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# Introduction

The database for the Digital Banking Kiosk project is meticulously designed to support the comprehensive functionalities of the kiosks. It captures customer interactions, transactions, kiosk maintenance, and other critical aspects. The design aligns with Scotiabank's technological infrastructure and meets specific requirements for efficient, secure data handling.

# Normalization Application

Each table has been normalized to the Third Normal Form (3NF) to ensure data integrity, eliminate redundancy, and facilitate efficient querying. This involves ensuring that every non-primary key attribute is fully functionally dependent on the primary key and that there are no transitive dependencies.

# Digital Banking Kiosk Database Design

## 1. Customer table

**Purpose:** Central repository of customer demographic and contact information.

**Primary Key:** CustomerID

**Range of Values:** Varied; unique customer identifiers and personal information.

**Normalization:** 3NF to eliminate data redundancy.

**Data Elements:** CustomerID, FirstName, LastName, DateOfBirth, Address, Email, PhoneNumber

### Definition of data elements:

**CustomerID:** A unique identifier for each customer.

**FirstName:** Customer's first name.

**LastName:** Customer's last name.

**DateOfBirth:** Customer's date of birth.

**Address:** Customer's residential address.

**Email:** Customer's email address.

**PhoneNumber:** Customer's contact phone number.

## 2. Account table

**Purpose:** Records details of all customer bank accounts.

**Primary Key:** AccountID

**Range of Values:** Unique account identifiers, account types, and balance information.

**Normalization:** 3NF; attributes depend only on AccountID.

**Data Elements:** AccountID, CustomerID (FK), AccountType, Balance, DateOpened

### Definition of data elements:

**AccountID:** A unique identifier for each bank account.

**CustomerID:** Foreign key linking to the Customer Table.

**AccountType:** Type of bank account (e.g., savings, checking).

**Balance:** Current balance in the account.

**DateOpened:** Date when the account was opened.

## 3. Transaction table

**Purpose:** Tracks all financial transactions conducted by customers.

**Primary Key:** TransactionID

**Range of Values:** Unique transaction identifiers, types, and amounts.

**Normalization:** 3NF to ensure transaction-specific information.

**Data Elements:** TransactionID, AccountID (FK), TransactionType, Amount, Timestamp

### Definition of data elements:

**TransactionID:** A unique identifier for each transaction.

**AccountID:** Foreign key linking to the Account Table.

**TransactionType:** Type of transaction (e.g., deposit, withdrawal).

**Amount:** Monetary value of the transaction.

**Timestamp:** Date and time when the transaction occurred.

## 4. Login table

**Purpose:** Log each customer login attempt for security and tracking.

**Primary Key:** LoginID

**Range of Values:** Unique login instances and timestamps.

**Normalization**: 3NF; each login detail is tied to a single entry.

**Data Elements:** LoginID, CustomerID (FK), Timestamp, LoginMethod

### Definition of data elements:

**LoginID:** A unique identifier for each login instance.

**CustomerID:** Foreign key linking to the Customer Table.

**Timestamp:** Date and time of the login.

**LoginMethod:** Method used for login (e.g., password, biometric).

## 5. Biometric data table

**Purpose:** Stores biometric data used for customer authentication.

**Primary Key:** BiometricID

**Range of Values:** Unique identifiers, biometric data sets.

**Normalization:** 3NF; biometric data is specific to each customer.

**Data Elements:** BiometricID, CustomerID (FK), FingerprintData, FacialRecognitionData

### Definition of data elements:

**BiometricID:** A unique identifier for each set of biometric data.

**CustomerID:** Foreign key linking to the Customer Table.

**FingerprintData:** Data from the customer's fingerprint scan.

**FacialRecognitionData:** Data from the customer's facial recognition scan.

## 6. Service Interaction table

**Purpose:** Details interactions between customers and various kiosk services.

**Primary Key:** InteractionID

**Range of Values:** Unique interaction identifiers, types of services accessed.

**Normalization:** 3NF; each interaction is distinct and fully described.

**Data Elements:** InteractionID, CustomerID (FK), KioskID (FK), ServiceType, InteractionTimestamp

### Definition of data elements:

**InteractionID:** A unique identifier for each service interaction.

**CustomerID:** Foreign key linking to the Customer Table.

**KioskID:** Foreign key linking to the Kiosk Information Table.

**ServiceType:** Type of service the customer interacted with.

**InteractionTimestamp:** Date and time of the interaction.

## 7. Kiosk Maintenance table

**Purpose:** Manages and records maintenance activities for each kiosk.

**Primary Key:** MaintenanceID

**Range of Values:** Unique maintenance activity identifiers, types of maintenance.

**Normalization:** 3NF; each maintenance record is distinct.

**Data Elements:** MaintenanceID, KioskID (FK), MaintenanceDate, MaintenanceType, TechnicianID

### Definition of data elements:

**MaintenanceID:** A unique identifier for each maintenance activity.

**KioskID:** Foreign key linking to the Kiosk Information Table.

**MaintenanceDate:** Date of the maintenance activity.

**MaintenanceType:** Type of maintenance performed (e.g., software update, hardware repair).

**TechnicianID:** Identifier for the technician who performed the maintenance.

## 8. Employee table

**Purpose:** Contains information about Scotiabank employees, including those servicing kiosks.

**Primary Key:** EmployeeID

**Range of Values:** Unique employee identifiers, roles, contact information.

**Normalization:** 3NF; employee details are unique and independent.

**Data Elements:** EmployeeID, Name, Role, BranchID (FK), ContactInfo

### Definition of data elements:

**EmployeeID:** A unique identifier for each employee.

**Name:** Employee's full name.

**Role:** Employee's job role or title.

**BranchID:** Foreign key linking to the Branch Table.

**ContactInfo:** Contact details of the employee.

## 9. Branch table

**Purpose:** Details information about each Scotiabank branch location.

**Primary Key:** BranchID

**Range of Values:** Unique branch identifiers, location details.

**Normalization:** 3NF; specific information about each branch.

**Data Elements:** BranchID, BranchName, Location, ManagerID (FK), ContactInfo

### Definition of data elements:

**BranchID:** A unique identifier for each bank branch.

**BranchName:** Name of the bank branch.

**Location:** Geographic location of the branch.

**ManagerID:** Identifier for the branch manager.

**ContactInfo:** Contact details of the branch.

## 10. Feedback table

**Purpose:** Captures customer feedback specific to their kiosk experience.

**Primary Key:** FeedbackID

**Range of Values:** Unique identifiers for each feedback instance.

**Normalization:** 3NF; feedback tied to specific customers and kiosks.

**Data Elements:** FeedbackID, CustomerID (FK), KioskID (FK), FeedbackText, FeedbackDate

### Definition of data elements:

**FeedbackID:** A unique identifier for each piece of feedback.

**CustomerID:** Foreign key linking to the Customer Table.

**KioskID:** Foreign key linking to the Kiosk Information Table.

**FeedbackText:** Text of the customer's feedback.

**FeedbackDate:** Date when the feedback was given.

## 11. Cheque deposit table

**Purpose:** Tracks cheques deposited by customers at kiosks.

**Primary Key:** DepositID

**Range of Values:** Unique identifiers for each cheque deposit.

**Normalization:** 3NF; each deposit is unique and linked to a specific account.

**Data Elements:** DepositID, AccountID (FK), ChequeNumber, Amount, DateDeposited, ChequeImage

### Definition of data elements:

**DepositID:** A unique identifier for each cheque deposit.

**AccountID:** Foreign key linking to the Account Table.

**ChequeNumber:** Number of the cheque deposited.

**Amount:** Amount of money on the cheque.

**DateDeposited:** Date when the cheque was deposited.

**ChequeImage:** An image or digital representation of the deposited cheque.

## 12. Web banking activity table

**Purpose:** Records all customer activities conducted via web banking through the kiosk.

**Primary Key:** ActivityID

**Range of Values:** Unique activity identifiers, various web banking actions.

**Normalization:** 3NF; specific details per web banking activity.

**Data Elements:** ActivityID, CustomerID (FK), ActivityType, Timestamp, Details

### Definition of data elements:

**ActivityID:** A unique identifier for each web banking activity.

**CustomerID:** Foreign key linking to the Customer Table.

**ActivityType:** Type of web banking activity (e.g., balance inquiry, fund transfer).

**Timestamp:** Date and time when the activity occurred.

**Details:** Additional details about the activity.

## 13. Cash transaction table

**Purpose:** Manages details of cash-based transactions (deposits and withdrawals) at kiosks.

**Primary Key:** CashTransactionID

**Range of Values:** Unique identifiers for each cash transaction.

**Normalization:** 3NF; distinct records for each cash transaction.

**Data Elements:** CashTransactionID, AccountID (FK), Type, Amount, Date, Time

### Definition of data elements:

**CashTransactionID:** A unique identifier for each cash transaction.

**AccountID:** Foreign key linking to the Account Table.

**Type:** Type of cash transaction (deposit or withdrawal).

**Amount:** Amount of cash transacted.

**Date:** Date of the transaction.

**Time:** Time of the transaction.

## 14. Cash storage table

**Purpose:** Keeps track of cash inventory within each kiosk.

**Primary Key:** CashStorageID

**Range of Values:** Distinct entries for each currency denomination and quantity.

**Normalization:** 3NF; specific to each kiosk's cash storage.

**Data Elements:** CashStorageID, KioskID (FK), CurrencyDenomination, Quantity

### Definition of data elements:

**CashStorageID:** A unique identifier for each cash storage record.

**KioskID:** Foreign key linking to the Kiosk Information Table.

**CurrencyDenomination:** Type of currency and its denomination stored.

**Quantity:** Quantity of each denomination stored.

## 15. New account kit table

**Purpose:** Manages inventory and deployment of new account opening kits in kiosks.

**Primary Key:** KitID

**Range of Values:** Unique identifiers for account kits, types, and contents.

**Normalization:** 3NF; each kit is uniquely identified and linked to kiosk locations.

**Data Elements:** KitID, KioskID (FK), AccountType, KitContents, AvailabilityStatus

### Definition of data elements:

**KitID:** A unique identifier for each new account kit.

**KioskID:** Foreign key linking to the Kiosk Information Table.

**AccountType:** Type of account the kit is for (e.g., savings, checking).

**KitContents:** Contents of the new account kit.

**AvailabilityStatus:** Current availability status of the kit (e.g., in stock, out of stock).

## 16. Video call log table

**Purpose:** Records details of video calls made by customers to live bankers for assistance.

**Primary Key:** CallID

**Range of Values:** Unique call identifiers, duration, and notes.

**Normalization:** 3NF; each call log is distinct and linked to specific employees and customers.

**Data Elements:** CallID, CustomerID (FK), EmployeeID (FK), CallStartTime, CallEndTime, CallNotes

### Definition of data elements:

**CallID:** A unique identifier for each video call.

**CustomerID:** Foreign key linking to the Customer Table.

**EmployeeID:** Identifier for the employee involved in the call.

**CallStartTime:** Start time of the video call.

**CallEndTime:** End time of the video call.

**CallNotes:** Notes or details about the call

## 17. Card reader log table

**Purpose:** Logs each instance of card usage at the kiosk for accessing accounts or ATM services.

**Primary Key:** CardReaderLogID

**Range of Values:** Unique log entries for card-based transactions.

**Normalization:** 3NF; each log entry is distinct and related to specific customer transactions.

**Data Elements:** CardReaderLogID, CustomerID (FK), CardType, Timestamp, TransactionID (FK)

### Definition of data elements:

**CardReaderLogID:** A unique identifier for each card reader log entry.

**CustomerID:** Foreign key linking to the Customer Table.

**CardType:** Type of card used (debit or credit).

**Timestamp:** Date and time when the card was used.

**TransactionID:** Foreign key linking to the Transaction Table.

## 18. Web transfer table

**Purpose:** Records details of web-based fund transfers initiated at kiosks.

**Primary Key:** WebTransferID

**Range of Values:** Unique identifiers for each transfer, with details on amounts and involved accounts.

**Normalization:** 3NF; each transfer record is specific and complete.

**Data Elements:** WebTransferID, AccountIDFrom (FK), AccountIDTo (FK), Amount, TransferDate

### Definition of data elements:

**WebTransferID:** A unique identifier for each web-based fund transfer.

**AccountIDFrom:** Account ID from which funds are transferred.

**AccountIDTo:** Account ID to which funds are transferred.

**Amount:** Amount of funds transferred.

**TransferDate:** Date when the transfer occurred.

## 19. Bill payment table

**Purpose:** Manages bill payments executed through the kiosk.

**Primary Key:** BillPaymentID

**Range of Values:** Unique identifiers for each bill payment transaction.

**Normalization:** 3NF; each bill payment is specifically tied to a customer account and biller.

**Data Elements:** BillPaymentID, CustomerID (FK), BillerID, Amount, PaymentDate

### Definition of data elements:

**BillPaymentID:** A unique identifier for each bill payment.

**CustomerID:** Foreign key linking to the Customer Table.

**BillerID:** Identifier for the biller receiving the payment.

**Amount:** Amount paid.

**PaymentDate:** Date when the payment was made.

## 20. Card information table

**Purpose:** Stores details of customers' debit and credit cards.

**Primary Key:** CardID

**Range of Values:** Unique card identifiers, card numbers, types, and expiration details.

**Normalization:** 3NF; sensitive card information is specifically tied to customer accounts for security.

**Data Elements:** CardID, CustomerID (FK), AccountID (FK), CardNumber, CardType, IssueDate, ExpiryDate, SecurityCode, Status

### Definition of data elements:

**CardID:** A unique identifier for each debit/credit card.

**CustomerID:** Foreign key linking to the Customer Table.

**AccountID:** Foreign key linking to the Account Table.

**CardNumber:** Number on the debit/credit card.

**CardType:** Specifies if the card is debit or credit.

**IssueDate:** Date when the card was issued.

**ExpiryDate:** Expiration date of the card.

**SecurityCode:** CVV/CVC security code of the card.

**Status:** Current status of the card (e.g., active, blocked, expired).

## 21. Kiosk information table

**Purpose:** Contains detailed information about each individual kiosk unit.

**Primary Key:** KioskID

**Range of Values:** Unique identifiers for each kiosk, including location and model details.

**Normalization:** 3NF; each entry is distinct and fully describes a single kiosk.

**Data Elements:** KioskID, Location, InstallationDate, ModelType, Status

### Definition of data elements:

**KioskID:** A unique identifier for each kiosk.

**Location:** Physical location of the kiosk.

**InstallationDate:** Date when the kiosk was installed.

**ModelType:** Model or type of the kiosk.

**Status:** Operational status of the kiosk (e.g., Active, Under Maintenance).

# Visio diagram of the database design

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# Normalization applied:

**1NF (First Normal Form):** Ensured by having atomic data elements, no repeating groups, and unique primary keys in each table.

**2NF (Second Normal Form):** Achieved by removing partial dependencies; non-key attributes are fully functionally dependent on primary keys.

**3NF (Third Normal Form):** Eliminated transitive dependencies, ensuring non-key attributes are dependent only on primary keys.

# Conclusion

This database design for the Digital Banking Kiosk project represents a comprehensive effort to encompass all aspects of customer interaction, transaction processing, kiosk management, and employee activity within the Scotiabank framework. By adhering to normalization principles, the design ensures data integrity, efficiency in data handling, and robustness in supporting a wide range of banking functionalities. The interrelationship among various data elements is crafted to facilitate seamless operations, enhance user experience, and support strategic decision-making processes.

# Call to action

Database Review and Feedback: We invite stakeholders, particularly from Scotiabank's IT and data management teams, to review this database design thoroughly. Their insights and feedback are crucial for refining and optimizing the database structure.

**Implementation Planning:** Begin the planning phase for database implementation, which includes setting up the necessary infrastructure, procurement of software and hardware resources, and scheduling of development phases.

**Integration with Existing Systems:** Coordinate with Scotiabank's technical teams to ensure that the new database design aligns with and can be integrated into the existing IT infrastructure without disruptions.

**Training and Development:** Initiate training programs for staff, particularly those involved in data management and kiosk operations, to familiarize them with the new system. Concurrently, start the development and testing of the database system.

**Data Security Measures:** Implement robust data security protocols to protect sensitive customer and transaction information, adhering to legal and regulatory standards.

**Pilot Testing:** Plan for a pilot test of the database system with a limited number of kiosks to evaluate its performance and gather real-world data for further refinement.

**Ongoing Review and Maintenance:** Establish a protocol for regular monitoring, maintenance, and updating of the database system to ensure its continued effectiveness and relevance.

By following these steps, we aim to successfully integrate this comprehensive database design into the Digital Banking Kiosk project, thereby enhancing Scotiabank's service offerings and maintaining its competitive edge in the banking industry.