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DATABASE DESIGN CASE-STUDY ARTICLE



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Table of Contents

MISSION..... 2

OBJECTIVES..... 2

CONSTRAINTS..... 2

PRELIMINARY LIST OF TABLES, FINAL LIST OF TABLES..... 3

FIELD LIST..... 3

PRELIMINARY ER DIAGRAM 4

FINAL ER DIAGRAM 5

RELATIONSHIP BETWEEN TABLES 6

DATABASE DESIGN 7

AGGREGRATE VIEWS 8

CONCLUSION 13

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.

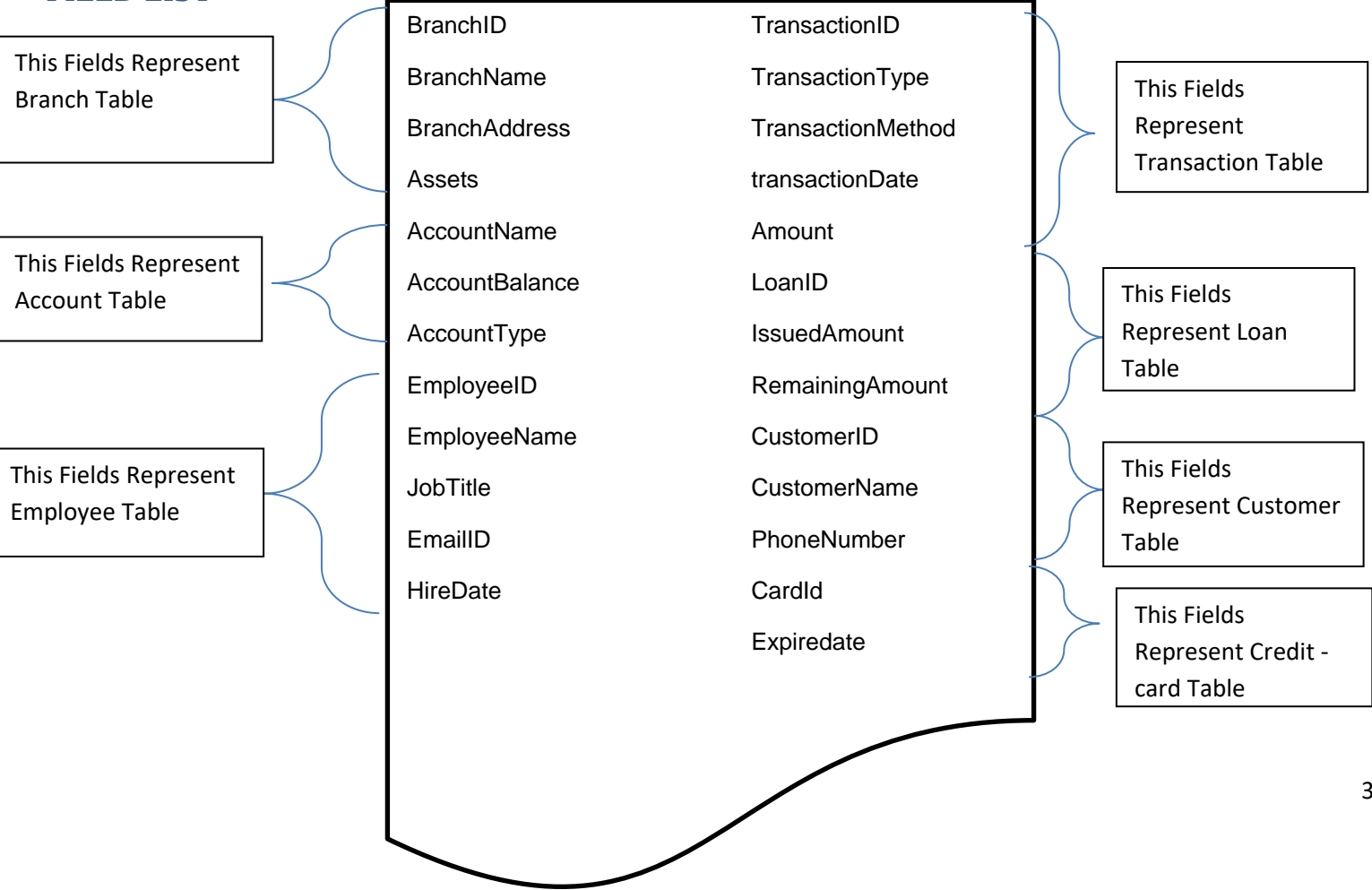
PRELIMINARY LIST OF TABLES

- Branch
- Accounts
- Customers
- ~~Bankers~~
- Loan
- ~~Borrowers~~
- Transactions
- ~~Loan Payments~~
- Credit Cards

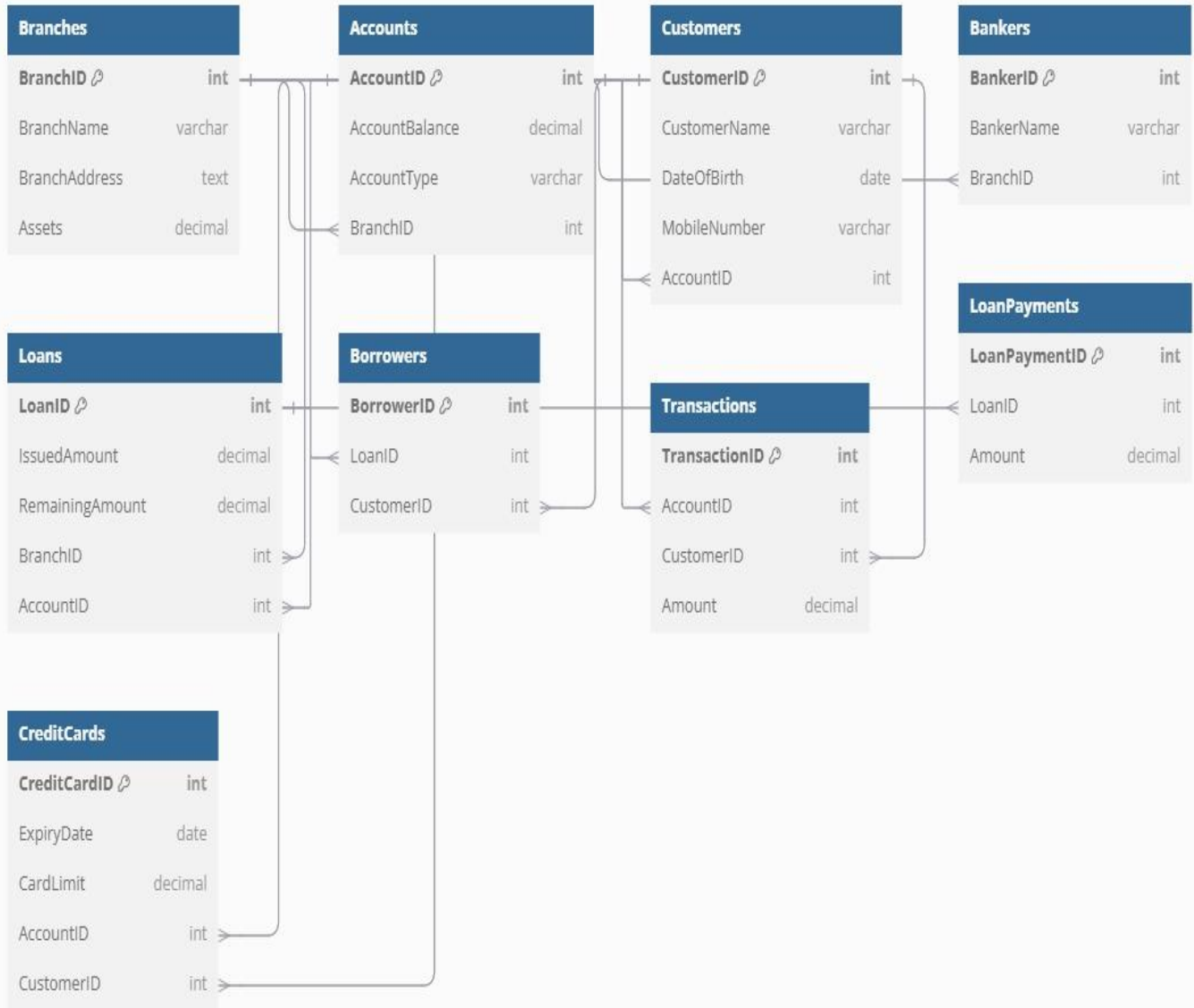
FINAL LIST OF TABLES

- Branch
- Accounts
- Customers
- Employees
- Loan
- Transactions
- Credit cards

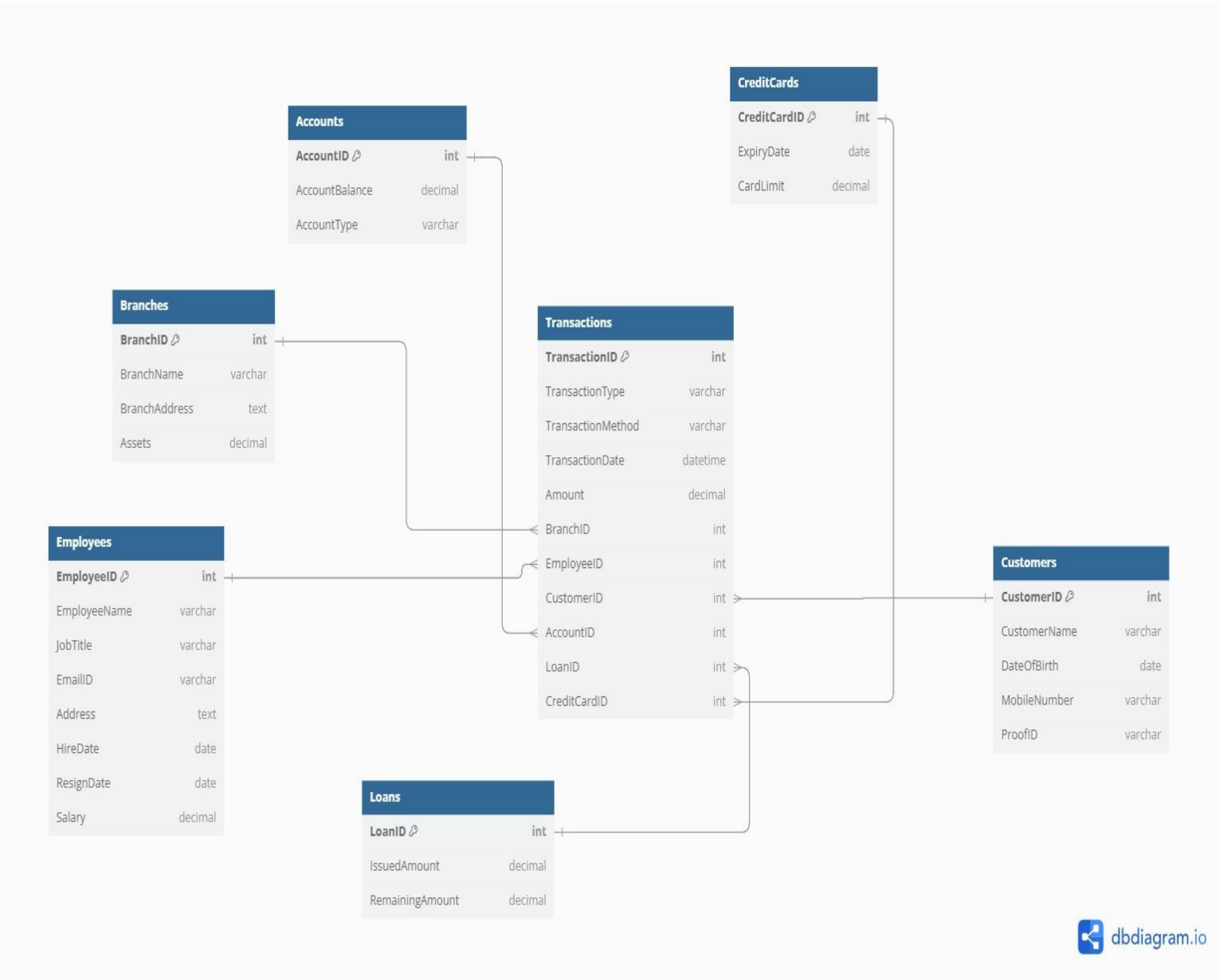
FIELD LIST



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

CONNECTIONS
SERVERS
localhost, <default> (root)
Character Sets
Databases
bank
company1
sakila
world
System Databases
Users
Tablespaces
odietta.database.windows.net, Co...

SQLQuery_company1.sql - disconnected
SQLQuery_1 - localh... (root)
Run Cancel Disconnect Change Database: mf_bank

```
12  
13 CREATE TABLE Employees (  
14     EmployeeID INT PRIMARY KEY AUTO_INCREMENT,  
15     EmployeeName VARCHAR(255) NOT NULL,  
16     JobTitle VARCHAR(100),  
17     EmailID VARCHAR(255) UNIQUE NOT NULL,  
18     Address TEXT,  
19     HireDate DATE NOT NULL,  
20     ResignDate DATE,  
21     Salary DECIMAL(15,2) NOT NULL  
22 );  
23  
24 CREATE TABLE Customers (  
25     CustomerID INT PRIMARY KEY AUTO_INCREMENT,  
26     CustomerName VARCHAR(255) NOT NULL,  
27     DateOfBirth DATE,  
28     MobileNumber VARCHAR(20),  
29     ...
```

Results Messages

	TransactionID	TransactionType	TransactionMethod	TransactionDate	Amount	CustomerName	AccountType	BranchName
1	1	Deposit	Cash	2024-02-12 09:30:00	2500.00	Grace Adams	Checking	Main Campus Branch
2	2	Deposit	Wire Transfer	2024-01-18 16:20:00	5000.00	David Miller	Checking	Main Campus Branch
3	7	Loan Payment	Cheque	2024-06-01 10:10:00	5000.00	Franklin Harris	Savings	Main Campus Branch

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

AZURE
Sign in to Azure...

Ln 178, Col 22 Spaces: 4 UTF-8 CRLF 11 rows MySQL 00:00:04 localhost: mf_bank

AGGREGATE VIEWS

AGGREGATE VIEW: CUSTOMER DETAILS

Scenario: Want to know customer's details

Table used: Class and customers

View name: Customer Details

Fields name: Account id, Balance, A/c type(From accounts) and Customer ID,name, DOB, contact, ProofID(From Customers)

Purpose: To gather information About customer of bank.

Accounts	
AccountID	int
AccountBalance	decimal
AccountType	varchar

Customers	
customerID	int
CustomerName	varchar
DateOfBirth	date
MobileNumber	varchar
ProofID	varchar

CustomerID	CustomerName	Mobile Number	ProofID	Account ID	Account Type	Account balance
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SQL Database Query

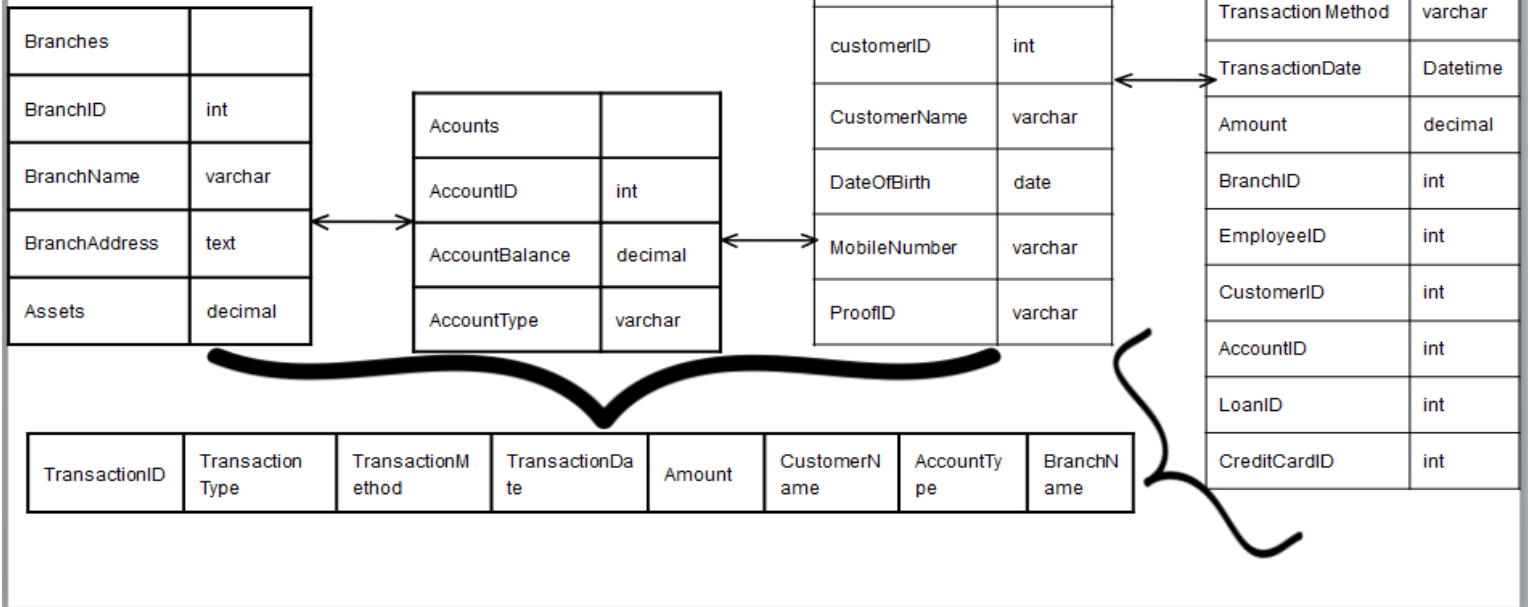
```
143 CREATE VIEW CustomerAccountDetails AS
144 SELECT
145     c.CustomerID,
146     c.CustomerName,
147     c.MobileNumber,
148     c.ProofID,
149     a.AccountID,
150     a.AccountType,
151     a.AccountBalance
152 FROM Customers c
153 JOIN Accounts a ON c.CustomerID = a.AccountID;
```

```
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

TRANSACTION HISTORY



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

```
157 CREATE VIEW TransactionHistory AS
158 SELECT
159     t.TransactionID,
160     t.TransactionType,
161     t.TransactionMethod,
162     t.TransactionDate,
163     t.Amount,
164     c.CustomerName,
165     a.AccountType,
166     b.BranchName
167 FROM Transactions t
168 JOIN Customers c ON t.CustomerID = c.CustomerID
169 JOIN Accounts a ON t.AccountID = a.AccountID
170 JOIN Branches b ON t.BranchID = b.BranchID;
--
172 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
ExpiryDate	date
CardLimit	decimal

Customers	
customerID	int
CustomerName	varchar
DateOfBirth	date
MobileNumber	varchar
ProofID	varchar

CreditC ardID	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.