VIRTUNEXA

PROJECT REPORT

PROJECT TITLE: ATMAPP

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1. Introduction

The ATM Simulator Application is a GUI-based system designed to replicate the functionalities of an Automated Teller Machine (ATM). It allows users to perform banking transactions such as deposits, withdrawals, and balance inquiries in a user-friendly environment. The application is built using Java with Swing for the graphical user interface and integrates MySQL as the database through JDBC. In this app if we are not register then we can register ourself and further do login in the app once we login we will see three options that is withdraw deposit and balance once this is done we can do logout and go to the login page back. The login or register data is to be saved in the MYSQL Database.

2. Technologies Used

- **Java:** Core programming language used for application development.
- **Java Swing:** Used for creating the graphical user interface (GUI).
- **JDBC (Java Database Connectivity):** To establish a connection between Java and MySQL.
- **MySQL:** Relational database management system used for storing user accounts and transaction details.
- **AWT (Abstract Window Toolkit):** Used for basic UI components and event handling.

3. Objective and Scope

Objectives:

- To simulate an ATM interface that allows users to perform banking operations.
- To implement user authentication and secure banking transactions.
- To maintain a database of user accounts and transaction history.

Scope:

- Users can perform actions like deposit, withdraw, and check balance.
- User authentication is managed using a PIN-based login system.
- Future enhancements may include fund transfers and mini-statements.

4. System Design

4.1 Architecture Pattern: MVC (Model-View-Controller)

- **Model:** Handles database operations related to users and transactions.
- **View:** Swing-based GUI for user interaction.

- **Controller:** Manages user input, authentication, and banking operations.

4.2 Flow of the Application

1. User enters card details and PIN for authentication.
2. Upon successful authentication, the user is presented with transaction options.
3. The user can perform a deposit, withdrawal, or check balance.
4. The application updates the database and displays results accordingly.

5. Implementation

5.1 User Interface

- **Login Screen:** Allows users to enter account number and PIN.
- **Main Menu:** Provides options for withdrawal, deposit, and balance inquiry.
- **Transaction Screens:** Displays input fields and buttons for performing transactions.
- **Result Display:** Shows transaction success or failure messages.

5.2 Database Integration

- **Connection:** Uses JDBC to connect with the MySQL database.
- **Tables:**
  - users (id, username, Password, balance)
- **CRUD Operations:**
  - **Create** new users and transactions.
  - **Read** user details and transaction history.
  - **Update** account balances.

6.Code Snippet

```
import javax.swing.*;
import java.awt.*;
import java.awt.event.*;
import java.sql.*;

public class ATMApp {

    private JFrame frame;
    private JTextField usernameField;
    private JPasswordField passwordField;
    private DBHelper dbHelper;

    public static void main(String[] args) {
        EventQueue.invokeLater(() -> {
            try {
                ATMApp window = new ATMApp();
                window.frame.setVisible(true);
            } catch (Exception e) {
                e.printStackTrace();
            }
        });
    }

    public ATMApp() {
        dbHelper = new DBHelper();
        initialize();
    }

    private void initialize() {
        frame = new JFrame("ATM Simulator");
        frame.setBounds(100, 100, 500, 400);
        frame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
        frame.setResizable(false);
        frame.getContentPane().setBackground(new Color(50, 50, 50));

        showLoginPanel();
    }

    private void showLoginPanel() {
        frame.getContentPane().removeAll();

        // Login Panel
        JPanel loginPanel = new JPanel();
        loginPanel.setBackground(new Color(50, 50, 50));
        frame.getContentPane().add(loginPanel, BorderLayout.CENTER);
        loginPanel.setLayout(new GridBagLayout());
        GridBagConstraints gbc = new GridBagConstraints();
        gbc.insets = new Insets(10, 10, 10, 10);

        // Username label and field
        JLabel lblUsername = new JLabel("Username:");
        lblUsername.setForeground(Color.WHITE);
        lblUsername.setFont(new Font("Arial", Font.PLAIN, 16));
        gbc.gridx = 0;
        gbc.gridy = 0;
        loginPanel.add(lblUsername, gbc);
```

```
usernameField = new JTextField(20);
usernameField.setFont(new Font("Arial", Font.PLAIN, 16));
gbc.gridx = 1;
gbc.gridy = 0;
loginPanel.add(usernameField, gbc);

// Password label and field
JLabel lblPassword = new JLabel("Password:");
lblPassword.setForeground(Color.WHITE);
lblPassword.setFont(new Font("Arial", Font.PLAIN, 16));
gbc.gridx = 0;
gbc.gridy = 1;
loginPanel.add(lblPassword, gbc);

passwordField = new JPasswordField(20);
passwordField.setFont(new Font("Arial", Font.PLAIN, 16));
gbc.gridx = 1;
gbc.gridy = 1;
loginPanel.add(passwordField, gbc);

// Login Button
JButton btnLogin = new JButton("Login");
btnLogin.setFont(new Font("Arial", Font.BOLD, 16));
btnLogin.setBackground(new Color(0, 153, 51));
btnLogin.setForeground(Color.WHITE);
btnLogin.setFocusPainted(false);
btnLogin.setPreferredSize(new Dimension(150, 40));
gbc.gridx = 0;
gbc.gridy = 2;
gbc.gridwidth = 2;
loginPanel.add(btnLogin, gbc);

// Register Button
JButton btnRegister = new JButton("Register");
btnRegister.setFont(new Font("Arial", Font.BOLD, 16));
btnRegister.setBackground(new Color(0, 102, 204));
btnRegister.setForeground(Color.WHITE);
btnRegister.setFocusPainted(false);
btnRegister.setPreferredSize(new Dimension(150, 40));
gbc.gridx = 0;
gbc.gridy = 3;
gbc.gridwidth = 2;
loginPanel.add(btnRegister, gbc);

// Message Label
JLabel lblMessage = new JLabel("");
lblMessage.setForeground(Color.RED);
lblMessage.setFont(new Font("Arial", Font.ITALIC, 14));
```

```
    gbc.gridx = 0;
    gbc.gridy = 4;
    gbc.gridwidth = 2;
    loginPanel.add(lblMessage, gbc);

    // ActionListener for Login button
    btnLogin.addActionListener(e -> {
      String username = usernameField.getText();
      String password = new String(passwordField.getPassword());

      if (dbHelper.authenticate(username, password)) {
        showATMMenu(username);
      } else {
        lblMessage.setText("Invalid credentials! Please try again.");
      }
    });

    // ActionListener for Register button
    btnRegister.addActionListener(e -> showRegistrationForm());

    frame.revalidate();
    frame.repaint();
  }

  private void showRegistrationForm() {
    // Create a new JFrame for registration
    JFrame registerFrame = new JFrame("Register");
    registerFrame.setBounds(100, 100, 500, 400); // Increased window size
    registerFrame.setDefaultCloseOperation(JFrame.DISPOSE_ON_CLOSE);
    registerFrame.setResizable(false);
    registerFrame.getContentPane().setBackground(new Color(50, 50, 50));

    JPanel panel = new JPanel();
    panel.setBackground(new Color(50, 50, 50));
    registerFrame.getContentPane().add(panel, BorderLayout.CENTER);
    panel.setLayout(new GridBagLayout());
    GridBagConstraints gbc = new GridBagConstraints();
    gbc.insets = new Insets(10, 10, 10, 10);

    // Username field
    JLabel lblUsername = new JLabel("Username:");
    lblUsername.setForeground(Color.WHITE);
    lblUsername.setFont(new Font("Arial", Font.PLAIN, 16));
    gbc.gridx = 0;
    gbc.gridy = 0;
    panel.add(lblUsername, gbc);

    JTextField regUsernameField = new JTextField();
```

```
regUsernameField.setFont(new Font("Arial", Font.PLAIN, 16));
regUsernameField.setPreferredSize(new Dimension(300, 40)); // Increased size
gbc.gridx = 1;
gbc.gridy = 0;
panel.add(regUsernameField, gbc);

// Password field
JLabel lblPassword = new JLabel("Password:");
lblPassword.setForeground(Color.WHITE);
lblPassword.setFont(new Font("Arial", Font.PLAIN, 16));
gbc.gridx = 0;
gbc.gridy = 1;
panel.add(lblPassword, gbc);

JPasswordField regPasswordField = new JPasswordField();
regPasswordField.setFont(new Font("Arial", Font.PLAIN, 16));
regPasswordField.setPreferredSize(new Dimension(300, 40)); // Increased size
gbc.gridx = 1;
gbc.gridy = 1;
panel.add(regPasswordField, gbc);

// Initial Balance field
JLabel lblBalance = new JLabel("Initial Balance:");
lblBalance.setForeground(Color.WHITE);
lblBalance.setFont(new Font("Arial", Font.PLAIN, 16));
gbc.gridx = 0;
gbc.gridy = 2;
panel.add(lblBalance, gbc);

JTextField balanceField = new JTextField();
balanceField.setFont(new Font("Arial", Font.PLAIN, 16));
balanceField.setPreferredSize(new Dimension(300, 40)); // Increased size
gbc.gridx = 1;
gbc.gridy = 2;
panel.add(balanceField, gbc);

// Register Button
JButton btnRegister = new JButton("Register");
btnRegister.setFont(new Font("Arial", Font.BOLD, 16));
btnRegister.setBackground(new Color(0, 102, 204));
btnRegister.setForeground(Color.WHITE);
btnRegister.setFocusPainted(false);
btnRegister.setPreferredSize(new Dimension(200, 50)); // Increased button size
gbc.gridx = 0;
gbc.gridy = 3;
gbc.gridwidth = 2;
panel.add(btnRegister, gbc);
```

```
    // ActionListener for Register button
    btnRegister.addActionListener(e -> {
        String username = regUsernameField.getText();
        String password = new String(regPasswordField.getPassword());
        double balance = Double.parseDouble(balanceField.getText());

        if (dbHelper.registerUser(username, password, balance)) {
            JOptionPane.showMessageDialog(registerFrame, "User registered successfully!");
            registerFrame.dispose();
        } else {
            JOptionPane.showMessageDialog(registerFrame, "Registration failed. Try again.");
        }
    });

    registerFrame.setVisible(true);
}

private void showATMMenu(final String username) {
    frame.getContentPane().removeAll();

    // ATM Panel
    JPanel atmPanel = new JPanel();
    atmPanel.setBackground(new Color(50, 50, 50));
    frame.getContentPane().add(atmPanel, BorderLayout.CENTER);
    atmPanel.setLayout(new GridBagLayout());
    GridBagConstraints gbc = new GridBagConstraints();
    gbc.insets = new Insets(15, 15, 15, 15);

    // Balance label and display
    JLabel lblBalance = new JLabel("Balance: ");
    lblBalance.setForeground(Color.WHITE);
    lblBalance.setFont(new Font("Arial", Font.PLAIN, 18));
    gbc.gridx = 0;
    gbc.gridy = 0;
    atmPanel.add(lblBalance, gbc);

    JLabel balanceLabel = new JLabel(String.valueOf(dbHelper.getBalance(username)));
    balanceLabel.setForeground(Color.WHITE);
    balanceLabel.setFont(new Font("Arial", Font.PLAIN, 18));
    gbc.gridx = 1;
    gbc.gridy = 0;
    atmPanel.add(balanceLabel, gbc);

    // Deposit Button
    JButton btnDeposit = new JButton("Deposit");
    btnDeposit.setFont(new Font("Arial", Font.BOLD, 16));
    btnDeposit.setBackground(new Color(0, 153, 51));
    btnDeposit.setForeground(Color.WHITE);
btnDeposit.setFocusPainted(false);
btnDeposit.setPreferredSize(new Dimension(150, 40));
gbc.gridx = 0;
gbc.gridy = 1;
gbc.gridwidth = 2;
atmPanel.add(btnDeposit, gbc);

// Withdraw Button
JButton btnWithdraw = new JButton("Withdraw");
btnWithdraw.setFont(new Font("Arial", Font.BOLD, 16));
btnWithdraw.setBackground(new Color(204, 51, 51));
btnWithdraw.setForeground(Color.WHITE);
btnWithdraw.setFocusPainted(false);
btnWithdraw.setPreferredSize(new Dimension(150, 40));
gbc.gridx = 0;
gbc.gridy = 2;
gbc.gridwidth = 2;
atmPanel.add(btnWithdraw, gbc);

// Logout Button
JButton btnLogout = new JButton("Logout");
btnLogout.setFont(new Font("Arial", Font.BOLD, 16));
btnLogout.setBackground(new Color(102, 102, 102));
btnLogout.setForeground(Color.WHITE);
btnLogout.setFocusPainted(false);
btnLogout.setPreferredSize(new Dimension(150, 40));
gbc.gridx = 0;
gbc.gridy = 3;
gbc.gridwidth = 2;
atmPanel.add(btnLogout, gbc);

// Action for Deposit Button
btnDeposit.addActionListener(e -> {
   String amountStr = JOptionPane.showInputDialog(frame, "Enter deposit amount:");
   double amount = Double.parseDouble(amountStr);
   dbHelper.deposit(username, amount);
   balanceLabel.setText(String.valueOf(dbHelper.getBalance(username)));
});

// Action for Withdraw Button
btnWithdraw.addActionListener(e -> {
   String amountStr = JOptionPane.showInputDialog(frame, "Enter withdrawal amount:");
   double amount = Double.parseDouble(amountStr);
   dbHelper.withdraw(username, amount);
   balanceLabel.setText(String.valueOf(dbHelper.getBalance(username)));
});

// Action for Logout Button
```

```
        btnLogout.addActionListener(e -> {
            showLoginPanel();
        });

        frame.revalidate();
        frame.repaint();
    }
}

// JDBC MYSQL Connection
class DBHelper {

    private static final String URL = "jdbc:mysql://localhost:3306/ATMSystem";
    private static final String USER = "root";
    private static final String PASSWORD = "Sagar@9075";

    private Connection conn;

    public DBHelper() {
        try {
            conn = DriverManager.getConnection(URL, USER, PASSWORD);
        } catch (SQLException e) {
            e.printStackTrace();
        }
    }

    public boolean authenticate(String username, String password) {
        String query = "SELECT * FROM Users WHERE username = ? AND password = ?";
        try (PreparedStatement stmt = conn.prepareStatement(query)) {
            stmt.setString(1, username);
            stmt.setString(2, password);
            ResultSet rs = stmt.executeQuery();
            return rs.next();
        } catch (SQLException e) {
            e.printStackTrace();
        }
        return false;
    }

    public boolean registerUser(String username, String password, double initialBalance) {
        String query = "INSERT INTO Users (username, password, balance) VALUES (?, ?, ?)";
        try (PreparedStatement stmt = conn.prepareStatement(query)) {
            stmt.setString(1, username);
            stmt.setString(2, password);
            stmt.setDouble(3, initialBalance);
            int rowsAffected = stmt.executeUpdate();
            return rowsAffected > 0;
        } catch (SQLException e) {
            e.printStackTrace();
        }
        return false;
    }

    public double getBalance(String username) {
        String query = "SELECT balance FROM Users WHERE username = ?";
        try (PreparedStatement stmt = conn.prepareStatement(query)) {
            stmt.setString(1, username);
            ResultSet rs = stmt.executeQuery();
            if (rs.next()) {
                return rs.getDouble("balance");
            }
        } catch (SQLException e) {
            e.printStackTrace();
        }
        return 0.0;
    }

    public void updateBalance(String username, double newBalance) {
        String query = "UPDATE Users SET balance = ? WHERE username = ?";
        try (PreparedStatement stmt = conn.prepareStatement(query)) {
            stmt.setDouble(1, newBalance);
            stmt.setString(2, username);
            stmt.executeUpdate();
        } catch (SQLException e) {
            e.printStackTrace();
        }
    }

    public void deposit(String username, double amount) {
        double currentBalance = getBalance(username);
        double newBalance = currentBalance + amount;
        updateBalance(username, newBalance);
    }

    public void withdraw(String username, double amount) {
        double currentBalance = getBalance(username);
        if (currentBalance >= amount) {
            double newBalance = currentBalance - amount;
            updateBalance(username, newBalance);
        } else {
            System.out.println("Insufficient funds.");
        }
    }
}
```

7.SQL CODE

CREATE DATABASE ATMSystem;

USE ATMSystem;

CREATE TABLE Users (

  id INT AUTO_INCREMENT PRIMARY KEY,

  username VARCHAR(50) NOT NULL,

  password VARCHAR(50) NOT NULL,

  balance DOUBLE NOT NULL DEFAULT 0

);

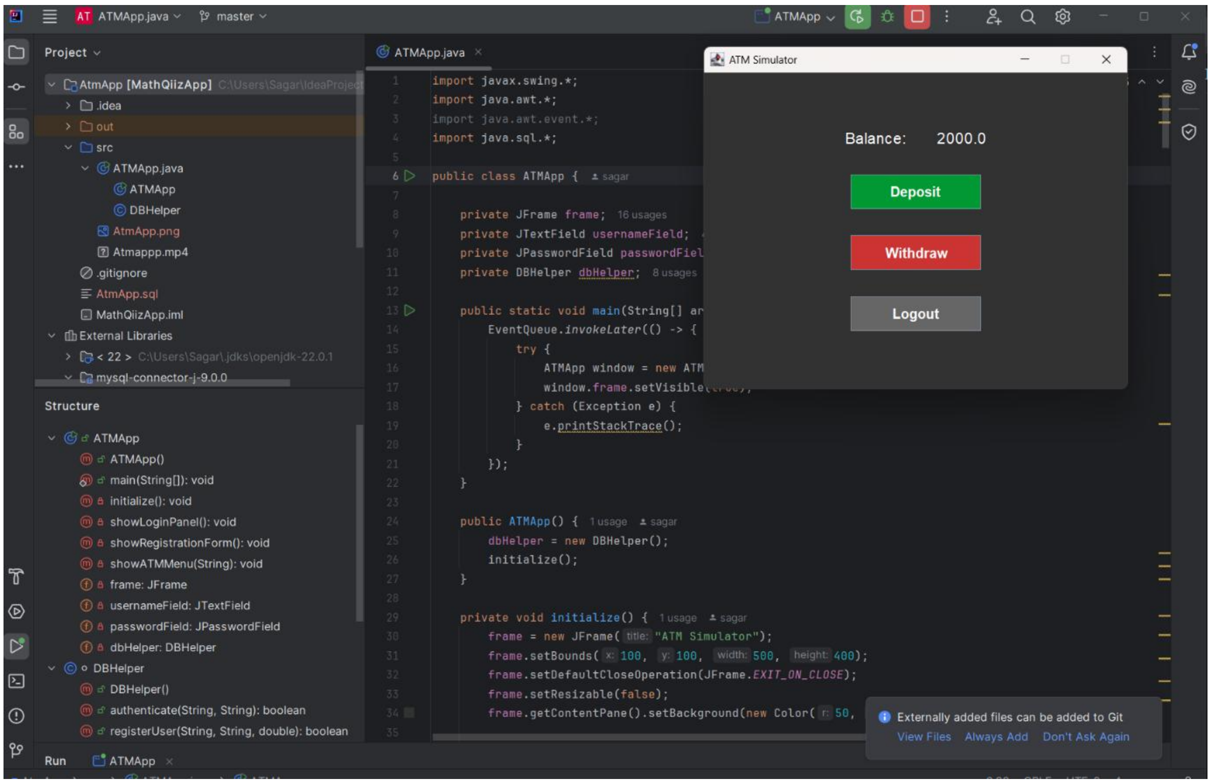
select*from Users;

8. Testing

- **Unit Testing:** Tested individual functions like user authentication and balance updates.
- **Integration Testing:** Verified interactions between GUI and database.
- **User Testing:** Conducted usability testing to refine the UI and transaction processes.

9. Results

The ATM Simulator successfully replicates basic ATM functionalities, ensuring secure transactions and an intuitive user experience.



```java
import javax.swing.*;
import java.awt.*;
import java.awt.event.*;
import java.sql.*;

public class ATMApp {

    private JFrame frame;
    private JTextField usernameField;
    private JPasswordField passwordFiel
    private DBHelper dbHelper;

    public static void main(String[] ar
        EventQueue.invokeLater(() -> {
            try {
                ATMApp window = new ATM
                window.frame.setVisible
            } catch (Exception e) {
                e.printStackTrace();
            }
        });
    }

    public ATMApp() {
        dbHelper = new DBHelper();
        initialize();
    }

    private void initialize() {
        frame = new JFrame( title: "ATM Simulator");
        frame.setBounds( x: 100, y: 100, width: 500, height: 400);
        frame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
        frame.setResizable(false);
        frame.getContentPane().setBackground(new Color( r: 50,
```

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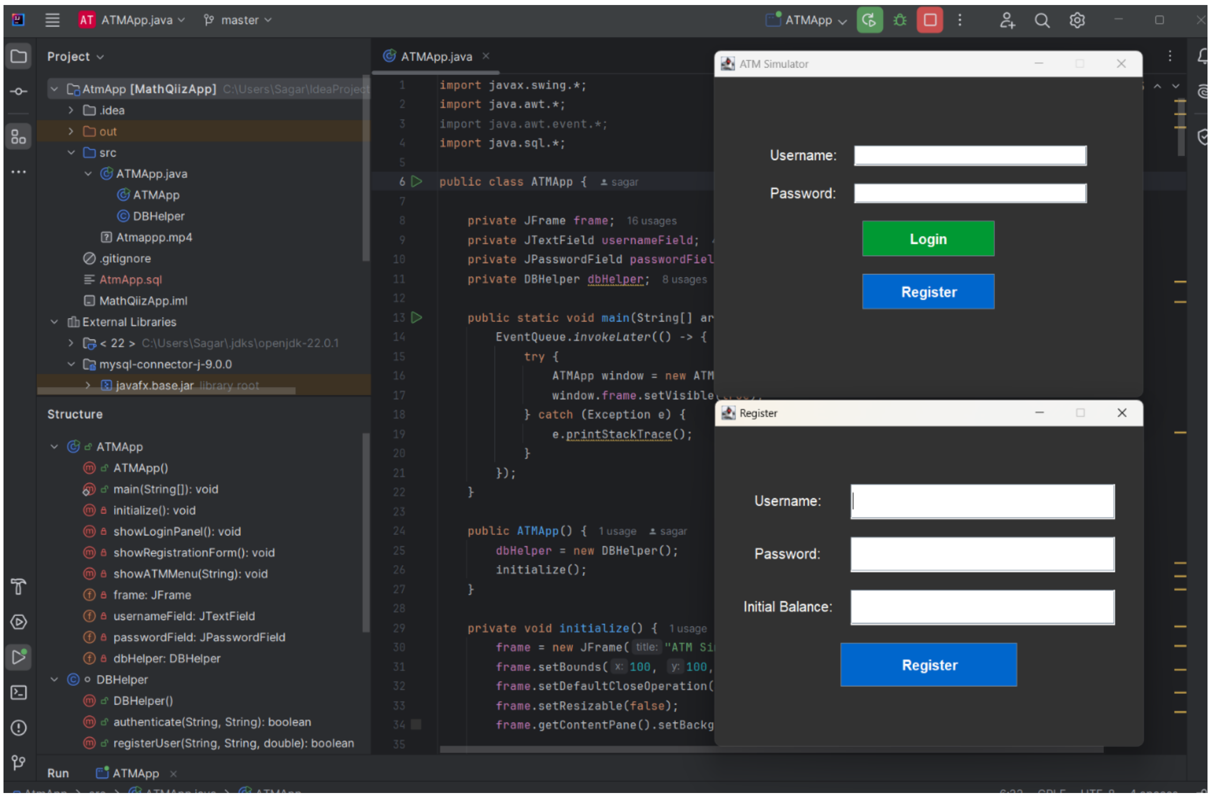

```java
import javax.swing.*;
import java.awt.*;
import java.awt.event.*;
import java.sql.*;

public class ATMApp {  sagar

    private JFrame frame;  16 usages
    private JTextField usernameField;
    private JPasswordField passwordFiel
    private DBHelper dbHelper;  8 usages

    public static void main(String[] ar
        EventQueue.invokeLater(() -> {
            try {
                ATMApp window = new ATM
                window.frame.setVisible
            } catch (Exception e) {
                e.printStackTrace();
            }
        });
    }

    public ATMApp() {  1 usage  sagar
        dbHelper = new DBHelper();
        initialize();
    }

    private void initialize() {  1 usage
        frame = new JFrame( title: "ATM Si
        frame.setBounds( x: 100,  y: 100,
        frame.setDefaultCloseOperation(
        frame.setResizable(false);
        frame.getContentPane().setBackg

```

10. Conclusion

This project demonstrates the use of Java Swing and JDBC for developing a GUI-based ATM simulator. Future enhancements could include fund transfers, mini-statements, and biometric authentication.