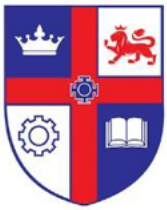

Islington college
(इस्लिङ्टन कलेज)

**CS4001NI Programming**

**30% Individual Coursework**

**2022-23 Autumn**

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**Group: L1C15**
**Assignment Due Date: Wednesday, May 10, 2023**
**Assignment Submission Date: Wednesday, May 10, 2023**

*I confirm that I understand my coursework needs to be submitted online via MySecondTeacher under the relevant module page before the deadline in order for my assignment to be accepted and marked. I am fully aware that late submissions will be treated as non-submission and a marks of zero will be awarded.*

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## 1.Introduction

Java is an object-oriented, class-based programming language designed to have as few implementation dependencies as possible. It is intended to enable application developers to write once and run anywhere (WORA), which means that compiled Java code can be run on all Java-compatible platforms without having to be recompiled. Java was first released in 1995 and is widely used to develop applications for desktop computers, web-based devices, and mobile devices. Java is known for its simplicity,robustness,andsecurity features, making it a popular choice for enterprise applications. Java is one of the most popular programming languages.Java was released in 1995 and is still widely used. It has many uses including developing software, mobileapplications,and building large systems. K nowledge of Javaopens many doorsfor the programmer. (java, 2023)

Speaking of coursework, it was all about helping students learn and understand programming, more specifically the concept of GUI, object casting, event handling, etc., which were the main topics of the second semester. These activities test the students' sincerity towards the module and the progress they have made so far. The coursework assigned instructed us to create a program for a bank which helps in adding Debit Card and credit card. In first course work I have implemented a real-world problem scenario using the Object- oriented concept of Java that includes creating a class to represent a Bank Card, together with its two subclasses to represent a Debit Card and a Credit Card respectively. In this coursework required us to create GUI. It was given in the question that the program needs to have a class named BankGUI. Each of these classes stores personnel data and has different methods depending on the needs. The program was then built using the instructions in the question.

For the class report, we also had to do lessons using **draw.io**, an online tool thatcanbeusedtocreatedifferent types of class diagrams, algorithms, flowcharts, ERDs, etc. In addition, the pseudocode of the BankGUI class was also written. Finally, various tests were carried out and the errors found were also documented in this report with a corresponding explanation and screenshots for clarification.

## 2.Class Diagram

A class diagram is a diagram used in design and modeling software to describe classes and their relationships. Class diagrams allow us to model software with a high level of abstraction without having to look at the source code.
The classes in the class diagram correspond to the classes in the source code. The diagram shows class names and attributes, class relationships, and sometimes class methods. (java-programming, 2023) (tutorialspoint, 2023)

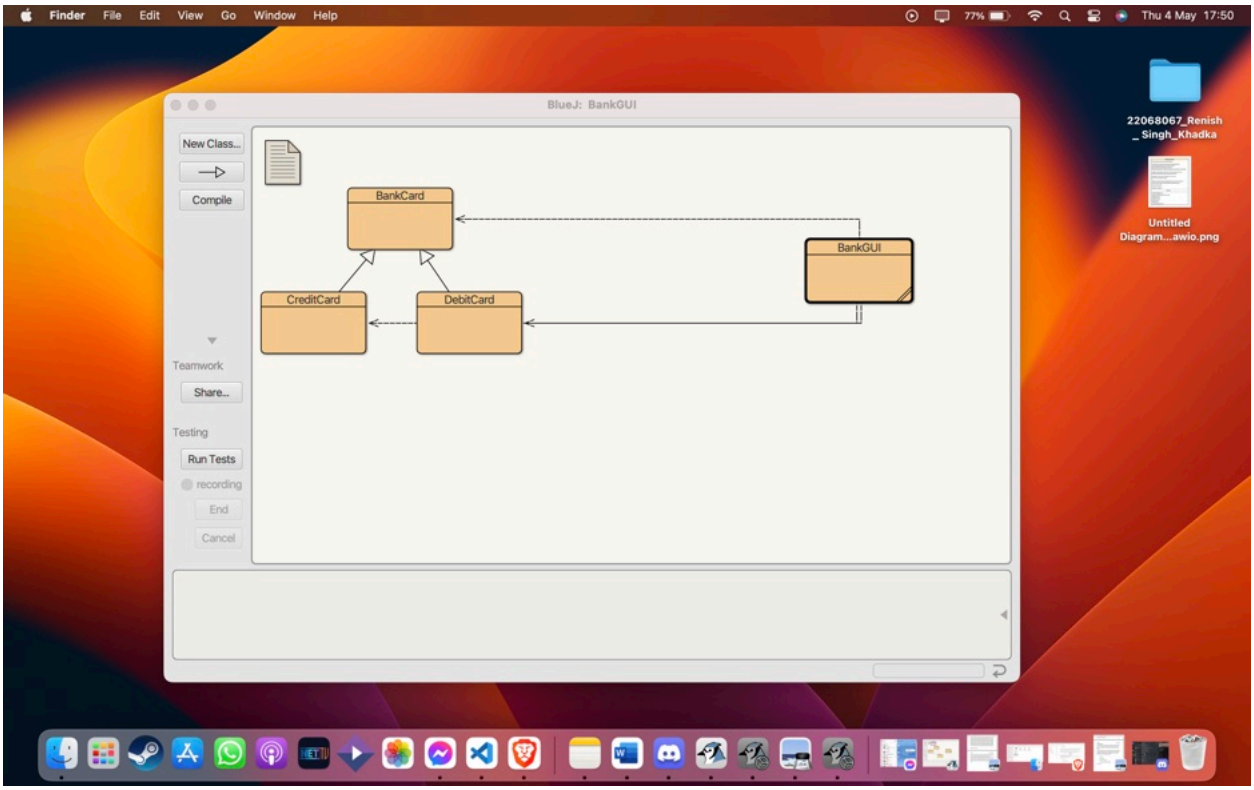


**Figure 1: Class Diagram.**

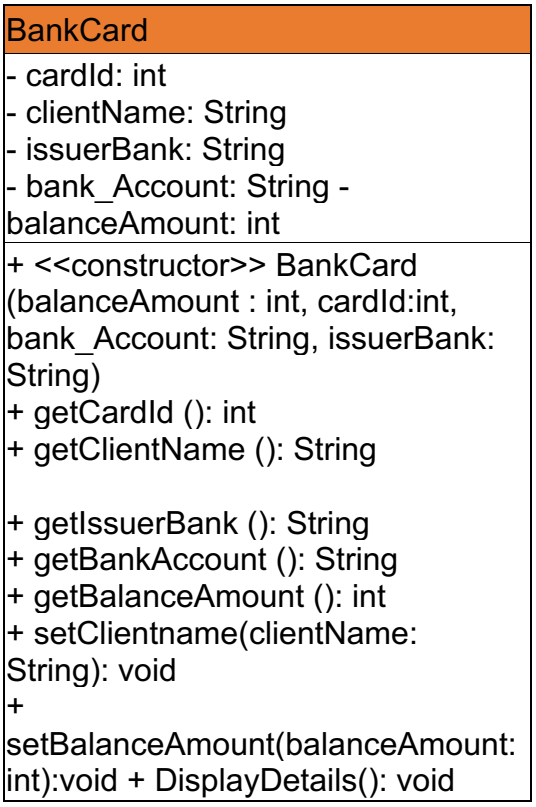


**Figure 2: Class Diagram of Bank Card.**

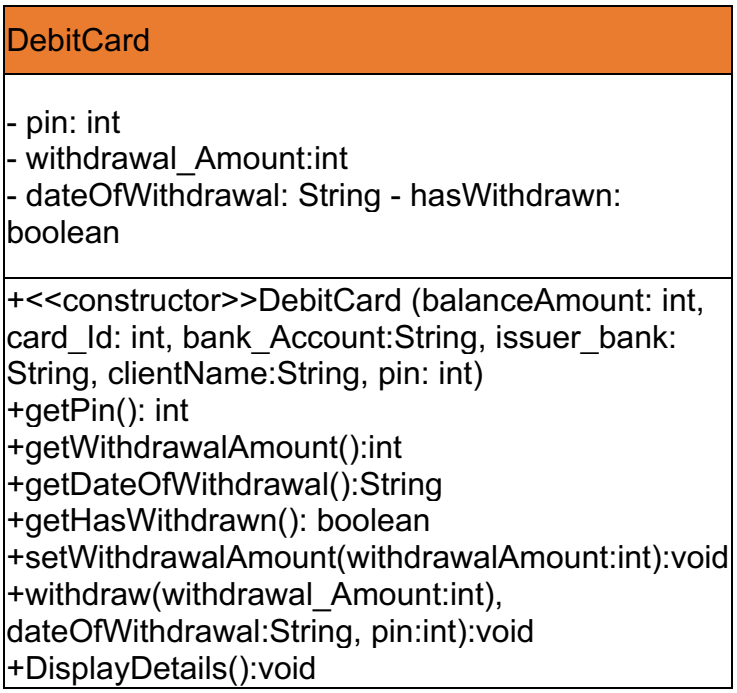


**Figure 3: Class diagram of DebitCard.**

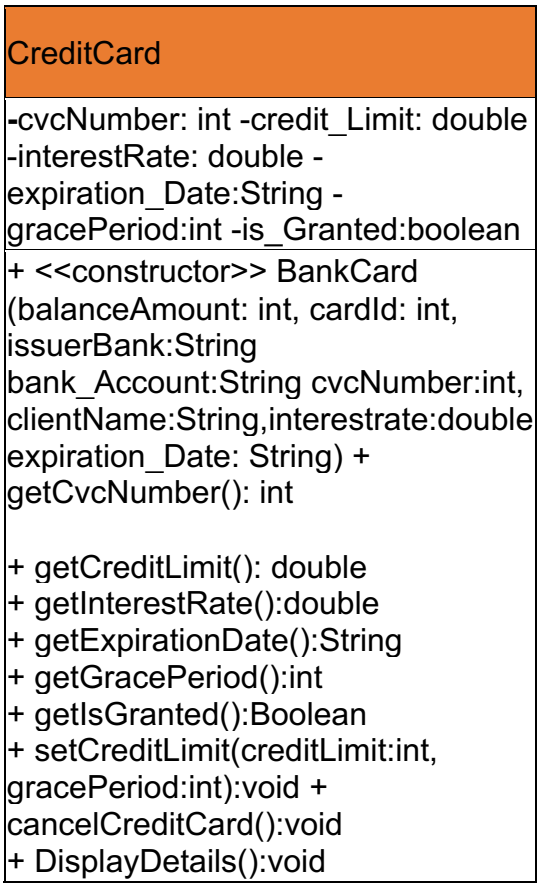


**Figure 4: Class diagram of CreditCard.**


**Figure 5: Class Diagram of GUI.**

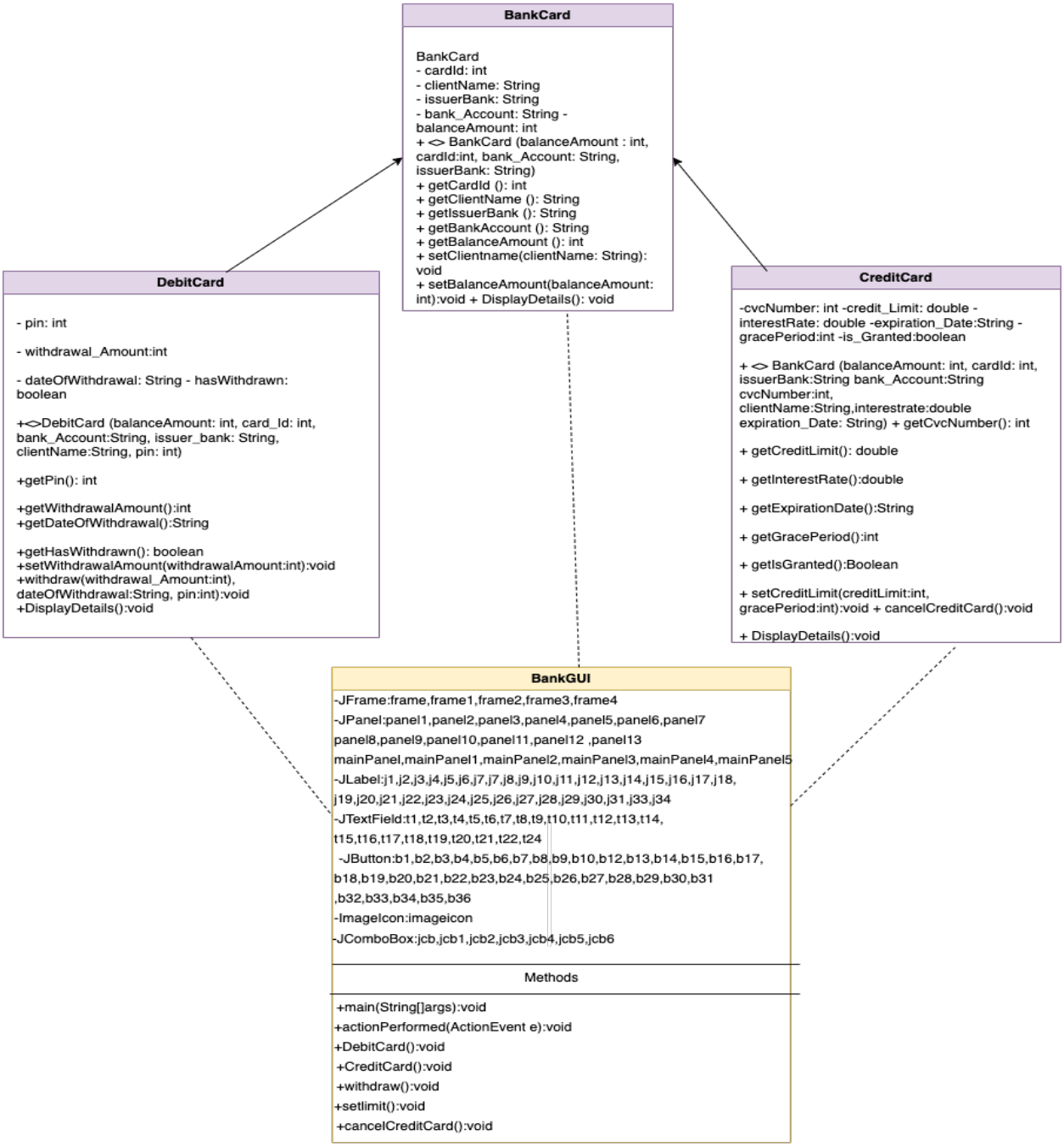


**Figure 6: Class Diagram with relation.**

## 3.Pseudocode

### 3.1 BankGUI

**DO**

**DECLARE** JPanelpanel1,panel2,panel3,mainPanel,mainPanel1,mainPanel2 ,mainPanel3,mainPanel4,mainPanel5;

**DECLARE** JFrame frame;

**DECLARE** JButton b1,b2,b3;

**DECLARE** JLabel j1,j2;

**DECLARE** ImageIcon imageIcon;

**DECLARE** JFrame frame1;

**DECLARE** JPanel panel4,panel5,panel6;

**DECLARE** JButton b4,b5,b6,b7,b8,b9,b10;

**DECLARE** JLabel j3,j4,j5,j6,j7,j8,j9;

**DECLARE** JTextField t1, t2, t3, t4, t5, t6, t7 ,t8;

**DECLARE** JFrame frame2;

**DECLARE** JPanel panel7,panel8,panel9;

**DECLARE** JButton b11,b12,b13,b14,b15,b16,b17,b18;

**DECLARE** JLabel j10, j11, j12, j13, j14, j15, j16,j21,j31,j33;

**DECLARE** JTextField t9, t10, t11, t12, t13, t14,t22,t24;

**DECLARE** JComboBox <String> jcb, jcb1,jcb2;

**DECLARE** JFrame frame3;

**DECLARE** JPanel panel10,panel11,panel12;

**DECLARE** JButton b19,b20,b21,b22,b23,b24;

**DECLARE** JLabel j17,j18,j19,j20,j22,j23,j35;

**DECLARE** JTextField t15,t16,t17,t18,t26;

**DECLARE** JFrame frame4;

**DECLARE** JPanel panel13,panel14,panel15;

**DECLARE** JButton b25,b26,b27,b28,b29,b30;

**DECLARE** JLabel j24 ,j25, j26;

**DECLARE** JTextField t19;

**DECLARE** JFrame frame5;

**DECLARE** JPanel panel16,panel17,panel18;

**DECLARE** JButton b31,b32,b33,b34,b35,b36;

**DECLARE** JLabel j27,j28,j29,j30,j34;

**DECLARE** JTextField t20,t21,t25;

**DECLARE** JComboBox <String> jcb3, jcb4,jcb5;

**DECLARE** ArrayList<BankCard> arrayBankCard = new ArrayList<BankCard>();

**CREATE** A CONSTRUCTOR BankGUI

**DO**

**INITIALIZE THE** JFrame frame

**SET**TITLE TO THE FRAME as “BankGUI “

**SET** BOUNDS TO THE FRAME

**SET** LAYOUT TO THE PANEL

**INITIALIZE** JPanel mainPanel

**SET** BOUNDS TO THE PANEL

**GIVE** BACKGROUND COLOR TO THE PANEL

**SET** LAYOUT TO THE PANEL

**INITIALIZE** JPanel panel1

**SET** BOUNDS TO THE PANEL

**GIVE** BACKGROUND COLOR TO THE PANEL

**SET** LAYOUT TO THE PANEL

**INITIALIZE** JPanel panel2
**SET** BOUNDS TO THE PANEL
**GIVE** BACKGROUND COLOR TO THE PANEL
**SET** LAYOUT TO THE PANEL

**INITIALIZE** JPanel panel3
**SET** BOUNDS TO THE PANEL
**GIVE** BACKGROUND COLOR TO THE PANEL
**SET** LAYOUT TO THE PANEL

**INITIALIZE THE** JLabel j1
**SET** THE TEXT TO " Welcome to the future of banking! "
**GIVE** BOUNDS TO THE LABEL
**GIVE** FONT TO THE LABEL

**INITIALIZE THE** JLabel j2
**SET** THE TEXT TO " Our app makes managing your money easier and more secure than ever before."
**GIVE** BOUNDS TO THE LABEL
**GIVE** FONT TO THE LABEL

**INITIALIZE THE** JButton b1
**SET** THE TEXT TO " Home "
**GIVE** BOUNDS TO THE BUTTON
**GIVE** FOREGROUND COLOR TO THE BUTTON
**GIVE** FONT TO THE BUTTON
**ADD** ACTIONLISTENER TO THE BUTTON b1

**DO**
    **CREATE** a new ActionListener object
    **CALL** method actionPerformed

```
    DO
        CALL method Home
        DISPOSE JFrame frame
    END DO
END DO

INITIALIZE THE JButton b2
SET THE TEXT TO " Debit Card "
GIVE BOUNDS TO THE BUTTON
GIVE FOREGROUND COLOR TO THE BUTTON
GIVE FONT TO THE BUTTON
ADD ACTIONLISTENER TO THE BUTTON b2

DO
    CREATE a new ActionListener object
    CALL method actionPerformed
    DO
        CALL method Debit Card
        DISPOSE JFrame frame
    END DO
END DO

INITIALIZE THE JButton b3
SET THE TEXT TO " Credit Card "
GIVE BOUNDS TO THE BUTTON
GIVE FOREGROUND COLOR TO THE BUTTON
GIVE FONT TO THE BUTTON
ADD ACTIONLISTENER TO THE BUTTON


DO
```

```
            CREATE a new ActionListener object
            CALL method actionPerformed
            DO
                CALL method Credit Card
                DISPOSE JFrame frame
            END DO
        END DO

        ADD PANEL panel1 TO THE PANEL panel2
        ADD PANEL pane2 TO THE PANEL panel3
        ADD LABEL j1 TO THE PANEL panel2
        ADD LABEL j2 TO THE PANEL panel2
        ADD BUTTON b1 TO THE PANEL panel3
        ADD BUTTON b2 TO THE PANEL panel3
        ADD BUTTON b3 TO THE PANEL panel3
        ADD PANEL panel1 TO THE PANEL mainPanel
        ADD PANEL mainPanel TO THE FRAME frame
        SET VISIBILITY OF THE FRAME
        SET RESIZABLE FALSE OF THE FRAME
END DO

CREATE method DebitCard
    DO
        INITIALIZE THE JFrame frame1
        GIVE TITLE TO THE FRAME as “Debit Card “
        GIVE BOUNDS TO THE FRAME
        SET LAYOUT TO THE PANEL

        INITIALIZE JPanel mainPanel1
        SET BOUNDS TO THE PANEL
        GIVE BACKGROUND COLOR TO THE PANEL
```

**SET** LAYOUT TO THE PANEL

**INITIALIZE** JPanel panel4
**SET** BOUNDS TO THE PANEL
**GIVE** BACKGROUND COLOR TO THE PANEL
**SET** LAYOUT TO THE PANEL

**INITIALIZE** JPanel panel5
**SET** BOUNDS TO THE PANEL
**GIVE** BACKGROUND COLOR TO THE PANEL
**SET** LAYOUT TO THE PANEL

**INITIALIZE** JPanel panel6
**SET** BOUNDS TO THE PANEL
**GIVE** BACKGROUND COLOR TO THE PANEL
**SET** LAYOUT TO THE PANEL
**INITIALIZE THE** JLabel j3
**SET** THE TEXT TO " Debit Card"
**GIVE** BOUNDS TO THE LABEL
**GIVE** FONT TO THE LABEL

**INITIALIZE THE** JLabel j4
**SET** THE TEXT TO " Card_ID: “
**GIVE** BOUNDS TO THE LABEL
**GIVE** FONT TO THE LABEL

**INITIALIZE THE** JTextField t1
**GIVE** BOUNDS TO THE TEXTFIELD
**ADD** TEXTFIELD TO THE PANEL

**INITIALIZE THE** JLabel j5

**SET** THE TEXT TO " Issuer Bank: “
**GIVE** BOUNDS TO THE LABEL
**GIVE** FONT TO THE LABEL

**INITIALIZE THE** JTextField t2
**GIVE** BOUNDS TO THE TEXTFIELD
**ADD** TEXTFIELD TO THE PANEL

**INITIALIZE THE** JLabel j6
**SET** THE TEXT TO " Balance Amount: “
**GIVE** BOUNDS TO THE LABEL
**GIVE** FONT TO THE LABEL

**INITIALIZE THE** JTextField t3
**GIVE** BOUNDS TO THE TEXTFIELD
**ADD** TEXTFIELD TO THE PANEL

**INITIALIZE THE** JLabel j7
**SET** THE TEXT TO "Clinet Name: “
**GIVE** BOUNDS TO THE LABEL
**GIVE** FONT TO THE LABEL

**INITIALIZE THE** JTextField t4
**GIVE** BOUNDS TO THE TEXTFIELD
**ADD** TEXTFIELD TO THE PANEL

**INITIALIZE THE** JLabel j8
**SET** THE TEXT TO "Bank Account: “
**GIVE** BOUNDS TO THE LABEL
**GIVE** FONT TO THE LABEL

**INITIALIZE THE** JTextField t5
**GIVE** BOUNDS TO THE TEXTFIELD
**ADD** TEXTFIELD TO THE PANEL

**INITIALIZE THE** JLabel j9
**SET** THE TEXT TO "Pin: “
**GIVE** BOUNDS TO THE LABEL
**GIVE** FONT TO THE LABEL

**INITIALIZE THE** JTextField t6
**GIVE** BOUNDS TO THE TEXTFIELD
**ADD** TEXTFIELD TO THE PANEL

**INITIALIZE THE** JButton b7
**SET** THE TEXT TO " Add Debit Card "
**GIVE** BOUNDS TO THE BUTTON
**GIVE** FOREGROUND COLOR TO THE BUTTON
**GIVE** FONT TO THE BUTTON
**ADD** ACTIONLISTENER TO THE BUTTON
**DO**
    **CREATE** a new ActionListener object
    **CALL** method actionPerformed
**DO**
  **TRY**
        **IF**( JTextField t1,t2,t3,t4,t5,t6 isEmpty() )
                **DISPLAYED** MESSAGE
        **END IF**

        **ELSE IF**( JTextField t3,t1,t6 is less than or equal to zero)

**DISPLAYED** MESSAGE

**END IF**

**ELSE**

**ASSIGN** input from JTextField t1 to variable cardId

**SET** Boolean cardID_rep false

**FOR** objects of BankCard from arrayBankCard in card as array

**IF**(CardId equals to cardid)

**SET** Boolean cardID_rep true

Break

**END IF**

**END FOR**

**IF**(boolean cardID_rep as false )

**Display Error Message**

**TextField t1,t2,t3,t4,t5,t6 setText empty**

**END IF**

**ELSE**

**ASSIGN** input from JTextField t3 to variable balanceAmount

**ASSIGN** input from JTextField t5 to variable bankAccount

**ASSIGN** input from JTextField t2 to variable issuerBank

**ASSIGN** input from JTextField t1 to variable cardId

**ASSIGN** input from JTextField t4 to variable clientName

**ASSIGN** input from JTextField t6 to variable pin_Num

**CAST** object of BankCard as Debitcard name objDebitCard

**ADD** objDebitCard to array BankCard

**DISPLAY** message

**END IF**

**END IF**

**END TRY**

**CATCH**

**DISPLAY error message**

```
            CATCH
                DISPLAY error message
END DO

            INITIALIZE THE JButton b8
            SET THE TEXT TO "Withdraw from Debit Card"
            GIVE BOUNDS TO THE BUTTON
            GIVE FOREGROUND COLOR TO THE BUTTON
            GIVE FONT TO THE BUTTON
            ADD ACTIONLISTENER TO THE BUTTON
            DO
                CREATE a new ActionListener object
                CALL method actionPerformed
                DO
                    CALL method Withdraw from Debit Card
                    DISPOSE JFrame frame1
                END DO
            END DO

            INITIALIZE THE JButton b9
            SET THE TEXT TO "Display"
            GIVE BOUNDS TO THE BUTTON
            GIVE FOREGROUND COLOR TO THE BUTTON
            GIVE FONT TO THE BUTTON
            ADD ACTIONLISTENER TO THE BUTTON
            DO
                CREATE a new ActionListener object
                    IF array size is equals to 0
                            DISPLAY MESSAGE
                    END IF
            ELSE
```

**FOR** objects of BankCard from arrayBankCard in card as array

**IF** card instance of DebitCard class

**PRINT** header with card information

**CAST** the BankCard object as DebitCard

**CALL** display from DebitCard

**END IF**

**END FOR**

**END IF**

**END DO**

**INITIALIZE THE** JButton b10

**SET** THE TEXT TO "Clear"

**GIVE** BOUNDS TO THE BUTTON

**GIVE** FOREGROUND COLOR TO THE BUTTON

**GIVE** FONT TO THE BUTTON

**ADD** ACTIONLISTENER TO THE BUTTON

**DO**

**CREATE** a new ActionListener object

**OVERRIDE** method actionPerformed

**DO**

**CLEAR** the JTextField t1,t2,t3,t4,t5,t6

**END DO**

**END DO**

**INITIALIZE THE** JButton b4

**SET** THE TEXT TO "Home"

**GIVE** BOUNDS TO THE BUTTON

**GIVE** FOREGROUND COLOR TO THE BUTTON

**GIVE** FONT TO THE BUTTON

**ADD** ACTIONLISTENER TO THE BUTTON

**DO**
**CREATE** a new ActionListener object
**CALL** method actionPerformed
**DO**
**CALL** method Home
DISPOSE JFrame frame1
**END DO**
**END DO**

**INITIALIZE THE** JButton b5
**SET** THE TEXT TO "Debit Card"
**GIVE** BOUNDS TO THE BUTTON
**GIVE** FOREGROUND COLOR TO THE BUTTON
**GIVE** FONT TO THE BUTTON
**ADD** ACTIONLISTENER TO THE BUTTON

**DO**
**CREATE** a new ActionListener object
**CALL** method actionPerformed
**DO**
**CALL** method Debit Card
DISPOSE JFrame frame1
**END DO**
**END DO**

**INITIALIZE THE** JButton b6
**SET** THE TEXT TO "Credit Card"
**GIVE** BOUNDS TO THE BUTTON
**GIVE** FOREGROUND COLOR TO THE BUTTON
**GIVE** FONT TO THE BUTTON
**ADD** ACTIONLISTENER TO THE BUTTON

**DO**

**CREATE** a new ActionListener object

**CALL** method actionPerformed

**DO**

**CALL** method Credit Card

**DISPOSE** JFrame frame1

**END DO**

**END DO**

**ADD** PANEL panel4 TO THE PANEL mainPanel1

**ADD** PANEL panel4 TO THE PANEL panel5

**ADD** PANEL pane6 TO THE PANEL panel5

**ADD** BUTTON b4 TO THE PANEL panel3

**ADD** BUTTON b5 TO THE PANEL panel3

**ADD** BUTTON b6 TO THE PANEL panel3

**ADD** LABEL j3 TO THE PANEL panel2

**ADD** LABEL j4 TO THE PANEL panel2

**ADD** TEXTFIELD t1 TO THE PANEL panel2

**ADD** LABEL j5 TO THE PANEL panel2

**ADD** TEXTFIELD t12 TO THE PANEL panel2

**ADD** LABEL j6 TO THE PANEL panel2

**ADD** TEXTFIELD t3 TO THE PANEL panel2

**ADD** LABEL j7TO THE PANEL panel2

**ADD** TEXTFIELD t4 TO THE PANEL panel2

**ADD** LABEL j8TO THE PANEL panel2

**ADD** TEXTFIELD t5 TO THE PANEL panel2

**ADD** LABEL j9TO THE PANEL panel2

**ADD** TEXTFIELD t6 TO THE PANEL panel2

**ADD** BUTTON b7 TO THE PANEL panel3

**ADD** BUTTON b8 TO THE PANEL panel3

**ADD** BUTTON b9 TO THE PANEL panel3

**ADD** BUTTON b10 TO THE PANEL panel3

**ADD** PANEL mainPanel1 TO THE FRAME frame1

**SET** VISIBILITY OF THE FRAME

**SET** RESIZABLE FALSE OF THE FRAME

**END DO**

**CREATE** method WithDraw

**DO**

**INITIALIZE THE** JFrame frame5

**GIVE** TITLE TO THE FRAME as “WithDraw “

**GIVE** BOUNDS TO THE FRAME

**SET** LAYOUT TO THE PANEL

**INITIALIZE** JPanel mainPanel5

**SET** BOUNDS TO THE PANEL

**GIVE** BACKGROUND COLOR TO THE PANEL

**SET** LAYOUT TO THE PANEL

**INITIALIZE** JPanel panel16

**SET** BOUNDS TO THE PANEL

**GIVE** BACKGROUND COLOR TO THE PANEL

**SET** LAYOUT TO THE PANEL

**INITIALIZE** JPanel panel17

**SET** BOUNDS TO THE PANEL

**GIVE** BACKGROUND COLOR TO THE PANEL

**SET** LAYOUT TO THE PANEL

**INITIALIZE** JPanel panel18

**SET** BOUNDS TO THE PANEL

**GIVE** BACKGROUND COLOR TO THE PANEL

**SET** LAYOUT TO THE PANEL

**INITIALIZE THE** JLabel j27
**SET** THE TEXT TO " WithDraw"
**GIVE** BOUNDS TO THE LABEL
**GIVE** FONT TO THE LABEL

**INITIALIZE THE** JLabel j28
**SET** THE TEXT TO " Card_ID: “
**GIVE** BOUNDS TO THE LABEL
**GIVE** FONT TO THE LABEL

**INITIALIZE THE** JTextField t20
**GIVE** BOUNDS TO THE TEXTFIELD
**ADD** TEXTFIELD TO THE PANEL

**INITIALIZE THE** JLabel j29
**SET** THE TEXT TO "Pin: “
**GIVE** BOUNDS TO THE LABEL
**GIVE** FONT TO THE LABEL

**INITIALIZE THE** JTextField t21
**GIVE** BOUNDS TO THE TEXTFIELD
**ADD** TEXTFIELD TO THE PANEL

**INITIALIZE THE** JLabel j33
**SET** THE TEXT TO "Amount: “
**GIVE** BOUNDS TO THE LABEL
**GIVE** FONT TO THE LABEL

**INITIALIZE THE** JTextField t25

**GIVE** BOUNDS TO THE TEXTFIELD
**ADD** TEXTFIELD TO THE PANEL

**INITIALIZE THE** JLabel j30
**SET** THE TEXT TO "WithDraw Date: “
**GIVE** BOUNDS TO THE LABEL
**GIVE** FONT TO THE LABEL

**INITIALIZE THE** jcb3
**SET** THE STRINGS “1"to “30”
**GIVE** BOUNDS TO THE COMBOBOX

**INITIALIZE THE** jcb4
**SET** THE STRINGS “jan” to “dec”
**GIVE** BOUNDS TO THE COMBOBOX

**INITIALIZE THE** jcb5
**SET** THE STRINGS “year”
**GIVE** BOUNDS TO THE COMBOBOX

**INITIALIZE THE** JButton b34
**SET** THE TEXT TO " WithDraw"
**GIVE** BOUNDS TO THE BUTTON
**GIVE** FONT TO THE BUTTON
**ADD** ACTIONLISTENER TO THE BUTTON
**DO**
    **CREATE** a new ActionListener object
     **OVERRIDE** method actionPerformed
**DO**
  **IF**(JTextField t21,t25,t20 isEmpty())
    **DISPLAY** error message

**END IF**

**ELSE** (JTextField t21,t25,t20 is less than or equals to zero)

**DISPLAY** error message

**END IF**

**TRY**

**ASSING** JTextField t21 to variable pin

**ASSING** JTextField t25 to variable withdrawal_Amount

**ASSING** JTextField t20 to variable cardid

**ASSIGN** input from JComboBox jcb3 to variable day

**ASSIGN** input from JComboBox jc4 to variable month

**ASSIGN** input from JComboBox jcb5 to variable year

**SET** boolean flag1 false

**FOR** objects of BankCard from arrayBankCard in card as array

**IF (**card instance of DebitCard class)

**IF(cardID is equals to cardid)**

**CAST** object of BankCard as DebitCard name debit

**IF**(pin is equals to pin)

**ADD** objCreditCard to array BankCard

**SET** boolean flag1 true

break

**END IF**

**ELSE**

**DISPLAY** error message

**END IF**

**END IF**

**END IF**

**END FOR**

**IF(**boolean flag1 as true)

**DISPLAY** success message

**END IF**

**ELSE**

```
                    DISPLAY error message
                END IF
            END TRY
            CATCH
                DISPLAY error message
            CATCH
                DISPLAY error message
        END DO
    END DO

    INITIALIZE THE JButton b35
    SET THE TEXT TO " Clear"
    GIVE BOUNDS TO THE BUTTON
    GIVE FOREGROUND COLOR TO THE BUTTON
    GIVE FONT TO THE BUTTON
    ADD ACTIONLISTENER TO THE BUTTON
    DO
        CREATE a new ActionListener object
        OVERRIDE method actionPerformed
        DO
        CLEAR the JTextField t20,t25,t21
      END DO
    END DO
    INITIALIZE THE JButton b36
    SET THE TEXT TO " Go Back"
    GIVE BOUNDS TO THE BUTTON
    GIVE FOREGROUND COLOR TO THE BUTTON
    GIVE FONT TO THE BUTTON
    ADD ACTIONLISTENER TO THE BUTTON
    DO
      CREATE a new ActionListener object
```

```
    CALL method actionPerformed
    DO
        CALL method Debit Card
        DISPOSE JFrame frame5
   END DO
END DO


INITIALIZE THE JButton b31
SET THE TEXT TO "Home"
GIVE BOUNDS TO THE BUTTON
GIVE FONT TO THE BUTTON
ADD ACTIONLISTENER TO THE BUTTON

DO
    CREATE a new ActionListener object
    CALL method actionPerformed
    DO
        CALL method Home
        DISPOSE JFrame frame5
   END DO
END DO

INITIALIZE THE JButton b32
SET THE TEXT TO "Debit Card"
GIVE BOUNDS TO THE BUTTON
GIVE FOREGROUND COLOR TO THE BUTTON
GIVE FONT TO THE BUTTON
ADD ACTIONLISTENER TO THE BUTTON

DO
```

```
    CREATE a new ActionListener object
    CALL method actionPerformed
    DO
        CALL method DebitCard
        DISPOSE JFrame frame5
   END DO
END DO

INITIALIZE THE JButton b33
SET THE TEXT TO "Credit Card"
GIVE BOUNDS TO THE BUTTON
GIVE FOREGROUND COLOR TO THE BUTTON
GIVE FONT TO THE BUTTON
ADD ACTIONLISTENER TO THE BUTTON

DO
    CREATE a new ActionListener object
    CALL method actionPerformed
    DO
        CALL method CreditCard
        DISPOSE JFrame frame5
   END DO
END DO

ADD PANEL panel16 TO THE PANEL mainPanel5
ADD PANEL panel17 TO THE PANEL panel16
ADD PANEL pane18 TO THE PANEL panel17
ADD BUTTON b31 TO THE PANEL panel18
ADD BUTTON b32 TO THE PANEL panel18
ADD BUTTON b33 TO THE PANEL panel18
ADD LABEL j27 TO THE PANEL panel17
```

**ADD** LABEL j28 TO THE PANEL panel17
**ADD** TEXTFIELD t20 TO THE PANEL panel17
**ADD** LABEL j29 TO THE PANEL panel17
**ADD** TEXTFIELD t21 TO THE PANEL panel17
**ADD** LABEL j30 TO THE PANEL panel17
**ADD** ComboBox jcb3 TO THE PANEL panel17
**ADD** ComboBox jcb4 TO THE PANEL panel17
**ADD** ComboBox jcb5 TO THE PANEL panel17
**ADD** BUTTON b34 TO THE PANEL panel17
**ADD** BUTTON b35 TO THE PANEL panel17
**ADD** BUTTON b36 TO THE PANEL panel17
**ADD** LABEL j33 TO THE PANEL panel17
**ADD** TEXTFIELD t25 TO THE PANEL panel17
**ADD** PANEL mainPanel5 TO THE FRAME frame5
**SET** VISIBILITY OF THE FRAME
**SET** RESIZABLE FALSE OF THE FRAME

**END DO**

**CREATE** method CreditCard
**DO**

**INITIALIZE THE** JFrame frame2
**GIVE** TITLE TO THE FRAME as “Debit Card “
**GIVE** BOUNDS TO THE FRAME
**SET** LAYOUT TO THE PANEL

**INITIALIZE** JPanel mainPanel2
**SET** BOUNDS TO THE PANEL
**GIVE** BACKGROUND COLOR TO THE PANEL
**SET** LAYOUT TO THE PANEL

**INITIALIZE** JPanel panel7

**SET** BOUNDS TO THE PANEL
**GIVE** BACKGROUND COLOR TO THE PANEL
**SET** LAYOUT TO THE PANEL

**INITIALIZE** JPanel panel8
**SET** BOUNDS TO THE PANEL
**GIVE** BACKGROUND COLOR TO THE PANEL
**SET** LAYOUT TO THE PANEL

**INITIALIZE** JPanel panel9
**SET** BOUNDS TO THE PANEL
**GIVE** BACKGROUND COLOR TO THE PANEL
**SET** LAYOUT TO THE PANEL

**INITIALIZE THE** JLabel j10
**SET** THE TEXT TO " Credit Card"
**GIVE** BOUNDS TO THE LABEL
**GIVE** FONT TO THE LABEL

**INITIALIZE THE** JLabel j11
**SET** THE TEXT TO " Card_ID: “
**GIVE** BOUNDS TO THE LABEL
**GIVE** FONT TO THE LABEL

**INITIALIZE THE** JTextField t9
**GIVE** BOUNDS TO THE TEXTFIELD
**ADD** TEXTFIELD TO THE PANEL

**INITIALIZE THE** JLabel j12
**SET** THE TEXT TO " Issuer Bank: “
**GIVE** BOUNDS TO THE LABEL

**GIVE** FONT TO THE LABEL

**INITIALIZE THE** JTextField t10
**GIVE** BOUNDS TO THE TEXTFIELD
**ADD** TEXTFIELD TO THE PANEL

**INITIALIZE THE** JLabel j13
**SET** THE TEXT TO "Balance Amount: “
**GIVE** BOUNDS TO THE LABEL
**GIVE** FONT TO THE LABEL

**INITIALIZE THE** JTextField t11
**GIVE** BOUNDS TO THE TEXTFIELD
**ADD** TEXTFIELD TO THE PANEL

**INITIALIZE THE** JLabel j14
**SET** THE TEXT TO "Client Name: “
**GIVE** BOUNDS TO THE LABEL
**GIVE** FONT TO THE LABEL

**INITIALIZE THE** JTextField t12
**GIVE** BOUNDS TO THE TEXTFIELD
**ADD** TEXTFIELD TO THE PANEL

**INITIALIZE THE** JLabel j15
**SET** THE TEXT TO " Balance Amount: “
**GIVE** BOUNDS TO THE LABEL
**GIVE** FONT TO THE LABEL

**INITIALIZE THE** JTextField t13
**GIVE** BOUNDS TO THE TEXTFIELD

**ADD** TEXTFIELD TO THE PANEL

**INITIALIZE THE** JLabel j16
**SET** THE TEXT TO " CVC Number:: “
**GIVE** BOUNDS TO THE LABEL
**GIVE** FONT TO THE LABEL

**INITIALIZE THE** JTextField t14
**GIVE** BOUNDS TO THE TEXTFIELD
**ADD** TEXTFIELD TO THE PANEL

**INITIALIZE THE** JLabel j31
**SET** THE TEXT TO " Interest Rate: “
**GIVE** BOUNDS TO THE LABEL
**GIVE** FONT TO THE LABEL

**INITIALIZE THE** JTextField t22
**GIVE** BOUNDS TO THE TEXTFIELD
**ADD** TEXTFIELD TO THE PANEL

**INITIALIZE THE** JLabel j33
**SET** THE TEXT TO " Grace Period: “
**GIVE** BOUNDS TO THE LABEL
**GIVE** FONT TO THE LABEL

**INITIALIZE THE** JTextField t24
**GIVE** BOUNDS TO THE TEXTFIELD
**ADD** TEXTFIELD TO THE PANEL

**INITIALIZE THE** JLabel j21
**SET** THE TEXT TO " Experice date: “

**GIVE** BOUNDS TO THE LABEL
**GIVE** FONT TO THE LABEL

**INITIALIZE THE** jcb
**SET** THE STRINGS “1"to “30”
**GIVE** BOUNDS TO THE COMBOBOX

**INITIALIZE THE** jcb1
**SET** THE STRINGS “jan” to “dec”
**GIVE** BOUNDS TO THE COMBOBOX

**INITIALIZE THE** jcb2
**SET** THE STRINGS “year”
**GIVE** BOUNDS TO THE COMBOBOX

**INITIALIZE THE** JButton b14
**SET** THE TEXT TO " Add Credit Card "
**GIVE** BOUNDS TO THE BUTTON
**GIVE** FOREGROUND COLOR TO THE BUTTON
**GIVE** FONT TO THE BUTTON
**ADD** ACTIONLISTENER TO THE BUTTON
**DO**
    **CREATE** a new ActionListener object
    **CALL** method actionPerformed
    **DO**
        **SET** Boolean check_ true
        **IF(**JTextField t9,t10,t11,t12,t13,t14 isEmpty() )
                **DISPLAY** error message
                **SET** Boolean check_ false
        **END IF**

**ELSE IF(JTextField t11,t9,t14 is less than or equal to zero )**

**DSPLAY** error message

**END IF**

**IF(**Boolean check_ as true)

**TRY**

**ASSIGN** input from JTextField t11 to variable balanceAmount

**ASSIGN** input from JTextField t13 to variable bank_Account

**ASSIGN** input from JTextField t10 to variable issuerBank

**ASSIGN** input from JTextField t9 to variable cardId

**ASSIGN** input from JTextField t12 to variable clientName

**ASSIGN** input from JTextField t14 to variable cvcNumber

**ASSIGN** input from JTextField t22 to variable interestRate

**ASSIGN** input from JComboBox jcb to variable day

**ASSIG** input from JComboBox jcb1 to variable month

**ASSIGN** input from JComboBox jcb2 to variable year

**SET** Boolean cardIDExists fasle

**FOR** objects of BankCard from arrayBankCard in card asarray

**IF**(card insanceof CreditCard class)

**ASSING**cardId from array to existingCardID

**IF**(cardId is equal to existingCardID)

**SET** boolean cardIdExists true

**DISPLAY** error message

Break

**END IF**

**END IF**

**END FOR**

**IF(**cardIdExists does't exists**)**

**CAST** object of BankCard as Creditcard name objCreditCard

**ADD** objCreditCard to array BankCard

```
                    DISPLAY message
            END IF
             END TRY
                CATCH
                SET TextField empty t9,t10,t11,t12,t13,t14,t22 SET
                    DISPLAY error message
                CATCH
                SET TextField empty t9,t10,t11,t12,t13,t14,t22 SET
                    DISPLAY error message

        END IF
END DO

INITIALIZE THE JButton b15
SET THE TEXT TO " Cancel Card "
GIVE BOUNDS TO THE BUTTON
GIVE FOREGROUND COLOR TO THE BUTTON
GIVE FONT TO THE BUTTON
ADD ACTIONLISTENER TO THE BUTTON
DO
    CREATE a new ActionListener object
    CALL method actionPerformed
    DO
        CALL method Cancel Card
        DISPOSE JFrame frame2
   END DO
END DO

INITIALIZE THE JButton b16
SET THE TEXT TO "Set credit limit"
GIVE BOUNDS TO THE BUTTON
```

**GIVE** FOREGROUND COLOR TO THE BUTTON
**GIVE** FONT TO THE BUTTON
**ADD** ACTIONLISTENER TO THE BUTTON
**DO**
**CREATE** a new ActionListener object
**CALL** method actionPerformed
**DO**
**CALL** method Set credit limit
**DISPOSE** JFrame frame2
**END DO**
**END DO**

**INITIALIZE THE** JButton b17
**SET** THE TEXT TO " Display "
**GIVE** BOUNDS TO THE BUTTON
**GIVE** FOREGROUND COLOR TO THE BUTTON
**GIVE** FONT TO THE BUTTON
**ADD** ACTIONLISTENER TO THE BUTTON
**DO**
**CREATE** a new ActionListener object
**IF** array size is equals to 0
**DO**
DISPLAY MESSAGE
**END DO**
**ELSE**
**FOR** objects of BankCard from arrayBankCard in card as array
**IF** card instance of CreditCard class
**PRINT** header with card information
**CAST** the BankCard object as CreditCard
**CALL** display from CreditCard

```
                END IF
            END FOR
        END ELSE
    END DO

    INITIALIZE THE JButton b18
    SET THE TEXT TO "Clear "
    GIVE BOUNDS TO THE BUTTON
    GIVE FOREGROUND COLOR TO THE BUTTON
    GIVE FONT TO THE BUTTON
    ADD ACTIONLISTENER TO THE BUTTON
    DO
    CREATE a new ActionListener object
    OVERRIDE method actionPerformed
            DO
            CLEAR the JTextField t9,t10,t11,t12,t13,t14,t22
        END DO
    END DO

    INITIALIZE THE JButton b11
    SET THE TEXT TO " Home"
    GIVE BOUNDS TO THE BUTTON
    GIVE FOREGROUND COLOR TO THE BUTTON
    GIVE FONT TO THE BUTTON
    ADD ACTIONLISTENER TO THE BUTTON
    DO
        CREATE a new ActionListener object
        CALL method actionPerformed
        DO
            CALL method Debit Card
            DISPOSE JFrame frame2
```

```
    END DO
END DO

INITIALIZE THE JButton b14
SET THE TEXT TO " Debit Card"
GIVE BOUNDS TO THE BUTTON
GIVE FONT TO THE BUTTON
ADD ACTIONLISTENER TO THE BUTTON
DO
    CREATE a new ActionListener object
    CALL method actionPerformed
    DO
        CALL method Debit Card
        DISPOSE JFrame frame1
    END DO
END DO

INITIALIZE THE JButton b13
SET THE TEXT TO " Credit Card"
GIVE BOUNDS TO THE BUTTON
GIVE FOREGROUND COLOR TO THE BUTTON
GIVE FONT TO THE BUTTON
ADD ACTIONLISTENER TO THE BUTTON
DO
    CREATE a new ActionListener object
    CALL method actionPerformed
    DO
        CALL method Credit Card
        DISPOSE JFrame frame2
    END DO
END DO
```

**ADD** PANEL panel7 TO THE PANEL mainPanel2
**ADD** PANEL panel8 TO THE PANEL panel7
**ADD** PANEL pane8 TO THE PANEL panel9
**ADD** BUTTON b11 TO THE PANEL panel9
**ADD** BUTTON b12 TO THE PANEL panel9
**ADD** BUTTON b13 TO THE PANEL panel9
**ADD** LABEL j10 TO THE PANEL panel8
**ADD** LABEL j11 TO THE PANEL panel8
**ADD** TEXTFIELD t9 TO THE PANEL panel8
**ADD** LABEL j12 TO THE PANEL panel8
**ADD** TEXTFIELD t10 TO THE PANEL panel8
**ADD** LABEL j13 TO THE PANEL panel8
**ADD** TEXTFIELD t11 TO THE PANEL panel8
**ADD** LABEL j14 TO THE PANEL panel8
**ADD** TEXTFIELD t12 TO THE PANEL panel8
**ADD** LABEL j15 TO THE PANEL panel8
**ADD** TEXTFIELD t13 TO THE PANEL panel8
**ADD** LABEL j16 TO THE PANEL panel8
**ADD** TEXTFIELD t14 TO THE PANEL panel8
**ADD** BUTTON b14 TO THE PANEL panel8
**ADD** BUTTON b15 TO THE PANEL panel8
**ADD** BUTTON b16 TO THE PANEL panel8
**ADD** BUTTON b17 TO THE PANEL panel8
**ADD** BUTTON b18 TO THE PANEL panel8
**ADD** LABEL j31 TO THE PANEL panel8
**ADD** TEXTFIELD t22 TO THE PANEL panel8
**ADD** LABEL j33 TO THE PANEL panel8
**ADD** TEXTFIELD t24 TO THE PANEL panel8
**ADD** LABEL j21 TO THE PANEL panel8
**ADD** COMBOBOX jcb TO THE PANEL panel8

**ADD** COMBOBOX jcb1 TO THE PANEL panel8
**ADD** COMBOBOX jcb2 TO THE PANEL panel8
**ADD** PANEL mainPanel2 TO THE FRAME frame2
**SET** VISIBILITY OF THE FRAME
**SET** RESIZABLE FALSE OF THE FRAME
**END DO**

**CREATE** method setLimit
**DO**
**INITIALIZE THE** JFrame frame3
**GIVE** TITLE TO THE FRAME as “Debit Card “
**GIVE** BOUNDS TO THE FRAME
**SET** LAYOUT TO THE PANEL

**INITIALIZE** JPanel mainPanel3
**SET** BOUNDS TO THE PANEL
**GIVE** BACKGROUND COLOR TO THE PANEL
**SET** LAYOUT TO THE PANEL

**INITIALIZE** JPanel panel10
**SET** BOUNDS TO THE PANEL
**GIVE** BACKGROUND COLOR TO THE PANEL
**SET** LAYOUT TO THE PANEL

**INITIALIZE** JPanel panel11
**SET** BOUNDS TO THE PANEL
**GIVE** BACKGROUND COLOR TO THE PANEL
**SET** LAYOUT TO THE PANEL

**INITIALIZE** JPanel panel12
**SET** BOUNDS TO THE PANEL

**GIVE** BACKGROUND COLOR TO THE PANEL
**SET** LAYOUT TO THE PANEL

**INITIALIZE THE** JLabel j17
**SET** THE TEXT TO " Set Credit Limit"
**GIVE** BOUNDS TO THE LABEL
**GIVE** FONT TO THE LABEL

**INITIALIZE THE** JLabel j18
**SET** THE TEXT TO " Card_ID: “
**GIVE** BOUNDS TO THE LABEL
**GIVE** FONT TO THE LABEL

**INITIALIZE THE** JTextField t15
**GIVE** BOUNDS TO THE TEXTFIELD
**ADD** TEXTFIELD TO THE PANEL

**INITIALIZE THE** JLabel j20
**SET** THE TEXT TO " Credit Limit: “
**GIVE** BOUNDS TO THE LABEL
**GIVE** FONT TO THE LABEL

**INITIALIZE THE** JTextField t17
**GIVE** BOUNDS TO THE TEXTFIELD
**ADD** TEXTFIELD TO THE PANEL

**INITIALIZE THE** JLabel j35
**SET** THE TEXT TO " Grace Period: “
**GIVE** BOUNDS TO THE LABEL
**GIVE** FONT TO THE LABEL

**INITIALIZE THE** JTextField t26
**GIVE** BOUNDS TO THE TEXTFIELD
**ADD** TEXTFIELD TO THE PANEL

**INITIALIZE THE** JButton b22
**SET** THE TEXT TO " Set limit "
**GIVE** BOUNDS TO THE BUTTON
**GIVE** FOREGROUND COLOR TO THE BUTTON
**GIVE** FONT TO THE BUTTON
**ADD** ACTIONLISTENER TO THE BUTTON
**DO**
**CREATE** a new ActionListener object
**OVERRIDE** method actionPerformed
**DO**
**SET** boolean fieldvalid true
**IF(TextField t15,t17,t26 isempty() )**
**DISPLAY** error message
**SET** boolean fieldvalid false
**END IF**
**IF**(boolean fieldvalid as true)
**TRY**
**ASSING** JTextField t15 to variable cardId
**ASSING** JTextField t17 to variable creditLimit
**ASSING** JTextField t26 to variable gracePeriod
**SET** boolean card false
**FOR** objects of BankCard from arrayBankCard in card as array
**IF** card instance of CreditCard class
**ASSING** CardId to variable cardID
**IF(cardID is equals to cardid)**
**SET** Boolean card true
**CAST** object of BankCard as Creditcard name credit

**ADD** credit to array BankCard
**DISPLAY** message
Break
**END IF**
**END IF**
**END FOR**
**IF**(card doesn't exist)
**DISPLAY error message**
**END IF**
**END TRY**
**CATCH**
**SET TextField empty t9,t10,t11,t12,t13,t14,t22 SET**
**DISPLAY** error message
**CATCH**
**SET TextField empty t9,t10,t11,t12,t13,t14,t22 SET**
**DISPLAY** error message
**END IF**
**END DO**
**END DO**

**INITIALIZE THE** JButton b23
**SET** THE TEXT TO " clear"
**GIVE** BOUNDS TO THE BUTTON
**GIVE** FOREGROUND COLOR TO THE BUTTON
**GIVE** FONT TO THE BUTTON
**ADD** ACTIONLISTENER TO THE BUTTON
**DO**
**CREATE** a new ActionListener object
**OVERRIDE** method actionPerformed
**DO**
**CLEAR** the JTextField t15,t26,t17

```
        END DO
    END DO

INITIALIZE THE JButton b24
SET THE TEXT TO " Go Back"
GIVE BOUNDS TO THE BUTTON
GIVE FOREGROUND COLOR TO THE BUTTON
GIVE FONT TO THE BUTTON
ADD ACTIONLISTENER TO THE BUTTON
DO
    CREATE a new ActionListener object
    CALL method actionPerformed
    DO
        CALL method Credit Card
        DISPOSE JFrame frame3
    END DO
END DO

INITIALIZE THE JButton b19
SET THE TEXT TO " Home"
GIVE BOUNDS TO THE BUTTON
GIVE FOREGROUND COLOR TO THE BUTTON
GIVE FONT TO THE BUTTON
ADD ACTIONLISTENER TO THE BUTTON
DO
    CREATE a new ActionListener object
    CALL method actionPerformed
    DO
        CALL method Home
        DISPOSE JFrame frame3
    END DO
```

**END DO**

**INITIALIZE THE** JButton b20
**SET** THE TEXT TO " Debit Card"
**GIVE** BOUNDS TO THE BUTTON
**GIVE** FOREGROUND COLOR TO THE BUTTON
**GIVE** FONT TO THE BUTTON
**ADD** ACTIONLISTENER TO THE BUTTON
**DO**
    **CREATE** a new ActionListener object
    **CALL** method actionPerformed
    **DO**
        **CALL** method Debit card
        **DISPOSE** JFrame frame3
   **END DO**
**END DO**

**INITIALIZE THE** JButton b21
**SET** THE TEXT TO " Credit Card"
**GIVE** BOUNDS TO THE BUTTON
**GIVE** FOREGROUND COLOR TO THE BUTTON
**GIVE** FONT TO THE BUTTON
**ADD** ACTIONLISTENER TO THE BUTTON
**DO**
    **CREATE** a new ActionListener object
    **CALL** method actionPerformed
    **DO**
        **CALL** method Credit Card
        **DISPOSE** JFrame frame3
   **END DO**
**END DO**

**ADD** PANEL panel10 TO THE PANEL mainPanel3
**ADD** PANEL panel11 TO THE PANEL panel10
**ADD** PANEL pane11 TO THE PANEL panel12
**ADD** BUTTON b19 TO THE PANEL panel12
**ADD** BUTTON b20 TO THE PANEL panel12
**ADD** BUTTON b21 TO THE PANEL panel12
**ADD** LABEL j17 TO THE PANEL panel11
**ADD** LABEL j18 TO THE PANEL panel11
**ADD** TEXTFIELD t15 TO THE PANEL panel11
**ADD** LABEL j20 TO THE PANEL panel11
**ADD** TEXTFIELD t17 TO THE PANEL panel11
**ADD** TEXTFIELD t26 TO THE PANEL panel11
**ADD** LABEL j35 TO THE PANEL panel11
**ADD** BUTTON b22 TO THE PANEL panel11
**ADD** BUTTON b23 TO THE PANEL panel11
**ADD** BUTTON b24 TO THE PANEL panel11
**ADD** PANEL mainPanel3 TO THE FRAME frame3
**SET** VISIBILITY OF THE FRAME
**SET** RESIZABLE FALSE OF THE FRAME
**END DO**

**CREATE** method cancelCreditCard
**DO**
**INITIALIZE THE** JFrame frame4
**GIVE** TITLE TO THE FRAME as “CancelCreditCard “
**GIVE** BOUNDS TO THE FRAME
**SET** LAYOUT TO THE PANEL

**INITIALIZE** JPanel mainPanel4
**SET** BOUNDS TO THE PANEL

**GIVE** BACKGROUND COLOR TO THE PANEL
**SET** LAYOUT TO THE PANEL

**INITIALIZE** JPanel panel13
**SET** BOUNDS TO THE PANEL
**GIVE** BACKGROUND COLOR TO THE PANEL
**SET** LAYOUT TO THE PANEL

**INITIALIZE** JPanel panel14
**SET** BOUNDS TO THE PANEL
**GIVE** BACKGROUND COLOR TO THE PANEL
**SET** LAYOUT TO THE PANEL

**INITIALIZE** JPanel panel15
**SET** BOUNDS TO THE PANEL
**GIVE** BACKGROUND COLOR TO THE PANEL
**SET** LAYOUT TO THE PANEL

**INITIALIZE THE** JLabel j24
**SET** THE TEXT TO " Cancel Card"
**GIVE** BOUNDS TO THE LABEL
**GIVE** FONT TO THE LABEL

**INITIALIZE THE** JLabel j25
**SET** THE TEXT TO " Card_ID: “
**GIVE** BOUNDS TO THE LABEL
**GIVE** FONT TO THE LABEL

**INITIALIZE THE** JTextField t19
**GIVE** BOUNDS TO THE TEXTFIELD
**ADD** TEXTFIELD TO THE PANEL

**INITIALIZE THE** JButton b28
**SET** THE TEXT TO " Go Back"
**GIVE** BOUNDS TO THE BUTTON
**GIVE** FOREGROUND COLOR TO THE BUTTON
**GIVE** FONT TO THE BUTTON
**ADD** ACTIONLISTENER TO THE BUTTON
**DO**
    **CREATE** a new ActionListener object
    **CALL** method actionPerformed
    **DO**
        **CALL** method Credit Card
        **DISPOSE** JFrame frame4
   **END DO**
**END DO**

**INITIALIZE THE** JButton b29
**SET** THE TEXT TO " Cancel Card"
**GIVE** BOUNDS TO THE BUTTON
**GIVE** FOREGROUND COLOR TO THE BUTTON
**GIVE** FONT TO THE BUTTON
**ADD** ACTIONLISTENER TO THE BUTTON
**DO**
**CREATE** a new ActionListener object
**OVERRIDE** method actionPerformed
**DO**
      **IF**(JTextField t19 isEmpyt() )
        **DISPLAY** error message
       **END IF**
       **ELSE IF** (JTextField is less tha or equals to zero)
          **DISPLAY** error message

```
        END IF
        TRY
            ASSING JTextField t19 to variable cardid
    FOR objects of BankCard from arrayBankCard in card as array
                IF (cancel instance of CreditCard class)
                    ASSING cancel CardId equals to cardId
                    IF(cardid equals to cardId)
                CAST object of BankCard as Creditcard name cancel
                        ADD  cancel  to array BankCard
                     END IF
                END IF
               END FOR
        END TRY
        CATCH
          SET JTextField t19 empty
           DISPLAY error message
        END CATCH
        CATCH
          SET JTextField t19 empty
           DISPLAY error message
        END CATCH
    END DO
    END DO

    INITIALIZE THE JButton b30
    SET THE TEXT TO " Clear"
    GIVE BOUNDS TO THE BUTTON
    GIVE FOREGROUND COLOR TO THE BUTTON
    GIVE FONT TO THE BUTTON
    ADD ACTIONLISTENER TO THE BUTTON\
    DO
```

**CREATE** a new ActionListener object
**OVERRIDE** method actionPerformed
**DO**
**CLEAR** the JTextField t19
**END DO**
**END DO**

**INITIALIZE THE** JButton b25
**SET** THE TEXT TO " Home"
**GIVE** BOUNDS TO THE BUTTON
**GIVE** FOREGROUND COLOR TO THE BUTTON
**GIVE** FONT TO THE BUTTON
**ADD** ACTIONLISTENER TO THE BUTTON

**DO**
**CREATE** a new ActionListener object
**CALL** method actionPerformed
**DO**
**CALL** method Home
**DISPOSE** JFrame frame4
**END DO**
**END DO**

**INITIALIZE THE** JButton b26
**SET** THE TEXT TO " Debit Card"
**GIVE** BOUNDS TO THE BUTTON
**GIVE** FONT TO THE BUTTON
**ADD** ACTIONLISTENER TO THE BUTTON

**DO**
**CREATE** a new ActionListener object

```
    CALL method actionPerformed
    DO
        CALL method Debit card
        DISPOSE JFrame frame4
   END DO
END DO

INITIALIZE THE JButton b27
SET THE TEXT TO " Credit Card"
GIVE BOUNDS TO THE BUTTON
GIVE FOREGROUND COLOR TO THE BUTTON
GIVE FONT TO THE BUTTON
ADD ACTIONLISTENER TO THE BUTTON

DO
    CREATE a new ActionListener object
    CALL method actionPerformed
    DO
        CALL method Credit Card
        DISPOSE JFrame frame4
   END DO
END DO

ADD PANEL panel13 TO THE PANEL mainPanel4
ADD PANEL panel14 TO THE PANEL panel13
ADD PANEL pane14 TO THE PANEL panel15
ADD BUTTON b25 TO THE PANEL panel15
ADD BUTTON b26 TO THE PANEL panel15
ADD BUTTON b27 TO THE PANEL panel15
ADD LABEL j24 TO THE PANEL panel14
ADD LABEL j25 TO THE PANEL panel14
```

**ADD** TEXTFIELD t19 TO THE PANEL panel14
**ADD** BUTTON b28 TO THE PANEL panel14
**ADD** BUTTON b29 TO THE PANEL panel14
**ADD** BUTTON b30 TO THE PANEL panel14
**ADD** PANEL mainPanel4 TO THE FRAME frame4
**SET** VISIBILITY OF THE FRAME
**SET** RESIZABLE FALSE OF THE FRAME

**END DO**

**END DO**

## 4.Method Description

A method in java is a block of code that, when called, performs the action specified in it. For example, if you have written instruction to draw a circle in a method, this is enough. Your ca put values or parameters in method that run only when called. They are also called functions. The main uses of methods in Java are allows code to be reused (defined once and used many times), ability to break down a complex program into smaller code fragments, Increasing code readability. (Simplilearn , 2023), (W3school, 2023)

### 4.1 BankGUI():

#### 4.1.1actionPerformed(ActionEvent e):

**Home:**

- When this button is pressed, it call the “BankGUI” methods and redirect to home page when the button is clicked.
- Old GUI will be disposed.
- Return type: void.

**Debit Card:**

- When this button is pressed, it call the “DebitCard” methods and redirect to home page when the button is clicked.
- Old GUI will be disposed.
- Return type: void.

**Credit Card:**

- When this button is pressed, it call the “CreditCard” methods and it redirect to the credit card.
- Old GUI will be disposed.
- Return type: void.

### 4.2 DebitCard():

- Access modifier : public
- Method to open the GUI created for adding Debit card.
- Use of JFrame and its components like JPanel, JLabel, JTextField, JComboBox, JButton, etc.
- Contains an anonymous per-button action listener that performs specific tasks for each button.
- The different buttons and their functions are listed below.
- Return type : void

### 4.1.2 actionPerformed(ActionEvent e):

**Add to debit card**:

- When this button is pressed, The method first checks whether all mandatory fields are filled out and the input values are not negative and non-zero.
- Then the input values used to create a new object of type DebitCard which is added to an array list of BankCard class.
- If the ID exists, an error message is displayed. If the ID does not exist, **a** new DebitCard object is added to the ArrayList and a success message is displayed.
- The method also handles a NumberFormatException if the input values are invalid integers.
- Old GUI will be disposed.
- Return type:void.

**Withdraw from Debit Card:**

- When clicked, it calls the "withdraw" **method, which handles** the withdrawal process for **the** DebitCard object.
- Old GUI will be disposed.

- Return type: void.

**Display:**

- When this button is pressed, the information relating to the appropriate class is displayed.
- The method checks whether the ArrayList is empty and displays an error message if it is.
- Display object of debit card when array list is not empty. Prints the ID of the form and calls the object's view method to view its other properties.
- Return type: void.

**Clear:**

- When this button is pressed, the values from text fields are cleared.
- Effectively erasing any previous user input.
- Return type: void

**Home:**

- When this button is pressed, it call the “BankGUI” methods and redirect to home page when the button is clicked.
- Old GUI will be disposed.
- Return type: void.

**Debit Card:**

- When this button is pressed, it call the “DebitCard” methods and redirect to home page when the button is clicked.
- Old GUI will be disposed.
- Return type: void.

**Credit Card:**

- When this button is pressed, it call the “CreditCard” methods and it redirect to the credit card.
- Old GUI will be disposed.
- Return type: void.

### 4.3 Withdraw():

- Access modifier : public
- Method to open the GUI created for WithDraw.
- It uses the Swing library to create a graphical interface and includes text boxes and combo boxes for user input, and buttons for actions such as withdrawing money and clearing input fields.
- Use of JFrame and its components like JPanel, JLabel, JTextField, JComboBox, JButton, etc.
- Return type : void.

#### 4.3.1 actionPerformed(ActionEvent e):

**Withdraw:**

- When the button is pressed it check the required fields have been filled not.
- If any of the required fields are empty, an error message is displayed.
- When the valid card ID is entered in the text box along with Withdrawal Amount, date Of Withdrawal, and PIN number display an information dialog.
- When the withdraw button is clicked the methods to withdraw amount from debit card is called here.
- Return type: void.

**Clear:**

- When this button is pressed, the values from text fields are cleared.
- Effectively erasing any previous user input.
- Return type: void.

**Go Back:**

- When this button is pressed, it call the “DebitCard” methods and redirect to Debit Card page when the button is clicked.
- Old GUI will be disposed.
- Return type: void.

**Home:**

- When this button is pressed, it call the “BankGUI” methods and redirect to home page when the button is clicked.
- Old GUI will be disposed.
- Return type: void.

**Debit Card:**

- When this button is pressed, it call the “DebitCard” methods and redirect to Debit Card page when the button is clicked.
- Old GUI will be disposed.
- Return type: void.

**Credit Card:**

- When this button is pressed, it calls the “CreditCard” methods and redirect to Credit Card page when the button is clicked.
- Old GUI will be disposed.
- Return type: void.

### 4.4 CreditCard():

- Access modifier : public
- Method to open the GUI created for adding Credit card.
- Use of JFrame and its components like JPanel, JLabel, JTextField, JComboBox, JButton, etc.
- Finally, it includes an anonymous per-button action listener that performs specific tasks for each button. The different buttons and their functions are listed below.
- Return type : void.

#### 4.4.1 actionPerformed(ActionEvent e):

**Add to Credit Card:**

- When this button is pressed, the input values and the method first checks if all the necessary fields are filled and if the input values are non-negative and non-zero.
- Then create a new CreditCard object with the input values and check if the card ID already exists in the ArrayList.
- If the ID exists, an error message is displayed. If the ID does not exist, a new CreditCard object is added to the ArrayList and a success message is displayed.
- The method also handles a NumberFormatException if the input values are invalid integers.
- Old GUI will be disposed.
- Return type: void.

**Cancel Credit Card:**

- Called just after the user performs an action cancelCreditCard GUI will open.
- Old GUI will be disposed.

- Return type: non.

**Set credit limit:**

- Called just after the user performs an action setlimit GUI will open.
- Old GUI will be disposed.
- Return type: non.

**Display:**

- When this button is pressed, the information relating to the appropriate class is displayed.
- It Don't display when array list is empty.
- Display object of Credit card when array list is not empty.
- Return type: non

**Clear:**

- When this button is pressed, the values from text fields are cleared.
- Effectively erasing any previous user input.
- Return type: void.

**Home:**

- When this button is pressed, it call the "BankGUI" methods and redirect to home page when the button is clicked.
- Old GUI will be disposed.
- Return type: void.

**Debit Card:**

- When this button is pressed, it call the "DebitCard" methods and redirect to Debit Card page when the button is clicked.
- Old GUI will be disposed.

- Return type: void.

**Credit Card:**

- When this button is pressed, it call the “CreditCard” methods and redirect to Credit Card page when the button is clicked.
- Old GUI will be disposed.
- Return type: void.

### 4.5 setlimit():

- Access modifier : public
- Method to open the GUI created for setting limit of credit card
- Use of JFrame and its components like JPanel, JLabel, JTextField, JComboBox, JButton, etc.
- Return type : void

### 4.5.1 actionPerformed(ActionEvent e):

**Set limit:**

- When all the required input entered in the GUI.
- When the button is clicked the method to set the credit limit from the CreditCard class is called here.
- It uses the Swing library to create a graphical interface and includes text boxes and combo boxes for user input, and buttons for actions such as withdrawing money and clearing input fields. The functionality of the button is shown below.
- An object of BankCard is cast as CreditCard.
- Return type: void.

**Clear:**

- When this button is pressed, the values from text fields are cleared.
- Effectively erasing any previous user input.
- Return type: void.

**Go Back:**

- When this button is pressed, it calls the “CreditCard” methods and redirect to Credit Card page when the button is clicked.
- Old GUI will be disposed.
- Return type: void.

**Home:**

- When this button is pressed, it calls the “BankGUI” methods and redirect to home page when the button is clicked.
- Old GUI will be disposed.
- Return type: void.

**Debit Card:**

- When this button is pressed, it calls the “DebitCard” methods and redirect to Debit Card page when the button is clicked.
- Old GUI will be disposed.
- Return type: void.

**Credit Card:**

- When this button is pressed, it calls the “CreditCard” methods and redirect to Credit Card page when the button is clicked.
- Old GUI will be disposed.
- Return type: void.

### 4.6 cancelCreditCard():

- Access modifier : public
- Method to open the GUI created for adding Credit card.
- Use of JFrame and its components like JPanel, JLabel, JTextField, JComboBox, JButton, etc.
- Return type : void

### 4.6.1 actionPerformed(ActionEvent e):

**Cancel Card:**

- The card id is entered in the GUI. When this button is pressed, the input value of card ID is compared to the existing card ID.
- If a valid Enrollment id has been entered, it is used to cancel the credit card.
- When the button is clicked the method to cancel the credit card from the CreditCard class is called here.

**Clear:**

- When this button is pressed, the values from text fields are cleared.
- Effectively erasing any previous user input.
- Return type: void.

**Go Back:**

- When this button is pressed, it call the “CreditCard” methods and redirect to Credit Card page when the button is clicked.
- Old GUI will be disposed.
- Return type: void.

**Home:**

- When this button is pressed, it call the “BankGUI” methods and redirect to home page when the button is clicked.
- Old GUI will be disposed.
- Return type: void.

**Debit Card:**

- When this button is pressed, it call the “DebitCard” methods and redirect to Debit Card page when the button is clicked.
- Old GUI will be disposed.
- Return type: void.

**Credit Card:**

- When this button is pressed, it call the “CreditCard” methods and redirect to Credit Card page when the button is clicked.
- Old GUI will be disposed.
- Return type: void

## 5.Testing

### 5.1 Test1: To Test that the program can be compiled and run using the Terminal

| | |
|---|---|
| Test No: | 1 |
| Objective | To Test that the program can be compiled and run using the Terminal |
| Action | - Open Terminal put code "cd file path"<br>- Then type "java file name .java"<br>- Then type "java java file name" |
| Expected result: | The program would compile and run |
| Actual Result | The program was compiled and run |
| Conclusion | The test is successful. |

**Table 1: Test using Terminal.**

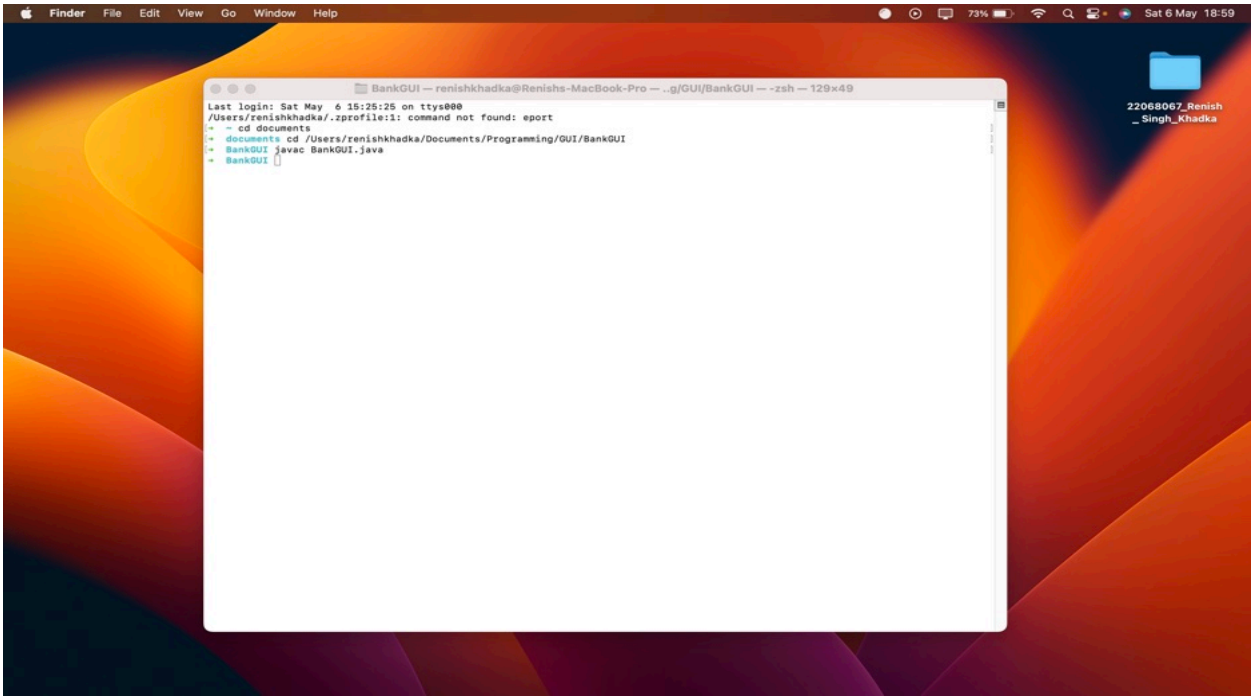


**Figure 7: Successfully compile and run using terminal**

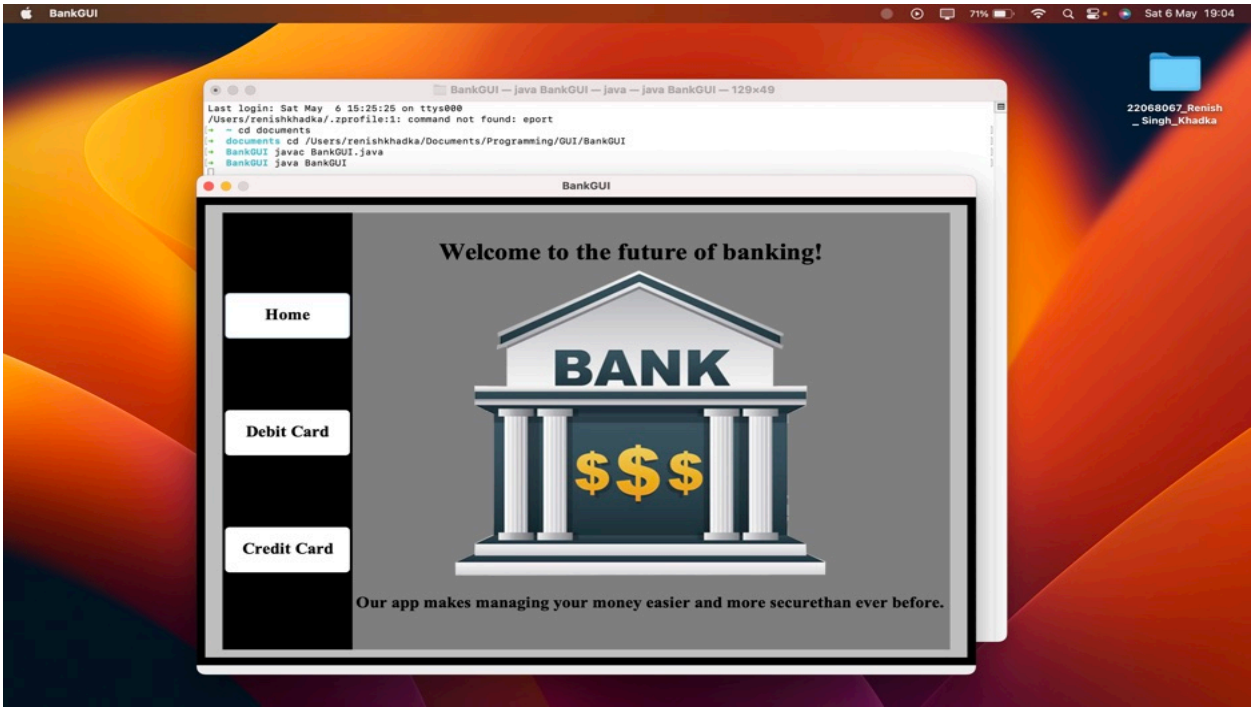


**Figure 8: GUI opened with terminal.**

### 5.2 Test2: Adding objects in Debit Card

| | |
|---|---|
| Test No: | 2 |
| Objective | Adding objects in Debit Card |
| Action | - Fill the text fields of DebitCard<br>Card ID:12<br>Client Name:Renish Khadka<br>Issuer Bank: Kumari Bank<br>Balance Account: Current<br>Balance Amount: 23000<br>Pin:6211<br><br>- Click on Add to Debit Card button |
| Expected result: | Message Dialog Box would appear" Your Details have been stored!" |
| Actual Result | Message Dialog Box would appear" Your Details have been stored!" |
| Conclusion | The test is successful. |

**Table 2: Adding objects in Debit Card.**


**Figure 9: Adding objects in Debit Card.**

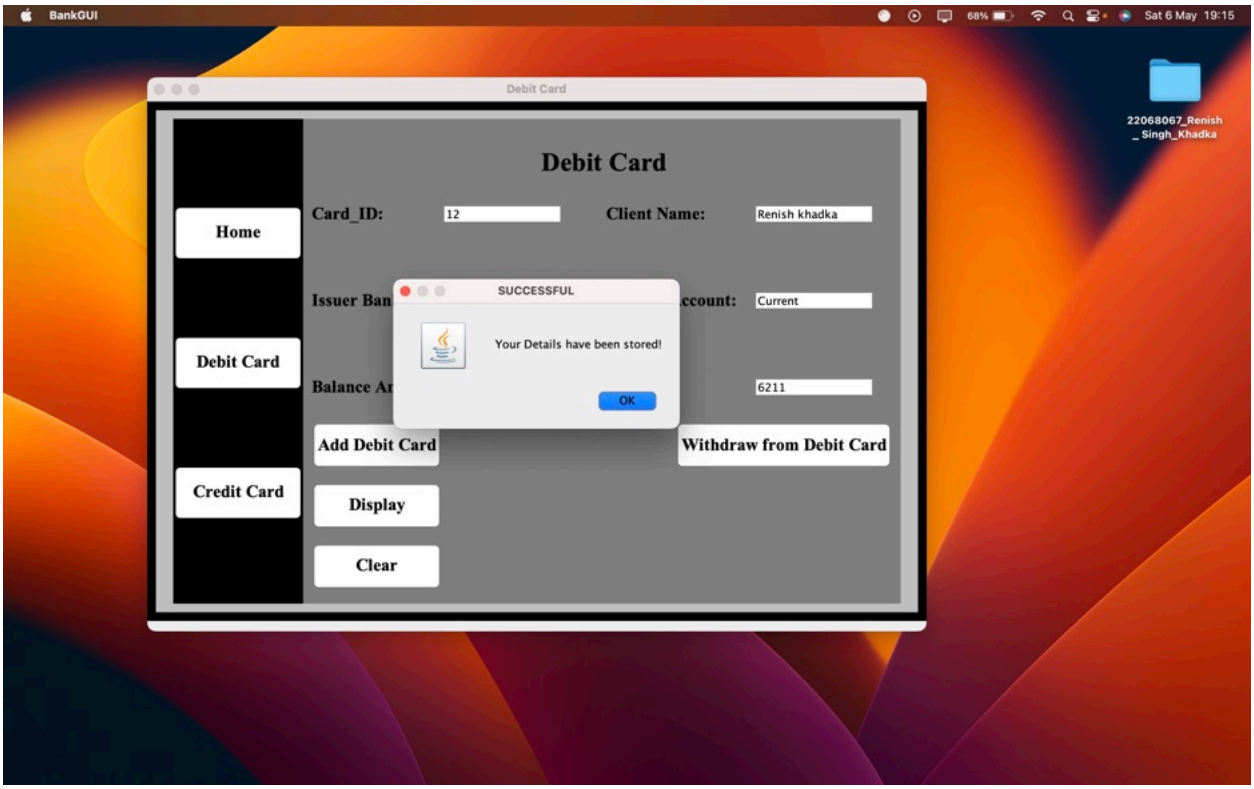


**Figure 10: Pop up message after values are added.**

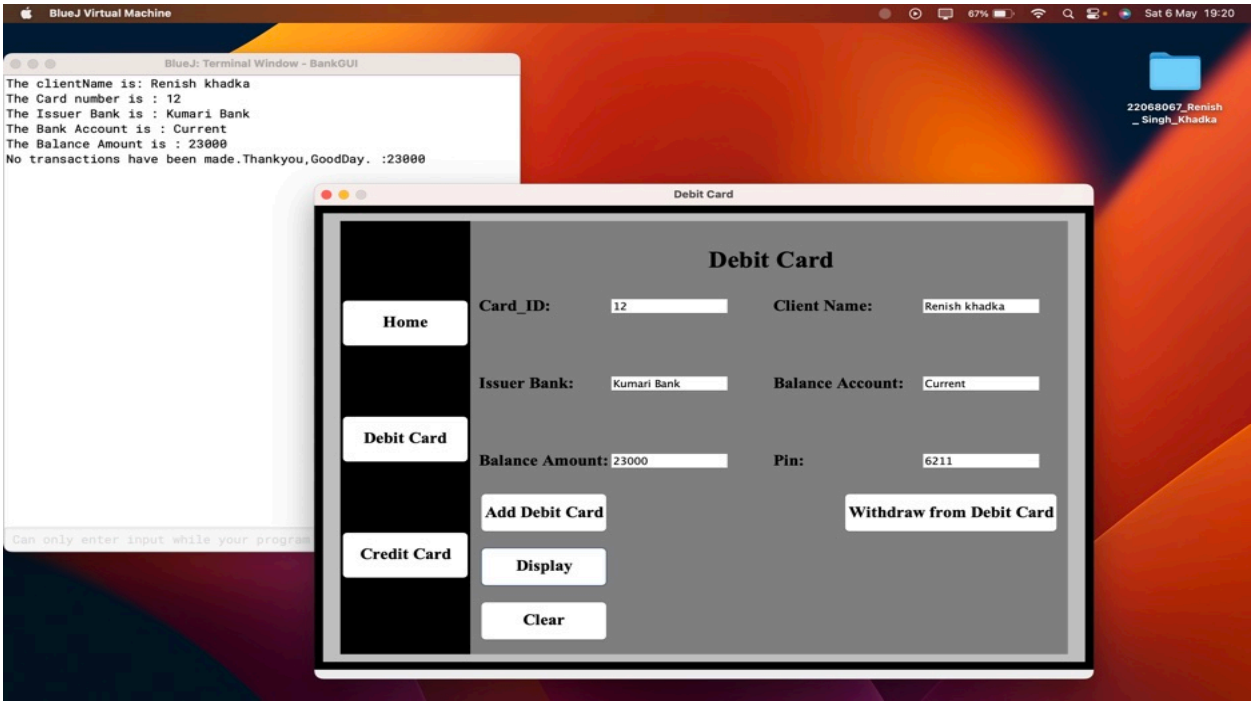


**Figure 11: Image of values being displayed after they are added.**

### 5.2.1 Test 2.1: Adding Objects in Credit Card

| | |
|---|---|
| Test No: | 2.1 |
| Objective | Adding objects in Credit Card |
| Action | - Fill the text fields of CreditCard<br>Card ID:23<br>Client Name:Diya Basnet<br>Issuer Bank: Nabil bank<br>Balance Account: Saving<br>Balance Amount: 500000<br>CVC Number:5555<br>Interest Rate:12<br>Grace Period: 1<br>Expire date: 1/jan/2023<br>- Click on Add Credit Card button |
| Expected result: | Message Dialog Box would appear “Values have been stored” |
| Actual Result | Message Dialog Box would appear “Values have been stored” |
| Conclusion | The test is successful. |

**Table 3: Adding objects in Credit Card.**

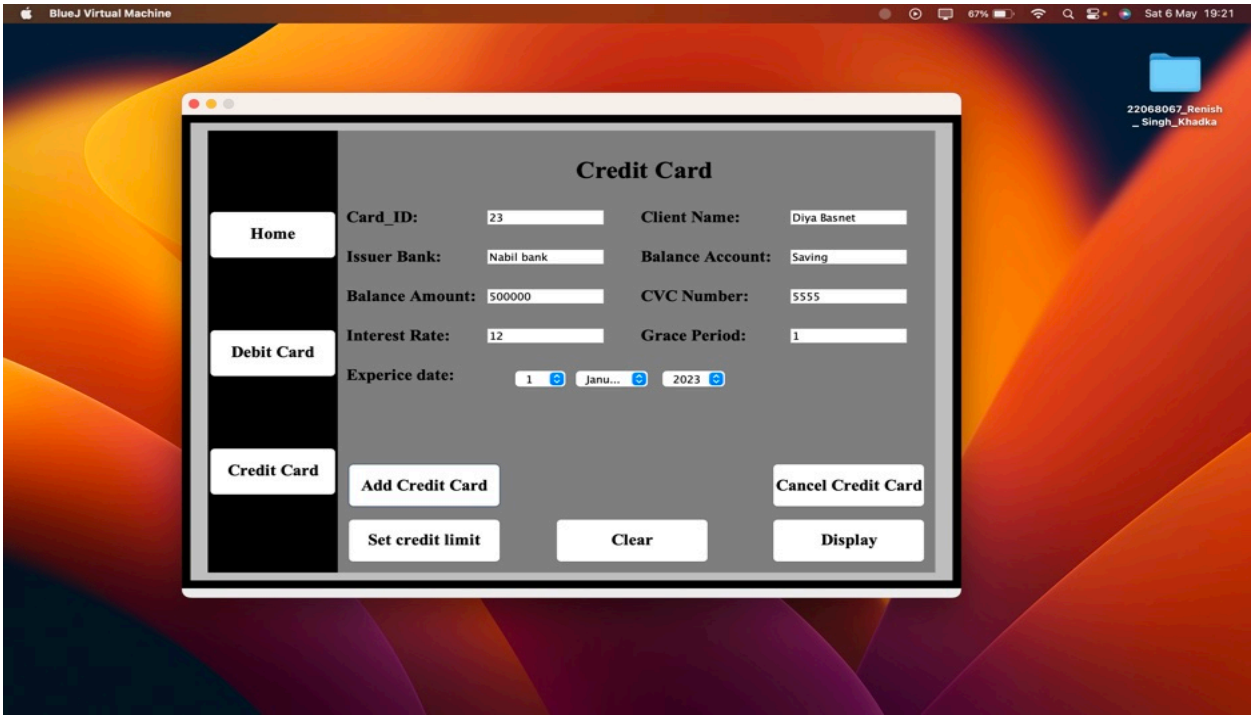


**Figure 12: Adding objects in Credit Card GUI.**

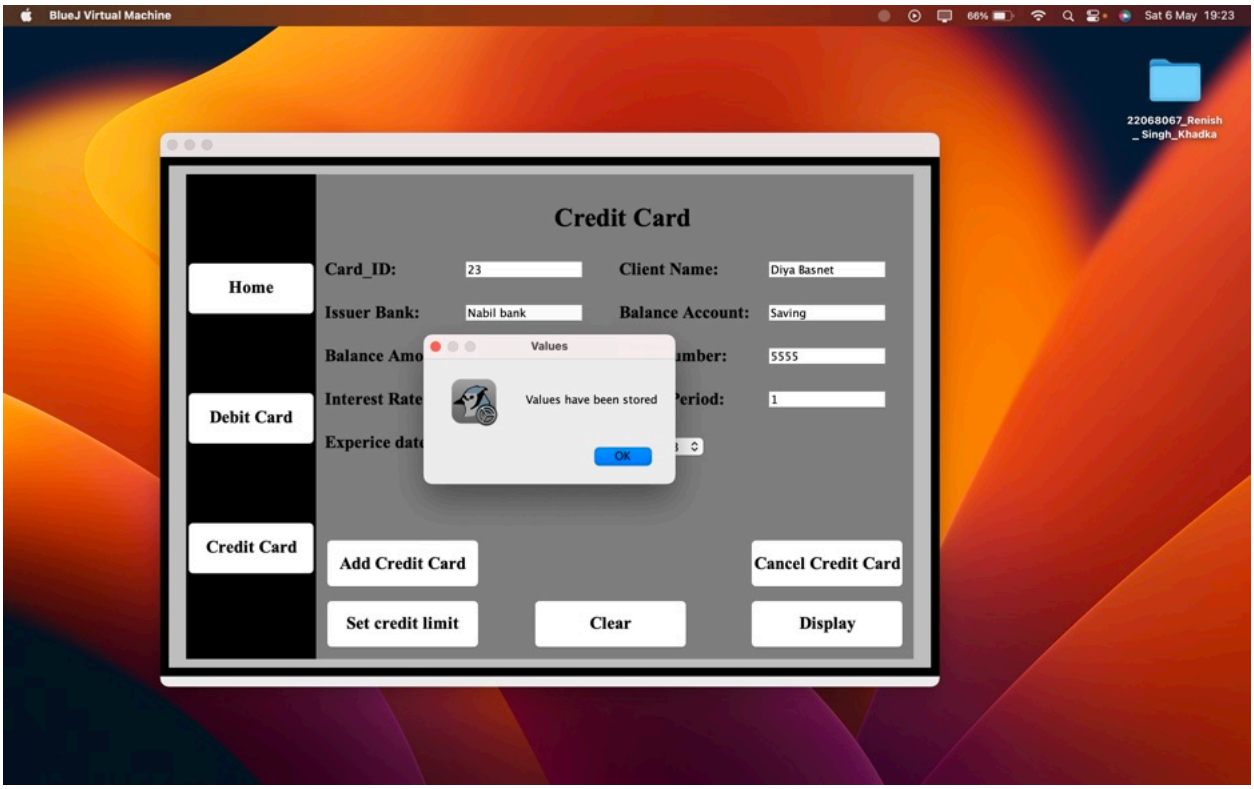


**Figure 13: Pop up message after adding values in Credit Card.**

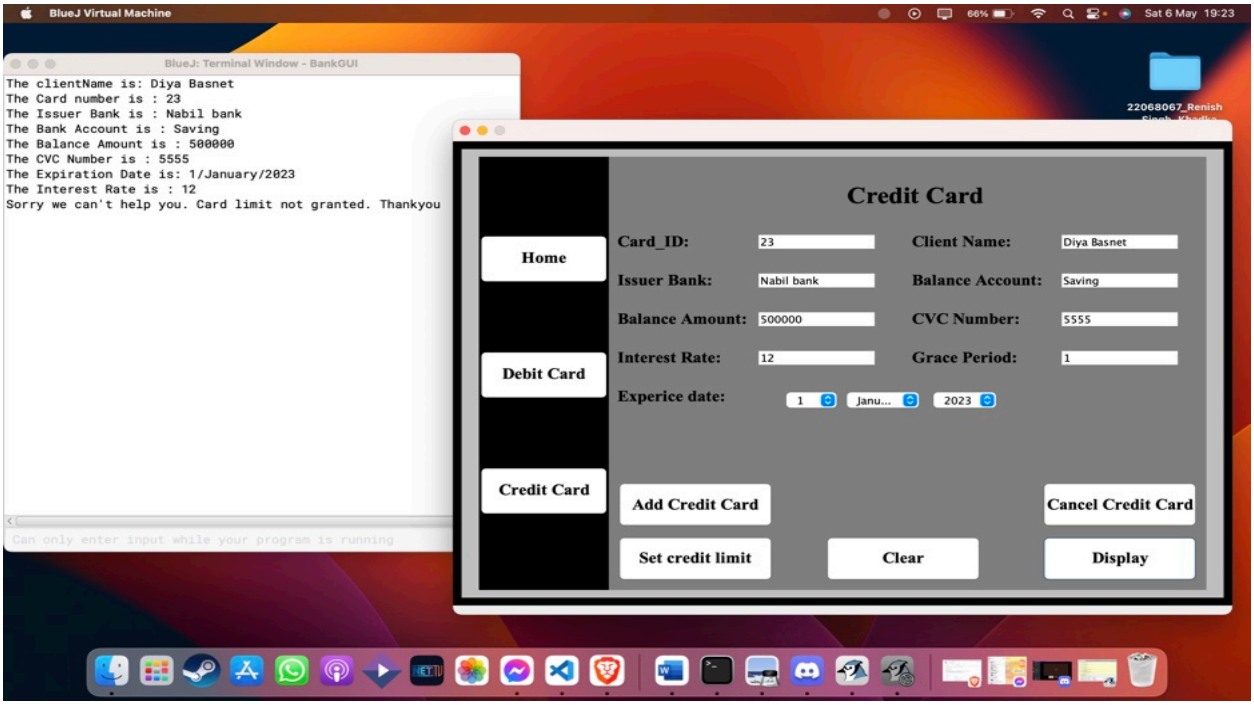


**Figure 14: Values being displayed after they are added.**

### 5.2.2 Test 2.2: Withdrawing From Debit Card

| Test No: | 2.2 |
|---|---|
| Objective | Withdrawing from DebitCard |
| Action | - Fill the text fields of WithDraw<br>Card_ID:12<br>Pin: 6211<br>Amount: 5000<br>WithDraw Date: 1/may/2023<br>- Click on WithDraw button |
| Expected result: | Message Dialog Box would appear" Amount has withdrawn" |
| Actual Result | Message Dialog Box would appear" Amount has withdrawn" |
| Conclusion | The test is successful. |

**Table 4: Withdrawing from DebitCard.**

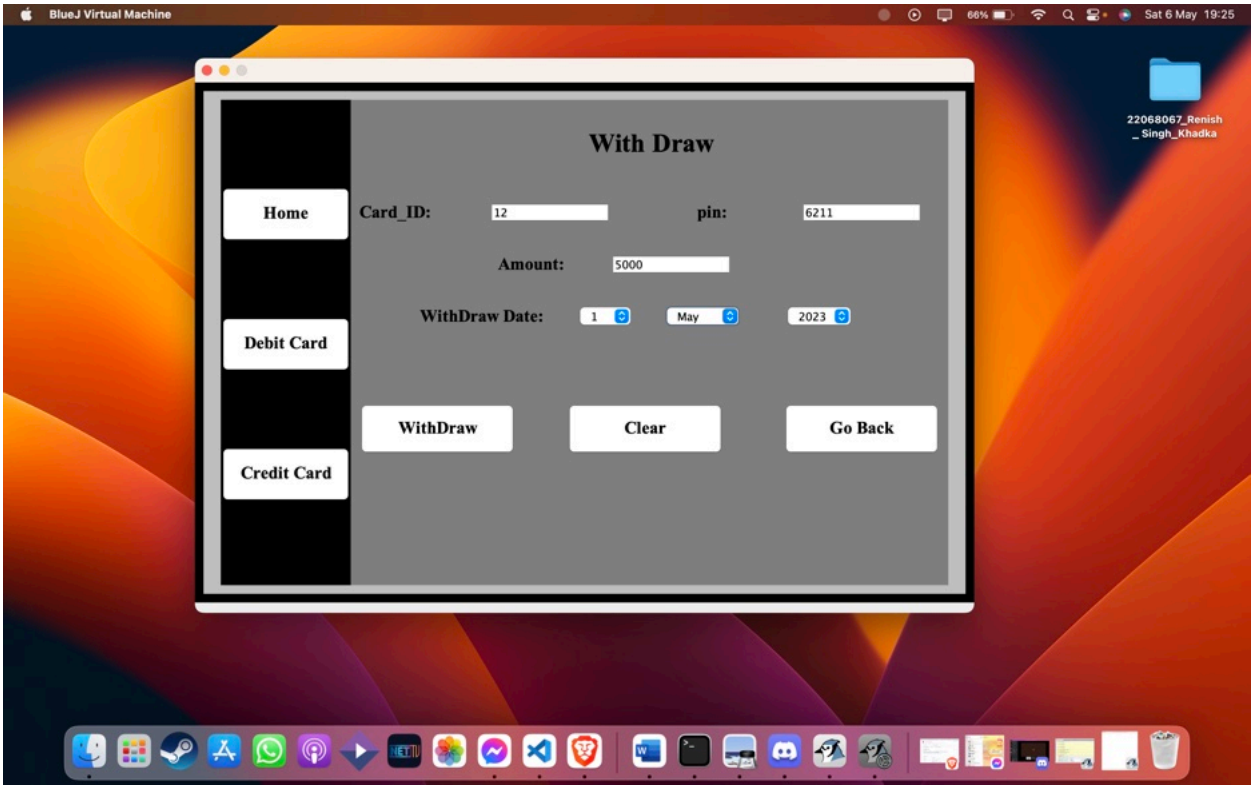


**Figure 15: Adding values in withdraw GUI.**

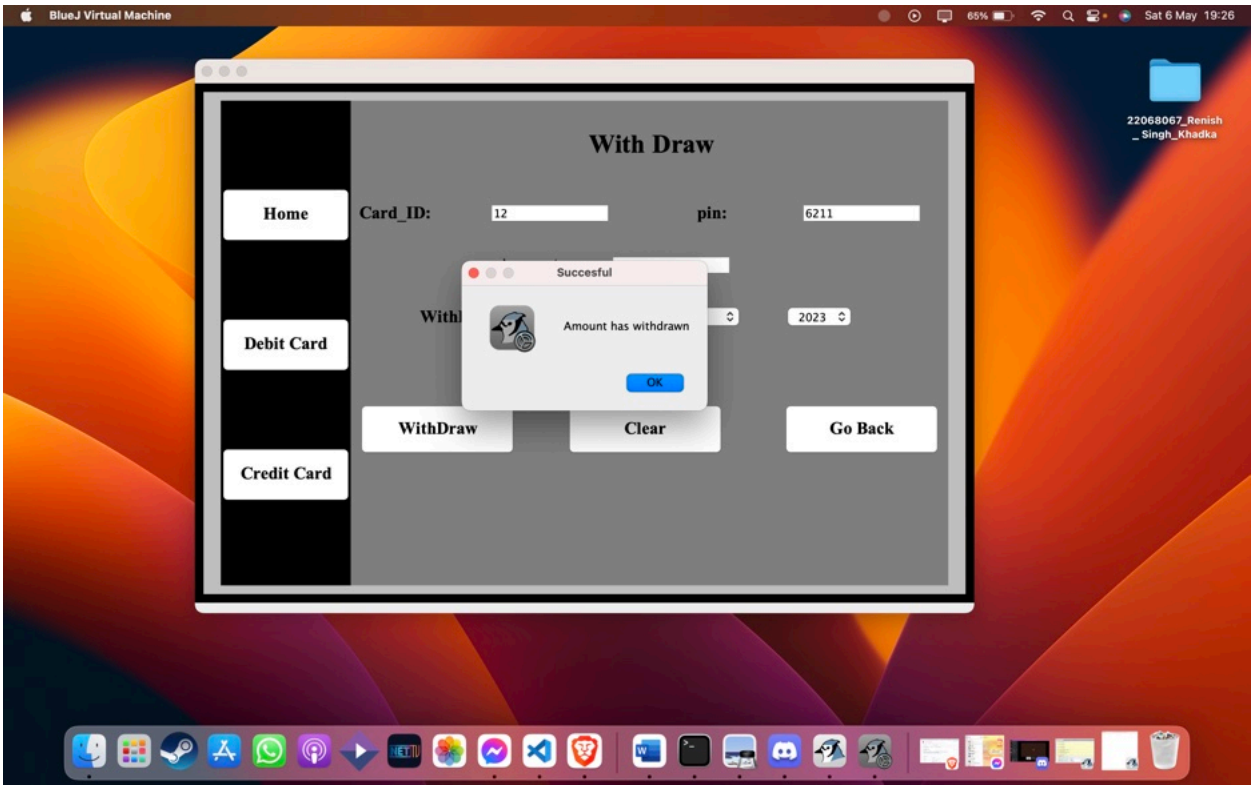


**Figure 16: Pop up message after input all details.**

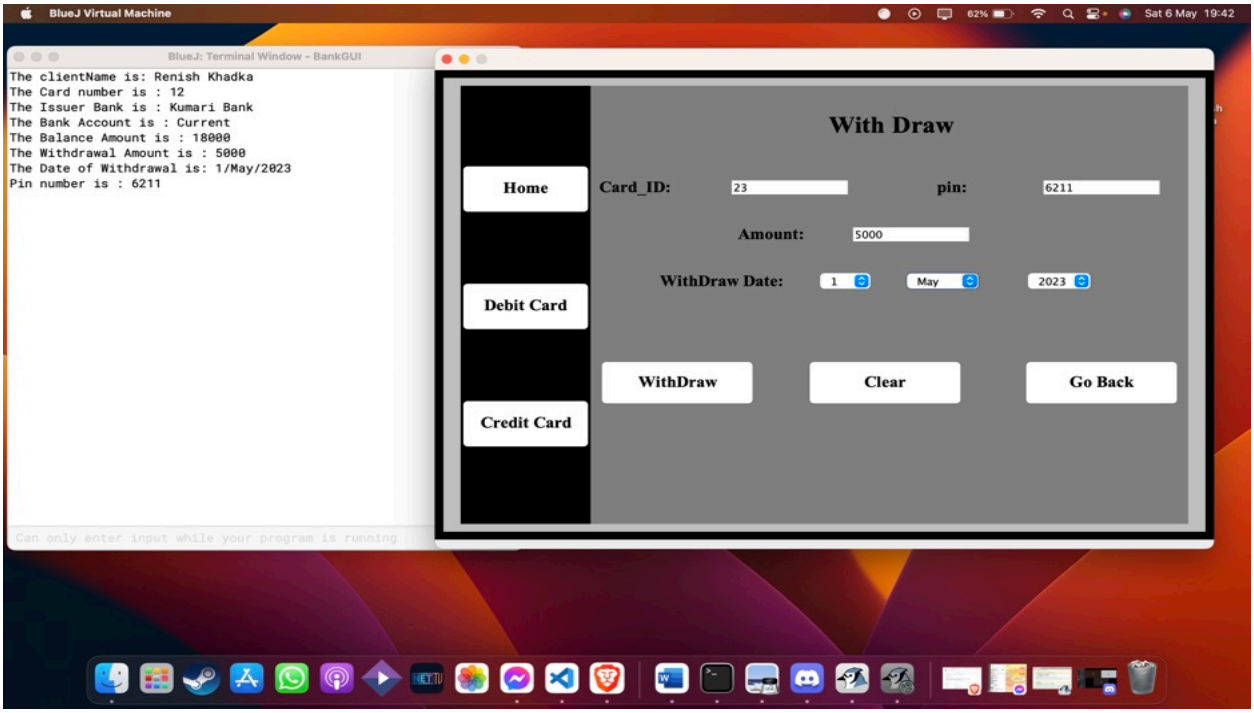


**Figure 17: Display all the details after adding values.**

### 5.2.3 Test 2.3: Setting the credit limit

| Test No: | 2.3 |
|---|---|
| Objective | Setting the Credit limit |
| Action | - Fill the text fields of Credit limit<br>Card_ID:23<br>Credit Limit: 5000<br>Grace Period: 2<br>Experice date: 1/feb/2023<br>- Click on WithDraw button |
| Expected result: | Message Dialog Box would appear"<br>Credit Limit has been set" |
| Actual Result | Message Dialog Box would appear"<br>Credit Limit has been set" |
| Conclusion | The test is successful. |

**Table 5: Setting the CreditLimit.**

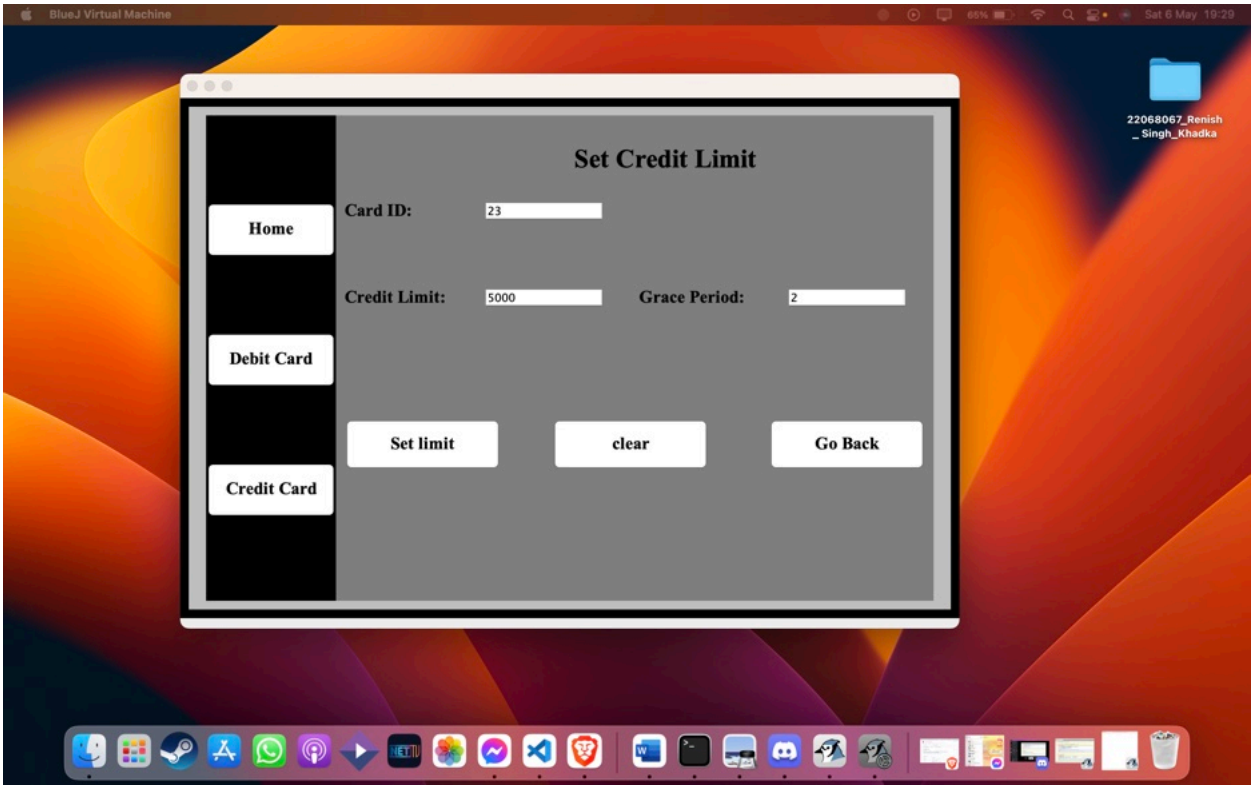


**Figure 18: Adding values in Set Credit Limit.**

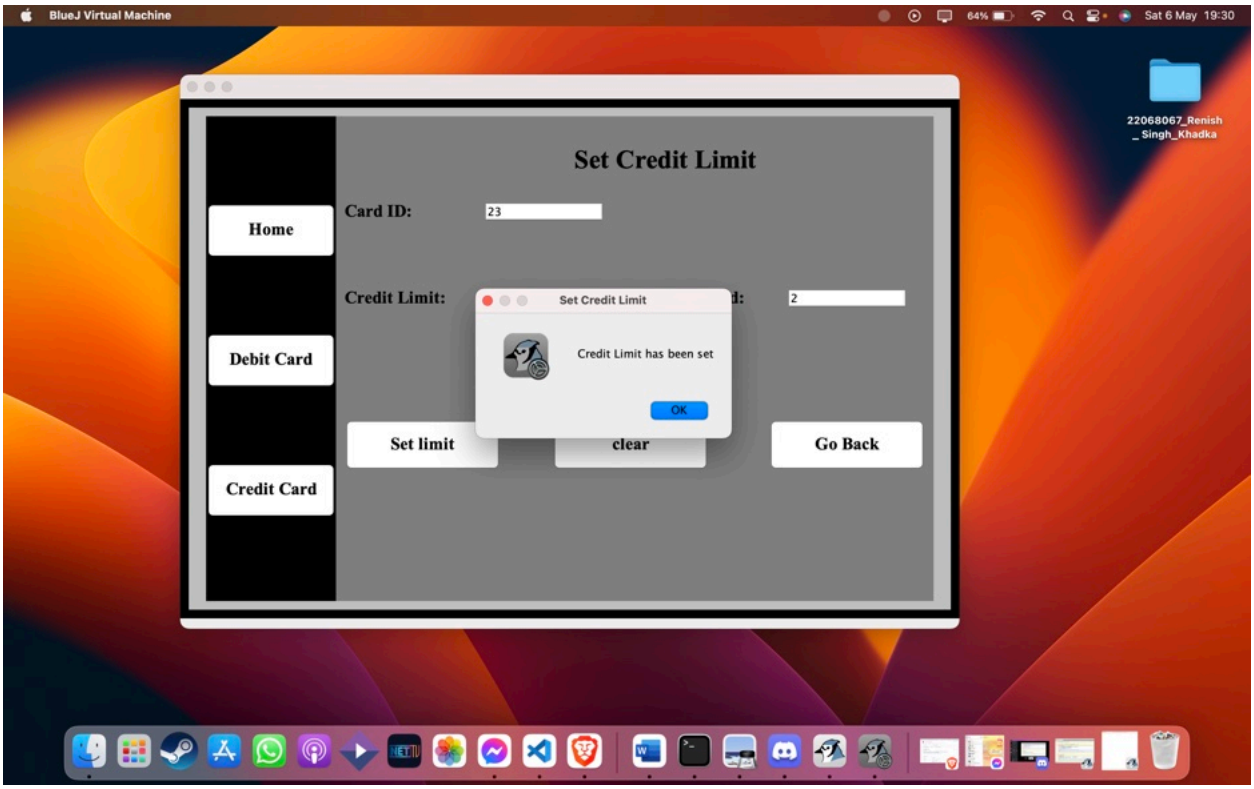


**Figure 19: Pop up message after adding values.**

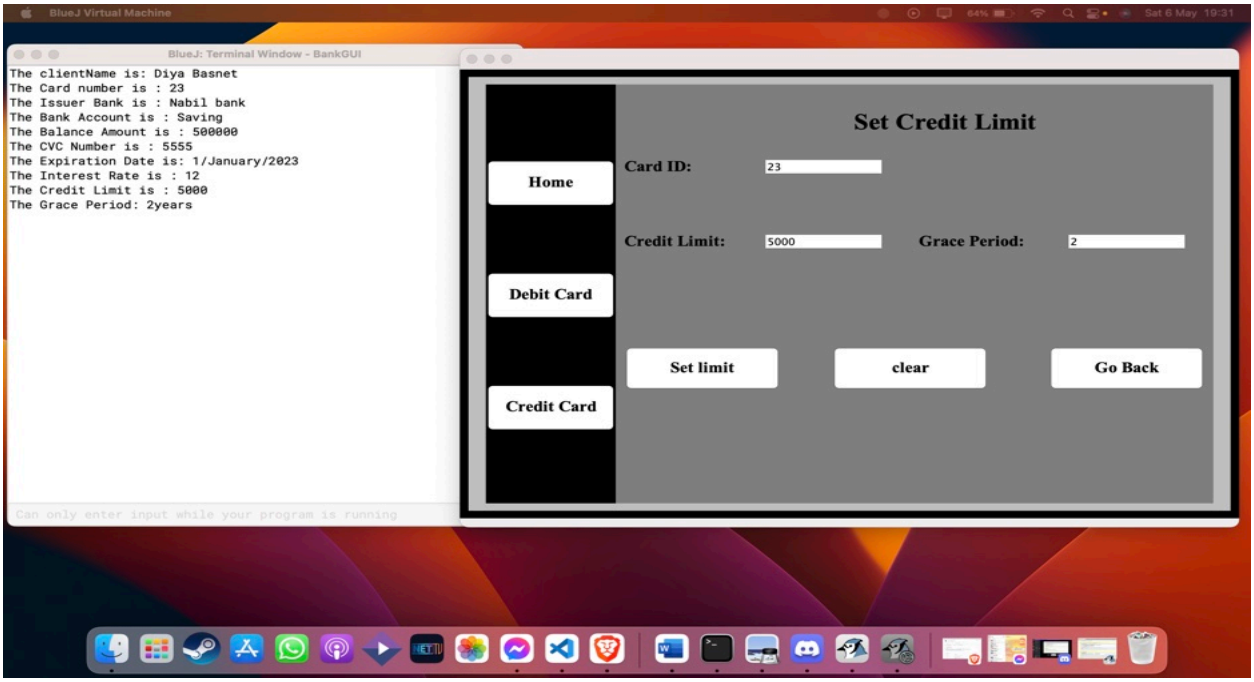


**Figure 20: Display all the details after adding values.**

### 5.2.2 Test 2.3: Removing the Credit Card

| Test No: | 2.3 |
|---|---|
| Objective | Removing the Credit Card |
| Action | - Fill the text fields of Credit limit Card_ID:23<br>- Click on Cancel Card |
| Expected result: | Message Dialog Box would appear" CreditCard has been canceld" |
| Actual Result | Message Dialog Box would appear" CreditCard has been canceld" |
| Conclusion | The test is successful. |

**Table 6: Removing the Credit Card.**

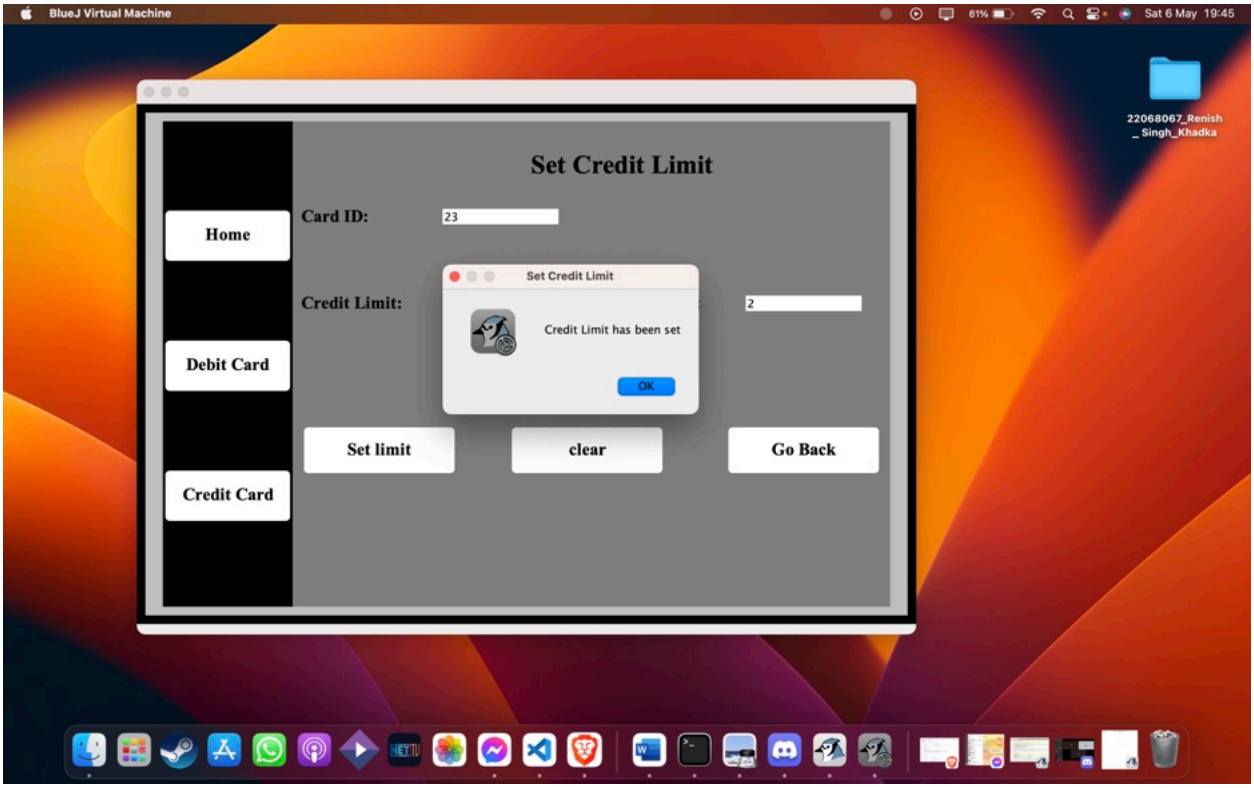


**Figure 21: Pop up message after adding all values.**

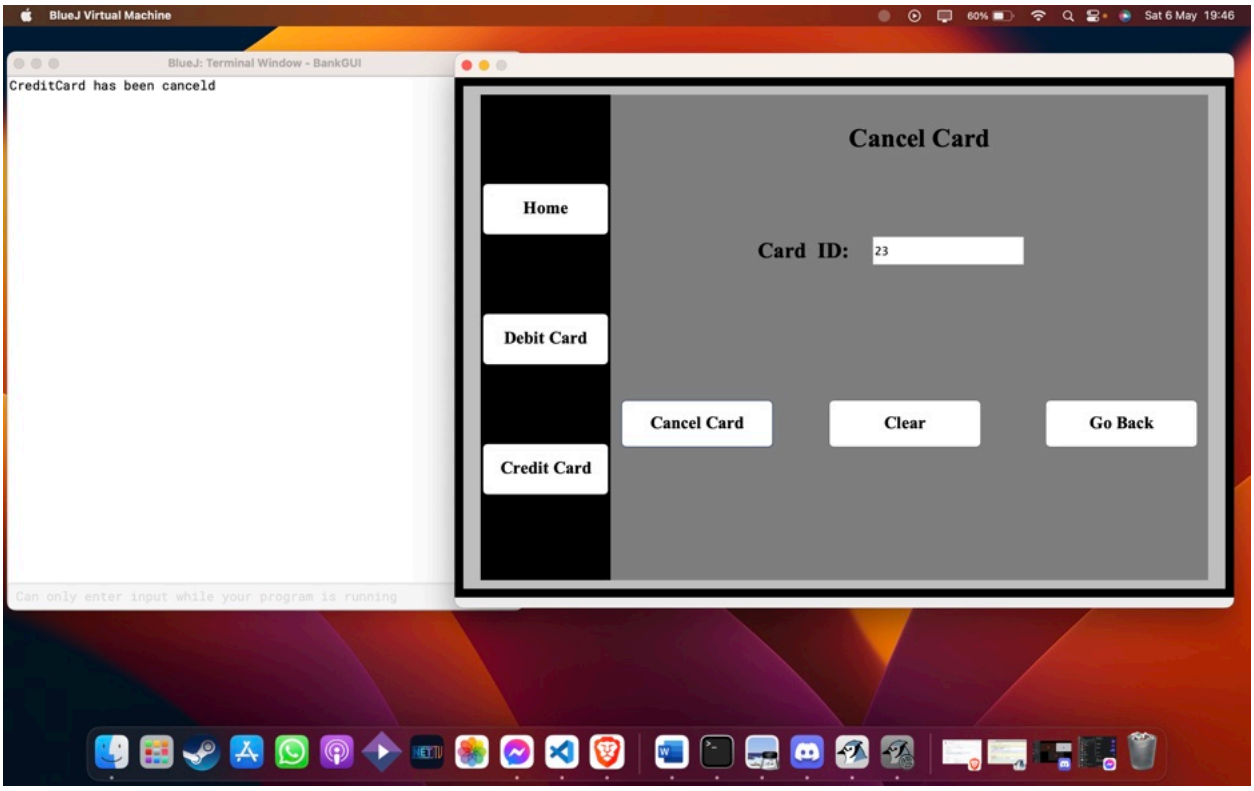


**Figure 22: Adding values in Cancel card and displayed message.**

### 5.3 Test 3: Testing Appropriate Dialog boxes when unsuitable values entered.

| Test No: | 2.3 |
|---|---|
| Objective | Adding duplicate CardId for Debit Card and Credit Card respectively |
| Action | - Fill the text fields of debit card<br>Card ID:3<br>Client Name:Anish Dahal<br>Issuer Bank: Kumari Bank<br>Balance Account: Saving<br>Balance Amount: 34500<br>Pin:234<br>- Click on Add to Debit Card button.<br>- Again,repeat the same process for debit card.<br>- Fill the text fields of credit card<br>Card ID:234<br>Client Name:Prabhab Khanal<br>Issuer Bank: Nabil bank<br>Balance Account:Current<br>Balance Amount: 5000<br>CVC Number:111<br>Interest Rate:8<br>Grace Period: 3<br>Expire date: 23/jan/2023<br>- Click on Add to Credit Card button.<br>- Again, repeat the same process for Credit card. |
| Expected result: | Message Dialog Box would appear" A cardId you enter already exist enter new one with suitable details " |
| Actual Result | Message Dialog Box would appear" A cardId you enter already exist enter new one with suitable details " |
| Conclusion | The test was successful. |

**Figure 23: Adding duplicate CardId for debit and Credit Card.**

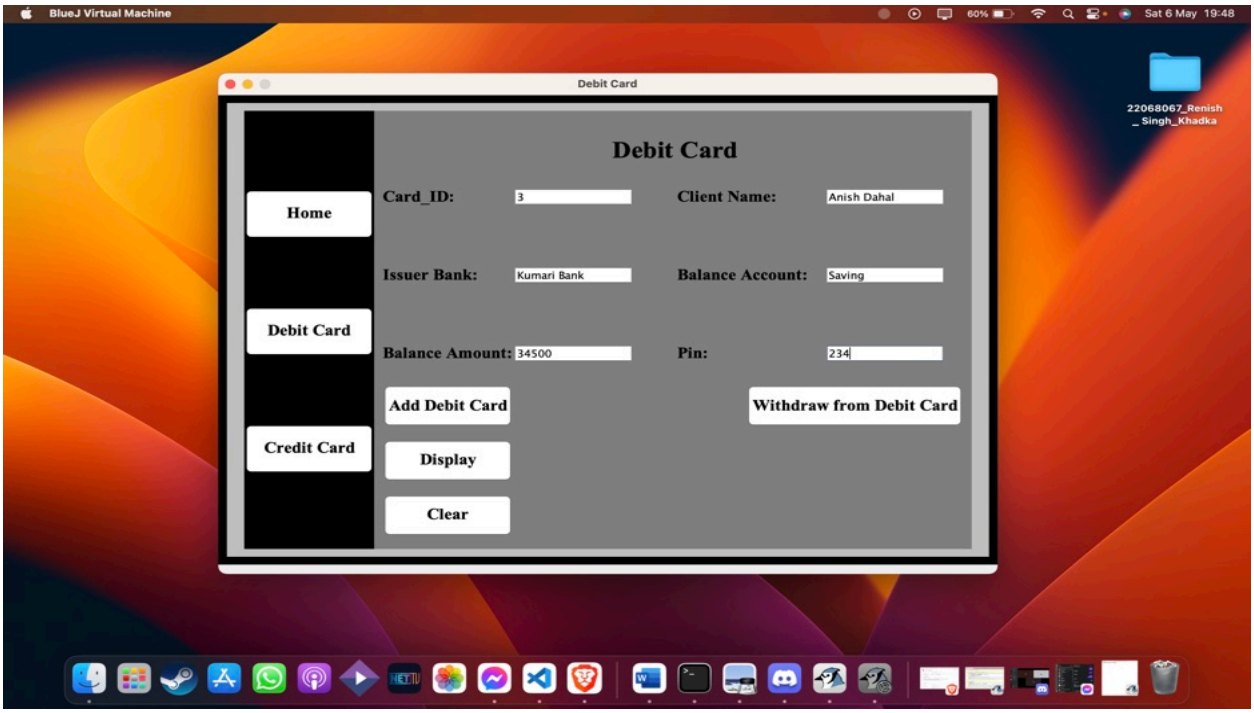


**Figure 24: Adding values in DebitCard GUI.**

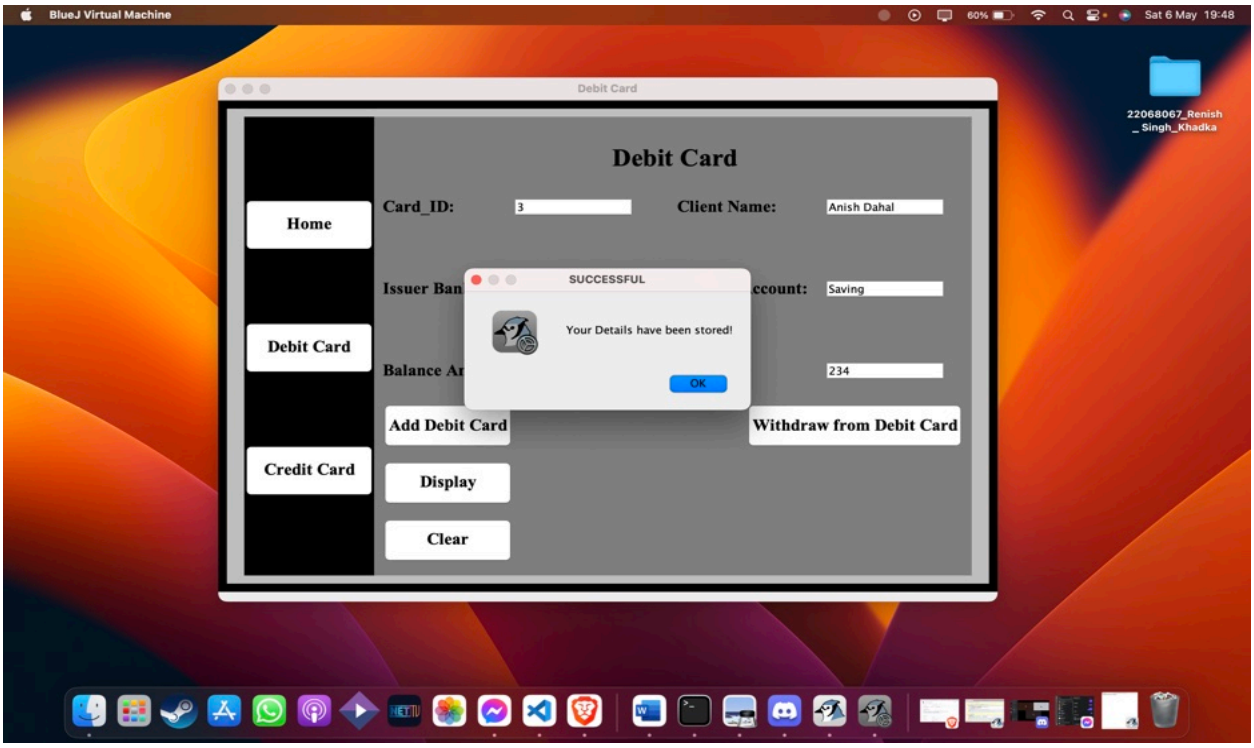


**Figure 25: Pop up message is displayed.**

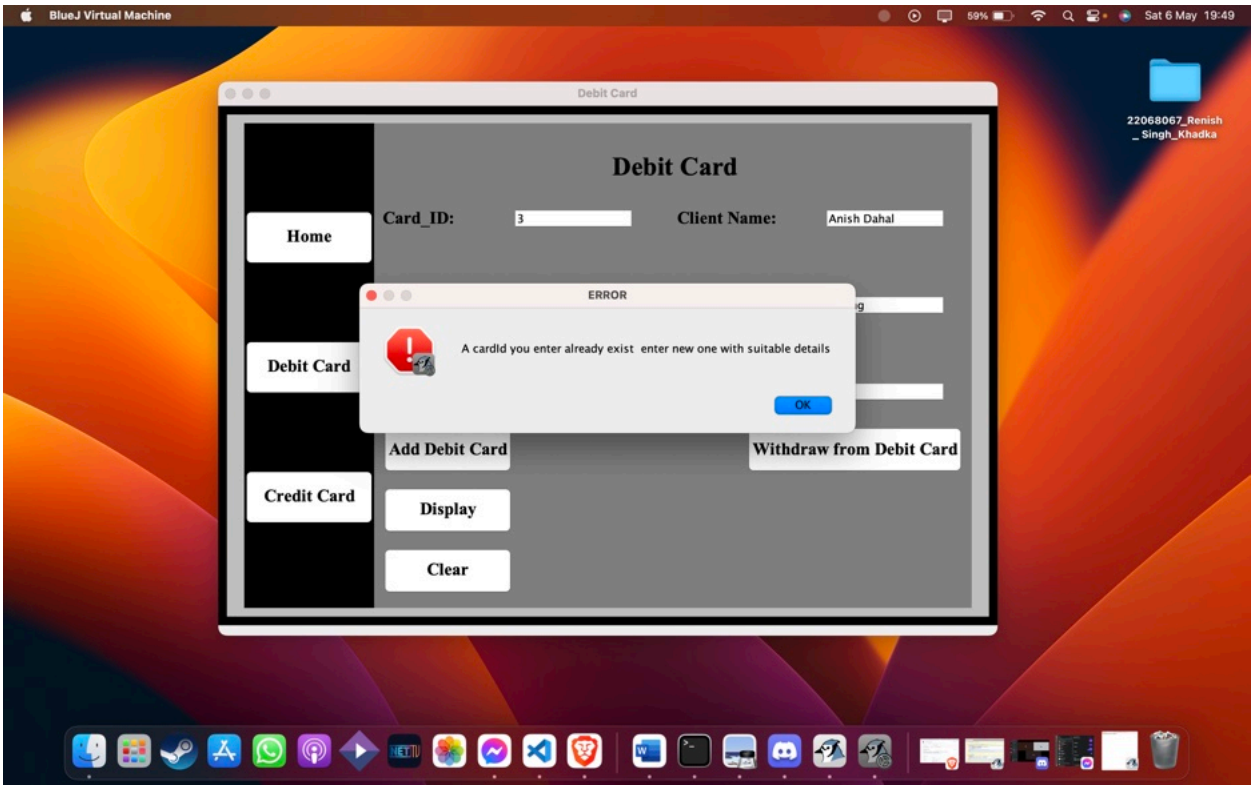


**Figure 26: Adding duplicate Values and pop up error message.**

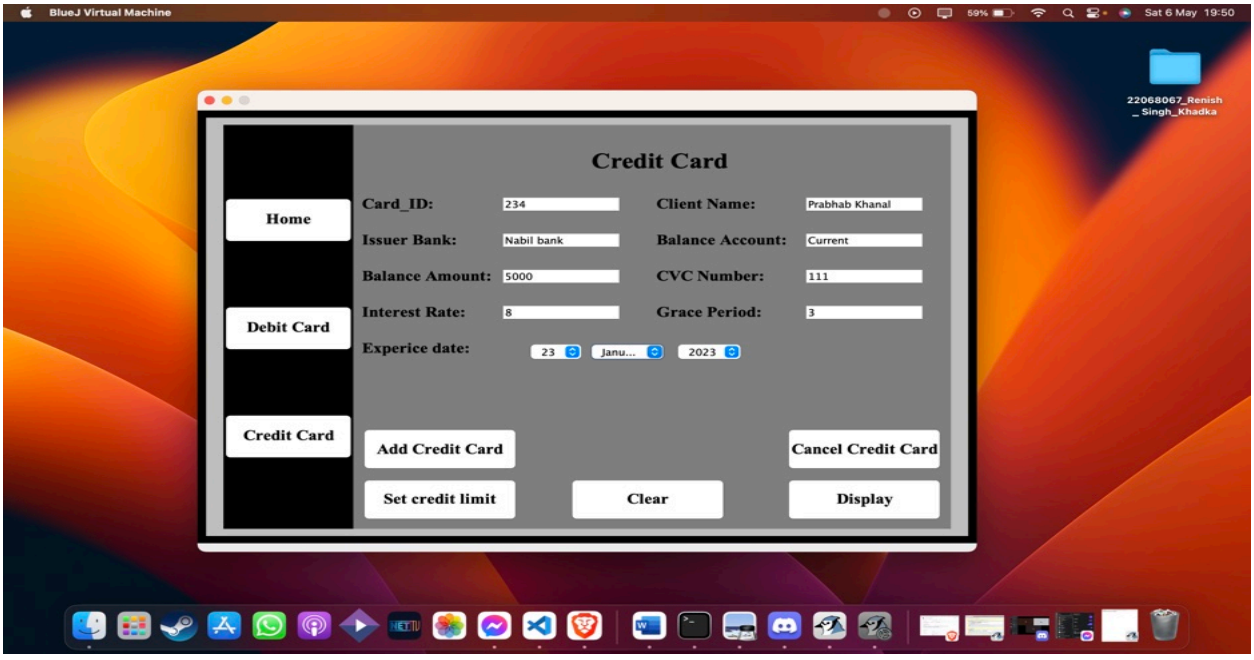


**Figure 27: Adding values in Credit Card.**

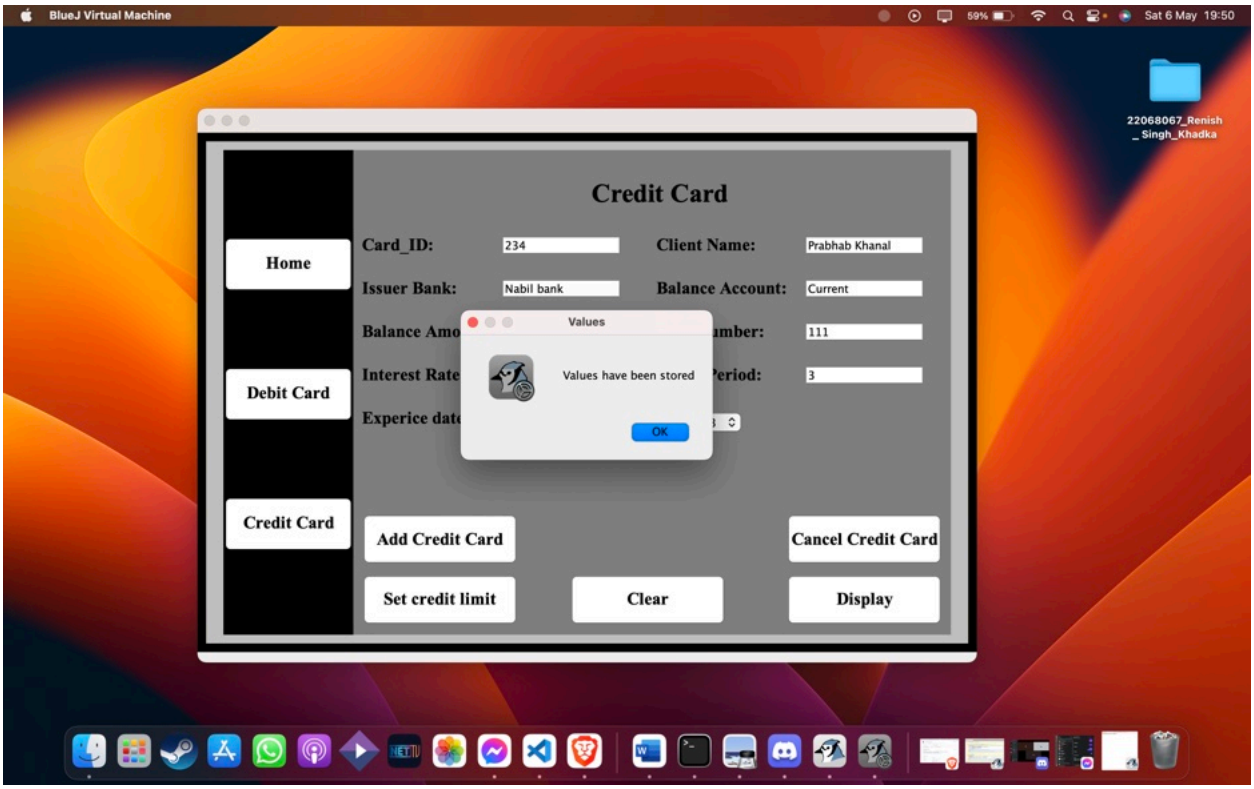


**Figure 28: Pop up success message added to array list.**

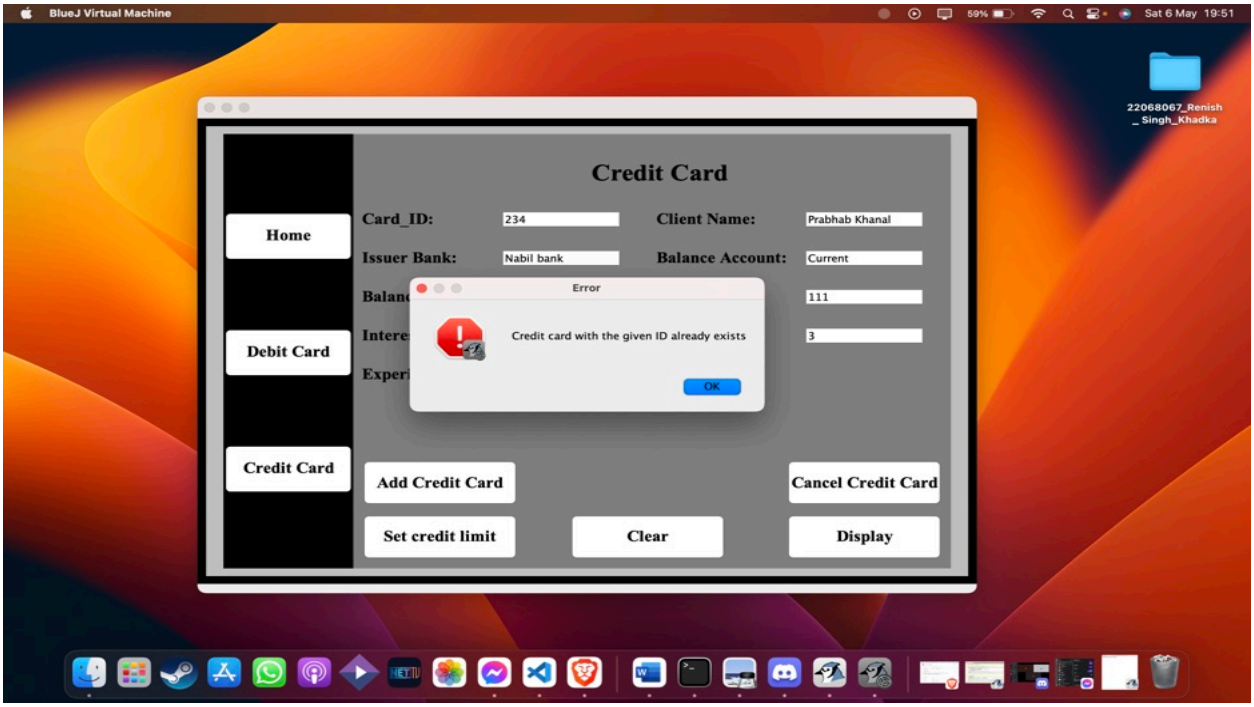


**Figure 29: Pop up error message after entering duplicate ID.**

### 5.3.1 Test 3.1: Credit Card not Found

| Test No: | 2.3 |
|---|---|
| Objective | Credit Card not found |
| Action | - Fill the text fields of credit card<br>Card ID:234<br>Client Name:Prabhab Khanal<br>Issuer Bank: Nabil bank<br>Balance Account:Current<br>Balance Amount: 5000<br>CVC Number:111<br>Interest Rate:8<br>Grace Period: 3<br>Expire date: 23/jan/2023<br>- Fill the text fields of Cancel Card<br>Card_ID:23<br>- Click on Cancel Card |
| Expected result: | Message Dialog Box would appear “No credit card to cancel” |
| Actual Result | Message Dialog Box would appear “No credit card to cancel” |
| Conclusion | The test was successful. |

**Table 7: Credit Card not found.**

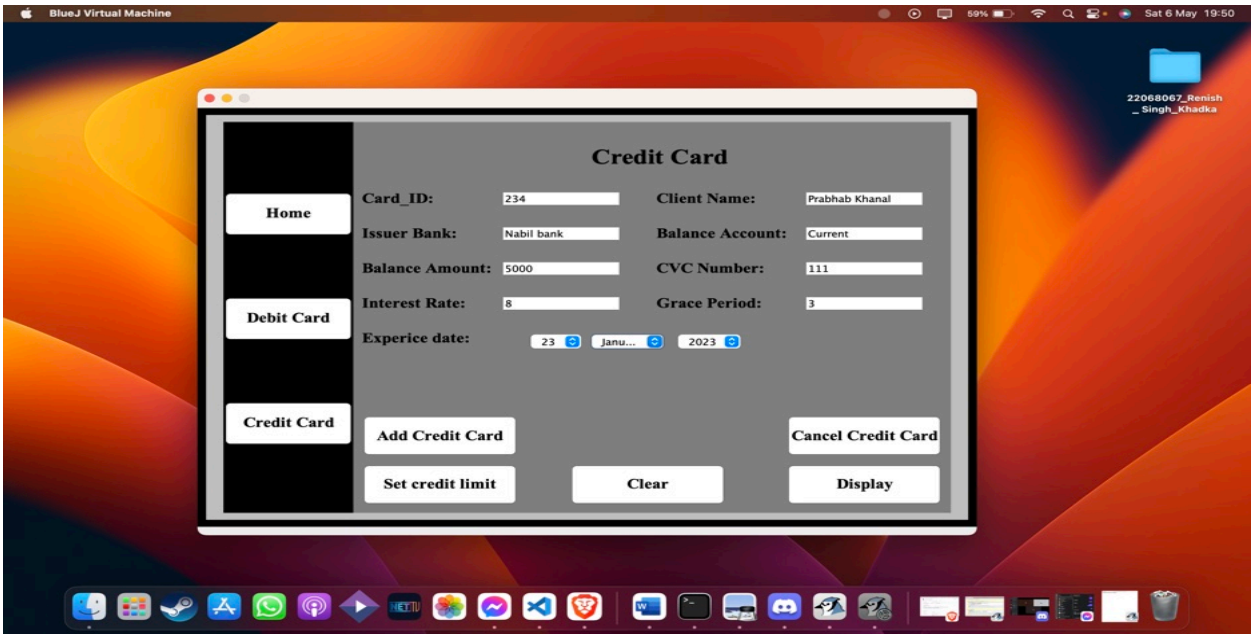


**Figure 30: Adding details in Credit Card.**

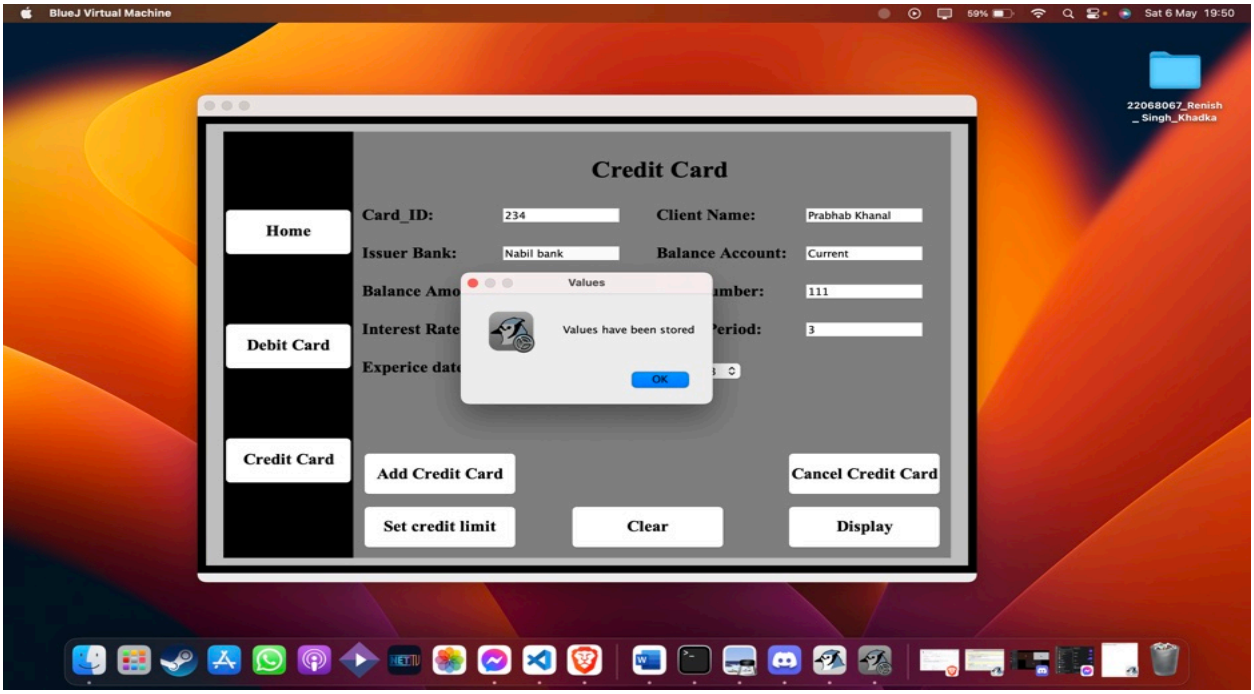


**Figure 31: Pop up message added to array list.**

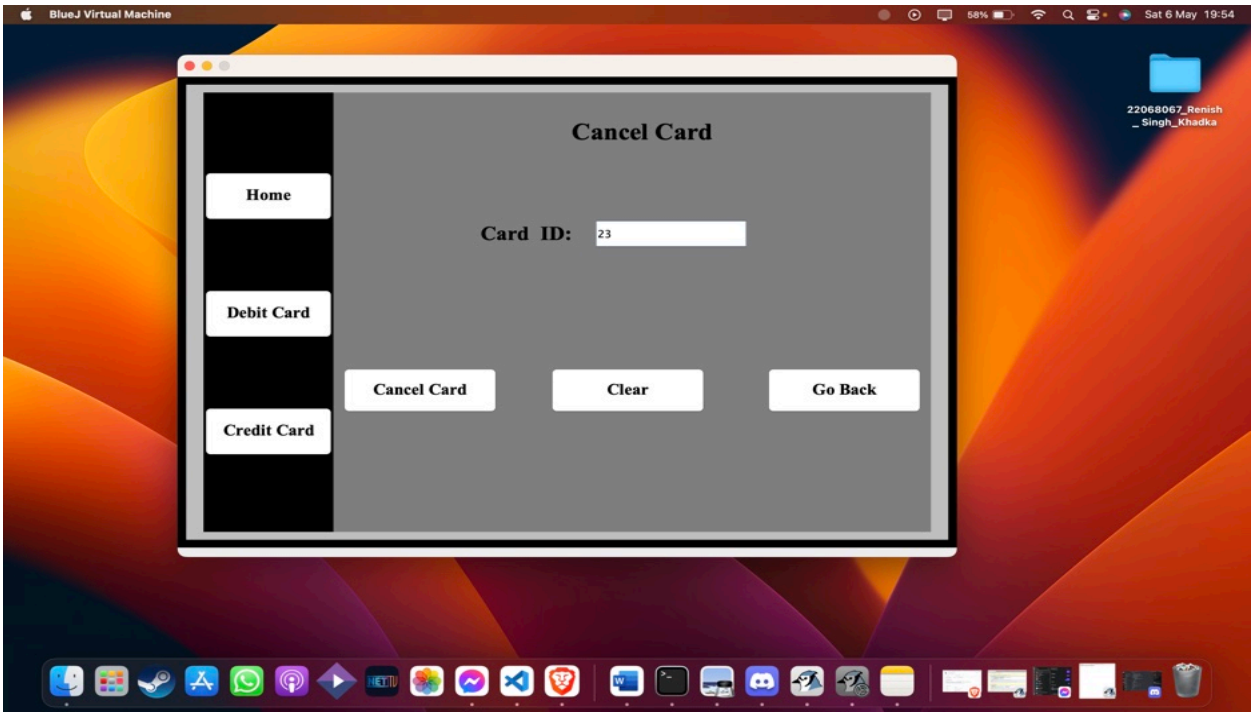


**Figure 32: Adding id in cancel credit card.**

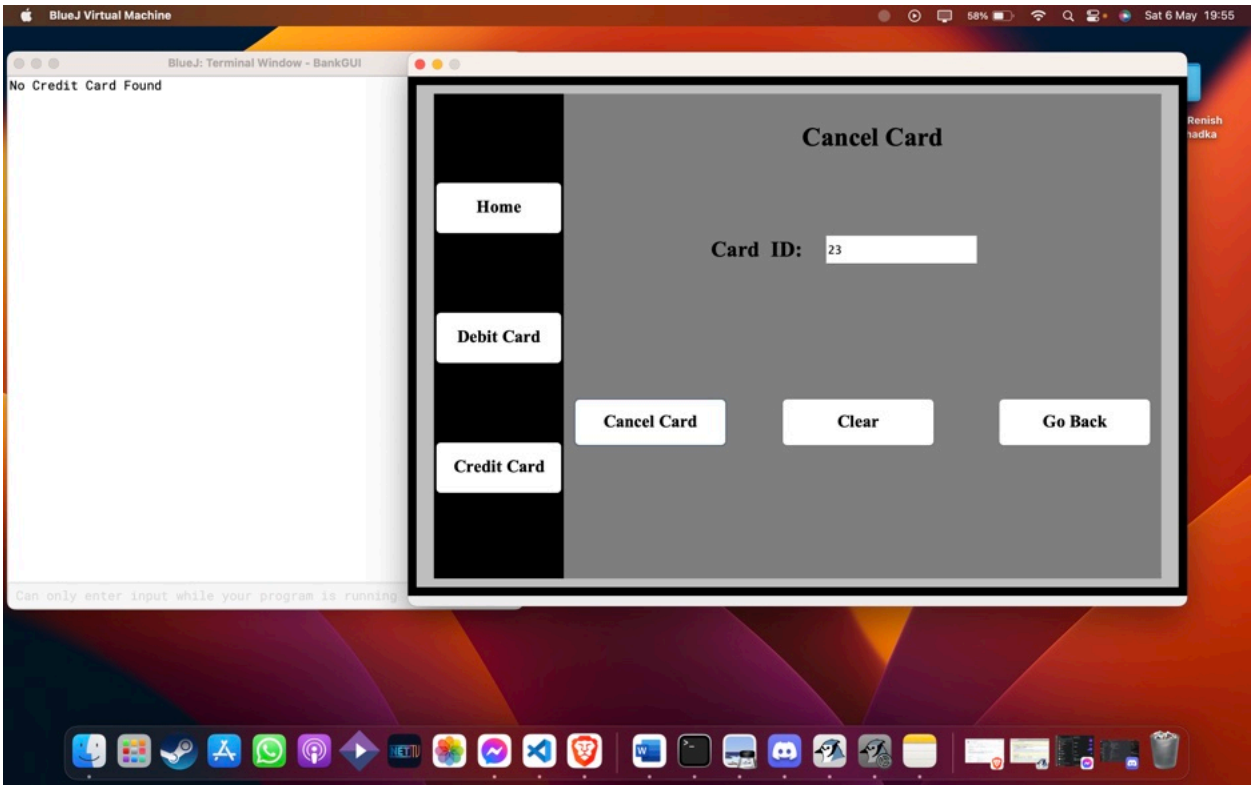


**Figure 33: Displayed message Credit card not found.**

### 5.3.2 Test3.2: Adding wrong values in Debit Card

| | |
|---|---|
| Test No: | 2 |
| Objective | Adding wrong values in Debit Card |
| Action | - Fill the text fields of DebitCard<br>Card ID:12<br>Client Name:Renish Khadka<br>Issuer Bank: Kumari Bank<br>Balance Account: Current<br>Balance Amount: one lakh<br>Pin:twenty<br><br>- Click on Add to Debit Card button |
| Expected result: | Message Dialog Box would appear"<br>Please Input appropratie value" |
| Actual Result | Message Dialog Box would appear"<br>Please Input appropratie value" |
| Conclusion | The test was successful. |

**Table 8: Adding Wrong values in Debit Card.**

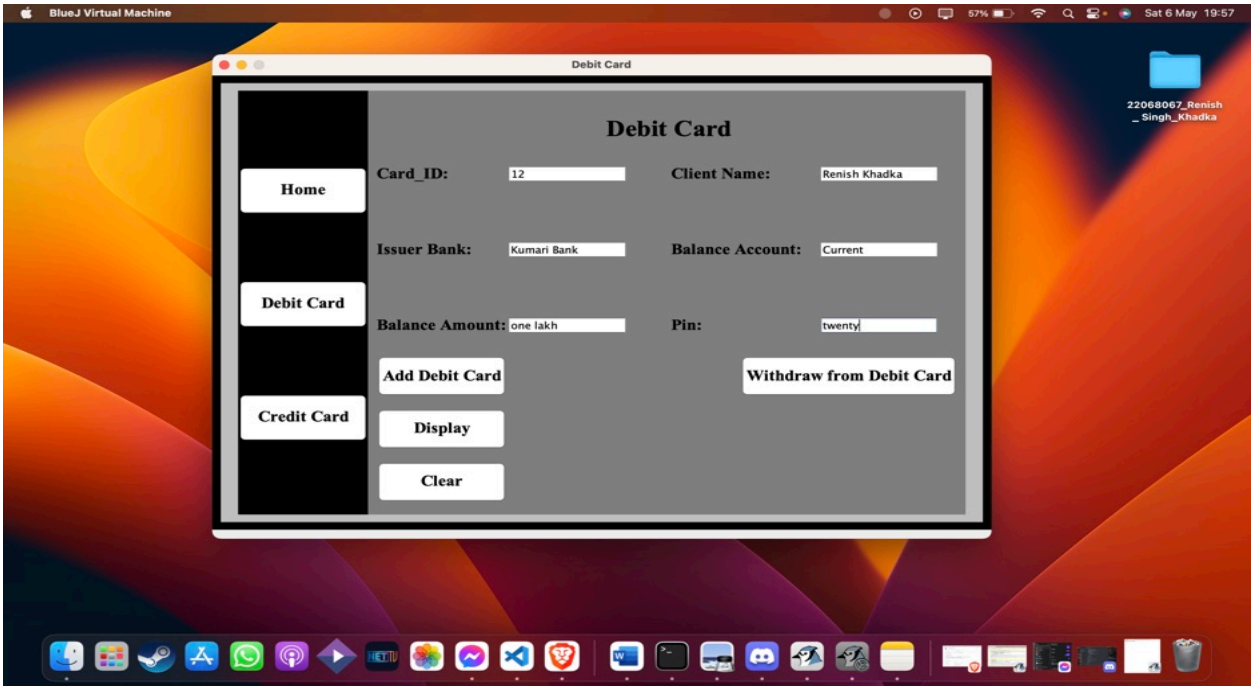


**Figure 34: Adding wrong values in Debit Card.**

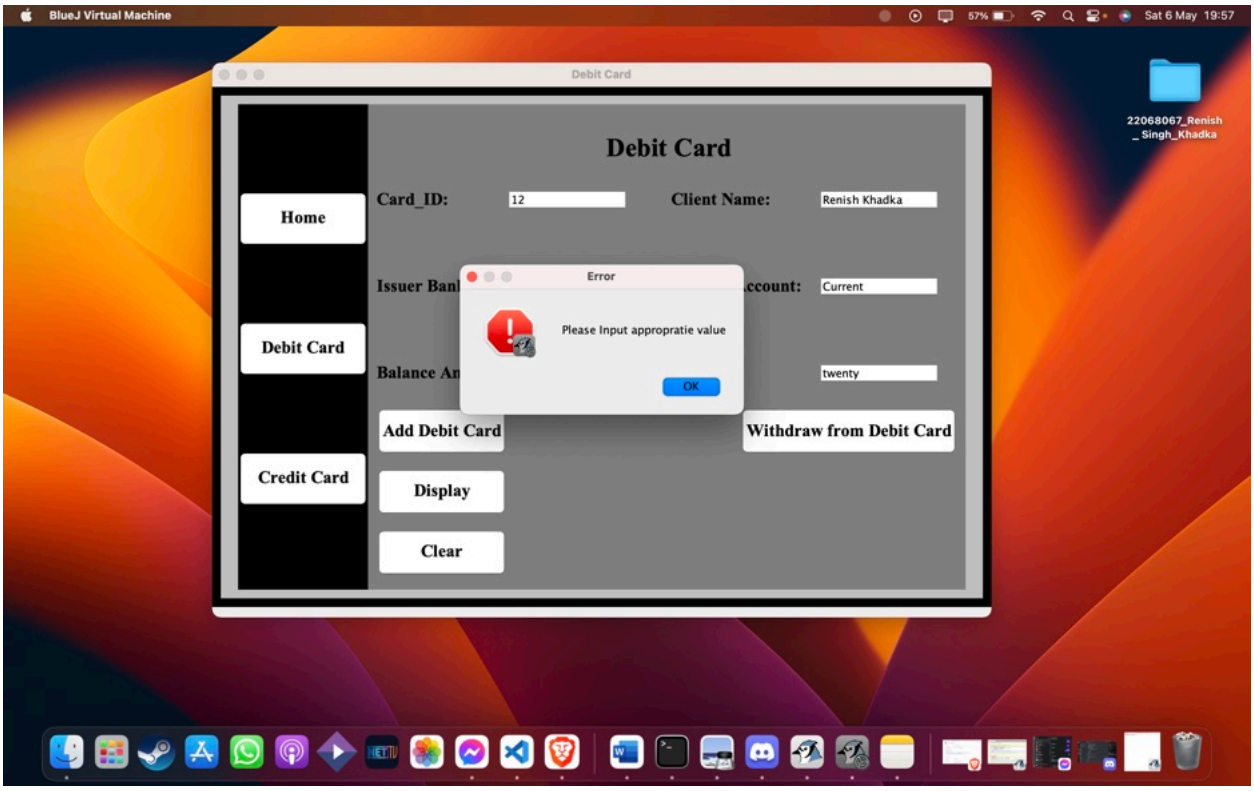


**Figure 35: Pop up Error message.**

### 5.3.3Test3.3: Adding wrong values in Credit Card

| | |
|---|---|
| Test No: | 2 |
| Objective | Adding wrong values in Credit Card |
| Action | - Fill the text fields of CreditCard<br>-<br>Card ID:234<br>Client Name: 12321d<br>Issuer Bank: Nabil<br>Balance Account:Current<br>Balance Amount: five hundred<br>CVC Number:111<br>Interest Rate:8<br>Grace Period: three<br>Expire date: 23/jan/2023<br><br>- Click on Add to Debit Card button |
| Expected result: | Message Dialog Box would appear”Invalid Input” |
| Actual Result | Message Dialog Box would appear”Invalid Input” |
| Conclusion | The test was successful. |

**Table 9: Adding wrong values in Credit Card.**

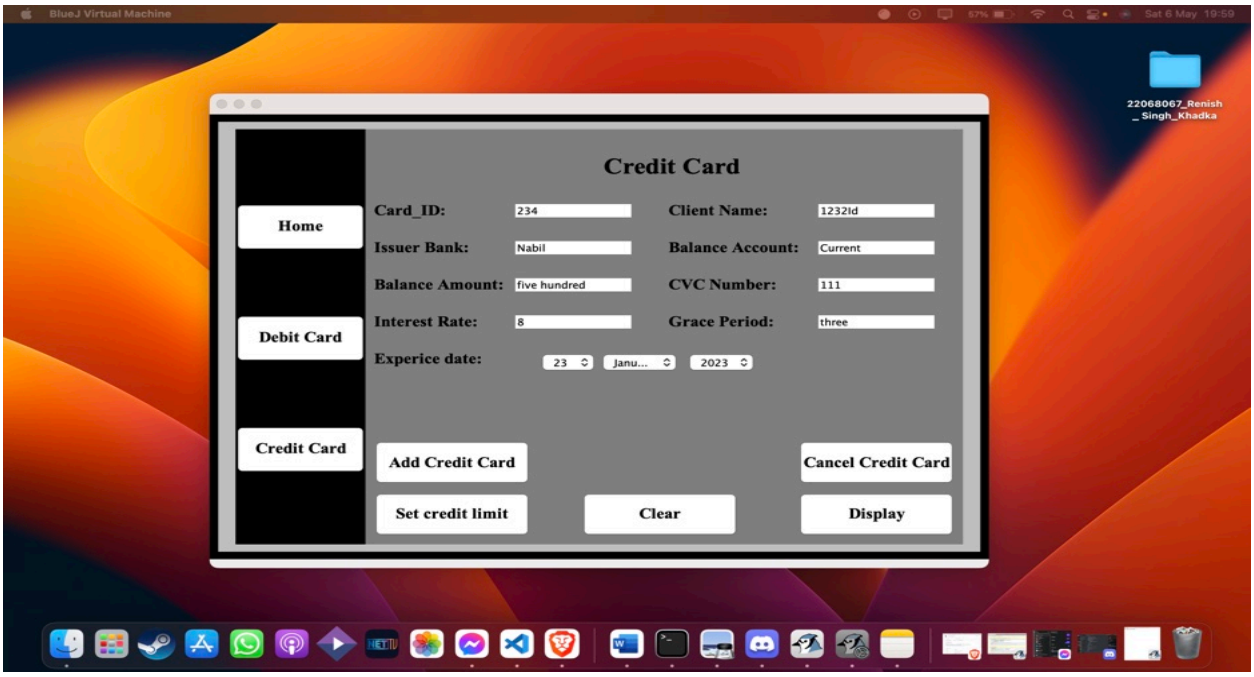


**Figure 36: Adding wrong values in Credit Card.**

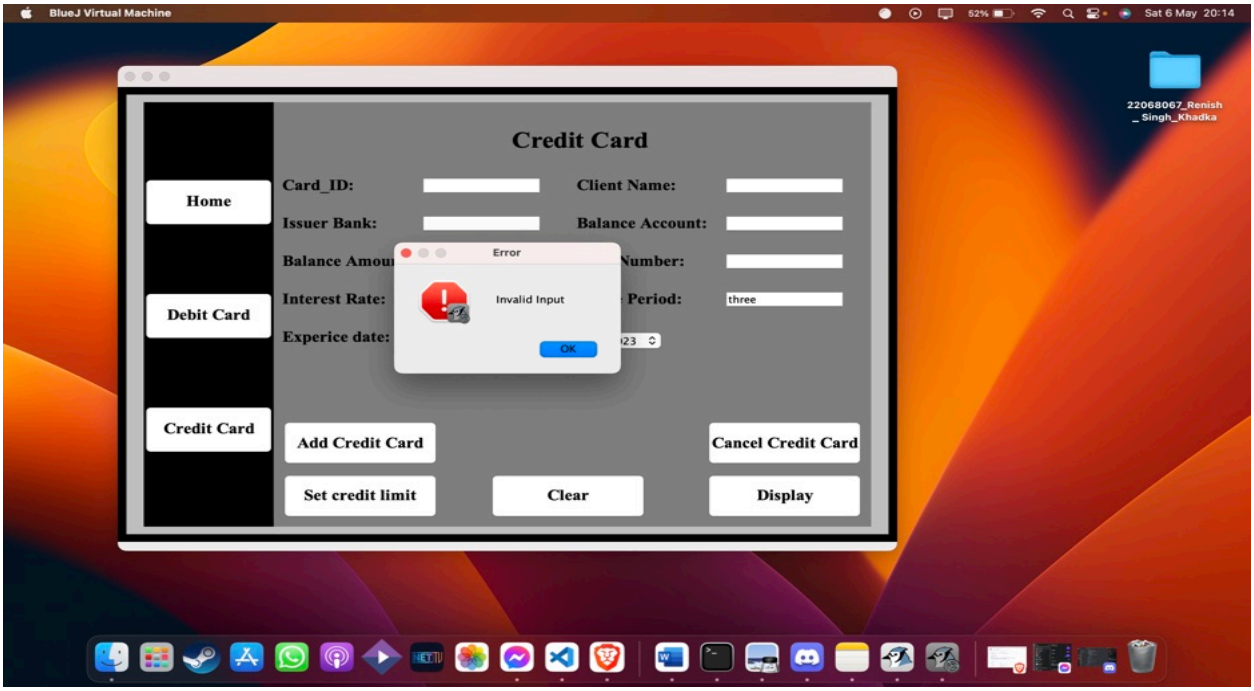


**Figure 37: Pop up error message.**

### 5.3.4 Test3.4: Adding Empty values in Debit Card and Credit Card

| Test No: | 2 |
|---|---|
| Objective | Adding Empty values in Debit Card and Credit Card |
| Action | - Fill the text fields of DebitCard<br>Card ID:<br>Client Name:<br>Issuer Bank:<br>Balance Account:<br>Balance Amount:<br>Pin:<br><br>- Click on Add to Debit Card button<br>- Fill the text fields of CreditCard<br><br>Card ID:<br>Client Name:<br>Issuer Bank:<br>Balance Account:<br>Balance Amount:<br>CVC Number:<br>Interest Rate:<br>Grace Period:<br>Expire date:<br>- Click on Add to Credit Card |
| Expected result: | Message Dialog Box would appear" Enter values!!!!!" |
| Actual Result | Message Dialog Box would appear" Enter values!!!!!" |
| Conclusion | The test was successful. |

**Table 10: Adding empty values in Debit Card and Credit Card.**

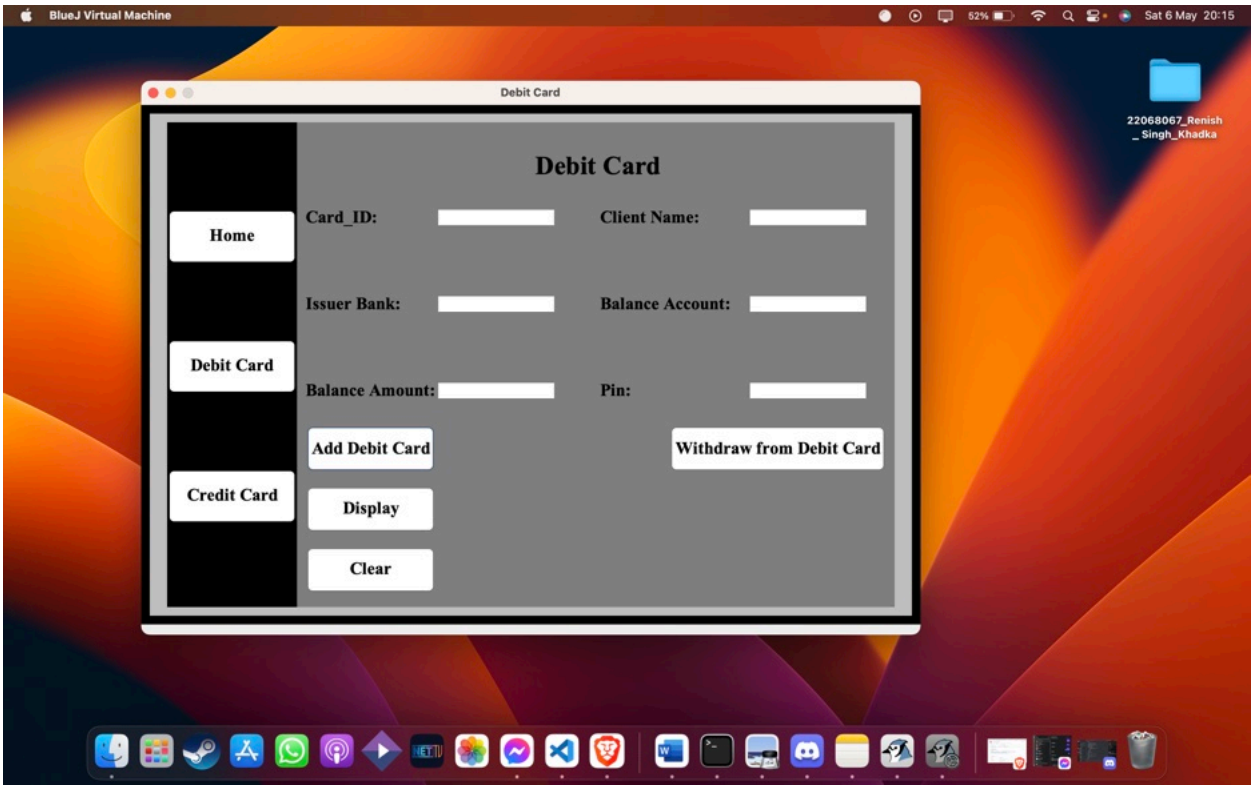


**Figure 38: Adding Empty value in Debit card.**

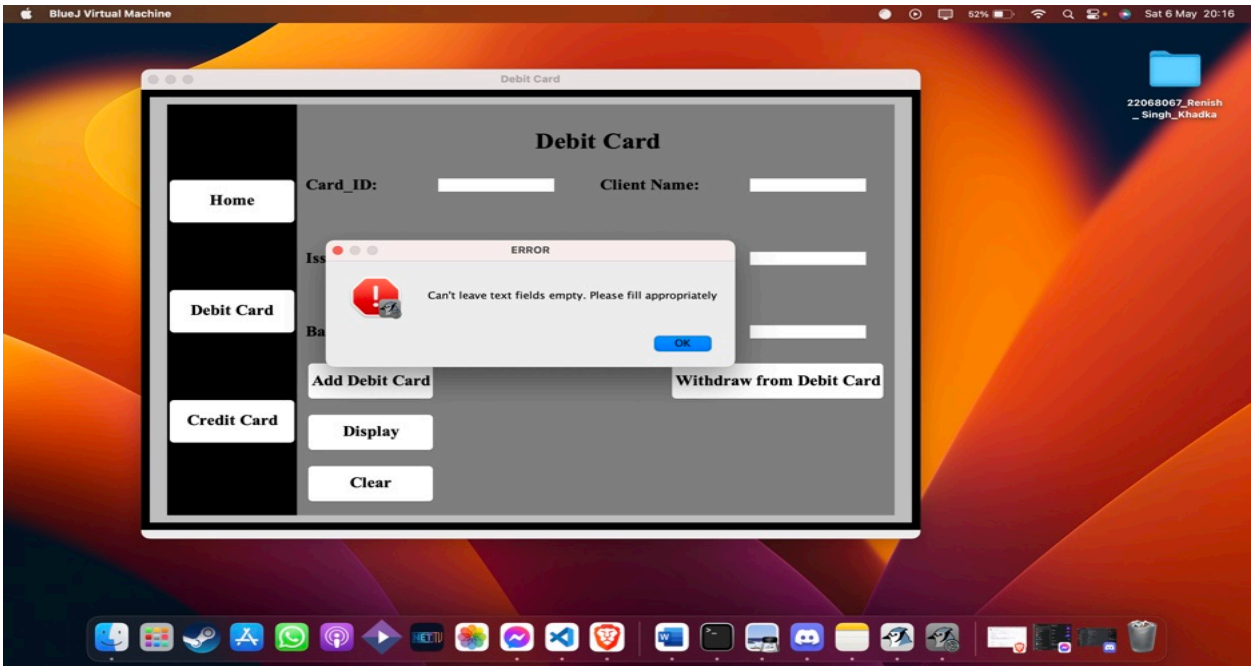


**Figure 39: Pop up error message.**

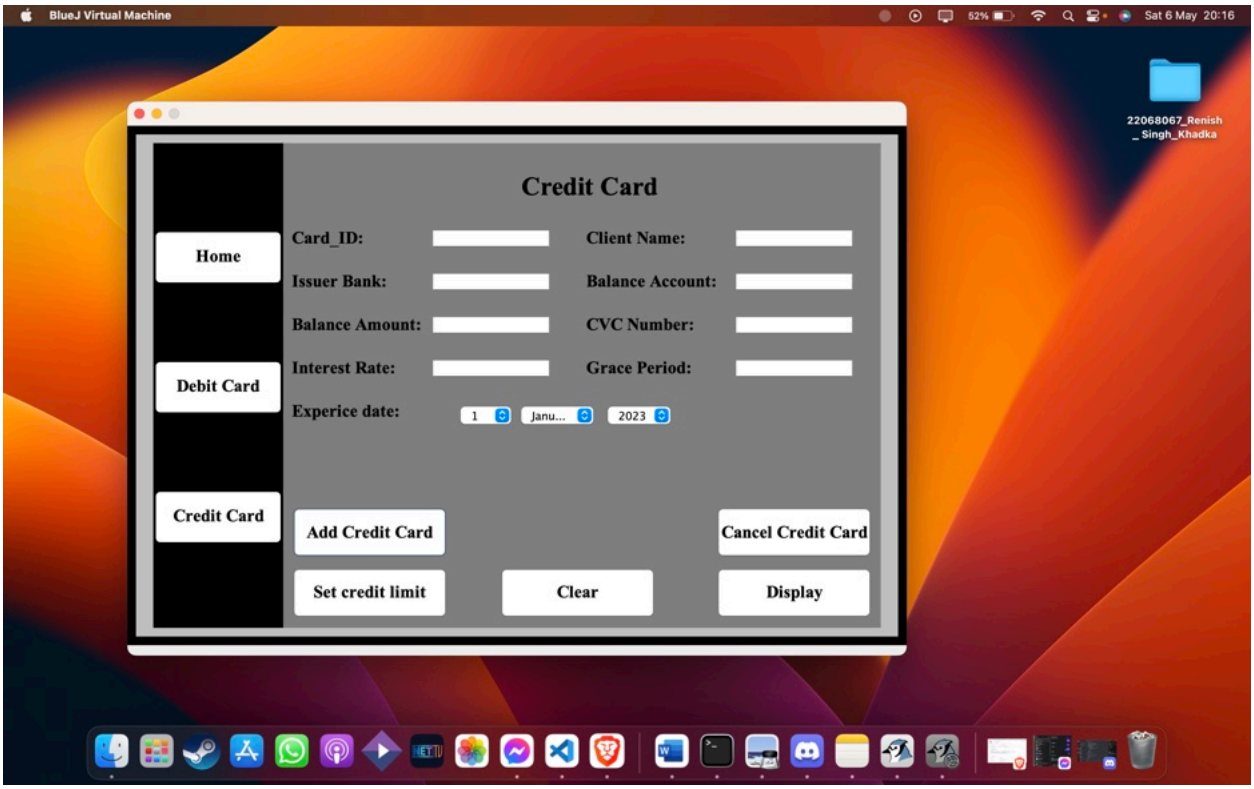


**Figure 40: Adding empty values in Credit Card.**

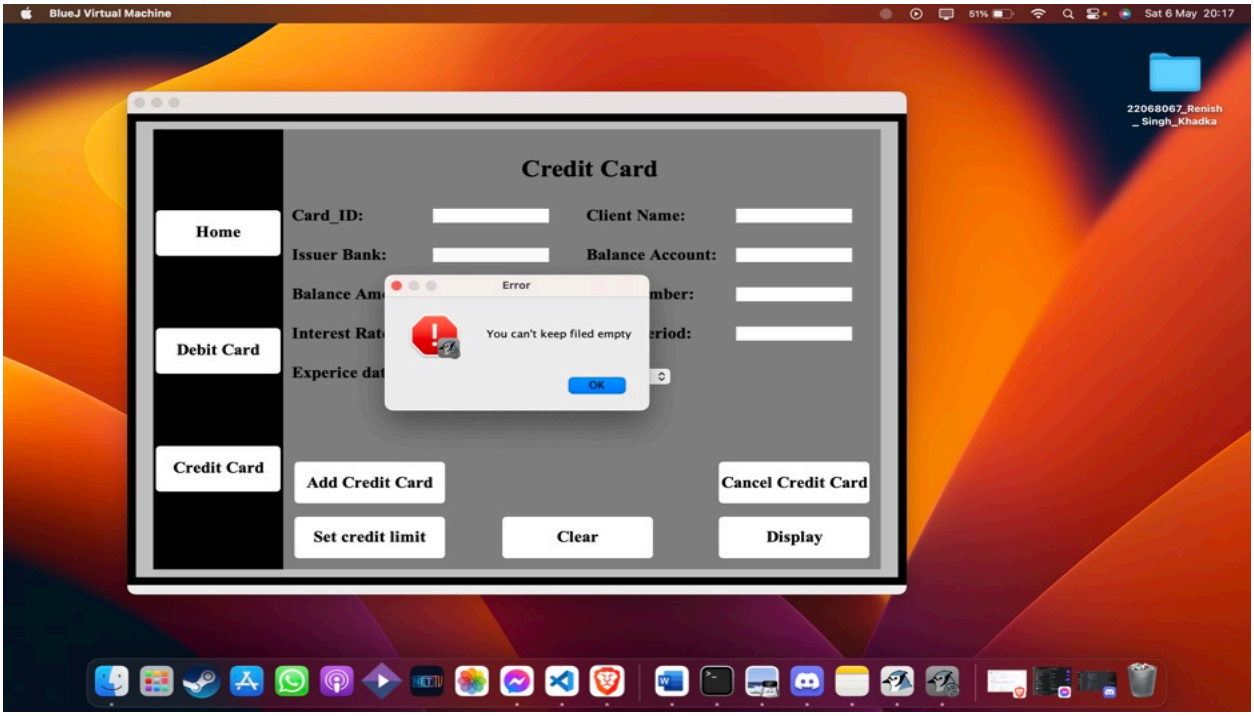


**Figure 41: Pop up error message.**

### 5.3.5 Test3.5: Pressing buttons without adding any values

| | |
|---|---|
| Test No: | 2 |
| Objective | Pressing buttons without adding any values |
| Action | - Click On Display button<br>- Click on Cancel Credit Card<br>- Click on set Limit |
| Expected result: | Message Dialog Box would appear" Required Filed Must be filled","No card to cancel" |
| Actual Result | Message Dialog Box would appear" Required Filed Must be filled","No card to cancel" |
| Conclusion | The test was successful. |

**Table 11 Pressing buttons without adding any values.**

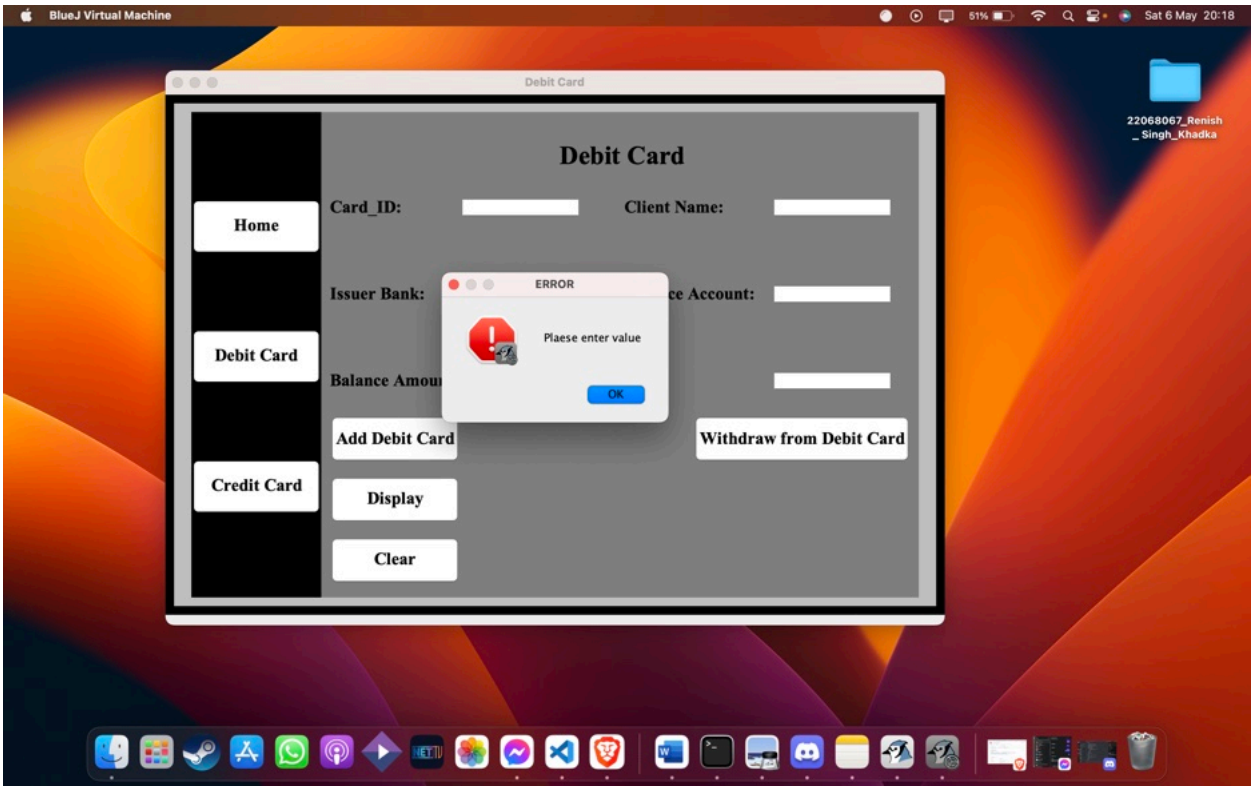


**Figure 42: Pressing Display button without adding values.**

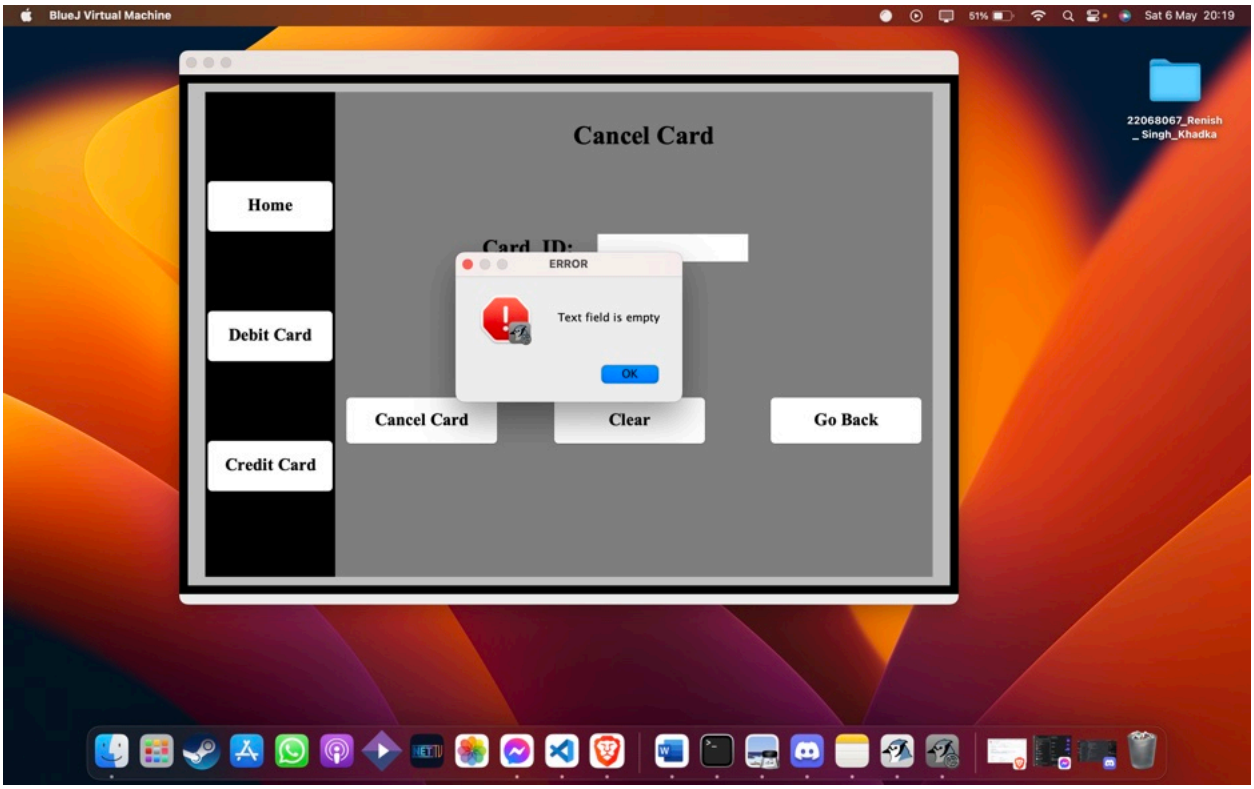


**Figure 43: Pop up error message.**

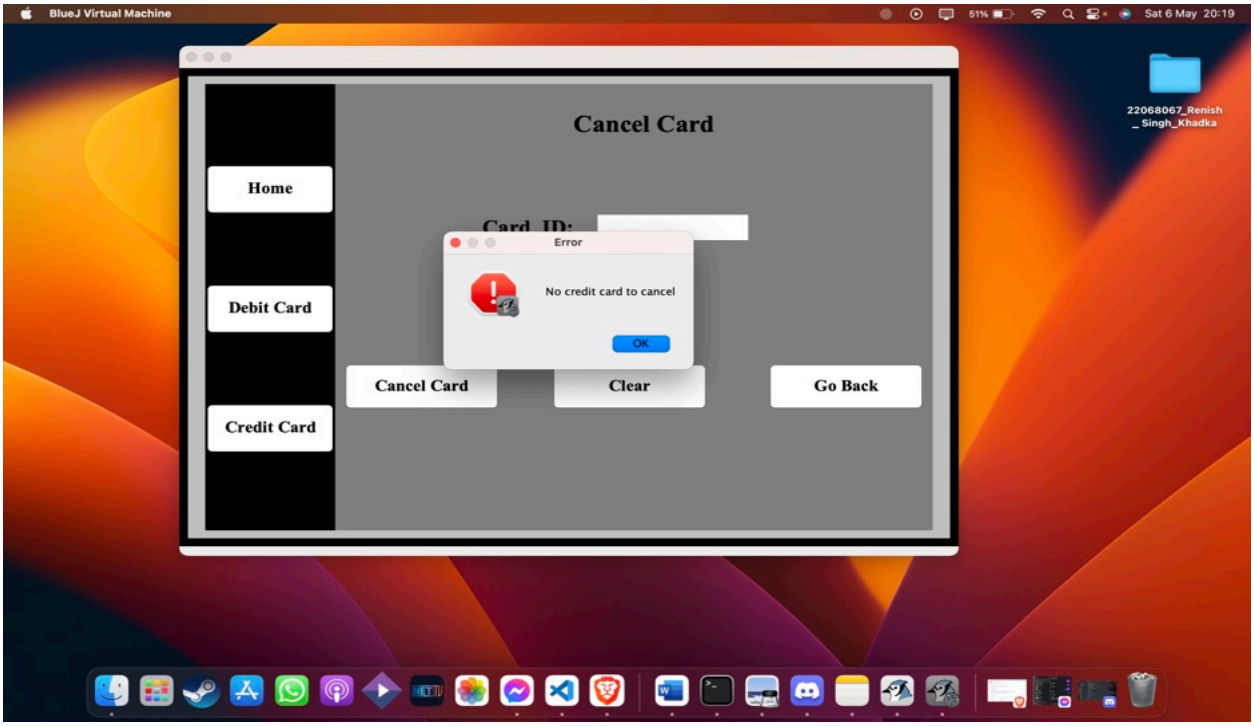


**Figure 44: Pop up error message when clicking cancercard button.**

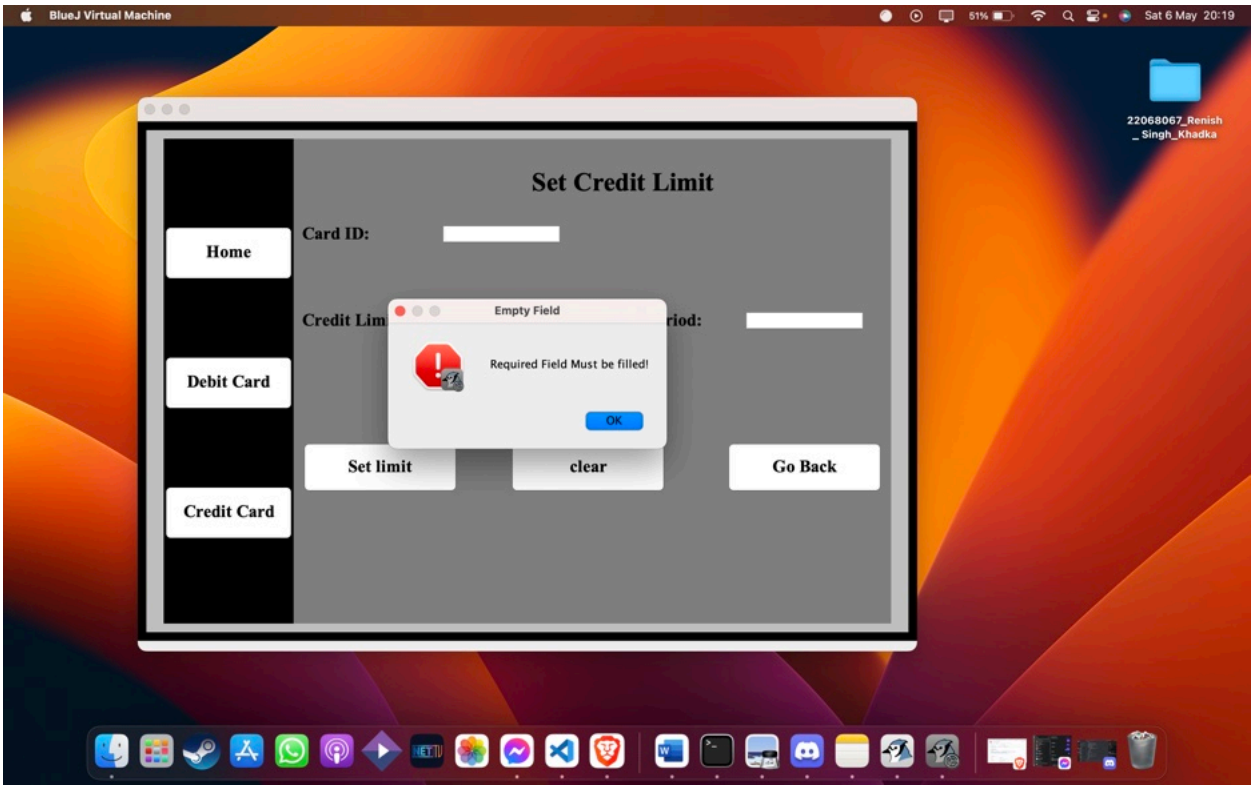


**Figure 45: Pop up error message  when clicking set limit without adding values.**

## 6.ERROR DETECTION AND CORRECTION

### 6.1 SYNTAX ERROR AND CORRECTION

Syntax errors occur when a Java program encounters syntax problems due to improper use of Java syntax. For example, missing semicolons, missing parentheses, misspelledkeywords, using an undeclared variable, misnamed variable, function or class, class not found, missing double quotes in strings, etc. When the Java compiler detects syntax errors in a program, it prevents it that the code will compile correctly and will not create a .class file until the bugs are fixed. Error appears on the output screen. (Luthra, 2023)

**ERROR**: In the above code semicolon is missing at the end of the String yrs statement.

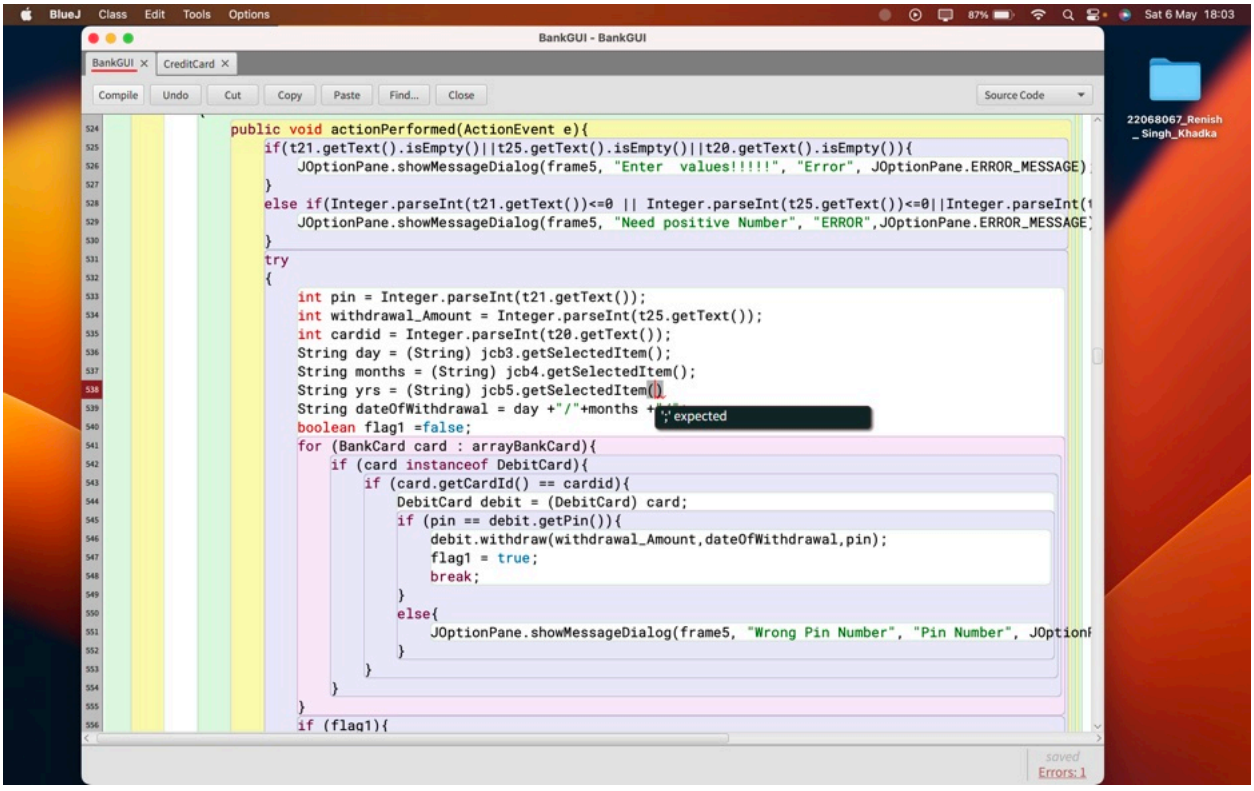


**Figure 46: Syntax Error.**

**CORRECTION**: The error was fixed by closing the semicolon at the end of the String yrs statement.

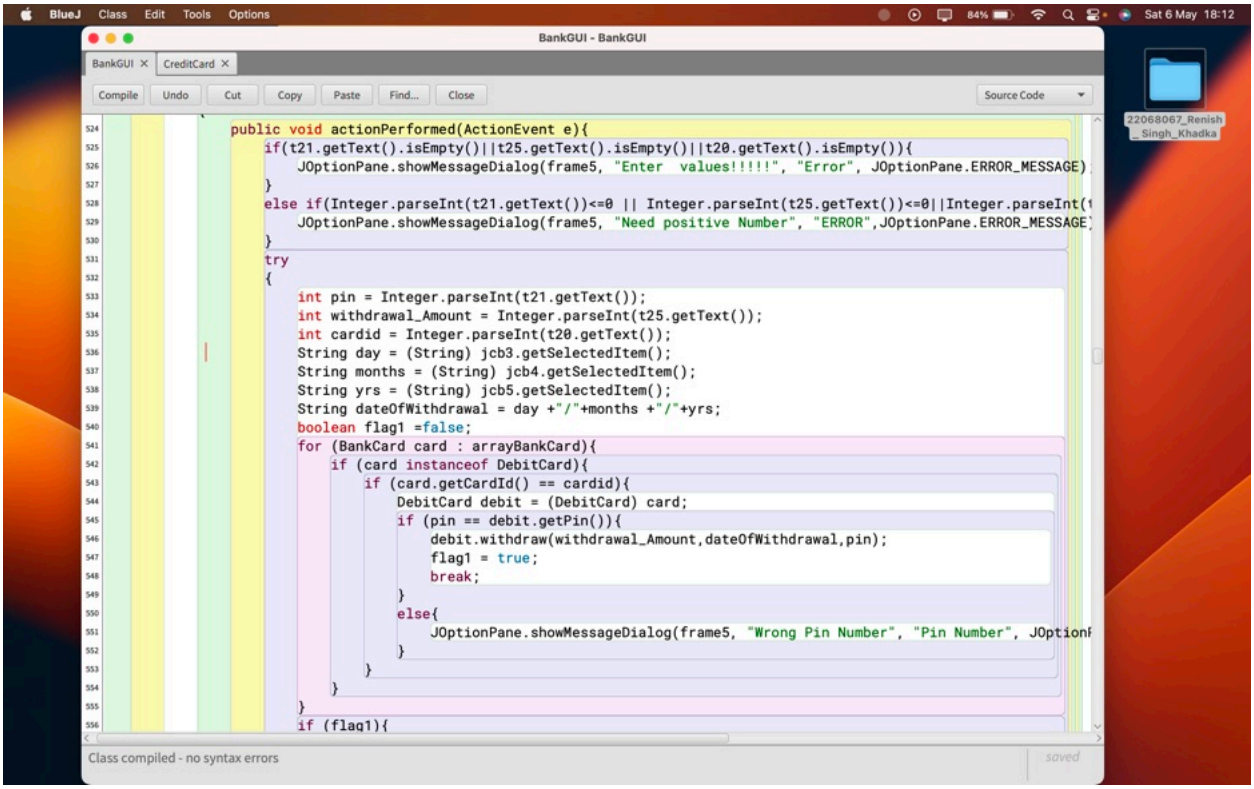


**Figure 47: Correction of Syntax error.**

## 6.2 LOGICAL ERROR AND CORRECTION

A logical error is an error in a program's source code that causes unexpected and incorrect behavior. A logical error is classified as a type of run-time error that can cause a program to produce erroneous output. This can also cause the program to crash during execution.

Logical errors are not always immediately recognizable. This is because, unlike syntax errors, these errors are valid when accounted for in the language, but they do not cause expected behavior.They can occur in both interpreted and compiled languages. A logical fallacy is also referred to as a logical fallacy. (Rouse, 2023). (programiz, 2023)

**ERROR**: There is logic error in the below code Boolean value of cardExists is true and after that set the Boolean value false in if condition cause of this logical error we can't add the value of credit card in array list.

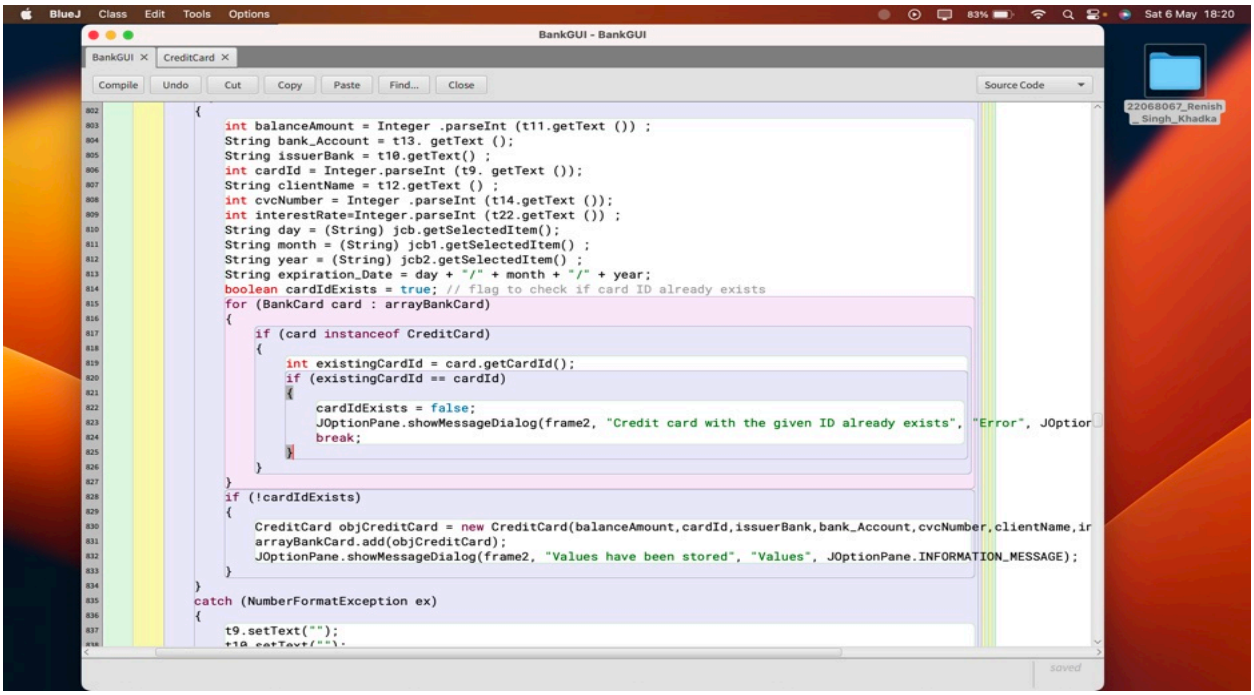


**Figure 48: Logical error.**

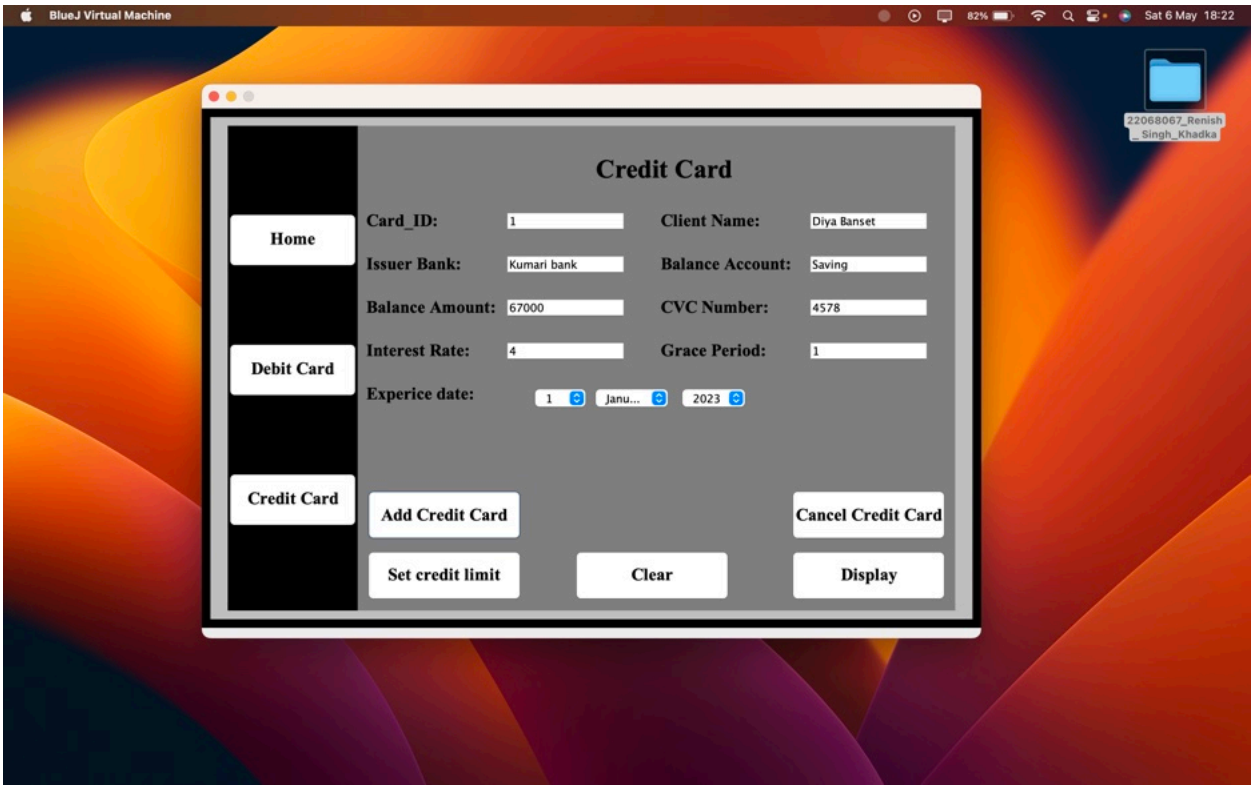


**Figure 49: Logical Error Add to Credit card button not working.**

**CORRECTION**: This error is fixed by changing the Boolean value of card Exists and then after.
we can add the value of credit card in array list.

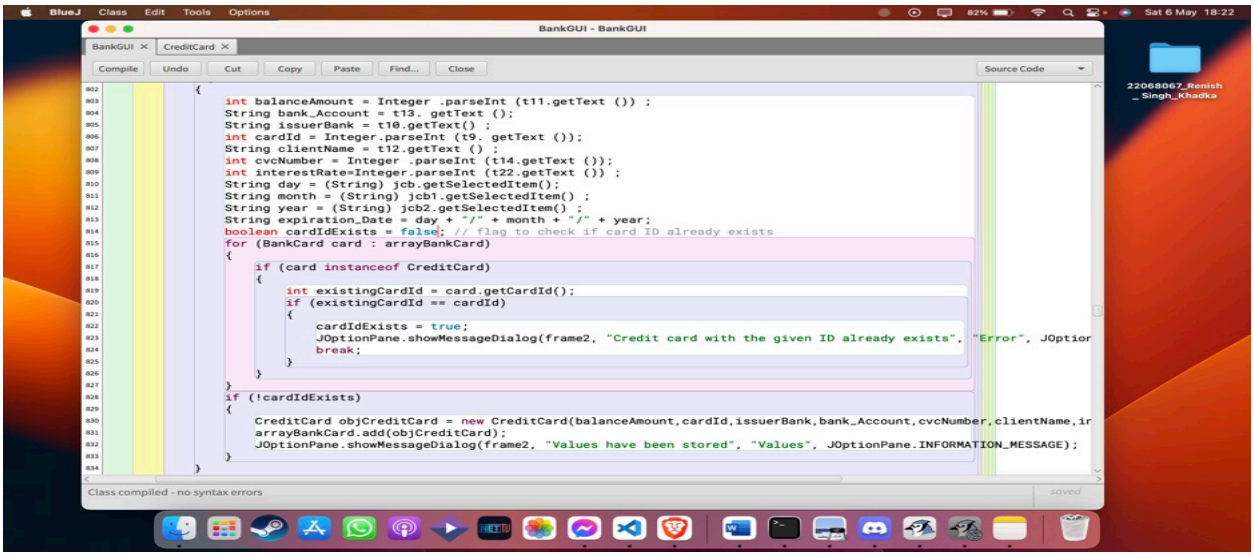


**Figure 50: Correction of Logical error.**

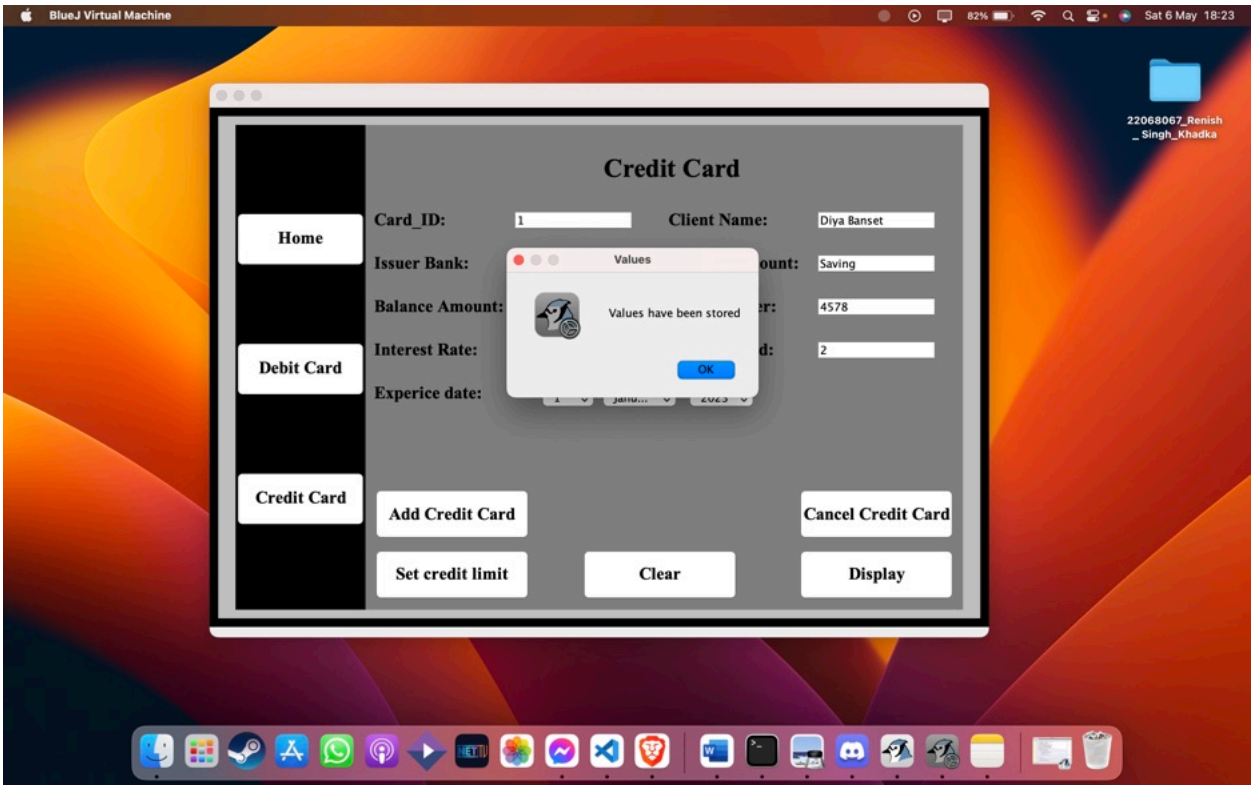


**Figure 51: Correction of logical error and Credit card button is working.**

## 6.3 SEMANTIC ERROR AND CORRECTION

### 6.3.1 Incompatible types: int cannot be converted to java.lang.String

Sometimes when converting values we get "cannot convert incompatible Java.lang.string types to int". A string is a collection of character strings consisting of a quoted string literal. An integer is a data type that contains a number.java.lang.String objects are immutable and generally represent character strings.Since we know that in some scenarios we convert strings to int, errors can occur in this case, so here we show the errors that can occur when converting string to int. (Know Program, 2023) (java, 2023)

**ERROR**: The error incompatible types: String cannot be converted to int was seen. The error was called due to change of int and String in constructor

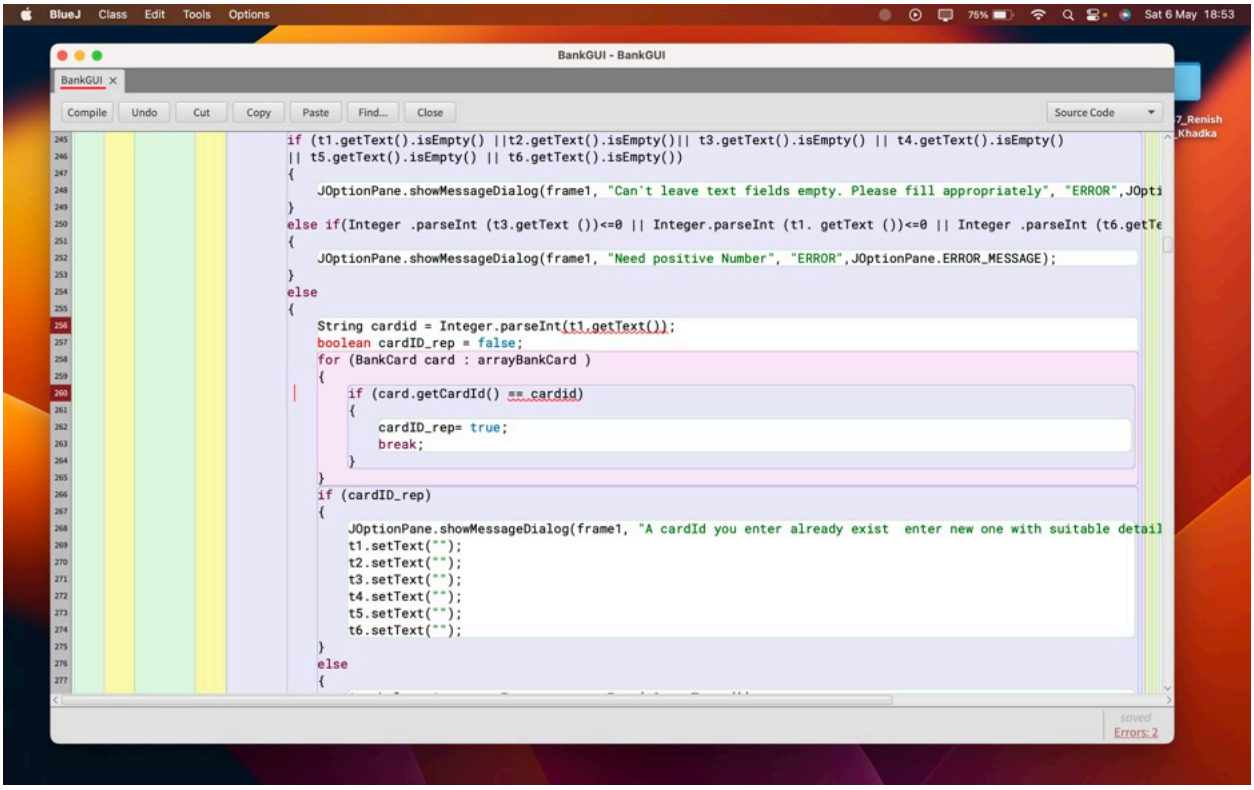


**Figure 52: Semantic error.**

**CORRECTION:** The error was solved by changing the datatype of variable String into int.

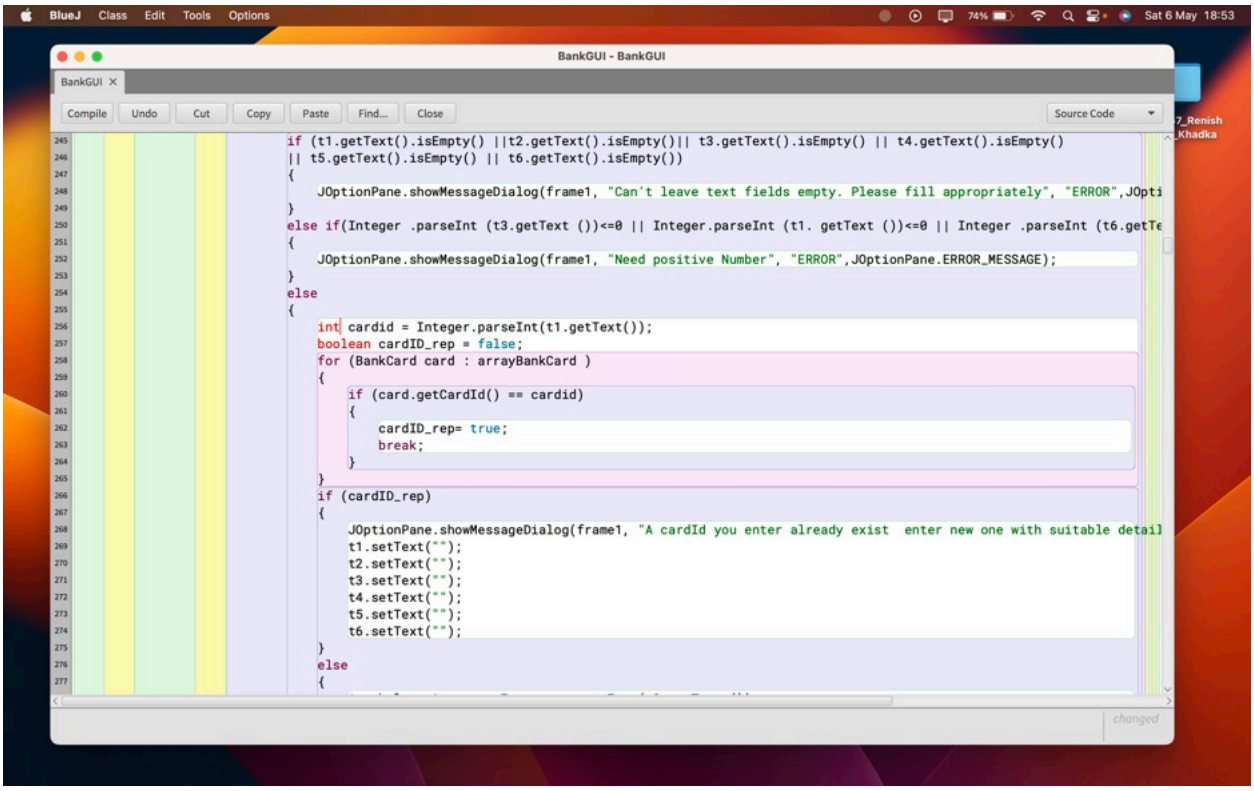


**Figure 53: Correction of Semantic error.**

## 7.Conclusion

As we all know Java has been one of the hardest programming languages to learn. Many obstacles were seen while learning Java Programming. And when I saw the notification of assignment of Programming module, I was shocked and don't know about how to start the coursework. At first it was hard for me to understand java as I have never learned any programming language. But slowly I learned the method, attributes and classes in java later it became more understanding ad clear about how it works. After some days I have started writing code and I took lots of help from senior friends and mates. I have enhanced my skills to intermediate level in Java with help of resources provided by the college, books, blogs and different website.

To sum up, the main objective of this assignment was to enhance the project developed in the first part of the coursework by adding a new class that creates a graphical user interface (GUI) for managing bank card details stored in an ArrayList. The newly created class contains the main method and can be tested using the command prompt.

The program is designed to provide an intuitive and user-friendly interface for users to add, modify, and delete bank card details. Additionally, it facilitates efficient management of all bank cards, offering a search function that enables users to filter bank card information based on different criteria such as cardholder name, card number, and expiration date.

The project helped us improve our programming skills in Java and GUI development, as well as our understanding of data structures such as ArrayLists. The use of appropriate design patterns helped us to create a reliable and efficient system that is both easy to use and functional.

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# 9. Appendix

## 9.1 BankGUI

```
import javax.swing.*;
import java.awt.*;
import javax.swing.JTextField;
import java.awt.event.ActionListener;
import java.awt.event.ActionEvent;
import java.util.ArrayList;

public class BankGUI
{
   //Com for main gui
   JPanel
panel1,panel2,panel3,mainPanel,mainPanel1,mainPanel2,mainPanel3,mainPanel4,mai
nPanel5;
   JFrame frame;
   JButton b1,b2,b3;
   JLabel j1,j2;
   ImageIcon imageIcon;

   //com for debit card
   JFrame frame1;
   JPanel panel4,panel5,panel6;
   JButton b4,b5,b6,b7,b8,b9,b10;
   JLabel j3,j4,j5,j6,j7,j8,j9;
   JTextField t1, t2, t3, t4, t5, t6, t7 ,t8;

   //com for credit card
   JFrame frame2;
   JPanel panel7,panel8,panel9;
   JButton b11,b12,b13,b14,b15,b16,b17,b18;
```

```
JLabel j10, j11, j12, j13, j14, j15, j16,j21,j31,j33;
JTextField t9, t10, t11, t12, t13, t14,t22,t24;
JComboBox <String> jcb, jcb1,jcb2;

//com for set limit
JFrame frame3;
JPanel panel10,panel11,panel12;
JButton b19,b20,b21,b22,b23,b24;
JLabel j17,j18,j19,j20,j22,j23,j35;
JTextField t15,t16,t17,t18,t26;

//com for cancelcredit card
JFrame frame4;
JPanel panel13,panel14,panel15;
JButton b25,b26,b27,b28,b29,b30;
JLabel j24 ,j25, j26;
JTextField t19;

//com for withdraw card
JFrame frame5;
JPanel panel16,panel17,panel18;
JButton b31,b32,b33,b34,b35,b36;
JLabel j27,j28,j29,j30,j34;
JTextField t20,t21,t25;
JComboBox <String> jcb3, jcb4,jcb5;

//arraylist for adding object in arraylist
ArrayList<BankCard> arrayBankCard = new ArrayList<BankCard>();

// making constructor to run the home page
public BankGUI () {
```

```
        // initialize frame
        frame = new JFrame("BankGUI");
        frame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
        frame.setSize(900, 640);
        frame.setLayout(null);
        //adding panel into panel to show different color format
        mainPanel = new JPanel();
        mainPanel.setBounds(0, 0, 900, 600);
        mainPanel.setBackground(Color.black);
        mainPanel.setLayout(null);

        panel1 = new JPanel();
        panel1.setBackground(Color.lightGray);
        panel1.setBounds(10, 10, 880, 580);
        panel1.setLayout(null);

        panel2 = new JPanel();
        panel2.setBackground(Color.gray);
        panel2.setBounds(20, 10, 840, 560);
        panel2.setLayout(null);

        panel3 = new JPanel();
        panel3.setBackground(Color.black);
        panel3.setBounds(0, 0, 150, 560);
        panel3.setLayout(null);

        // adding image to make GUI better
        imageIcon = new
ImageIcon("/Users/renishkhadka/Documents/Programming/GUI/GUI/2.png");
        JLabel imageLabel = new JLabel(imageIcon);
        imageLabel.setBounds(50,38, 850, 450);
```

```
        //adding components like Jtextfiled,Jcombobox, Jbuttons,Jlabel
        j1 = new JLabel("Welcome to the future of banking!");
        j1.setBounds(250,0,900,100);
        j1.setFont(new Font("Serif", Font.BOLD, 30));

        j2= new JLabel("Our app makes managing your money easier and more
securethan ever before.");
        j2.setBounds(154,450,900,100);
        j2.setFont(new Font("Serif", Font.BOLD, 20));

        //used of action listener to preform task to their respectful buttons
        b1 = new JButton("Home");
        b1.setBounds(0,100,150,65);
        b1.setForeground(Color.black);
        b1.setFont(new Font("Serif", Font.BOLD, 20));
        b1.addActionListener(new ActionListener()
        {
            public void actionPerformed(ActionEvent e)
            {
                new BankGUI();
                frame.dispose();
            }

          });

        b2 = new JButton("Debit Card");
        b2.setBounds(0,250,150,65);
        b2.setFont(new Font("Serif", Font.BOLD, 20));
        b2.addActionListener(new ActionListener()
        {
```

```
        public void actionPerformed(ActionEvent e)
        {
            DebitCard();
            frame.dispose();
        }

    });

b3 = new JButton("Credit Card");
b3.setBounds(0,400,150,65);
b3.setFont(new Font("Serif", Font.BOLD, 20));

b3.addActionListener(new ActionListener()
{
        public void actionPerformed(ActionEvent e)
        {
            CreditCard();
            frame.dispose();
        }
    });

//adding components into panel
panel1.add(panel2);
panel2.add(panel3);
panel2.add(j1);
panel2.add(j2);
panel2.add(imageLabel);
panel3.add(b1);
panel3.add(b2);
panel3.add(b3);
mainPanel.add(panel1);
```

```
        frame.add(mainPanel);
        frame.setVisible(true);
        frame.setResizable(false);

    }
    //creating method to open another GUI
    public void DebitCard(){
        // initialize frame
        frame1 =new JFrame("Debit Card");
        frame1.setSize(900, 640);
        frame1.setLayout(null);
        //adding panels into panel to show diiferent colors
        mainPanel1 = new JPanel();
        mainPanel1.setBounds(0, 0, 900, 600);
        mainPanel1.setBackground(Color.black);
        mainPanel1.setLayout(null);

        panel4 = new JPanel();
        panel4.setBackground(Color.lightGray);
        panel4.setBounds(10, 10, 880, 580);
        panel4.setLayout(null);

        panel5 = new JPanel();
        panel5.setBackground(Color.gray);
        panel5.setBounds(20, 10, 840, 560);
        panel5.setLayout(null);

        panel6 = new JPanel();
        panel6.setBackground(Color.black);
        panel6.setBounds(0, 0, 150, 560);
        panel6.setLayout(null);
```

```
//adding components like Jtextfiled,Jcombobox, Jbuttons,Jlabel
j3 = new JLabel("Debit Card");
j3.setBounds(425,0,300,100);
j3.setFont(new Font("Serif", Font.BOLD, 30));

j4=new JLabel("Card_ID:");
j4.setBounds(160,100,120,20);
j4.setFont(new Font("Serif", Font.BOLD, 20));

t1=new JTextField();
t1.setBounds(310,100,140,20);

j5=new JLabel("Issuer Bank:");
j5.setBounds(160,200,120,20);
j5.setFont(new Font("Serif", Font.BOLD, 20));

t2=new JTextField();
t2.setBounds(310,200,140,20);

j6=new JLabel("Balance Amount:");
j6.setBounds(160,300,170,20);
j6.setFont(new Font("Serif", Font.BOLD, 20));

t3=new JTextField();
t3.setBounds(310,300,140,20);

j7=new JLabel("Client Name:");
j7.setBounds(500,100,170,20);
j7.setFont(new Font("Serif", Font.BOLD, 20));
```

```
t4=new JTextField();
t4.setBounds(670,100,140,20);

j8=new JLabel("Balance Account:");
j8.setBounds(500,200,170,20);
j8.setFont(new Font("Serif", Font.BOLD, 20));

t5=new JTextField();
t5.setBounds(670,200,140,20);

j9=new JLabel("Pin:");
j9.setBounds(500,300,170,20);
j9.setFont(new Font("Serif", Font.BOLD, 20));

t6=new JTextField();
t6.setBounds(670,300,140,20);


b7 = new JButton("Add Debit Card");
b7.setBounds(160,350,150,55);
b7.setForeground(Color.black);
b7.setFont(new Font("Serif", Font.BOLD, 20));
//used of action listener to preform task to their respectful buttons
b7.addActionListener(new ActionListener()
{
      public void actionPerformed(ActionEvent e)
      {
         try
         {
               if (t1.getText().isEmpty() ||t2.getText().isEmpty()||
t3.getText().isEmpty() || t4.getText().isEmpty()
```

```
                || t5.getText().isEmpty() || t6.getText().isEmpty())
                {
                    JOptionPane.showMessageDialog(frame1, "Can't leave text fields
empty. Please fill appropriately", "ERROR",JOptionPane.ERROR_MESSAGE);
                }
                else if(Integer .parseInt (t3.getText ())<=0 || Integer.parseInt (t1.
getText ())<=0 || Integer .parseInt (t6.getText ())<=0)
                {
                    JOptionPane.showMessageDialog(frame1, "Need positive
Number", "ERROR",JOptionPane.ERROR_MESSAGE);
                }
                else
                {
                    int cardid = Integer.parseInt(t1.getText());
                    boolean cardID_rep = false;
                    for (BankCard card : arrayBankCard )
                    {
                        if (card.getCardId() == cardid)
                        {
                            cardID_rep= true;
                            break;
                        }
                    }
                    if (cardID_rep)
                    {
                        JOptionPane.showMessageDialog(frame1, "A cardId you enter
already exist  enter new one with suitable details  ",
"ERROR",JOptionPane.ERROR_MESSAGE);
                            t1.setText("");
                            t2.setText("");
                            t3.setText("");
```

```
                    t4.setText("");
                    t5.setText("");
                    t6.setText("");
                }
                else
                {
                    int balanceAmount = Integer .parseInt (t3.getText ()) ;
                    String bankAccount = t5. getText ();
                    String issuerBank = t2.getText() ;
                    int cardId = Integer.parseInt (t1. getText ());
                    String clientName = t4.getText () ;
                    int pin_Num = Integer .parseInt (t6.getText ());
                     DebitCard objDebitCard = new DebitCard(balanceAmount,
cardId, bankAccount, issuerBank, clientName, pin_Num);
                     arrayBankCard.add(objDebitCard);
                    JOptionPane.showMessageDialog(frame1, "Your Details have
been stored!", "SUCCESSFUL", JOptionPane. INFORMATION_MESSAGE);

                    }
                }
            }
            catch(NumberFormatException ex)
            {
                JOptionPane.showMessageDialog(frame1, "Please Input appropratie
value","Error", JOptionPane. ERROR_MESSAGE);
                t1.setText("");
                t2.setText("");
                t3.setText("");
                t4.setText("");
                t5.setText("");
                t6.setText("");
```

```
                }
                catch(NullPointerException ex)
                {
                    JOptionPane.showMessageDialog(frame1, "Please Input appropratie
value","Error", JOptionPane. ERROR_MESSAGE);
                    t1.setText("");
                    t2.setText("");
                    t3.setText("");
                    t4.setText("");
                    t5.setText("");
                    t6.setText("");
                }
            }

        });
    b8 = new JButton("Withdraw from Debit Card");
    b8.setBounds(580,350,250,55);
    b8.setForeground(Color.black);
    b8.setFont(new Font("Serif", Font.BOLD, 20));
    b8.addActionListener(new
        ActionListener()
        {
            public void actionPerformed(ActionEvent e)
            {
                Withdraw();
                frame1.dispose();
            }

        });

    b9 = new JButton("Display");
```

```
        b9.setBounds(160,420,150,55);
        b9.setForeground(Color.black);
        b9.setFont(new Font("Serif", Font.BOLD, 20));

        b9.addActionListener(new ActionListener()
           {
              public void actionPerformed(ActionEvent e)
              {
                 if(arrayBankCard.size()==0)
                 {
                    JOptionPane.showMessageDialog(frame1, "Plaese enter value",
"ERROR",JOptionPane.ERROR_MESSAGE);
                 }
                 else
                 {
                 for(BankCard card : arrayBankCard)
                 {
                    if (card instanceof DebitCard)
                    {
                       DebitCard debitobj = (DebitCard) card;
                       debitobj.DisplayDetails();
                    }
                 }
              }
              }
           });

        b10 = new JButton("Clear");
        b10.setBounds(160,490,150,55);
        b10.setForeground(Color.black);
        b10.setFont(new Font("Serif", Font.BOLD, 20));
```

```
b10.addActionListener(new ActionListener()
{
        public void actionPerformed(ActionEvent e)
        {
            t1.setText("");
            t2.setText("");
            t3.setText("");
            t4.setText("");
            t5.setText("");
            t6.setText("");
        }

    });

b4 = new JButton("Home");
b4.setBounds(0,100,150,65);
b4.setForeground(Color.black);
b4.setFont(new Font("Serif", Font.BOLD, 20));

b4.addActionListener(new ActionListener()
{
        public void actionPerformed(ActionEvent e)
        {
            new BankGUI();
            frame1.dispose();
        }

    });

b5 = new JButton("Debit Card");
```

```
b5.setBounds(0,250,150,65);
b5.setFont(new Font("Serif", Font.BOLD, 20));
b5.addActionListener(new ActionListener()
{
      public void actionPerformed(ActionEvent e)
      {
         DebitCard();
         frame1.dispose();
      }

   });

b6 = new JButton("Credit Card");
b6.setBounds(0,400,150,65);
b6.setFont(new Font("Serif", Font.BOLD, 20));

b6.addActionListener(new ActionListener()
{
      public void actionPerformed(ActionEvent e)
      {
         CreditCard();
         frame1.dispose();
      }

   });
//adding components into panels
mainPanel1.add(panel4);
panel4.add(panel5);
panel5.add(panel6);
panel6.add(b4);
panel6.add(b5);
```

```
        panel6.add(b6);
        panel5.add(j3);
        panel5.add(j4);
        panel5.add(t1);
        panel5.add(j5);
        panel5.add(t2);
        panel5.add(j6);
        panel5.add(t3);
        panel5.add(j7);
        panel5.add(t4);
        panel5.add(j8);
        panel5.add(t5);
        panel5.add(j9);
        panel5.add(t6);
        panel5.add(b7);
        panel5.add(b8);
        panel5.add(b9);
        panel5.add(b10);

        frame1.add(mainPanel1);
        frame1.setVisible(true);
        frame1.setResizable(false);

    }
    //creating method to open another GUI
    public void Withdraw(){
        //
        frame5 =new JFrame();
        frame5.setSize(900, 640);
        frame5.setLayout(null);
        ////adding panels into panel to show diiferent colors
```

```
mainPanel5 = new JPanel();
mainPanel5.setBounds(0, 0, 900, 600);
mainPanel5.setBackground(Color.black);
mainPanel5.setLayout(null);

panel16 = new JPanel();
panel16.setBackground(Color.lightGray);
panel16.setBounds(10, 10, 880, 580);
panel16.setLayout(null);

panel17 = new JPanel();
panel17.setBackground(Color.gray);
panel17.setBounds(20, 10, 840, 560);
panel17.setLayout(null);

panel18 = new JPanel();
panel18.setBackground(Color.black);
panel18.setBounds(0, 0, 150, 560);
panel18.setLayout(null);

//adding components like Jtextfiled,Jcombobox, Jbuttons,Jlabel
j27 = new JLabel("With Draw");
j27.setBounds(425,0,300,100);
j27.setFont(new Font("Serif", Font.BOLD, 30));

j28=new JLabel("Card_ID:");
j28.setBounds(160,120,120,20);
j28.setFont(new Font("Serif", Font.BOLD, 20));

t20=new JTextField();
t20.setBounds(310,120,140,20);
```

```
j29=new JLabel("pin:");
j29.setBounds(550,120,170,20);
j29.setFont(new Font("Serif", Font.BOLD, 20));

t21=new JTextField();
t21.setBounds(670,120,140,20);

j33=new JLabel("Amount:");
j33.setBounds(320,180,170,20);
j33.setFont(new Font("Serif", Font.BOLD, 20));

t25=new JTextField();
t25.setBounds(450,180,140,20);

j30=new JLabel("WithDraw Date:");
j30.setBounds(230,240,190,20);
j30.setFont(new Font("Serif", Font.BOLD, 20));

String day[]={"1","2","3","4","5","6","7","8","9","10","11","12","13",
      "14","15","16","17","18","19","20","21","22","23","24","25","26",
      "27","28","29","30"};
jcb3= new JComboBox <String>(day);
jcb3.setBounds(410,235,69,32);

String month[]={"January", "February", "March", "April", "May",
      "June", "July" , "August", "September", "October",
      "November", "December"};
jcb4= new JComboBox <String>(month);
jcb4.setBounds(510,235,94,32);
```

```
String year[]={"2023","2024","2025","2026","2027","2028"};
jcb5=new JComboBox<String>(year);
jcb5.setBounds(650,235,83,32);
//used of action listener to preform task to their respectful buttons
b34 = new JButton("WithDraw");
b34.setBounds(160,350,180,60);
b34.setForeground(Color.black);
b34.setFont(new Font("Serif", Font.BOLD, 20));


b34.addActionListener(new ActionListener()
   {
      public void actionPerformed(ActionEvent e){
         if(t21.getText().isEmpty()||t25.getText().isEmpty()||t20.getText().isEmpty()){
            JOptionPane.showMessageDialog(frame5, "Enter  values!!!!!", "Error",
JOptionPane.ERROR_MESSAGE);
         }
         else if(Integer.parseInt(t21.getText())<=0 ||
Integer.parseInt(t25.getText())<=0||Integer.parseInt(t20.getText())<=0){
            JOptionPane.showMessageDialog(frame5, "Need positive Number",
"ERROR",JOptionPane.ERROR_MESSAGE);
         }
         try
         {
            int pin = Integer.parseInt(t21.getText());
            int withdrawal_Amount = Integer.parseInt(t25.getText());
            int cardid = Integer.parseInt(t20.getText());
            String day = (String) jcb3.getSelectedItem();
            String months = (String) jcb4.getSelectedItem();
            String yrs = (String) jcb5.getSelectedItem();
            String dateOfWithdrawal = day +"/"+months +"/"+yrs;
```

```
                boolean flag1 =false;
                for (BankCard card : arrayBankCard){
                    if (card instanceof DebitCard){
                        if (card.getCardId() == cardid){
                            DebitCard debit = (DebitCard) card;
                            flag1 = true;
                            if (pin == debit.getPin()){
                                debit.withdraw(withdrawal_Amount,dateOfWithdrawal,pin);
                                JOptionPane.showMessageDialog(frame5, "Amount has
withdrawn", "Succesful", JOptionPane.INFORMATION_MESSAGE);
                                break;
                            }
                            else{
                                JOptionPane.showMessageDialog(frame5, "Wrong Pin
Number", "Pin Number", JOptionPane.ERROR_MESSAGE);
                            }
                        }
                    }
                }
                if (!flag1){
                    JOptionPane.showMessageDialog(frame5, "Credit card with the given
ID has not been added", "Error", JOptionPane.ERROR_MESSAGE);
                }
            }
            catch(NumberFormatException ex){
                JOptionPane.showMessageDialog(frame5, "Enter Proper values!!!!!",
"Error", JOptionPane.ERROR_MESSAGE);
            }
        }
    });
```

```
b35 = new JButton("Clear");
b35.setBounds(400,350,180,60);
b35.setForeground(Color.black);
b35.setFont(new Font("Serif", Font.BOLD, 20));
b35.addActionListener(new ActionListener()
{
        public void actionPerformed(ActionEvent e)
        {
            t20.setText("");
            t21.setText("");
            t25.setText("");
        }

    });
b36= new JButton("Go Back");
b36.setBounds(650,350,180,60);
b36.setForeground(Color.black);
b36.setFont(new Font("Serif", Font.BOLD, 20));

b36.addActionListener(new ActionListener()
{
        public void actionPerformed(ActionEvent e)
        {
            DebitCard();
            frame5.dispose();
        }

    });
```

```
b31 = new JButton("Home");
b31.setBounds(0,100,150,65);
b31.setForeground(Color.black);
b31.setFont(new Font("Serif", Font.BOLD, 20));
b31.addActionListener(new ActionListener()
{
      public void actionPerformed(ActionEvent e)
      {
         new BankGUI();
         frame5.dispose();
      }

   });

b32 = new JButton("Debit Card");
b32.setBounds(0,250,150,65);
b32.setFont(new Font("Serif", Font.BOLD, 20));

b32.addActionListener(new ActionListener()
{
      public void actionPerformed(ActionEvent e)
      {
         DebitCard();
         frame5.dispose();
      }

   });

b33 = new JButton("Credit Card");
b33.setBounds(0,400,150,65);
b33.setFont(new Font("Serif", Font.BOLD, 20));
```

```
b33.addActionListener(new ActionListener()
{
        public void actionPerformed(ActionEvent e)
        {
            CreditCard();
            frame5.dispose();
        }

    });
//adding components into panels
mainPanel5.add(panel16);
panel16.add(panel17);
panel17.add(panel18);
panel18.add(b31);
panel18.add(b32);
panel18.add(b33);
panel17.add(j27);
panel17.add(j28);
panel17.add(t20);
panel17.add(j29);
panel17.add(t21);
panel17.add(j30);
panel17.add(jcb3);
panel17.add(jcb4);
panel17.add(jcb5);
panel17.add(b34);
panel17.add(b35);
panel17.add(b36);
panel17.add(j33);
panel17.add(t25);
```

```
        frame5.add(mainPanel5);
        frame5.setVisible(true);
        frame5.setResizable(false);
    }

    //creating method to open another GUI
    public void CreditCard(){
        frame2 =new JFrame();
        frame2.setSize(900, 640);
        frame2.setLayout(null);

        mainPanel2 = new JPanel();
        mainPanel2.setBounds(0, 0, 900, 600);
        mainPanel2.setBackground(Color.black);
        mainPanel2.setLayout(null);

        panel7 = new JPanel();
        panel7.setBackground(Color.lightGray);
        panel7.setBounds(10, 10, 880, 580);
        panel7.setLayout(null);

        panel8 = new JPanel();
        panel8.setBackground(Color.gray);
        panel8.setBounds(20, 10, 840, 560);
        panel8.setLayout(null);

        panel9 = new JPanel();
        panel9.setBackground(Color.black);
        panel9.setBounds(0, 0, 150, 560);
        panel9.setLayout(null);
```

```
j10 = new JLabel("Credit Card");
j10.setBounds(425,0,300,100);
j10.setFont(new Font("Serif", Font.BOLD, 30));

j11=new JLabel("Card_ID:");
j11.setBounds(160,100,120,20);
j11.setFont(new Font("Serif", Font.BOLD, 20));

t9=new JTextField();
t9.setBounds(320,100,140,20);

j12=new JLabel("Issuer Bank:");
j12.setBounds(160,150,120,20);
j12.setFont(new Font("Serif", Font.BOLD, 20));

t10=new JTextField();
t10.setBounds(320,150,140,20);

j13=new JLabel("Balance Amount:");
j13.setBounds(160,200,170,20);
j13.setFont(new Font("Serif", Font.BOLD, 20));

t11=new JTextField();
t11.setBounds(320,200,140,20);

j14=new JLabel("Client Name:");
j14.setBounds(500,100,170,20);
j14.setFont(new Font("Serif", Font.BOLD, 20));

t12=new JTextField();
```

```
t12.setBounds(670,100,140,20);

j15=new JLabel("Balance Account:");
j15.setBounds(500,150,170,20);
j15.setFont(new Font("Serif", Font.BOLD, 20));

t13=new JTextField();
t13.setBounds(670,150,140,20);

j16=new JLabel("CVC Number:");
j16.setBounds(500,200,170,20);
j16.setFont(new Font("Serif", Font.BOLD, 20));

t14=new JTextField();
t14.setBounds(670,200,140,20);

j31=new JLabel("Interest Rate:");
j31.setBounds(160,250,170,20);
j31.setFont(new Font("Serif", Font.BOLD, 20));

t22=new JTextField();
t22.setBounds(320,250,140,20);

j33=new JLabel("Grace Period:");
j33.setBounds(500,250,170,20);
j33.setFont(new Font("Serif", Font.BOLD, 20));

t24=new JTextField();
t24.setBounds(670,250,140,20);
 j21=new JLabel("Experice date:");
j21.setBounds(160,300,190,20);
```

```
j21.setFont(new Font("Serif", Font.BOLD, 20));

String day[]={"1","2","3","4","5","6","7","8","9","10","11","12","13",
        "14","15","16","17","18","19","20","21","22","23","24","25","26",
        "27","28","29","30"};
jcb= new JComboBox <String>(day);
jcb.setBounds(350,300,69,32);

String month[]={"January", "February", "March", "April", "May",
        "June", "July" , "August", "September", "October",
        "November", "December"};
jcb1= new JComboBox <String>(month);
jcb1.setBounds(420,300,94,32);

String year[]={"2023","2024","2025","2026","2027","2028"};
jcb2=new JComboBox <String>(year);
jcb2.setBounds(520,300,83,32);

//used of action listener to preform task to their respectful buttons

b14 = new JButton("Add Credit Card");
b14.setBounds(160,420,180,60);
b14.setForeground(Color.black);
b14.setFont(new Font("Serif", Font.BOLD, 20));

b14.addActionListener(new ActionListener()
   {
      public void actionPerformed(ActionEvent e)
      {
         boolean check_ = true; //check flag
```

```
            if(t9.getText().isEmpty() || t10.getText().isEmpty() || t11.getText().isEmpty()
|| t12.getText().isEmpty() || t13.getText().isEmpty() || t14.getText().isEmpty()||t22.getText
().isEmpty())

            {
               JOptionPane.showMessageDialog(frame2, "You can't keep filed empty",
"Error",  JOptionPane.ERROR_MESSAGE);

               check_ = false;
            }
             else if(Integer.parseInt(t11.getText())<=0 ||
Integer.parseInt(t9.getText())<=0||Integer.parseInt(t14.getText())<=0
||Integer.parseInt(t22.getText())<=0){
               JOptionPane.showMessageDialog(frame5, "Need positive Number",
"ERROR",JOptionPane.ERROR_MESSAGE);
            }

            if (check_)
            {
               try //using try and catch for expectional handling
               {
                  int balanceAmount = Integer .parseInt (t11.getText ()) ;
                  String bank_Account = t13. getText ();
                  String issuerBank = t10.getText() ;
                  int cardId = Integer.parseInt (t9. getText ());
                  String clientName = t12.getText () ;
                  int cvcNumber = Integer .parseInt (t14.getText ());
                  int interestRate=Integer.parseInt (t22.getText ()) ;
                  String day = (String) jcb.getSelectedItem();
                  String month = (String) jcb1.getSelectedItem() ;
                  String year = (String) jcb2.getSelectedItem() ;
```

```
                String expiration_Date = day + "/" + month + "/" + year;
                boolean cardIdExists = false; // flag to check if card ID already exists
                for (BankCard card : arrayBankCard)
                {
                    if (card instanceof CreditCard)
                    {
                        int existingCardId = card.getCardId();
                        if (existingCardId == cardId)
                        {
                            cardIdExists = true;
                            JOptionPane.showMessageDialog(frame2, "Credit card with
the given ID already exists", "Error", JOptionPane.ERROR_MESSAGE);
                            break;
                        }
                    }
                }
                if (!cardIdExists)
                {
                    CreditCard objCreditCard = new
CreditCard(balanceAmount,cardId,issuerBank,bank_Account,cvcNumber,clientName,int
erestRate,expiration_Date);
                    arrayBankCard.add(objCreditCard);
                    JOptionPane.showMessageDialog(frame2, "Values have been
stored", "Values", JOptionPane.INFORMATION_MESSAGE);
                }
            }
            catch (NumberFormatException ex)
            {
                t9.setText("");
                t10.setText("");
                t11.setText("");
```

```
                    t12.setText("");
                    t13.setText("");
                    t14.setText("");
                    t22.setText("");
                    JOptionPane.showMessageDialog(frame2, "Invalid Input", "Error",
JOptionPane.ERROR_MESSAGE);
                }
                catch (NullPointerException ex)
                {
                    t9.setText("");
                    t10.setText("");
                    t11.setText("");
                    t12.setText("");
                    t13.setText("");
                    t14.setText("");
                    t22.setText("");
                    JOptionPane.showMessageDialog(frame2, "Invalid Input", "Error",
JOptionPane.ERROR_MESSAGE);
                }
            }
        }

    });

    b15 = new JButton("Cancel Credit Card");
    b15.setBounds(650,420,180,60);
    b15.setForeground(Color.black);
    b15.setFont(new Font("Serif", Font.BOLD, 20));

    b15.addActionListener(new ActionListener()
    {
```

```
        public void actionPerformed(ActionEvent e)
        {
            cancelCreditCard();
            frame2.dispose();
        }

    });

b16 = new JButton("Set credit limit");
b16.setBounds(160,490,180,60);
b16.setForeground(Color.black);
b16.setFont(new Font("Serif", Font.BOLD, 20));

b16.addActionListener(new ActionListener()
{
        public void actionPerformed(ActionEvent e)
        {
            setlimit();
            frame2.dispose();
        }

    });

b17 = new JButton("Display");
b17.setBounds(650,490,180,60);
b17.setForeground(Color.black);
b17.setFont(new Font("Serif", Font.BOLD, 20));

b17.addActionListener(new ActionListener()
    {
        public void actionPerformed(ActionEvent e)
```

```
            {
                if(arrayBankCard.size()==0){
                    JOptionPane.showMessageDialog(frame2, "PLease enter value",
"ERROR",JOptionPane.ERROR_MESSAGE);
                }
                else{
                    for(BankCard card : arrayBankCard){
                    if (card instanceof CreditCard){
                        CreditCard creditobj = (CreditCard) card;//casting creditcard obj
                        creditobj.DisplayDetails();//calling the method from another class using
downcasting.
                    }
                }
            }
            }
        }
    );

    b18 = new JButton("Clear");
    b18.setBounds(400,490,180,60);
    b18.setForeground(Color.black);
    b18.setFont(new Font("Serif", Font.BOLD, 20));

    b18.addActionListener(new ActionListener()
    {
        public void actionPerformed(ActionEvent e)
        {
            t9.setText("");
            t10.setText("");
            t11.setText("");
            t12.setText("");
```

```
            t13.setText("");
            t14.setText("");
            t22.setText("");

        }

    });


b11 = new JButton("Home");
b11.setBounds(0,100,150,65);
b11.setForeground(Color.black);
b11.setFont(new Font("Serif", Font.BOLD, 20));

b11.addActionListener(new ActionListener()
{
        public void actionPerformed(ActionEvent e)
        {
            new BankGUI();
            frame2.dispose();
        }

    });

b12 = new JButton("Debit Card");
b12.setBounds(0,250,150,65);
b12.setFont(new Font("Serif", Font.BOLD, 20));

b12.addActionListener(new ActionListener()
{
        public void actionPerformed(ActionEvent e)
```

```
        {
            DebitCard();
            frame2.dispose();
        }

    });

b13 = new JButton("Credit Card");
b13.setBounds(0,400,150,65);
b13.setFont(new Font("Serif", Font.BOLD, 20));

b13.addActionListener(new ActionListener()
{
        public void actionPerformed(ActionEvent e)
        {
            CreditCard();
            frame2.dispose();
        }

    });
//adding components into panels
mainPanel2.add(panel7);
panel7.add(panel8);
panel8.add(panel9);
panel9.add(b11);
panel9.add(b12);
panel9.add(b13);
panel8.add(j10);
panel8.add(j11);
panel8.add(t9);
panel8.add(j12);
```

```
        panel8.add(t10);
        panel8.add(j13);
        panel8.add(t11);
        panel8.add(j14);
        panel8.add(t12);
        panel8.add(j15);
        panel8.add(t13);
        panel8.add(j16);
        panel8.add(t14);
        panel8.add(b14);
        panel8.add(b15);
        panel8.add(b16);
        panel8.add(b17);
        panel8.add(b18);
        panel8.add(j31);
        panel8.add(t22);
        panel8.add(j33);
        panel8.add(t24);
        panel8.add(j21);
        panel8.add(jcb);
        panel8.add(jcb1);
        panel8.add(jcb2);


        frame2.add(mainPanel2);
        frame2.setVisible(true);
        frame2.setResizable(false);
    }
    //creating method to open another GUI
    public void setlimit(){
        frame3 =new JFrame();
```

```
frame3.setSize(900, 640);
frame3.setLayout(null);

mainPanel3 = new JPanel();
mainPanel3.setBounds(0, 0, 900, 600);
mainPanel3.setBackground(Color.black);
mainPanel3.setLayout(null);

panel10 = new JPanel();
panel10.setBackground(Color.lightGray);
panel10.setBounds(10, 10, 880, 580);
panel10.setLayout(null);

panel11 = new JPanel();
panel11.setBackground(Color.gray);
panel11.setBounds(20, 10, 840, 560);
panel11.setLayout(null);

panel12 = new JPanel();
panel12.setBackground(Color.black);
panel12.setBounds(0, 0, 150, 560);
panel12.setLayout(null);

j17 = new JLabel("Set Credit Limit");
j17.setBounds(425,0,300,100);
j17.setFont(new Font("Serif", Font.BOLD, 30));

j18=new JLabel("Card ID:");
j18.setBounds(160,100,120,20);
j18.setFont(new Font("Serif", Font.BOLD, 20));
```

```
t15=new JTextField();
t15.setBounds(320,100,140,20);

j20=new JLabel("Credit Limit:");
j20.setBounds(160,200,140,20);
j20.setFont(new Font("Serif", Font.BOLD, 20));

t17=new JTextField();
t17.setBounds(320,200,140,20);

j35=new JLabel("Grace Period:");
j35.setBounds(500,200,140,20);
j35.setFont(new Font("Serif", Font.BOLD, 20));

t26=new JTextField();
t26.setBounds(670,200,140,20);



b22 = new JButton("Set limit");
b22.setBounds(160,350,180,60);
b22.setForeground(Color.black);
b22.setFont(new Font("Serif", Font.BOLD, 20));

b22.addActionListener(new ActionListener()
   {
      public void actionPerformed(ActionEvent e)
      {
         boolean fieldvalid = true;
         if (t15.getText().isEmpty() || t17.getText().isEmpty() ||
         t26.getText().isEmpty())
         {
```

```
                JOptionPane.showMessageDialog(frame3, "Required Field Must be
filled!", "Empty Field", JOptionPane.ERROR_MESSAGE);
                fieldvalid = false; //using like flag upcasting
            }
            else
if(Integer.parseInt(t15.getText())<=0||Integer.parseInt(t17.getText())<=0||Integer.parseIn
t(t26.getText())<=0){
                JOptionPane.showMessageDialog(frame1, "Need positive Number",
"ERROR",JOptionPane.ERROR_MESSAGE);
            }
            if (fieldvalid)
            {
                try
                {
                    int cardid = Integer.parseInt(t15.getText());
                    int creditLimit = Integer.parseInt(t17.getText());
                    int gracePeriod = Integer.parseInt(t26.getText());
                    boolean card = false;

                    for (BankCard set : arrayBankCard)
                    {
                        if (set instanceof CreditCard)//calling from credit card
                        {
                            int cardID = set.getCardId();
                            if (cardID == cardid)
                            {
                                card = true;
                                CreditCard credit = (CreditCard) set;
                                credit.setCreditLimit(creditLimit,gracePeriod);
                                JOptionPane.showMessageDialog(frame, "Credit Limit has
been set", "Set Credit Limit", JOptionPane.INFORMATION_MESSAGE);
```

```
                        break;
                    }
                }
            }
            if (!card)
            {
                JOptionPane.showMessageDialog(frame3, "Credit card with the
given ID has not been added", "Error", JOptionPane.ERROR_MESSAGE);
            }
        }
        catch (NumberFormatException ex)
        {
            t15.setText("");
            t26.setText("");
            t17.setText("");
            JOptionPane.showMessageDialog(frame3, "Invalid input, please enter
numeric values only","Error", JOptionPane.ERROR_MESSAGE);
        }
        catch (NullPointerException ex)
        {
            t15.setText("");
            t26.setText("");
            t17.setText("");
            JOptionPane.showMessageDialog(frame3, "Invalid input, please enter
numeric values only","Error", JOptionPane.ERROR_MESSAGE);
        }
    }
}
});

b23 = new JButton("clear");
```

```
b23.setBounds(400,350,180,60);
b23.setForeground(Color.black);
b23.setFont(new Font("Serif", Font.BOLD, 20));

b23.addActionListener(new ActionListener()
{
    public void actionPerformed(ActionEvent e)
    {
        t15.setText("");
        t26.setText("");
        t17.setText("");
    }

  });

b24 = new JButton("Go Back");
b24.setBounds(650,350,180,60);
b24.setForeground(Color.black);
b24.setFont(new Font("Serif", Font.BOLD, 20));

b24.addActionListener(new ActionListener()
{
    public void actionPerformed(ActionEvent e)
    {
        CreditCard();
        frame3.dispose();
    }

  });
```

```
b19 = new JButton("Home");
b19.setBounds(0,100,150,65);
b19.setForeground(Color.black);
b19.setFont(new Font("Serif", Font.BOLD, 20));
b19.addActionListener(new ActionListener(){
        public void actionPerformed(ActionEvent e)
        {
            new BankGUI();
            frame3.dispose();
        }

    });

b20 = new JButton("Debit Card");
b20.setBounds(0,250,150,65);
b20.setFont(new Font("Serif", Font.BOLD, 20));

b20.addActionListener(new ActionListener(){
        public void actionPerformed(ActionEvent e){
            DebitCard();
            frame3.dispose();
        }

    });

b21 = new JButton("Credit Card");
b21.setBounds(0,400,150,65);
b21.setFont(new Font("Serif", Font.BOLD, 20));

b21.addActionListener(new ActionListener(){
```

```
            public void actionPerformed(ActionEvent e){
                CreditCard();
                frame3.dispose();
            }

        });
    //adding components into panels
    mainPanel3.add(panel10);
    panel10.add(panel11);
    panel11.add(panel12);
    panel12.add(b19);
    panel12.add(b20);
    panel12.add(b21);
    panel11.add(j17);
    panel11.add(j18);
    panel11.add(t15);
    panel11.add(j20);
    panel11.add(t17);
    panel11.add(t26);
    panel11.add(j35);
    panel11.add(b22);
    panel11.add(b23);
    panel11.add(b24);
    //make frame visible
    frame3.add(mainPanel3);
    frame3.setVisible(true);
    frame3.setResizable(false);
  }
  //creating method to open another GUI

  public void cancelCreditCard(){
```

```
frame4 =new JFrame();
frame4.setSize(900, 640);
frame4.setLayout(null);
//adding panels into panel to show diiferent colors
mainPanel4 = new JPanel();
mainPanel4.setBounds(0, 0, 900, 600);
mainPanel4.setBackground(Color.black);
mainPanel4.setLayout(null);

panel13 = new JPanel();
panel13.setBackground(Color.lightGray);
panel13.setBounds(10, 10, 880, 580);
panel13.setLayout(null);

panel14 = new JPanel();
panel14.setBackground(Color.gray);
panel14.setBounds(20, 10, 840, 560);
panel14.setLayout(null);

panel15 = new JPanel();
panel15.setBackground(Color.black);
panel15.setBounds(0, 0, 150, 560);
panel15.setLayout(null);
//adding components like Jtextfiled,Jcombobox, Jbuttons,Jlabel
j24 = new JLabel("Cancel Card");
j24.setBounds(425,0,300,100);
j24.setFont(new Font("Serif", Font.BOLD, 30));

j25=new JLabel("Card_ID:");
j25.setBounds(320,170,120,20);
j25.setFont(new Font("Serif", Font.BOLD, 25));
```

```
        t19=new JTextField();
        t19.setBounds(450,160,180,40);

        b28 = new JButton("Go Back");
        b28.setBounds(650,350,180,60);
        b28.setForeground(Color.black);
        b28.setFont(new Font("Serif", Font.BOLD, 20));

        b28.addActionListener(new ActionListener(){
            public void actionPerformed(ActionEvent e){
                CreditCard();
                frame4.dispose();
            }

        });

        b29 = new JButton("Cancel Card");
        b29.setBounds(160,350,180,60);
        b29.setForeground(Color.black);
        b29.setFont(new Font("Serif", Font.BOLD, 20));

        b29.addActionListener(new ActionListener()
        {
            public void actionPerformed(ActionEvent e)
            {
                if(t19.getText().isEmpty()){//chek whether filed is empty or not
                    JOptionPane.showMessageDialog(frame4, "Text field is empty",
"ERROR",JOptionPane.ERROR_MESSAGE);
                }
                else if(Integer.parseInt(t19.getText())<=0){
```

```
                JOptionPane.showMessageDialog(frame4, "Need positive Number",
"ERROR",JOptionPane.ERROR_MESSAGE);
            }
            try
            {
               int cardid = Integer.parseInt(t19.getText());
               for (BankCard cancel : arrayBankCard)
               {
                  if (cancel instanceof CreditCard)
                  {
                     int cardId = cancel.getCardId();
                     if (cardid == cardId)
                     {
                        CreditCard credit = (CreditCard) cancel; //using downcasting
                        credit.cancelCreditCard();
                     }
                  }
               }
            //using exceptional handling
            catch (NumberFormatException ex)
            {
               t19.setText("");
               JOptionPane.showMessageDialog(frame4,"No credit card to
cancel","Error", JOptionPane.ERROR_MESSAGE);
            }
            catch (NullPointerException ex)
            {
               t19.setText("");
               JOptionPane.showMessageDialog(frame4,"No credit card to
cancel","Error", JOptionPane.ERROR_MESSAGE);
```

```
            }
        }
    });

b30 = new JButton("Clear");
b30.setBounds(400,350,180,60);
b30.setForeground(Color.black);
b30.setFont(new Font("Serif", Font.BOLD, 20));
b30.addActionListener(new ActionListener(){
        public void actionPerformed(ActionEvent e){
            t19.setText("");
        }

    });



b25 = new JButton("Home");
b25.setBounds(0,100,150,65);
b25.setForeground(Color.black);
b25.setFont(new Font("Serif", Font.BOLD, 20));
b25.addActionListener(new ActionListener(){
        public void actionPerformed(ActionEvent e){
            new BankGUI();
            frame4.dispose();
        }

    });

b26 = new JButton("Debit Card");
b26.setBounds(0,250,150,65);
```

```
b26.setFont(new Font("Serif", Font.BOLD, 20));

b26.addActionListener(new ActionListener(){
        public void actionPerformed(ActionEvent e){
            DebitCard();
            frame4.dispose();
        }

    });

b27 = new JButton("Credit Card");
b27.setBounds(0,400,150,65);
b27.setFont(new Font("Serif", Font.BOLD, 20));

b27.addActionListener(new ActionListener(){
        public void actionPerformed(ActionEvent e){
            CreditCard();
            frame4.dispose();
        }

    });

mainPanel4.add(panel13);
panel13.add(panel14);
panel14.add(panel15);
panel15.add(b25);
panel15.add(b26);
panel15.add(b27);
panel14.add(j24);
panel14.add(j25);
panel14.add(t19);
```

```
        panel14.add(b28);
        panel14.add(b29);
        panel14.add(b30);
        frame4.add(mainPanel4);
        frame4.setVisible(true);
        frame4.setResizable(false);
    }

    //making main method
    public static void main(String[] args){
        new BankGUI();
    }

}
```