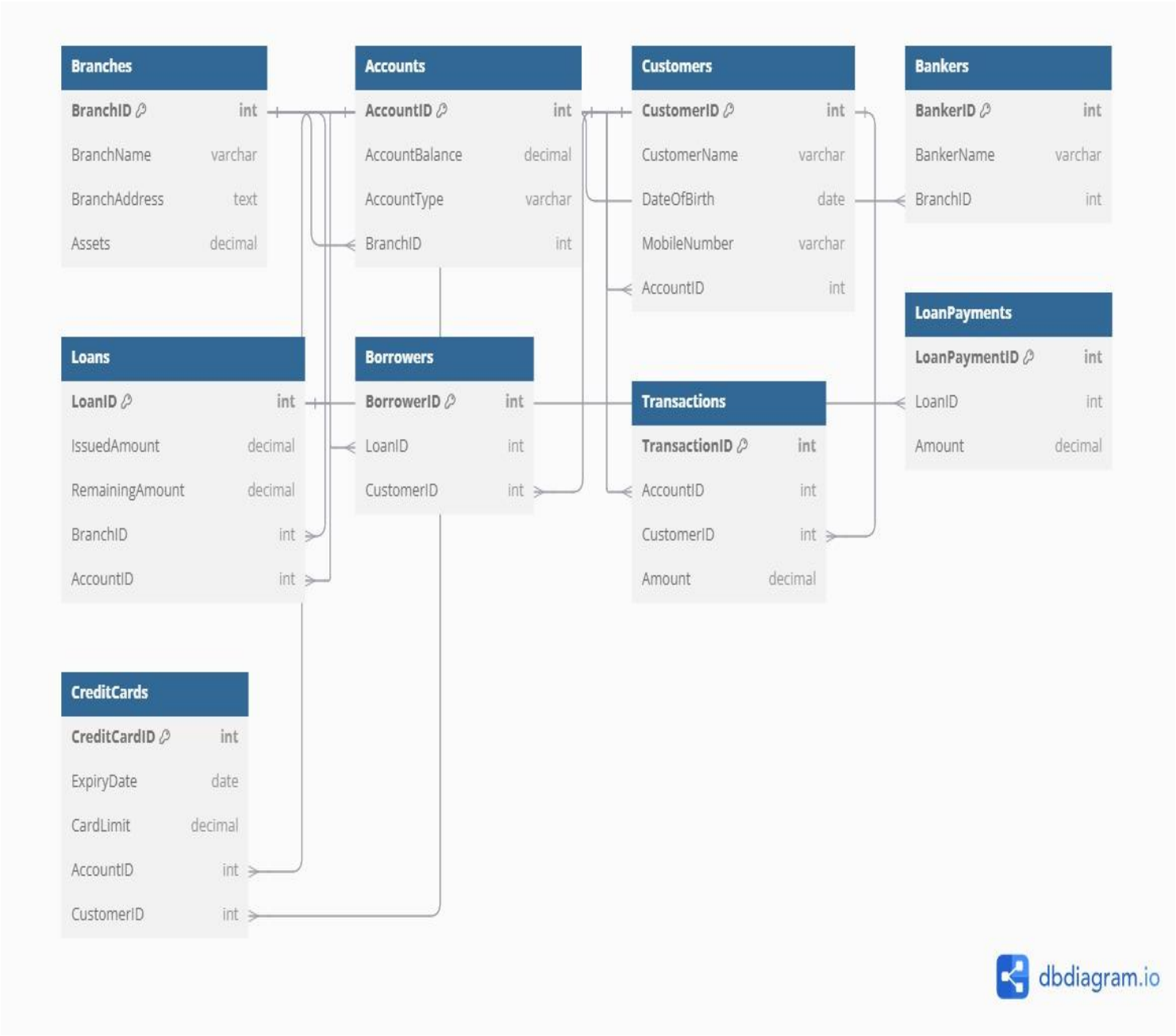
Transactions

Credit cards

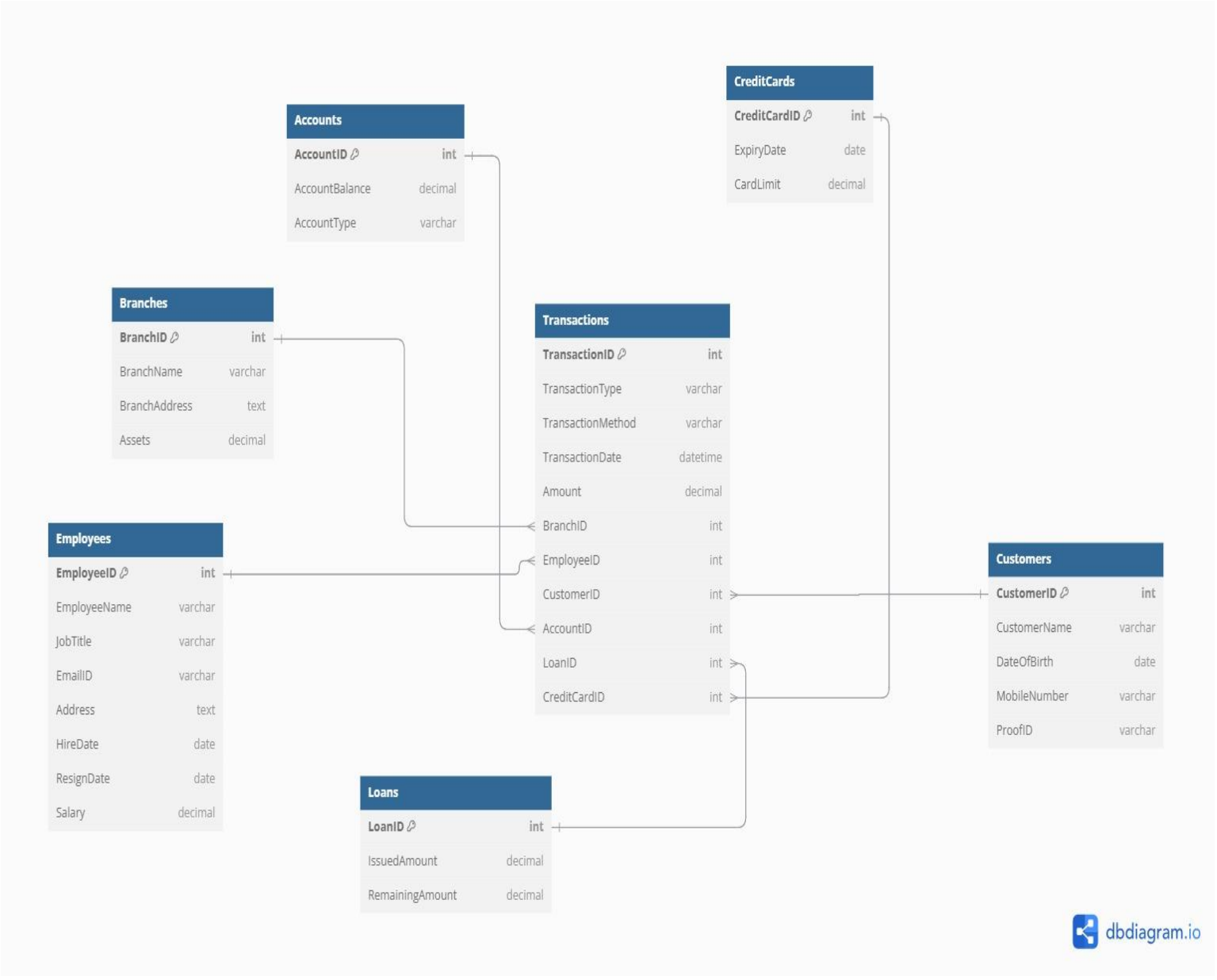
FIELD LIST



PRELIMINARY ER DIAGRAM



FINAL ER DIAGRAM

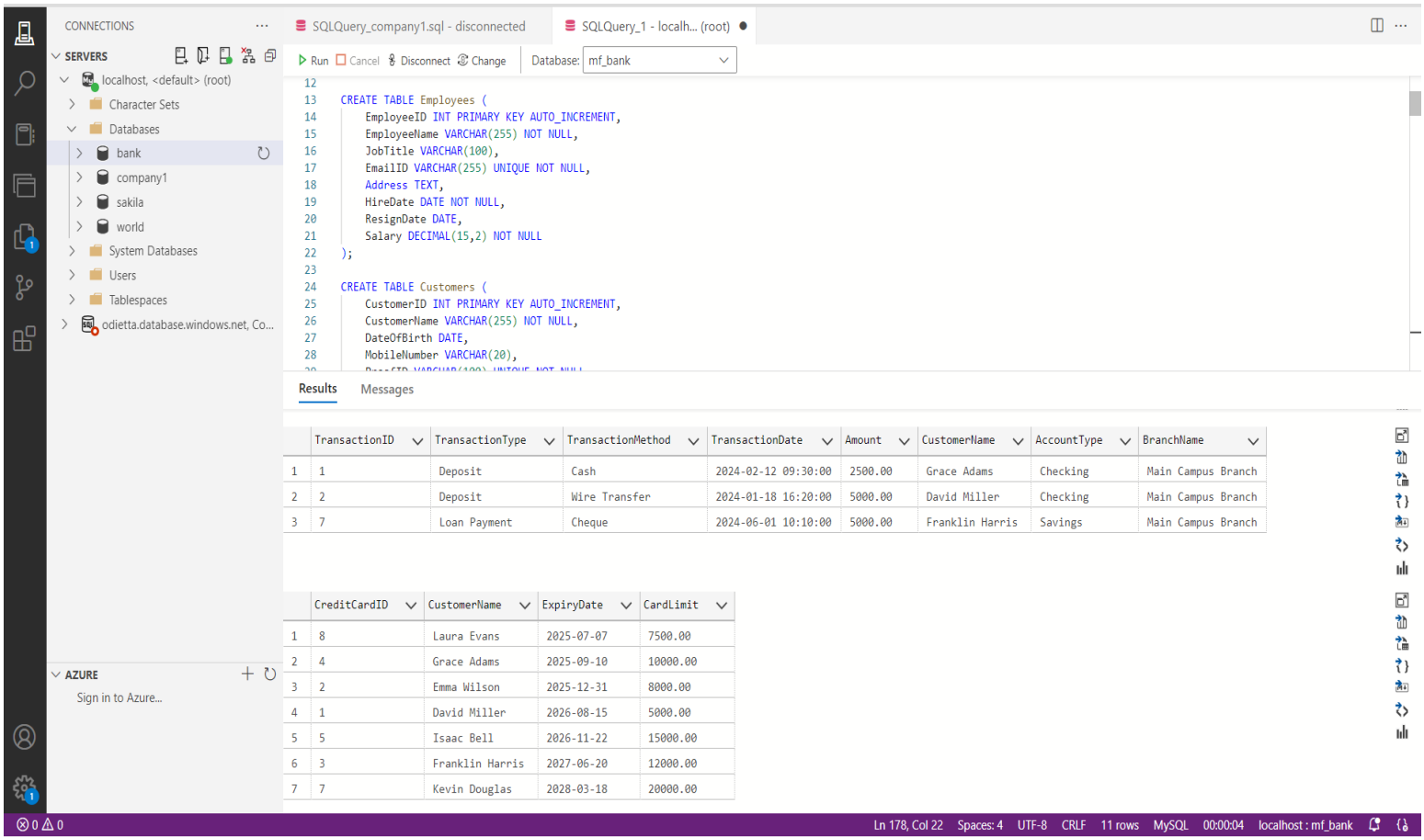


RELATIONSHIP BETWEEN TABLES

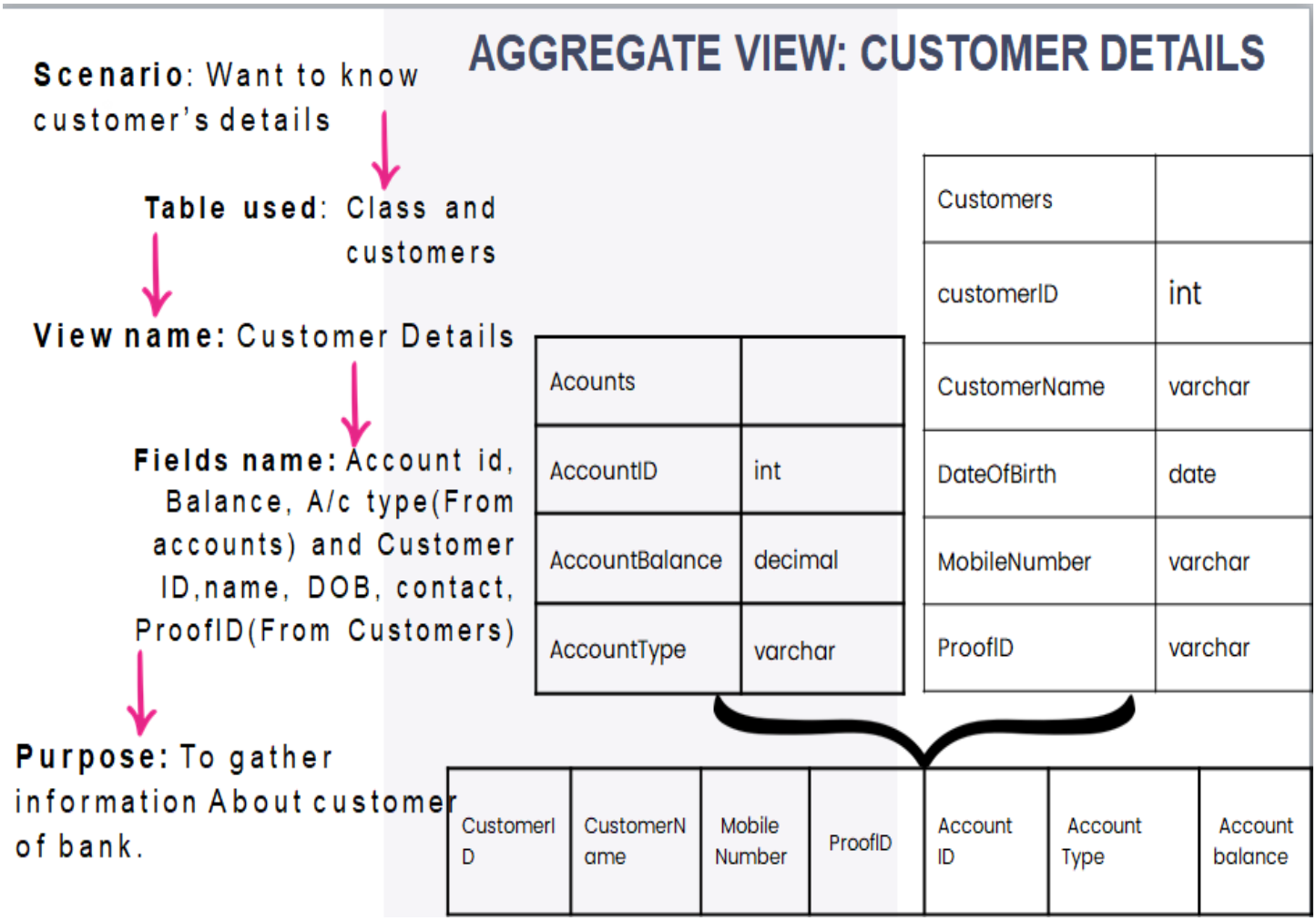
Relationship	Parent Table	Child Table	Relationship Type
One Branch to Many Transactions	Branches	Transactions	One-to-Many (1:N)
One Employee to Many Transactions	Employees	Transactions	One-to-Many (1:N)
One Customer to Many Transactions	Customers	Transactions	One-to-Many (1:N)
One Account to Many Transactions	Accounts	Transactions	One-to-Many (1:N)

One Loan to Many Transactions	Loans	Transactions	One-to-Many (1:N)
One CreditCard to Many Transactions	CreditCards	Transactions	One-to-Many (1:N)

DATABASE DESIGN



AGGREGRATE VIEWS

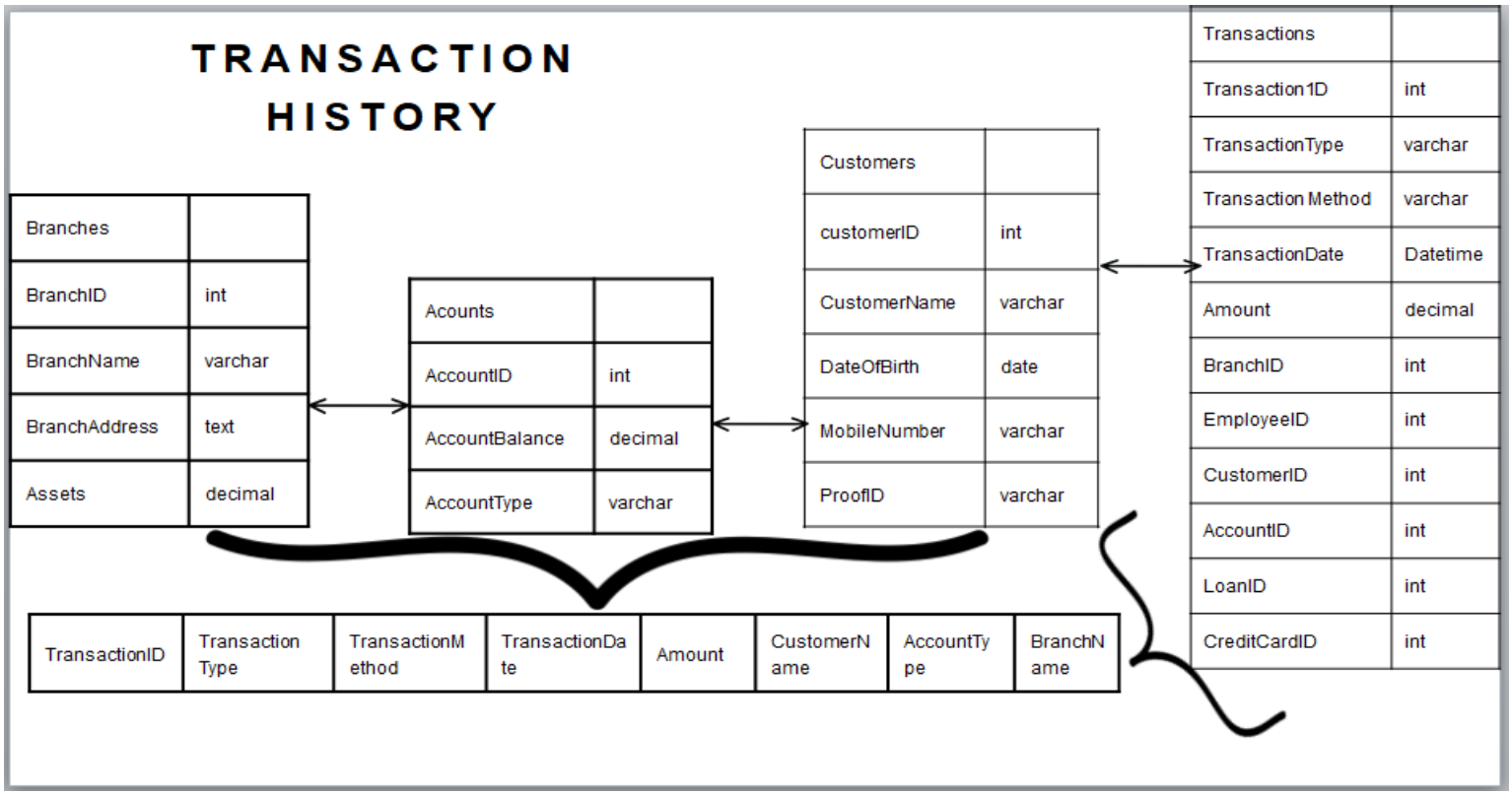


SQL Database Query

```
143    CREATE VIEW CustomerAccountDetails AS
144    SELECT
145        c.CustomerID,
146        c.CustomerName,
147        c.MobileNumber,
148        c.ProofID,
149        a.AccountID,
150        a.AccountType,
151        a.AccountBalance
152    FROM Customers c
153    JOIN Accounts a ON c.CustomerID = a.AccountID;
154
155    SELECT * FROM CustomerAccountDetails WHERE MobileNumber = '403-345-6789';
```

Results Messages

	CustomerID	CustomerName	MobileNumber	ProofID	AccountID	AccountType	AccountBalance
1	3	Franklin Harris	403-345-6789	DL-AB-789012	3	Business	2300.75



1.Scenario: want to the transaction history of the customer

2.TABLE USED: ACCOUNTS, BRANCHES, CUSTOMER, TRANSACTION

3.Fields name: Branch name(From branch table). Transaction Id, type, Method, date, Amount,(From Transaction Table). Account type(From Account table). Customer name(From Customer table).

4.View name: Transaction Histroy

5.Purpose: TO Gather information about the history of transaction between bank and customer.

SQL Database Query

```sql
CREATE VIEW TransactionHistory AS
SELECT
    t.TransactionID,
    t.TransactionType,
    t.TransactionMethod,
    t.TransactionDate,
    t.Amount,
    c.CustomerName,
    a.AccountType,
    b.BranchName
FROM Transactions t
JOIN Customers c ON t.CustomerID = c.CustomerID
JOIN Accounts a ON t.AccountID = a.AccountID
JOIN Branches b ON t.BranchID = b.BranchID;
```

```sql
SELECT * FROM TransactionHistory WHERE BranchName = 'Main Campus Branch';
```

Results | Messages

	TransactionID	TransactionType	TransactionMethod	TransactionDate	Amount	CustomerName	AccountType	BranchName
1	32	Deposit	Cash	2024-02-12 09:30:00	2500.00	Grace Adams	Checking	Main Campus Branch
2	33	Deposit	Wire Transfer	2024-01-18 16:20:00	5000.00	David Miller	Checking	Main Campus Branch
3	38	Loan Payment	Cheque	2024-06-01 10:10:00	5000.00	Franklin Harris	Savings	Main Campus Branch

ACTIVE CREDIT CARDS

1. **Scenario:** Want to know active Credit cards.

2. **Table used1:** Credit card table and Customer table.

3. **View name:** Active Credit cards.

4. **Fields name:** Credit Id, Expiry date, Credit limit(from credit table). Customer name(From Customer table).

5. **Purpose:** To Gather information about active credit cards in the bank.

CreditCards	
CreditCardID	int
ExpiryDäte	date
CardLimit	decimal

Customers	
customerID	int
CustomerName	varchar
DateOfBirth	date
MobileNumber	varchar
ProofID	varchar

CreditCardID	Customer Name	Expiry Date	CardLimit

SQL Database Query

```
174    CREATE VIEW ActiveCreditCards AS
175    SELECT
176        cc.CreditCardID,
177        c.CustomerName,
178        cc.ExpiryDate,
179        cc.CardLimit
180    FROM CreditCards cc
181    JOIN Customers c ON c.CustomerID = cc.CreditCardID
182    WHERE cc.ExpiryDate > CURDATE();

184    SELECT * FROM ActiveCreditCards
185    ORDER BY ExpiryDate ASC;
```

	CreditCardID	CustomerName	ExpiryDate	CardLimit
1	1	David Miller	2026-08-15	5000.00
2	2	Emma Wilson	2025-12-31	8000.00
3	3	Franklin Harris	2027-06-20	12000.00
4	4	Grace Adams	2025-09-10	10000.00
5	5	Isaac Bell	2026-11-22	15000.00
6	7	Kevin Douglas	2028-03-18	20000.00
7	8	Laura Evans	2025-07-07	7500.00

CONCLUSION

This project focused on building a secure and efficient database system to facilitate banking operations at all Ekpache Nkome Micro-finance bank branches. It ensures centralized data management, improves transaction accuracy, and automates routine tasks like account management and loan processing. The system supports real-time transactions, data protection, and follows the laid down business transaction and rules and standard regulatory policies to maintain integrity. With a well-structured design, it helps the bank manage branches, accounts, customers, loans, and transactions efficiently while enabling better decision-making and growth.