OBJECT ORIENTED ANALYSIS & DESIGN WITH JAVA

Module Integration & Testing Report

The PrimeBank Application project successfully delivers a functional, object-oriented application for basic banking operations, built using JavaFX for the graphical user interface and SQLite for data persistence. This system models core components of a commercial bank, including customer management, various account types, and transaction processing.

a) Sign Up
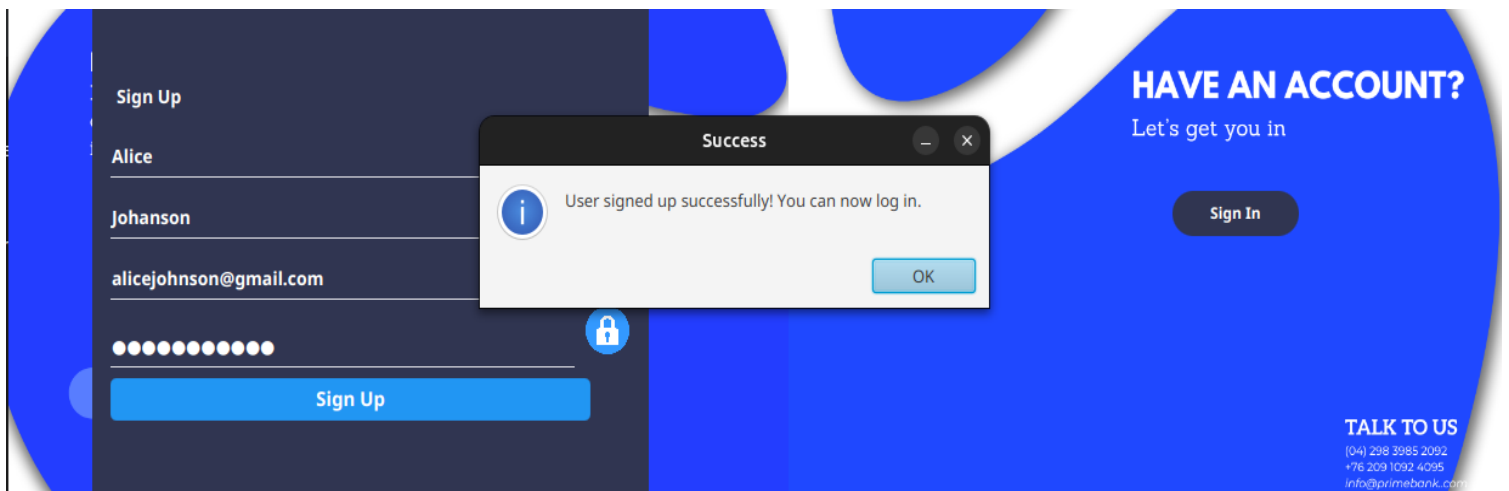
Navigate to the sign up and enter user details:

first name: Alice

surname: Johnson

email: alicejohnson@gmail.com

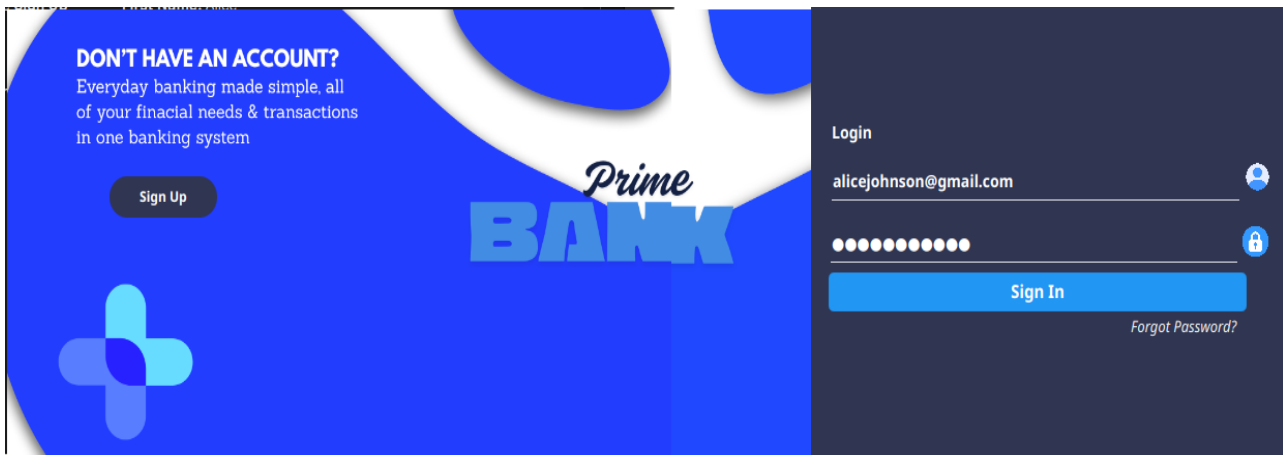*password: alicepwd123*

click sign up

b) Sign In & Profile setup

Navigate to the sign in screen and login.

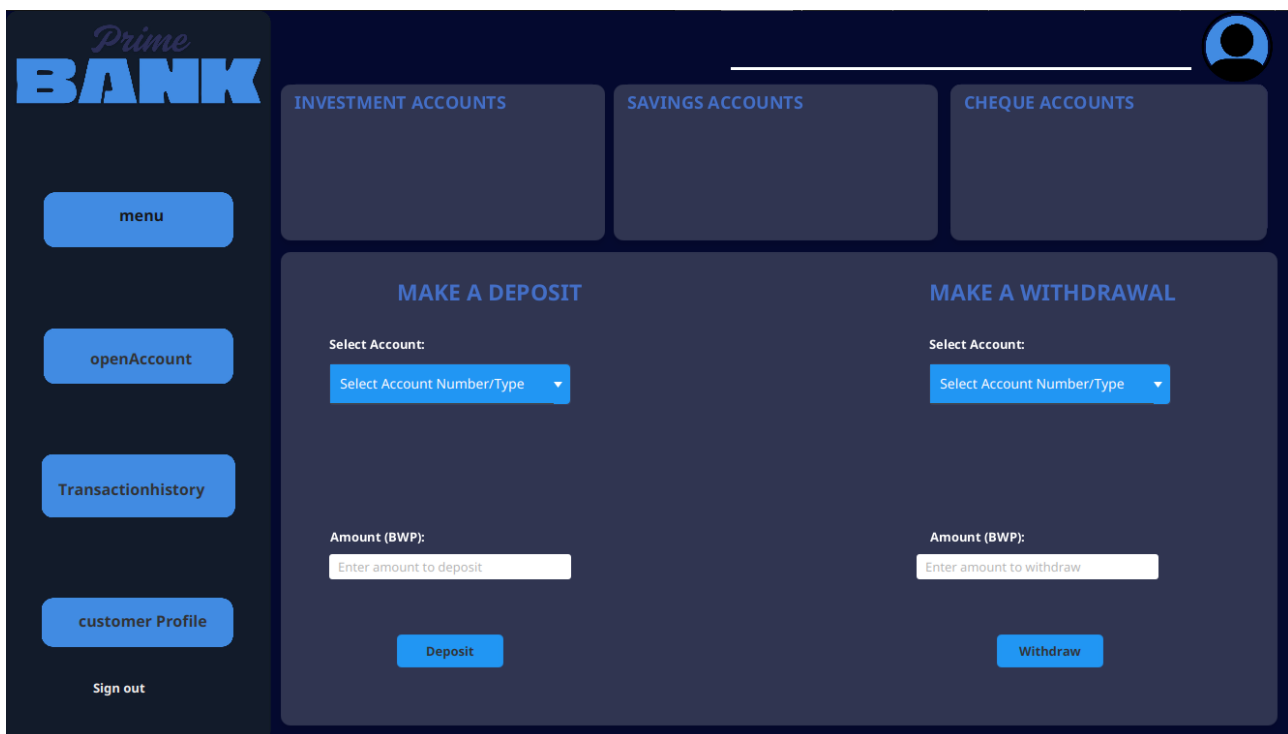*email: alicejohnson@gmail.com*

password: alicepwd123

<u>*click login*</u>

<u>*click login*</u>

Dashboard is then loaded

c)Open Accounts

Navigate to openAccount, select individual customer & fill out the form but your full names and email is already auto-filled.

Input the remaining details

alet msg: Saving account opened successfully.

Account details are immediately displayed at the saving account card and the customer profile.

menu

openAccount

Transactionhistory

customer Profile

Sign out

INVESTMENT ACCOUNTS

SAVINGS ACCOUNTS
• Acct No: E3E722AB
• Balance: BWP1000.00
• Rate: 2.5%
• Est. Interest: BWP25.00
• Applied Bal: BWP1025.00

CHEQUE ACCOUNTS

OPEN NEW ACCOUNT

Select Account Type:	Investment Account ▾
Initial Deposit Amount (BWP):	200
Full Name:	Alice Johanson
Date of Birth:	
Gender:	
Contact Number:	
Email Address:	alicejohnson@gmail.com
Residential Address:	
Next of Kin:	
Occupation:	
Customer Type:	☑ Individual ☐ Company
	Investment requires minimum BWP 500.00
National ID:	Enter National ID

Open Account

alert msg;   **investment requires minimum initial deposit of BWP 500**

menu

openAccount

Transactionhistory

customer Profile

Sign out

INVESTMENT ACCOUNTS
• Acct No: 141B2EA1
• Balance: BWP550.00
• Rate: 5.0%
• Est. Interest: BWP27.50
• Applied Bal: BWP577.50

SAVINGS ACCOUNTS
• Acct No: E3E722AB
• Balance: BWP1000.00
• Rate: 2.5%
• Est. Interest: BWP25.00
• Applied Bal: BWP1025.00

CHEQUE ACCOUNTS
• Acct No: 79B21558
• Balance: BWP200.00
• Overdraft Limit: BWP5000.00
• Name on Cheque: Alice Johanson

OPEN NEW ACCOUNT

Select Account Type:	Cheque Account ▾
Initial Deposit Amount (BWP):	Investment requires min BWP500.00
Full Name:	Alice Johanson
Date of Birth:	
Gender:	
Contact Number:	
Email Address:	alicejohnson@gmail.com
Residential Address:	
Next of Kin:	
Occupation:	
Customer Type:	☑ Individual ☐ Company
	ChequeAccount opened successfully! Account Number: 79B21558. Current Balance: BWP200.00
National ID:	Enter National ID

Open Account

all accounts opened…………….

d) Deposit and withdrawal

deposit 450 on investment account

and withdraw 250

e) Transaction History

Prime BANK

Welcome, Alice Johanson!

INVESTMENT ACCOUNTS
• Acct No: 141B2EA1
• Balance: BWP750.00
• Rate: 5.0%
• Est. Interest: BWP37.50
• Applied Bal: BWP787.50

SAVINGS ACCOUNTS
• Acct No: E3E722AB
• Balance: BWP1000.00
• Rate: 2.5%
• Est. Interest: BWP25.00
• Applied Bal: BWP1025.00

CHEQUE ACCOUNTS
• Acct No: 79B21558
• Balance: BWP200.00
• Overdraft Limit: BWP5000.00
• Name on Cheque: Alice Johanson

menu

openAccount

Transactionhistory

customer Profile

Sign out

Date/Time	Account Number	Type	Amount (BWP)	New Balance (BWP)
2025-11-26T11:54:46.016989812	141B2EA1	Withdrawal	250.0	750.0
2025-11-26T11:52:57.841735781	141B2EA1	Deposit	450.0	1000.0
2025-11-26T11:48:22.270777514	79B21558	Initial Deposit	200.0	200.0
2025-11-26T11:48:10.969363847	141B2EA1	Initial Deposit	550.0	550.0
2025-11-26T11:37:09.415925474	E3E722AB	Initial Deposit	1000.0	1000.0

transaction_id	account_number	transaction_date	type	amount	new_balance
Filter	Filter	Filter	Filter	Filter	Filter
8	8 E72C1FA9	2025-11-23T14:06:55.229619818	Deposit	34.0	584.0
9	9 E72C1FA9	2025-11-23T14:07:19.870477693	Withdrawal	24.0	560.0
10	10 9802015F	2025-11-23T14:07:58.676120594	Deposit	1.0	50.0
11	11 9802015F	2025-11-23T15:06:16.277196542	Deposit	10.0	60.0
12	12 E72C1FA9	2025-11-23T15:16:56.296690998	Deposit	10.0	570.0
13	13 1559FD7F	2025-11-23T15:29:29.7878569	Initial Deposit	20000.0	20000.0
14	14 7D3644F6	2025-11-23T15:42:35.948968962	Initial Deposit	20.0	20.0
15	15 EC59CB24	2025-11-23T15:45:01.671972013	Initial Deposit	500.0	500.0
16	16 BA4087C1	2025-11-23T15:46:04.218706723	Initial Deposit	3000.0	3000.0
17	17 BA4087C1	2025-11-23T15:47:04.473154236	Withdrawal	5000.0	-2000.0
18	18 BA4087C1	2025-11-23T15:47:23.718667579	Deposit	2000.0	0.0
19	19 EC59CB24	2025-11-23T15:47:40.362549301	Withdrawal	20.0	480.0
20	20 EC59CB24	2025-11-23T15:47:58.645713385	Withdrawal	20.0	460.0
21	21 EC59CB24	2025-11-23T15:48:09.012516994	Withdrawal	20.0	440.0
22	22 BA4087C1	2025-11-23T15:49:44.432969908	Withdrawal	2.0	-2.0
23	23 A18CB0DF	2025-11-26T09:44:25.483344741	Initial Deposit	500.0	500.0
24	24 2FBAD693	2025-11-26T09:45:27.538128419	Initial Deposit	900.0	900.0
25	25 0247FA31	2025-11-26T09:46:42.349274956	Initial Deposit	500.0	500.0
26	26 B5549682	2025-11-26T09:47:21.63440677	Initial Deposit	800.0	800.0
27	27 8D60E375	2025-11-26T09:49:53.461659894	Initial Deposit	34.0	34.0
28	28 11E4D16E	2025-11-26T11:19:34.399552502	Initial Deposit	1000.0	1000.0
29	29 3F77A763	2025-11-26T11:32:42.030678747	Initial Deposit	1000.0	1000.0
30	30 E3E722AB	2025-11-26T11:37:09.415925474	Initial Deposit	1000.0	1000.0
31	31 141B2EA1	2025-11-26T11:48:10.969363847	Initial Deposit	550.0	550.0
32	32 79B21558	2025-11-26T11:48:22.270777514	Initial Deposit	200.0	200.0
33	33 141B2EA1	2025-11-26T11:52:57.841735781	Deposit	450.0	1000.0
34	34 141B2EA1	2025-11-26T11:54:46.016989812	Withdrawal	250.0	750.0

Conclusion: PrimeBankApplication

I. Architectural Design and Implementation

The project adheres to a layered architectural pattern, strongly implementing the **Data Access Object (DAO)** pattern to separate business logic from database interactions.

- **GUI Layer (JavaFX Controllers):** The controllers (`LoginController`, `DashboardController`, `TransactionController`, etc.) manage user input and view navigation. The use of FXML allows for a clear separation of presentation logic from the Java code.

- **Business/Model** Layer (Core **Classes**): This layer contains the core banking logic and data models, including **User**, **Customer** (with subclasses `IndividualCustomer` and `CompanyCustomer`), **Account** (with subclasses `SavingsAccount`, `ChequeAccount`, and `InvestmentAccount`), and **Transaction**. This layer effectively demonstrates polymorphism, inheritance, and interfaces (`Withdrawal`, `InterestCalculation`).

- **Data Access Layer (DAO Interfaces and Implementations):** Interfaces (`UserDAO`, `CustomerDAO`, `AccountDAO`) define standard database operations, implemented by `UserDAOImpl`, `CustomerDAOImpl`, and `AccountDAOImpl`. This design makes the application more maintainable and adaptable to different database technologies in the future.

- **Database:** Two separate SQLite databases (`users.db` and `customer.db`) are used to segregate user authentication data from customer and account-specific transactional data, reflecting good security practice.

II. Key Features Achieved

1. **Secure User Authentication:** The system includes **Sign Up**, **Sign In**, and **Forgot Password** functionality. User passwords are not stored in plain text; `UserDAOImpl` uses **SHA-256 hashing** for secure storage and comparison.

2. **Polymorphic Account Management:** The application successfully models three distinct account types, each with unique logic:

   - **SavingsAccount**: Calculates interest based on customer type (individual vs. company).

   - **ChequeAccount**: Allows withdrawals with an overdraft limit (demonstrates the `Withdrawal` interface).

   - **InvestmentAccount**: Requires a minimum initial deposit and calculates a higher investment rate (demonstrates both `Withdrawal` and `InterestCalculation`).

3. **Real-Time Transaction Logging:** All deposits, withdrawals, and initial account funding are recorded as `Transaction` objects, ensuring a detailed audit trail. Transactions are displayed in a dedicated view, sorted by date.

4. **Customer Profile Management:** Users can update their contact information and occupation through the Customer Profile