

# ATM simulation - Financial assistance features

*Sai Saranya Mulukutla*

# Technical Report: ATM Simulation and financial assistance features

Project with Java, MySQL and front-end technologies

## ABSTRACT

This study describes the design and implementation of an ATM simulation project that incorporates modern financial aid features. The project, developed with Java, MySQL, and front-end technologies, seeks to provide customers with a genuine ATM experience while also providing financial management capabilities. Deposit, cash withdrawal, mini statement, PIN changing, and balance inquiry are among the key capabilities. The project also includes features such as goal monitoring, spending management, budgeting tools, Google Maps integration, and a chatbot for personalised financial guidance. The report examines the project's architecture, database design, relationship between entities, and important features. It also addresses potential applications, upgrades, and ideas for future enhancements. The research demonstrates the feasibility of integrating traditional ATM capabilities with innovative financial tools to encourage financial literacy and empower users to make informed decisions.

## LITERATURE SURVEY

Introduction: ATM simulations have evolved significantly over the years, transitioning from basic cash withdrawal machines to comprehensive financial management tools. This

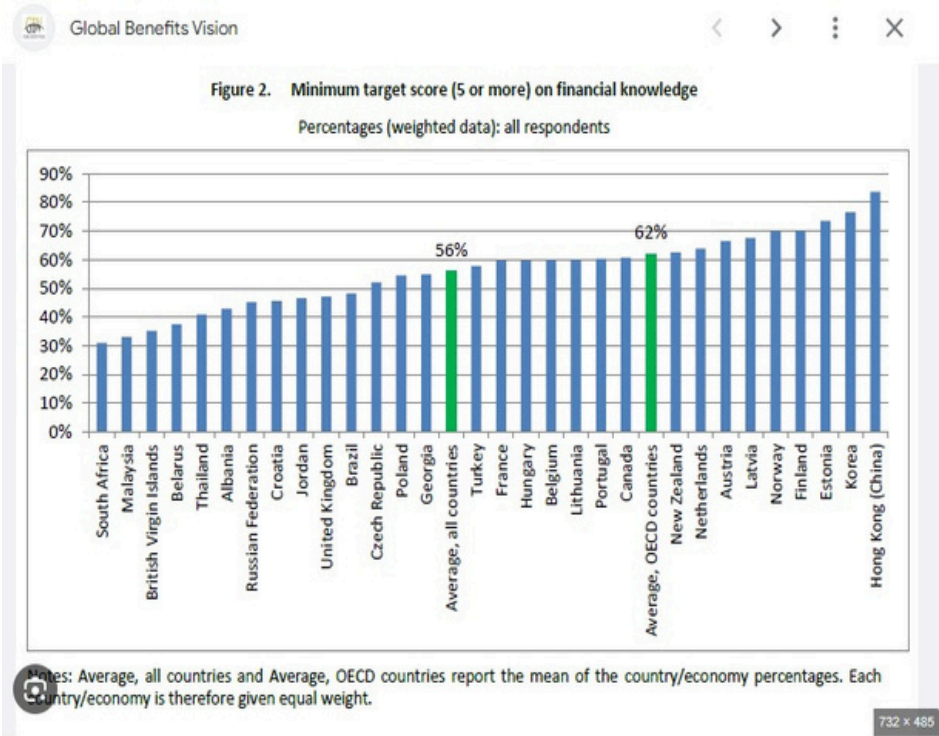
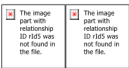
literature survey explores the development, implementation, and impact of ATM simulations integrated with modern financial aid features, as described in the study mentioned.

Evolution of ATM Simulations:

ATM simulations have undergone a transformation from simple transactional machines to sophisticated financial management platforms. According to a report by ATMmarketplace.com, the global ATM market is expected to grow at a CAGR of 7.9% from 2020 to 2025, driven by advancements in technology and the integration of innovative features.

Importance of Financial Literacy:

Financial literacy is crucial for individuals to make informed financial decisions and achieve financial well-being. According to the Organization for Economic Co-operation and Development (OECD), only 33% of adults globally are financially literate. Integrated ATM simulations offer a practical solution to improve financial literacy by providing users with hands-on experience and access to educational resources.



**Impact of Modern Financial Aid Features:** The incorporation of modern financial aid features such as goal monitoring, spending management, and budgeting tools enhances the effectiveness of ATM simulations in promoting financial literacy. A study by the Global Financial Literacy Excellence Center (GFLEC) found that individuals who use financial management tools are more likely to exhibit positive financial behaviors and achieve their financial goals.

#### **Technological Framework:**

The use of Java, MySQL, and front-end technologies in the development of ATM simulations enables seamless integration of traditional ATM capabilities with innovative features. According to the Stack Overflow Developer Survey 2021, Java remains one of the most widely used programming languages globally, offering robust functionality and compatibility.

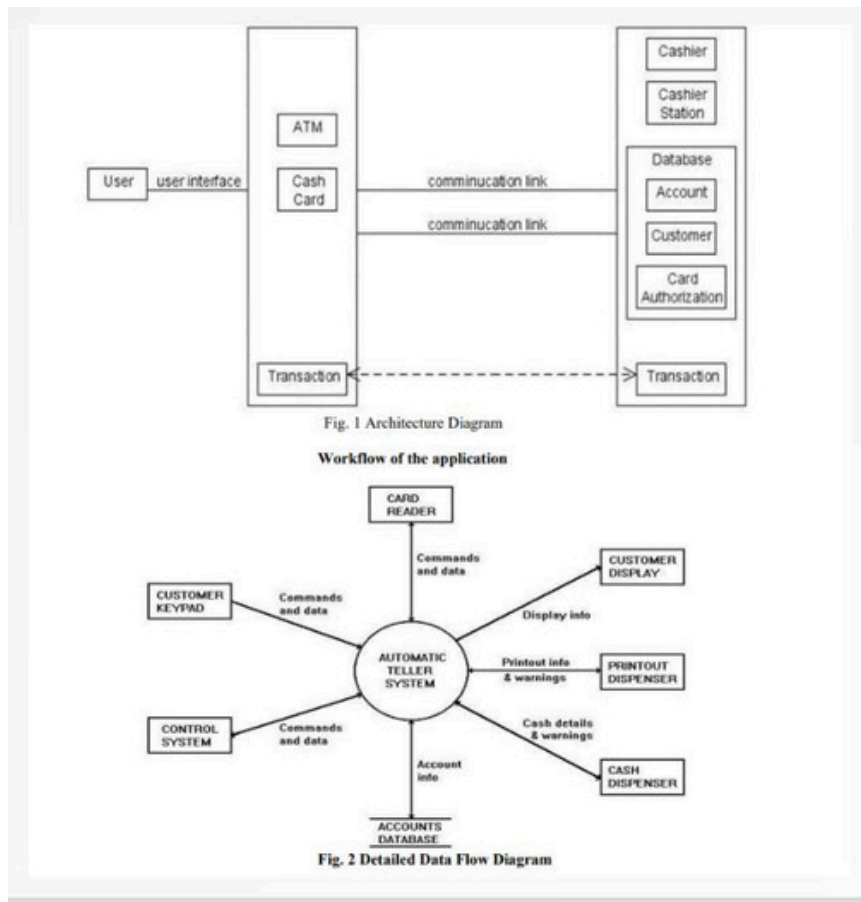
#### **User Experience and Engagement:**

The inclusion of features such as Google Maps integration and a chatbot for personalized financial guidance enhances user experience and engagement. Research by Nielsen Norman Group indicates that user-centric design principles, including intuitive navigation and interactive features, are essential for driving user engagement and satisfaction.

#### **Future Directions and Enhancements:**

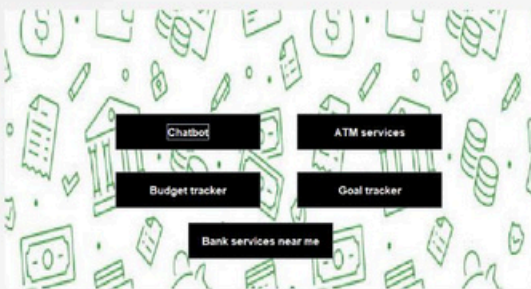
While the current study demonstrates the feasibility and effectiveness of integrated ATM simulations, there are several avenues for future research and enhancements. These include leveraging artificial intelligence (AI) and machine learning (ML) algorithms for personalized financial recommendations, integrating biometric authentication for enhanced security, and expanding access to underserved populations through mobile and digital banking solutions.

## **Existing model of atm:**



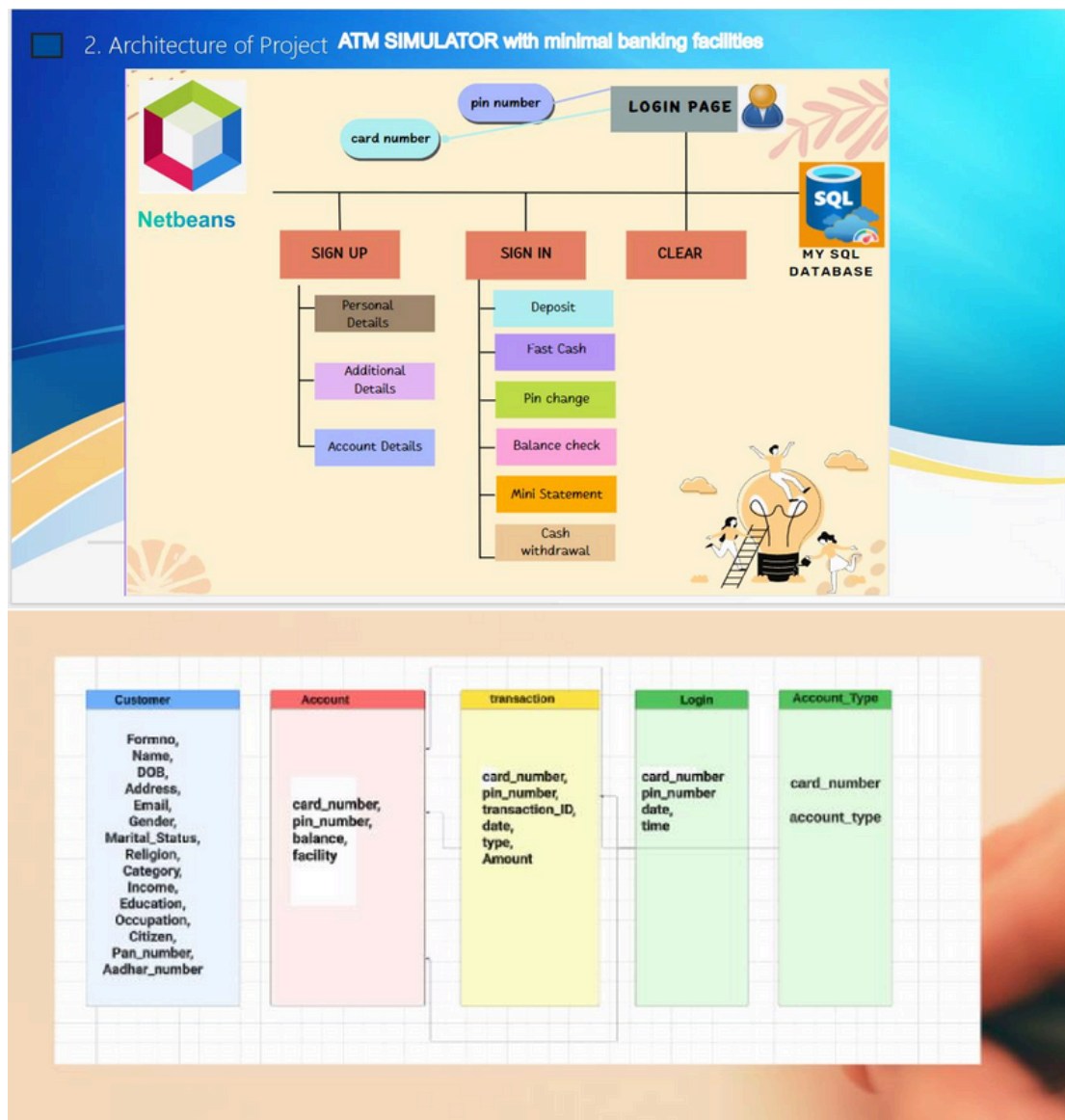
## Proposed model and overall architecture

### Overall architecture of the applet, features included.



#### Features of the project:

- 1) Interactive and customised chatbot for financial or banking procedure related queries.
- 2) ATM services like all real-time transactions
- 3) Personalised budget tracker for maintaining expenditure record.
- 4) Goal tracker, to provide specific maps for buying car, house etc while availing loans.
- 5) Geo map for finding the nearest bank services like atms, banks etc.



The design and implementation of an ATM (Automated Teller Machine) simulation project is done using Java, Java AWT, and Java GUI. The project encompasses various transaction facilities such as deposit, cash withdrawal, fast cash, mini statement, PIN change, and balance inquiry. MySQL has been utilized as the backend database management system to store and manage user account information and transaction records.

2. Project Overview: The primary objective of the ATM simulation project is to provide users with a virtual ATM experience where they can perform standard

banking transactions conveniently. The project offers a user-friendly graphical interface for interaction and employs secure backend mechanisms for data management and transaction processing.

### 3. Modules:

a. Deposit: The deposit module allows users to add funds to their account. Users input the amount they wish to deposit through the graphical interface. The system then updates the account balance in the backend MySQL database accordingly. This module is crucial as it facilitates the addition of funds to user accounts, enabling them to perform financial transactions seamlessly.

b. Cash Withdrawal: The cash withdrawal module enables users to withdraw funds from their account. Users specify the amount they want to withdraw via the GUI, and the system verifies if the requested amount is available in the account balance. If sufficient funds are available, the system dispenses the cash and updates the account balance in the database. This module is essential as it allows users to access their funds conveniently.

c. Fast Cash: Fast cash is a predefined cash withdrawal module that offers users the option to quickly withdraw commonly used denominations without specifying an exact amount. Users can select predefined withdrawal amounts such as \$20, \$50, or \$100. The system processes the request similar to the cash withdrawal module but with predefined withdrawal amounts. This module enhances user experience by providing quick access to commonly used denominations.

d. Mini Statement: The mini statement module enables users to view a summary of recent transactions performed on their account. Upon request through the GUI, the system retrieves transaction records from the MySQL database and displays them to

the user. This module is beneficial for users to track their recent transactions and monitor account activity. e. PIN Change: The PIN change module allows users to update their ATM PIN for security purposes. Users input their current PIN and specify a new PIN through the GUI. The system validates the current PIN and updates it in the backend MySQL database if the entered PIN is correct. This module is critical for maintaining account security by allowing users to change their PIN periodically. f. Balance Enquiry: The balance enquiry module enables users to check the available balance in their account. Users initiate a balance enquiry request through the GUI, and the system retrieves the account balance from the backend MySQL database and displays it to the user. This module provides users with real-time information about their account balance.

#### 4. Technology Stack:

Java (Platforms utilised are eclipse and netbeans): Used for the core logic and implementation of the ATM simulation project.

Java AWT (Abstract Window Toolkit): Employed for creating the graphical user interface (GUI) elements such as buttons, text fields, and labels.

Java GUI (Graphical User Interface): Utilized to design and develop the user-friendly interface for interaction with the ATM system. Many graphical inputs were given like buttons, drop-downs etc to enhance the user interaction with the application.

MySQL: Chosen as the backend database management system for storing user account information and transaction records securely.

#### Analysis on the ER Diagram:



1. Customer Table: formno (Primary Key), name, religion, dob (date of birth), address, education, citizen, email, aadhar\_no, gender, pan\_number, occupation, income, marital\_status.
2. Account Table: card\_number (Primary Key), account\_type, formno (Foreign Key referencing Customer).
3. Facility Table: facility\_id (Primary Key), facility.
4. Account\_Facility Table: card\_number (Composite Key, Foreign Key referencing Account), facility\_id (Composite Key, Foreign Key referencing Facility).
5. Login Table: card\_number (Composite Key, Foreign Key referencing Account), pin\_number (Composite Key), date\_time.
6. Transaction Table: transaction\_id (Primary Key), card\_number (Foreign Key referencing Account), pin\_number (Foreign Key referencing Login), date, type, amount.

Relationship between the Entities:

- One customer can have multiple accounts (one-to-many relationship). This relationship is established by the 'formno' attribute in the Customer table, which serves as the primary key, being referenced as a foreign key in the Account table.
- An account can have multiple facilities associated with it, and a facility can be associated with multiple accounts (many-to-many relationship). This relationship is represented by the Account\_Facility table, which acts as a junction table between Account and Facility tables. The Account\_Facility table contains foreign keys referencing both the Account table (via 'card\_number') and the Facility table (via 'facility\_id'), forming a composite primary key.

- An account can have multiple logins associated with it (one-to-many relationship).

This relationship is established by the Login table, where `card\_number` from the Account table is referenced as a foreign key.

- Each login can have multiple transactions associated with it (one-to-many relationship). This relationship is established by the Transaction table, where both `card\_number` and `pin\_number` from the Login table are referenced as foreign keys.

Features involved:

#### 1. Goal Setting:

- Users can set financial goals by providing details such as the name of the goal, target amount, and target date.
- Goals can be anything from saving for a vacation to paying off a debt or saving for retirement.

#### 2. Progress Tracking:

- The website tracks the progress of each financial goal set by the user.
- It displays this progress visually using a progress bar, which dynamically updates based on the user's input.

#### 3. ATM Locator:

- Although the functionality is not implemented in the provided code, there is a section dedicated to locating ATMs.
- Presumably, users would be able to search for nearby ATMs to withdraw cash or perform other banking transactions.

#### 4. Budgeting Tools:

- Similar to the ATM Locator section, the Budgeting Tools section is not implemented in the provided code.

- It is likely intended to provide users with tools and resources for budgeting, managing expenses, and optimizing their financial planning.

#### 5. Footer Links:

- The footer contains links to additional pages such as "About Us," "Contact Us," and "Privacy Policy," providing users with more information about the website and its policies.

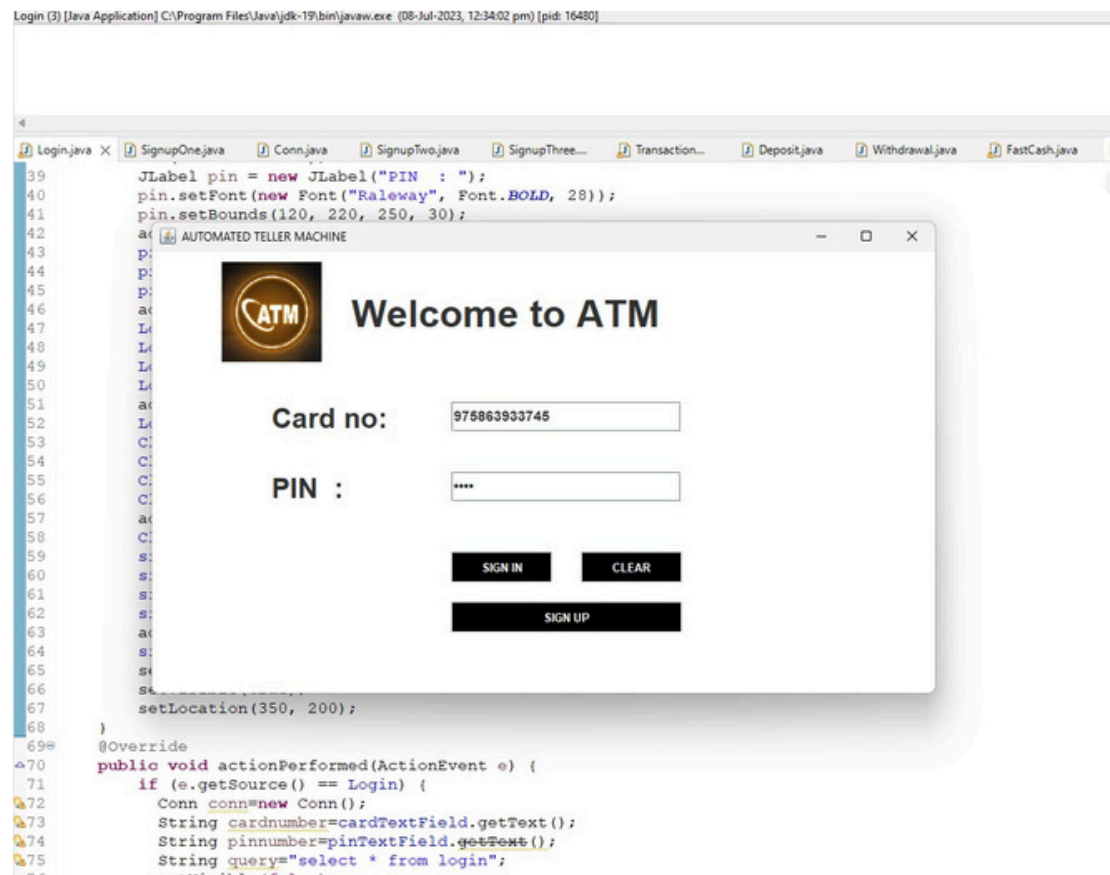
## CODING

Github repository for the source codes of the project

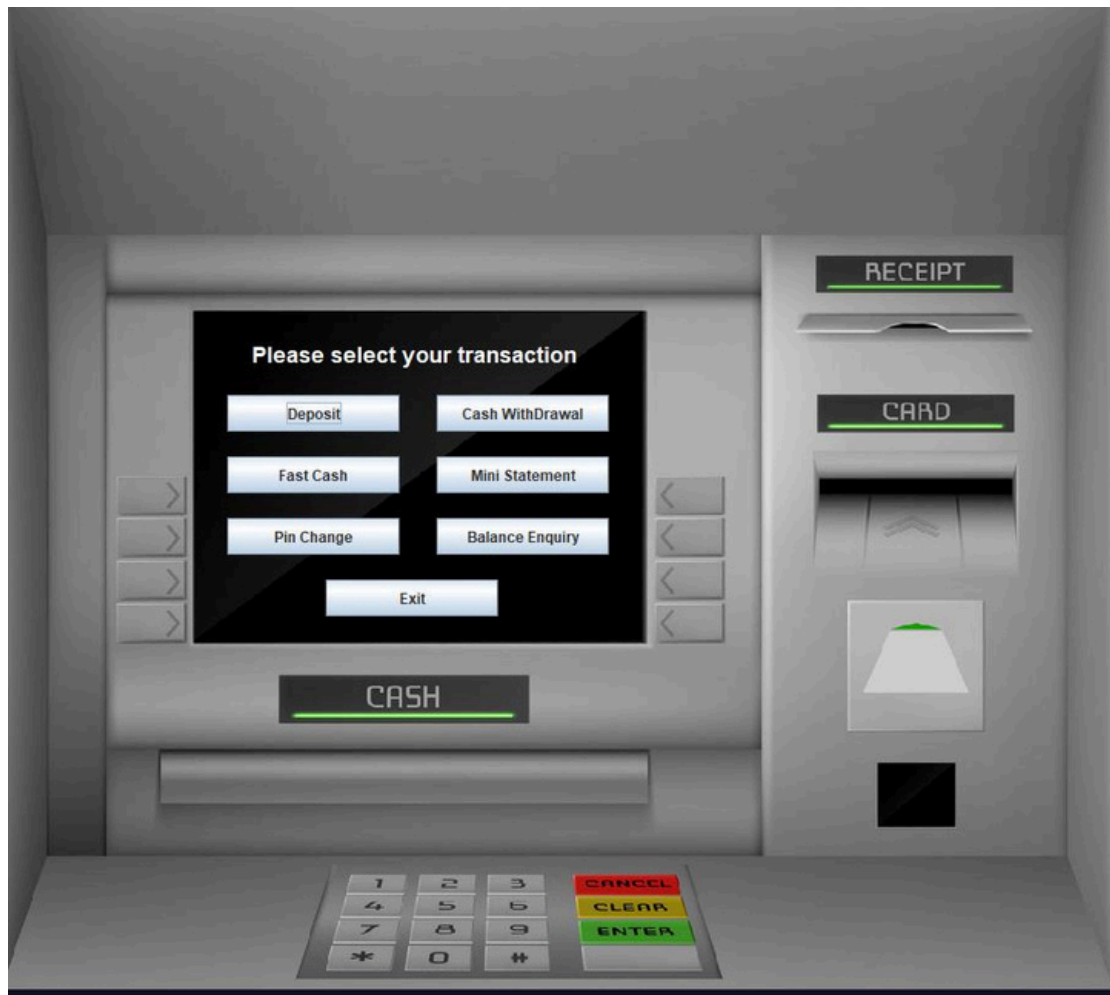
[https://github.com/saisaranya2005/ATM\\_SIMULATION](https://github.com/saisaranya2005/ATM_SIMULATION)

---

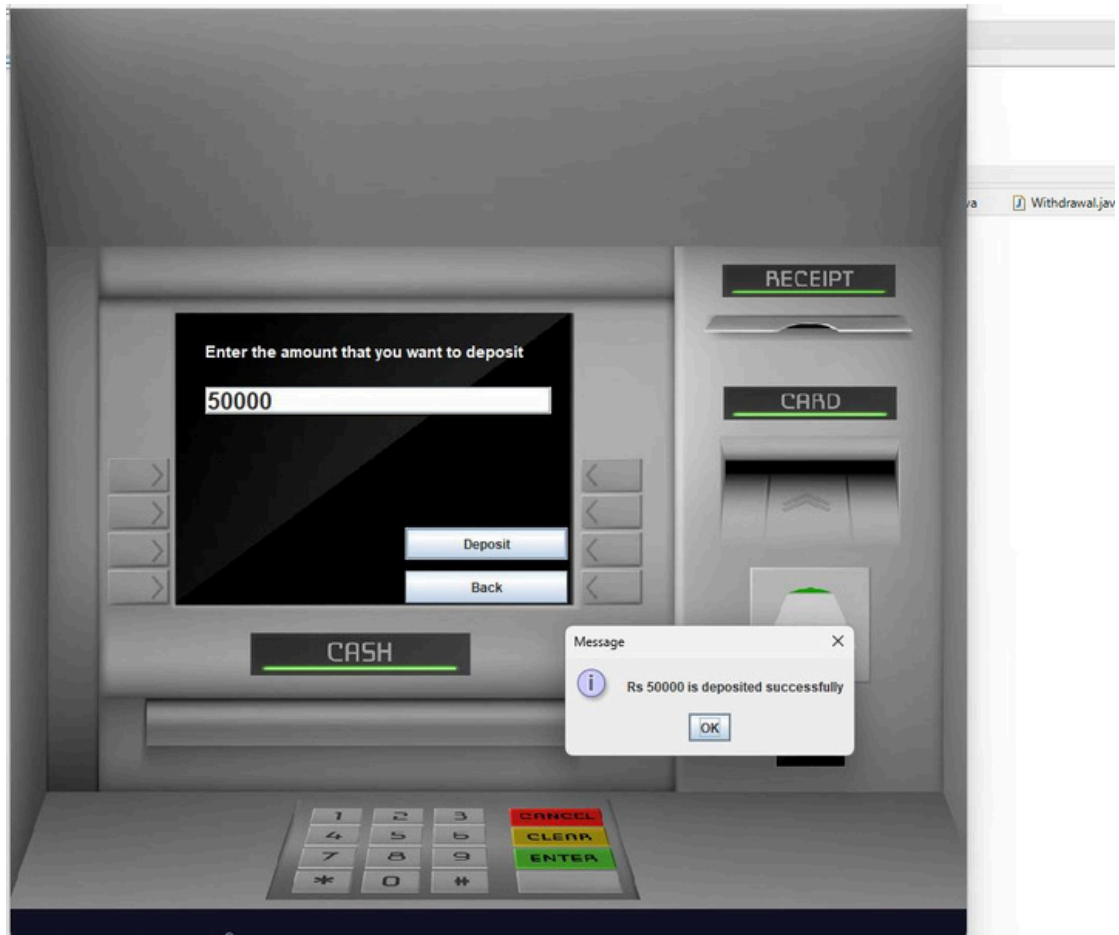
# SCREENSHOTS



Picture-1 : Initial Interface



Picture-2: Transactions display



Picture-3 Deposit phase

```
JLabel pin = new JLabel("PIN : ");
pin.setFont(new Font("Raleway", Font.BOLD, 28));
pin.setBounds(120, 220, 250, 30);
```



AUTOMATED TELLER MACHINE



# Welcome to ATM

Card no:

975863933745

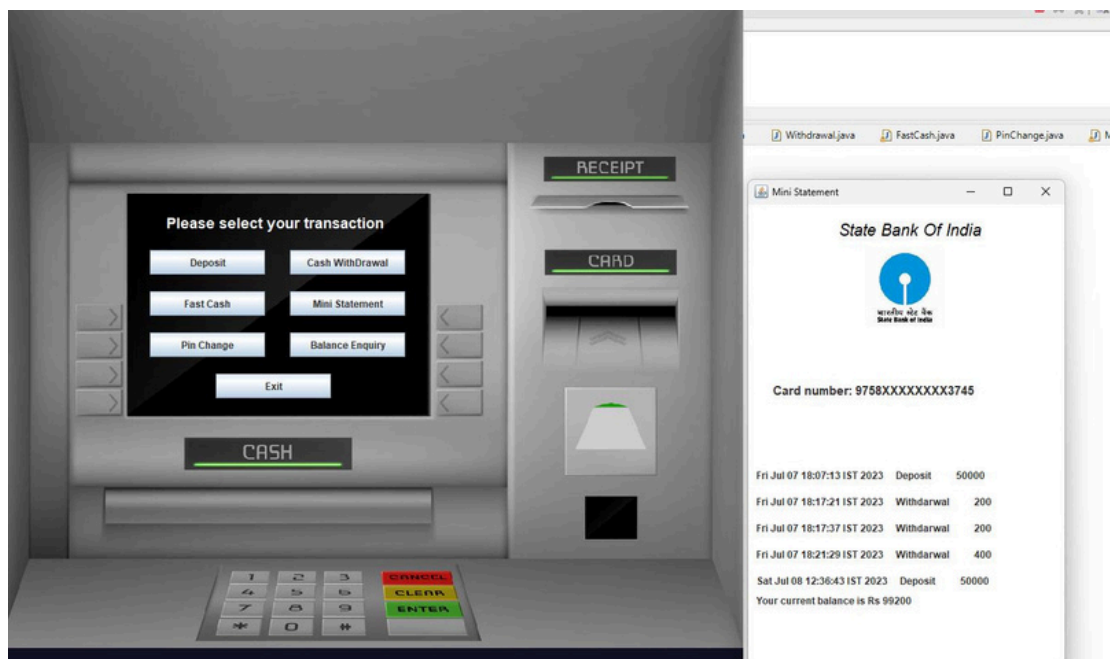
PIN :

....

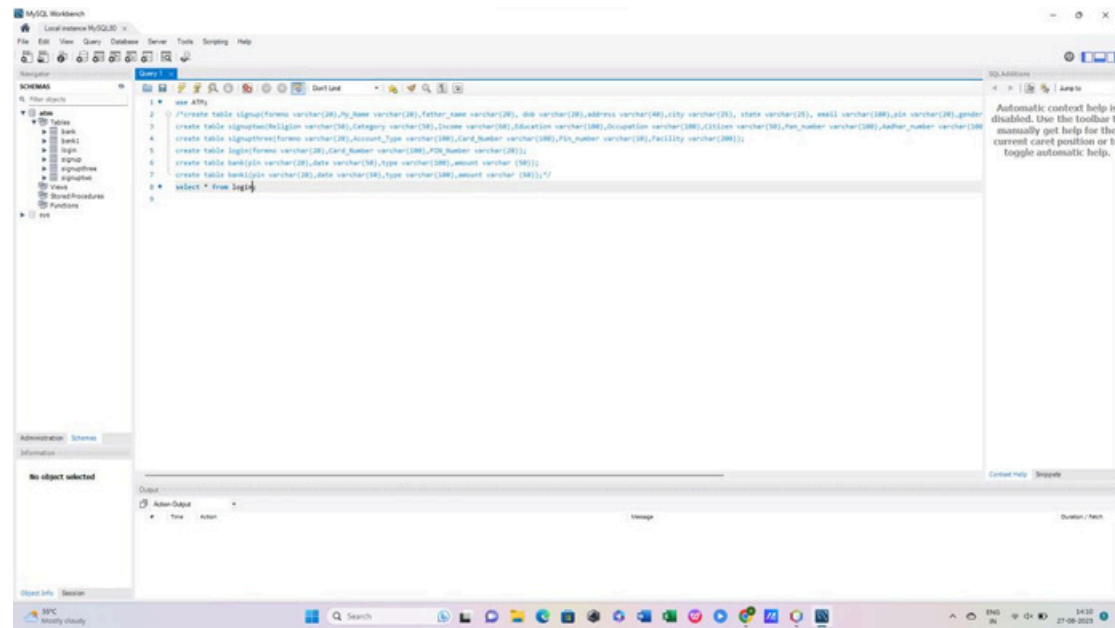
SIGN IN

CLEAR

SIGN UP

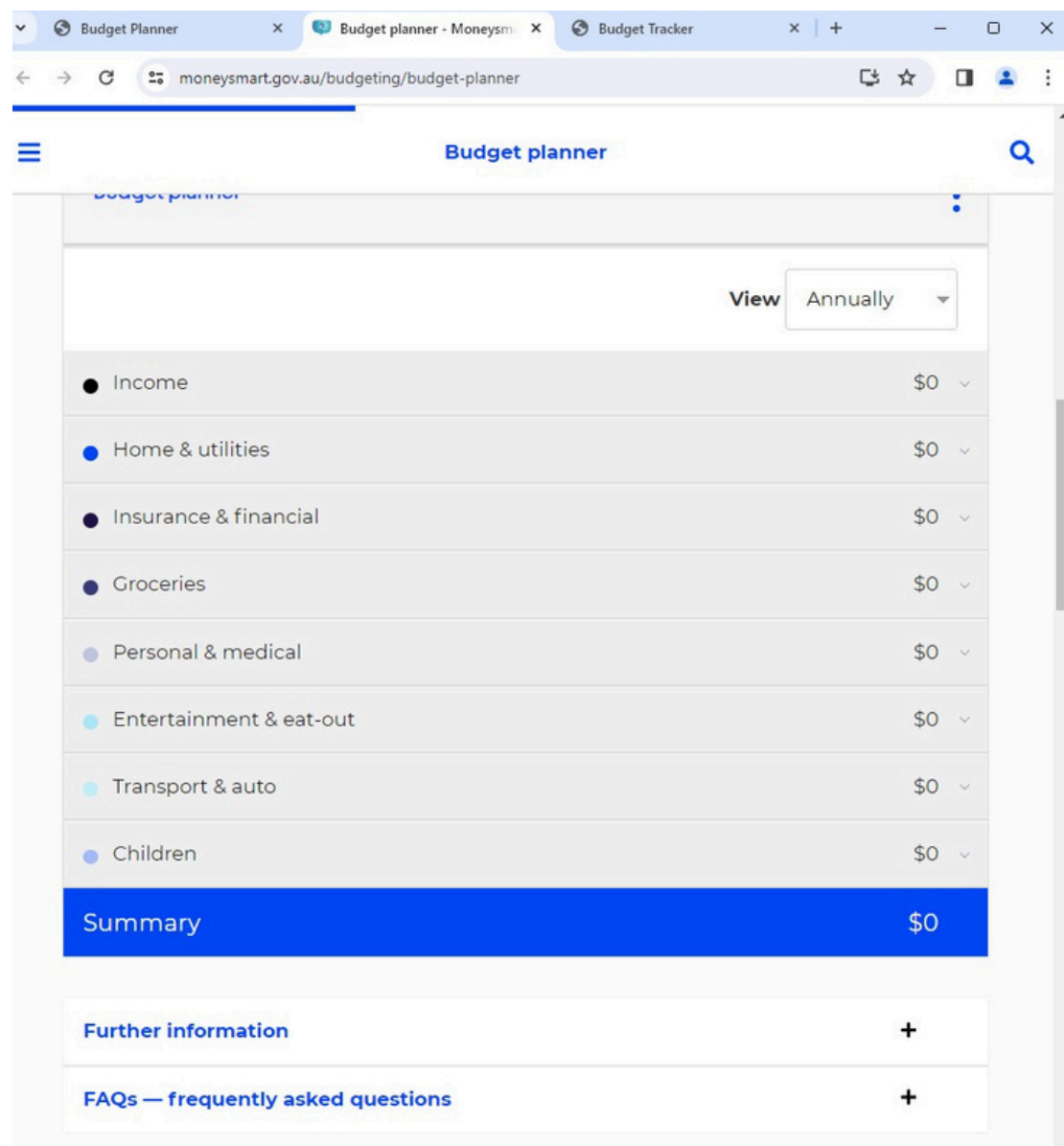


Picture-4 Ministatement print

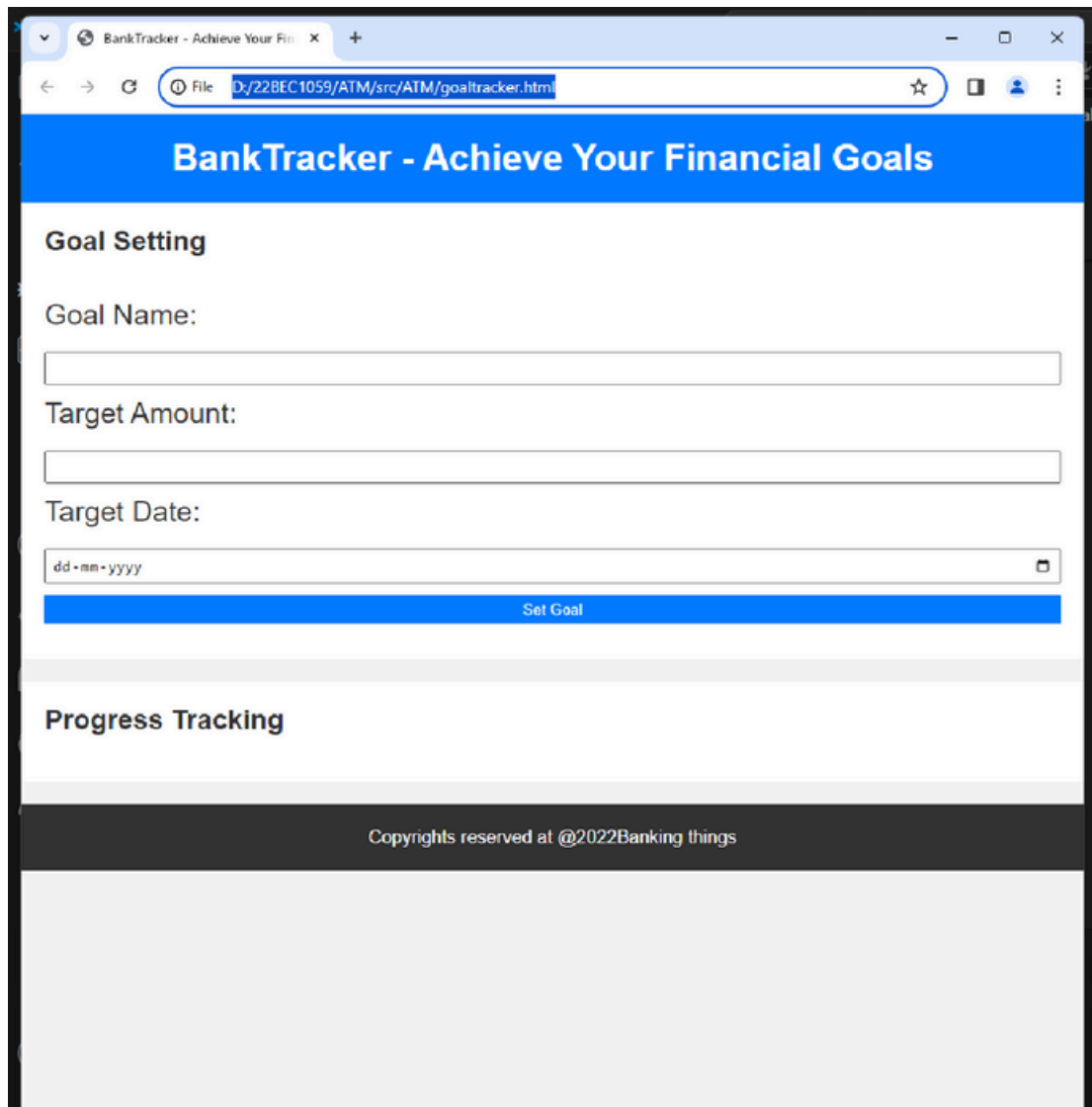


Picture-5 MySQL backend schema

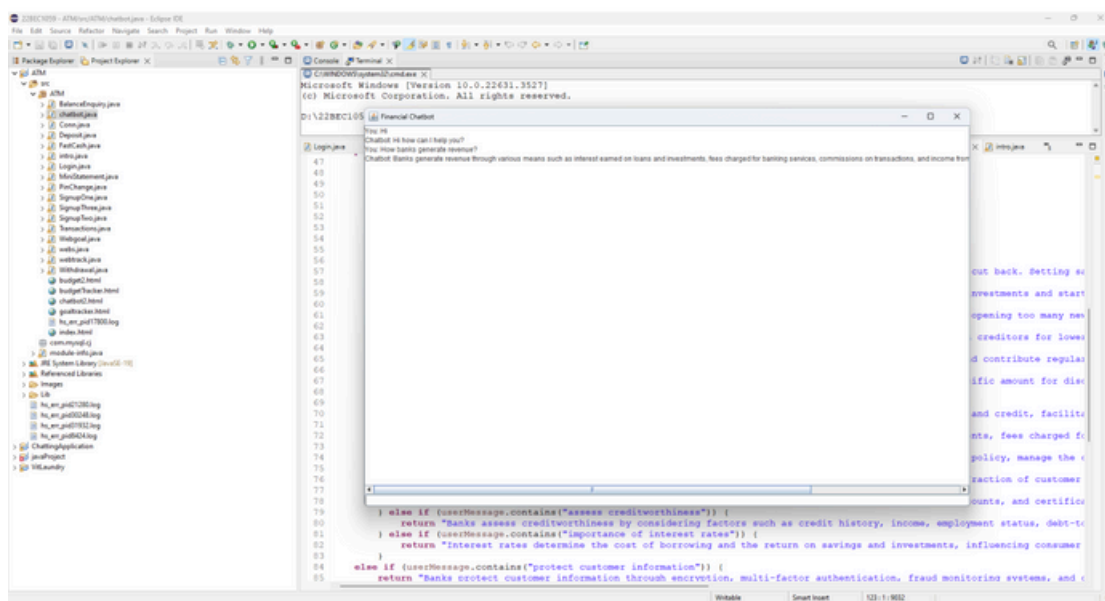




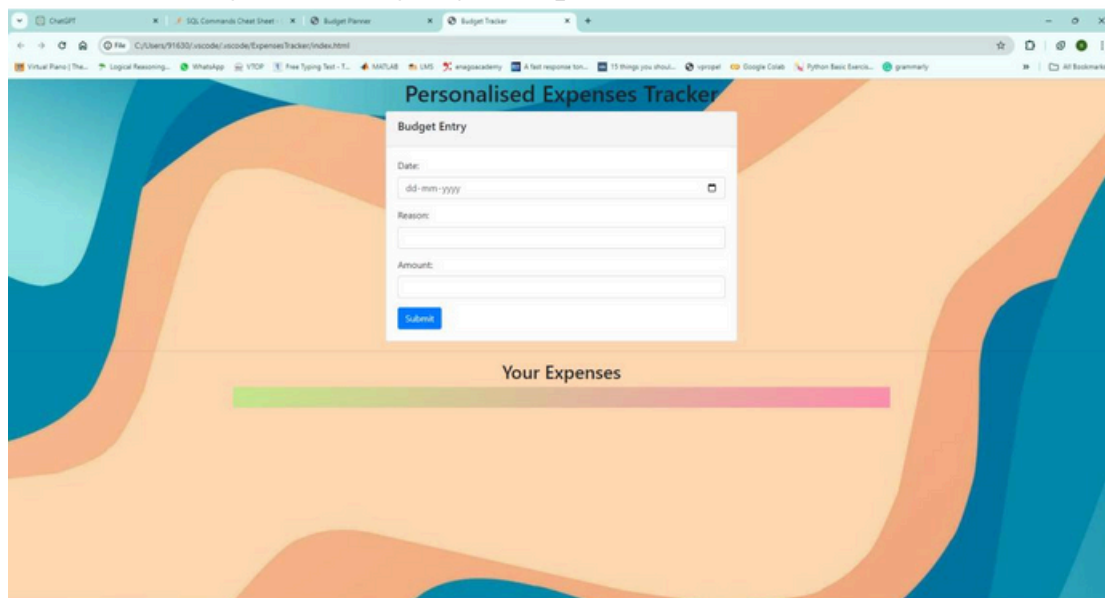
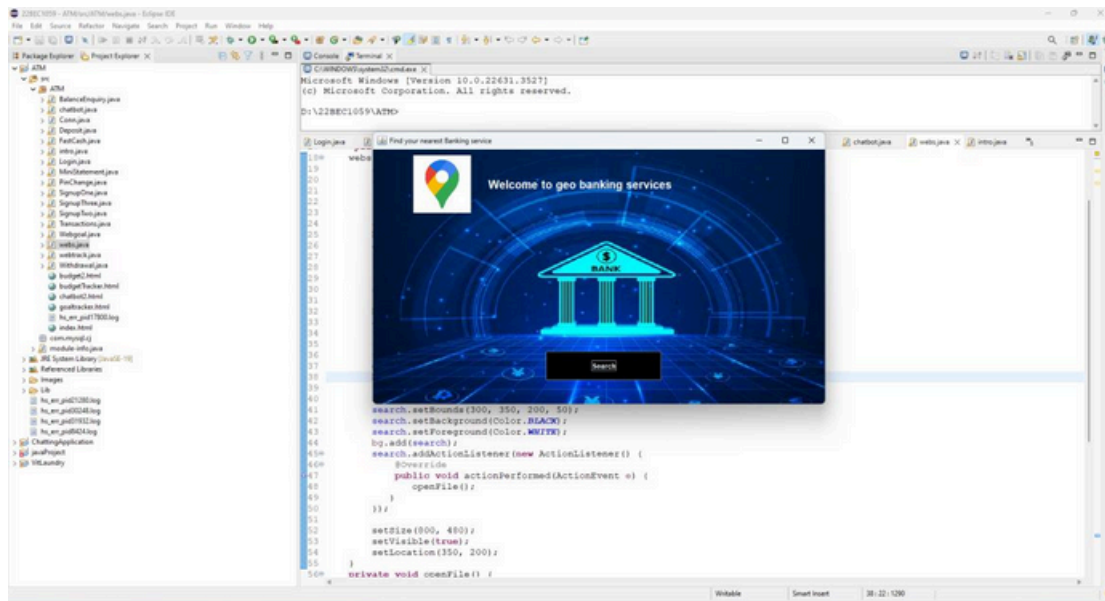
Picture-6: Budget planner

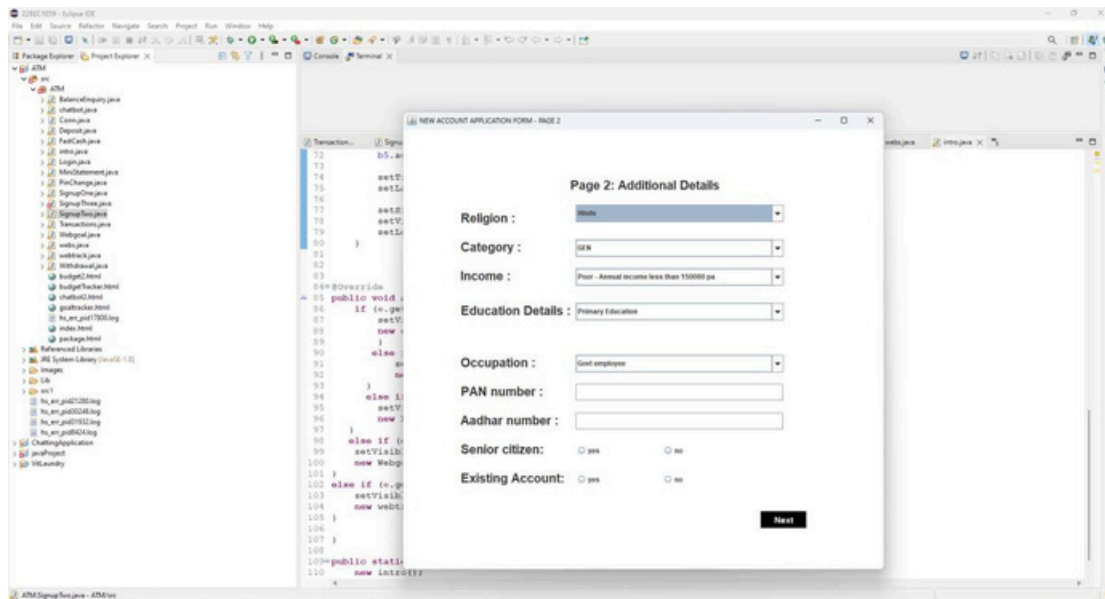


Picture-7:Goal tracker or list management

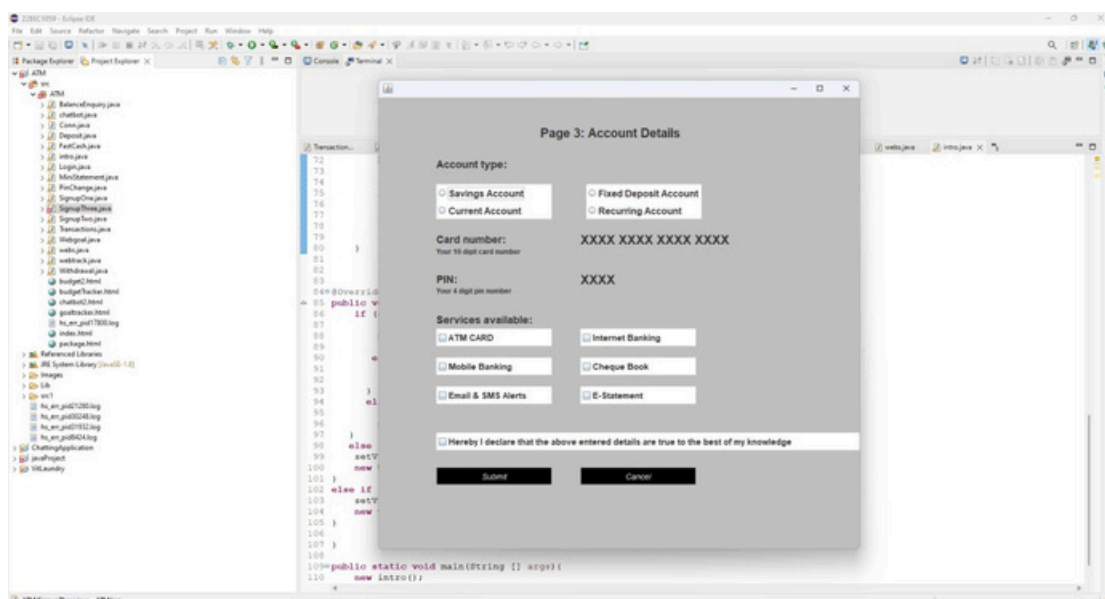


Picture-8 Financial chatbot





Picture-11 Sign up page for creating new bank account with exact procedure that people usually follow during account opening in banks aiming in fostering a real experience of banking system



Picture-12 Account creation details- allowing user to choose the services that they expect from the bank and prefer

# Inferences

The successful implementation of this project demonstrates the feasibility and effectiveness of integrating traditional ATM simulation with modern financial assistance features. By combining practical banking functionalities with innovative tools for financial management, the project caters to the evolving needs of users in the digital age.

The inclusion of features such as goal tracking, expenses management, budgeting, and chatbot assistance reflects a proactive approach to empowering users with comprehensive financial tools and resources. Moreover, the integration of Google Maps enhances user experience by providing convenient access to physical banking facilities. Overall, this project not only delivers a realistic ATM simulation but also serves as a valuable platform for promoting financial literacy, fostering responsible financial behavior, and empowering users to make informed financial decisions.

# Conclusion

In this project, we developed a comprehensive ATM simulation environment enriched with financial assistance features, aimed at providing users with a real-time experience of ATM operations while offering additional functionalities to enhance financial management. The project not only simulates typical ATM transactions but also integrates innovative features to address users' financial needs.

## Key Features:

**ATM Simulation:** The core aspect of the project is the ATM simulation, which accurately replicates the functionalities and interactions users would encounter in a real ATM environment. This includes options for cash withdrawals, balance inquiries, account transfers, and PIN changes, ensuring users gain practical experience.

## Financial Assistance Features:

**Goal Tracker:** Enables users to set financial goals and track their progress over time, promoting better financial planning and discipline.

**Expenses Tracker:** Provides a platform for users to record and monitor their expenses, facilitating budget management and expenditure analysis.

**Budget Tracker:** Offers tools for creating and managing budgets, helping users allocate funds effectively and stay within their financial limits.

**Google Maps Integration:** Integrating Google Maps functionality allows users to easily locate nearby ATMs or banks, enhancing convenience and accessibility. **Chatbot:** A chatbot feature is incorporated to address users' financial queries and provide assistance, offering personalized guidance and support.

Uses and improvements that can be addressed further which were obtained as suggestions via testimonials of project

Uses:

**Educational Tool:** The ATM simulation can be utilized as an educational tool in schools, colleges, and financial literacy programs to teach individuals about basic banking operations and financial management concepts.

**Training Platform:** Banks and financial institutions can use the simulation environment to train their employees, particularly new hires or those undergoing refresher courses, on ATM operations and customer interactions.

**Customer Engagement:** Banks can integrate the ATM simulation with their online banking platforms or mobile apps to enhance customer engagement. Users can familiarize themselves with ATM functionalities before using physical machines, reducing potential errors and enhancing user satisfaction.

**Financial Planning:** Individuals can leverage the financial assistance features such as goal tracking, expenses management, and budgeting to improve their financial planning skills, track their spending habits, and achieve their financial objectives effectively.

**Accessibility Improvement:** The integration of Google Maps can be further enhanced by incorporating features like accessibility ratings for ATMs and banks, real-time updates on ATM availability and cash availability, and directions optimized for users with disabilities.

**Improvements:**

**Enhanced Security:** Implement additional security measures such as two-factor authentication, biometric authentication, and transaction verification prompts to enhance the security of ATM transactions and protect users' financial information.

**Customization Options:** Provide users with customization options for the ATM interface, including font size adjustments, language preferences, and personalized transaction receipts, to cater to diverse user preferences and accessibility needs.

**Advanced Financial Analytics:** Integrate advanced financial analytics tools to offer users insights into their spending patterns, identify areas for cost-saving, and provide personalized recommendations for improving their financial health.

**Expanded Chatbot Functionality:** Enhance the chatbot's capabilities incorporating natural language processing (NLP) algorithms, machine learning models, and a wider range of financial knowledge to enable more sophisticated interactions and provide users with accurate and relevant financial advice.

**Feedback Mechanism:** Implement a feedback mechanism within the ATM simulation environment to gather user feedback, suggestions, and complaints, and use this data to continuously improve the user experience, identify areas for optimization, and prioritize future enhancements.



Integration with Financial APIs: Integrate the ATM simulation with external financial APIs to provide users with real-time access to their bank account information, transaction history, and account balances, enabling seamless integration with existing financial systems and services.

By considering these suggestions for uses and improvements, the ATM simulation and financial assistance features can be further enhanced to meet the evolving needs of users and provide a more comprehensive and engaging experience.