UMS
UNIVERSITI MALAYSIA SABAH

KP14603 OBJECT ORIENTED PROGRAMMING

SEMESTER II

SESSION 2019/2020

KP14603 INDIVIDUAL PROJECT 2 : CALCULATOR

NAME : NUR ALANI RIFHAN BINTI ROSLAN

MATRC NO : BI19110104

LECTURER NAME : MADAM HASNAH BINTI TANALOL

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INTRODUCTION

For this project, I choose to create a program which is a Calculator, plots of basic function. I create a very easy program to use for students and lecturers. I have made the calculator which will perform the basic mathematical functions like addition, subtraction, multiplication and division. The aim of this project is to understand Object Oriented Programming and JFrame. The calculator program performs basic mathematical problem. When the user operate the application calls the corresponding class and the user can perform different mathematical operations provided in the class.

The Calculator application performs basic operations. The application calls the corresponding class and the user can perform various mathematical operations provided in the class. There is a base class in the application which contains all the methods for calculation.

OBJECTIVES

1) To create a simple Java console application
2) To understand the object-oriented concepts
3) To reate application which request input from users, validate, process the input received and provide desired output.

JAVA CODE

```
package calculator;


/*
   Name      : Nur Alani Rifhan Binti Roslan
   Matric no : BI19110104
*/


public class Calculator extends javax.swing.JFrame {


   String FirstValue = "";
   String SecValue = "";
   String operator = "";


   public Calculator() {
      initComponents();
      this.setLocationRelativeTo(null);
   }


   @SuppressWarnings("unchecked")
   // <editor-fold defaultstate="collapsed" desc="Generated Code">
   private void initComponents() {


      txtDisplay = new javax.swing.JTextField();
```

```
btDecimal = new javax.swing.JButton();
btZero = new javax.swing.JButton();
btOne = new javax.swing.JButton();
btSeven = new javax.swing.JButton();
btTwo = new javax.swing.JButton();
btThree = new javax.swing.JButton();
btFour = new javax.swing.JButton();
btFive = new javax.swing.JButton();
btSix = new javax.swing.JButton();
btEight = new javax.swing.JButton();
btNine = new javax.swing.JButton();
btDelete = new javax.swing.JButton();
btCancel = new javax.swing.JButton();
btAdd = new javax.swing.JButton();
btSubt = new javax.swing.JButton();
btMul = new javax.swing.JButton();
btDiv = new javax.swing.JButton();
btEqual = new javax.swing.JButton();

setDefaultCloseOperation(javax.swing.WindowConstants.EXIT_ON_CLOSE);
setResizable(false);

txtDisplay.setFont(new java.awt.Font("Tahoma", 0, 24)); // NOI18N
txtDisplay.setHorizontalAlignment(javax.swing.JTextField.RIGHT);
```

```
btDecimal.setFont(new java.awt.Font("Tahoma", 1, 18)); // NOI18N
btDecimal.setText(".");
btDecimal.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        btDecimalActionPerformed(evt);
    }
});

btZero.setFont(new java.awt.Font("Tahoma", 1, 18)); // NOI18N
btZero.setText("0");
btZero.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        btZeroActionPerformed(evt);
    }
});

btOne.setFont(new java.awt.Font("Tahoma", 1, 18)); // NOI18N
btOne.setText("1");
btOne.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        btOneActionPerformed(evt);
    }
});
```

```
btSeven.setFont(new java.awt.Font("Tahoma", 1, 18)); // NOI18N
btSeven.setText("7");
btSeven.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        btSevenActionPerformed(evt);
    }
});

btTwo.setFont(new java.awt.Font("Tahoma", 1, 18)); // NOI18N
btTwo.setText("2");
btTwo.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        btTwoActionPerformed(evt);
    }
});

btThree.setFont(new java.awt.Font("Tahoma", 1, 18)); // NOI18N
btThree.setText("3");
btThree.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        btThreeActionPerformed(evt);
    }
});
```

```
btFour.setFont(new java.awt.Font("Tahoma", 1, 18)); // NOI18N
btFour.setText("4");
btFour.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        btFourActionPerformed(evt);
    }
});

btFive.setFont(new java.awt.Font("Tahoma", 1, 18)); // NOI18N
btFive.setText("5");
btFive.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        btFiveActionPerformed(evt);
    }
});

btSix.setFont(new java.awt.Font("Tahoma", 1, 18)); // NOI18N
btSix.setText("6");
btSix.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        btSixActionPerformed(evt);
    }
});
```

```
btEight.setFont(new java.awt.Font("Tahoma", 1, 18)); // NOI18N
btEight.setText("8");
btEight.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        btEightActionPerformed(evt);
    }
});

btNine.setFont(new java.awt.Font("Tahoma", 1, 18)); // NOI18N
btNine.setText("9");
btNine.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        btNineActionPerformed(evt);
    }
});

btDelete.setFont(new java.awt.Font("Tahoma", 1, 18)); // NOI18N
btDelete.setText("->");
btDelete.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        btDeleteActionPerformed(evt);
    }
});
```

```
btCancel.setFont(new java.awt.Font("Tahoma", 1, 18)); // NOI18N
btCancel.setText("CA");
btCancel.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        btCancelActionPerformed(evt);
    }
});

btAdd.setFont(new java.awt.Font("Tahoma", 1, 18)); // NOI18N
btAdd.setText("+");
btAdd.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        btAddActionPerformed(evt);
    }
});

btSubt.setFont(new java.awt.Font("Tahoma", 1, 18)); // NOI18N
btSubt.setText("-");
btSubt.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        btSubtActionPerformed(evt);
    }
});
```

```
btMul.setFont(new java.awt.Font("Tahoma", 1, 18)); // NOI18N
btMul.setText("*");
btMul.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        btMulActionPerformed(evt);
    }
});

btDiv.setFont(new java.awt.Font("Tahoma", 1, 18)); // NOI18N
btDiv.setText("/");
btDiv.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        btDivActionPerformed(evt);
    }
});

btEqual.setFont(new java.awt.Font("Tahoma", 1, 18)); // NOI18N
btEqual.setText("=");
btEqual.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        btEqualActionPerformed(evt);
    }
});
```

```
javax.swing.GroupLayout layout = new javax.swing.GroupLayout(getContentPane());
getContentPane().setLayout(layout);
layout.setHorizontalGroup(
   layout.createParallelGroup(javax.swing.GroupLayout.Alignment.LEADING)
   .addGroup(layout.createSequentialGroup()
      .addContainerGap()
      .addGroup(layout.createParallelGroup(javax.swing.GroupLayout.Alignment.LEADING)
         .addGroup(javax.swing.GroupLayout.Alignment.TRAILING, layout.createSequentialGroup()
            .addGap(0, 0, Short.MAX_VALUE)
            .addComponent(btSeven, javax.swing.GroupLayout.PREFERRED_SIZE, 64, javax.swing.GroupLayout.PREFERRED_SIZE)
            .addGap(18, 18, 18)
            .addGroup(layout.createParallelGroup(javax.swing.GroupLayout.Alignment.LEADING, false)
               .addComponent(btDelete, javax.swing.GroupLayout.DEFAULT_SIZE, 66, Short.MAX_VALUE)
               .addComponent(btEight, javax.swing.GroupLayout.DEFAULT_SIZE, javax.swing.GroupLayout.DEFAULT_SIZE, Short.MAX_VALUE))
            .addGap(18, 18, 18)
            .addGroup(layout.createParallelGroup(javax.swing.GroupLayout.Alignment.LEADING)
               .addComponent(btCancel, javax.swing.GroupLayout.PREFERRED_SIZE, 64, javax.swing.GroupLayout.PREFERRED_SIZE)
```

```
                .addComponent(btNine, javax.swing.GroupLayout.PREFERRED_SIZE, 62,
javax.swing.GroupLayout.PREFERRED_SIZE))
                .addGap(18, 18, 18)
                .addGroup(layout.createParallelGroup(javax.swing.GroupLayout.Alignment.L
EADING)
                .addComponent(btDiv, javax.swing.GroupLayout.PREFERRED_SIZE, 62,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addComponent(btMul, javax.swing.GroupLayout.PREFERRED_SIZE, 64,
javax.swing.GroupLayout.PREFERRED_SIZE))
                .addGap(20, 20, 20))
            .addGroup(layout.createSequentialGroup()
                .addGroup(layout.createParallelGroup(javax.swing.GroupLayout.Alignment.L
EADING, false)
                .addGroup(layout.createSequentialGroup()
                    .addGroup(layout.createParallelGroup(javax.swing.GroupLayout.Alignm
ent.LEADING)
                        .addGroup(layout.createSequentialGroup()
                            .addComponent(btOne,
javax.swing.GroupLayout.PREFERRED_SIZE,                                    64,
javax.swing.GroupLayout.PREFERRED_SIZE)
                            .addGap(18, 18, 18)
                            .addComponent(btTwo,
javax.swing.GroupLayout.PREFERRED_SIZE,                                    64,
javax.swing.GroupLayout.PREFERRED_SIZE)
                            .addGap(18, 18, 18)
                            .addComponent(btThree,
javax.swing.GroupLayout.PREFERRED_SIZE,                                    64,
javax.swing.GroupLayout.PREFERRED_SIZE))
```

```
                .addGroup(layout.createSequentialGroup()
                    .addComponent(btFour,
javax.swing.GroupLayout.PREFERRED_SIZE,                    64,
javax.swing.GroupLayout.PREFERRED_SIZE)
                    .addGap(18, 18, 18)
                    .addComponent(btFive,
javax.swing.GroupLayout.PREFERRED_SIZE,                    64,
javax.swing.GroupLayout.PREFERRED_SIZE)
                    .addGap(18, 18, 18)
                    .addComponent(btSix,
javax.swing.GroupLayout.PREFERRED_SIZE,                    64,
javax.swing.GroupLayout.PREFERRED_SIZE)))
                .addGap(18, 18, 18)
                .addGroup(layout.createParallelGroup(javax.swing.GroupLayout.Alignm
ent.LEADING)
                    .addComponent(btSubt,
javax.swing.GroupLayout.PREFERRED_SIZE,                    64,
javax.swing.GroupLayout.PREFERRED_SIZE)
                    .addComponent(btAdd, javax.swing.GroupLayout.PREFERRED_SIZE,
64, javax.swing.GroupLayout.PREFERRED_SIZE)))
                .addGroup(layout.createSequentialGroup()
                    .addComponent(btDecimal,
javax.swing.GroupLayout.PREFERRED_SIZE,                    64,
javax.swing.GroupLayout.PREFERRED_SIZE)
                    .addGap(18, 18, 18)
                    .addComponent(btZero,    javax.swing.GroupLayout.PREFERRED_SIZE,
64, javax.swing.GroupLayout.PREFERRED_SIZE)
                    .addGap(18, 18, 18)
```

```
                    .addComponent(btEqual, javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE, Short.MAX_VALUE)))
                .addContainerGap(javax.swing.GroupLayout.DEFAULT_SIZE,
Short.MAX_VALUE))
            .addGroup(layout.createSequentialGroup()
                .addComponent(txtDisplay)
                .addContainerGap())))
    );
    layout.setVerticalGroup(
        layout.createParallelGroup(javax.swing.GroupLayout.Alignment.LEADING)
        .addGroup(layout.createSequentialGroup()
            .addGap(29, 29, 29)
            .addComponent(txtDisplay, javax.swing.GroupLayout.PREFERRED_SIZE, 92,
javax.swing.GroupLayout.PREFERRED_SIZE)
            .addGap(18, 18, 18)
            .addGroup(layout.createParallelGroup(javax.swing.GroupLayout.Alignment.BASE
LINE)
                .addComponent(btDiv, javax.swing.GroupLayout.PREFERRED_SIZE, 46,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addComponent(btCancel, javax.swing.GroupLayout.PREFERRED_SIZE, 47,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addComponent(btDelete, javax.swing.GroupLayout.PREFERRED_SIZE, 47,
javax.swing.GroupLayout.PREFERRED_SIZE))
            .addGap(19, 19, 19)
            .addGroup(layout.createParallelGroup(javax.swing.GroupLayout.Alignment.BASE
LINE)
```

.addComponent(btEight, javax.swing.GroupLayout.PREFERRED_SIZE, 48, javax.swing.GroupLayout.PREFERRED_SIZE)

.addComponent(btNine, javax.swing.GroupLayout.PREFERRED_SIZE, 48, javax.swing.GroupLayout.PREFERRED_SIZE)

.addComponent(btMul, javax.swing.GroupLayout.PREFERRED_SIZE, 47, javax.swing.GroupLayout.PREFERRED_SIZE)

.addComponent(btSeven, javax.swing.GroupLayout.PREFERRED_SIZE, 47, javax.swing.GroupLayout.PREFERRED_SIZE))

.addGap(18, 18, 18)

.addGroup(layout.createParallelGroup(javax.swing.GroupLayout.Alignment.BASELINE)

.addComponent(btSubt, javax.swing.GroupLayout.PREFERRED_SIZE, 46, javax.swing.GroupLayout.PREFERRED_SIZE)

.addComponent(btFive, javax.swing.GroupLayout.PREFERRED_SIZE, 47, javax.swing.GroupLayout.PREFERRED_SIZE)

.addComponent(btSix, javax.swing.GroupLayout.PREFERRED_SIZE, 47, javax.swing.GroupLayout.PREFERRED_SIZE)

.addComponent(btFour, javax.swing.GroupLayout.PREFERRED_SIZE, 47, javax.swing.GroupLayout.PREFERRED_SIZE))

.addGap(18, 18, 18)

.addGroup(layout.createParallelGroup(javax.swing.GroupLayout.Alignment.BASELINE)

.addComponent(btAdd, javax.swing.GroupLayout.PREFERRED_SIZE, 47, javax.swing.GroupLayout.PREFERRED_SIZE)

.addComponent(btThree, javax.swing.GroupLayout.PREFERRED_SIZE, 47, javax.swing.GroupLayout.PREFERRED_SIZE)

.addComponent(btTwo, javax.swing.GroupLayout.PREFERRED_SIZE, 47, javax.swing.GroupLayout.PREFERRED_SIZE)

```
                .addComponent(btOne, javax.swing.GroupLayout.PREFERRED_SIZE, 47, javax.swing.GroupLayout.PREFERRED_SIZE))
            .addGap(18, 18, 18)
            .addGroup(layout.createParallelGroup(javax.swing.GroupLayout.Alignment.BASELINE)
                .addComponent(btZero, javax.swing.GroupLayout.PREFERRED_SIZE, 47, javax.swing.GroupLayout.PREFERRED_SIZE)
                .addComponent(btEqual, javax.swing.GroupLayout.PREFERRED_SIZE, 47, javax.swing.GroupLayout.PREFERRED_SIZE)
                .addComponent(btDecimal, javax.swing.GroupLayout.PREFERRED_SIZE, 47, javax.swing.GroupLayout.PREFERRED_SIZE))
            .addContainerGap(21, Short.MAX_VALUE))
        );

        pack();
    }// </editor-fold>

    private void btZeroActionPerformed(java.awt.event.ActionEvent evt) {
        txtDisplay.setText(txtDisplay.getText() + "0");
    }

    private void btOneActionPerformed(java.awt.event.ActionEvent evt) {
        txtDisplay.setText(txtDisplay.getText() + "1");
    }

    private void btTwoActionPerformed(java.awt.event.ActionEvent evt) {
```

```
    txtDisplay.setText(txtDisplay.getText() + "2");
}

private void btThreeActionPerformed(java.awt.event.ActionEvent evt) {
    txtDisplay.setText(txtDisplay.getText() + "3");
}

private void btFourActionPerformed(java.awt.event.ActionEvent evt) {
    txtDisplay.setText(txtDisplay.getText() + "4");
}

private void btFiveActionPerformed(java.awt.event.ActionEvent evt) {
    txtDisplay.setText(txtDisplay.getText() + "5");
}

private void btSixActionPerformed(java.awt.event.ActionEvent evt) {
    txtDisplay.setText(txtDisplay.getText() + "6");
}

private void btSevenActionPerformed(java.awt.event.ActionEvent evt) {
    txtDisplay.setText(txtDisplay.getText() + "7");
}

private void btEightActionPerformed(java.awt.event.ActionEvent evt) {
```

```
    txtDisplay.setText(txtDisplay.getText() + "8");
}

private void btNineActionPerformed(java.awt.event.ActionEvent evt) {
    txtDisplay.setText(txtDisplay.getText() + "9");
}

private void btDecimalActionPerformed(java.awt.event.ActionEvent evt) {

    if (!txtDisplay.getText().toString().contains("."))
    {
        txtDisplay.setText(txtDisplay.getText() + ".");
    }

}

private void btDeleteActionPerformed(java.awt.event.ActionEvent evt) {

    String number = txtDisplay.getText().toString();
    if (number.length() > 0)
    {
        number = number.substring(0, number.length() - 1);
        txtDisplay.setText(number);
    }
```

```
}

private void btCancelActionPerformed(java.awt.event.ActionEvent evt) {
    txtDisplay.setText("");
    operator = "";
    FirstValue = "";
    SecValue = "";
}

private void btAddActionPerformed(java.awt.event.ActionEvent evt) {
    operator = "+";
    FirstValue = txtDisplay.getText();
    txtDisplay.setText("");
}

private void btSubtActionPerformed(java.awt.event.ActionEvent evt) {
    operator = "-";
    FirstValue = txtDisplay.getText();
    txtDisplay.setText("");
}

private void btMulActionPerformed(java.awt.event.ActionEvent evt) {
    operator = "*";
    FirstValue = txtDisplay.getText();
```

```
    txtDisplay.setText("");
}

private void btDivActionPerformed(java.awt.event.ActionEvent evt) {
    operator = "/";
    FirstValue = txtDisplay.getText();
    txtDisplay.setText("");
}

private void btEqualActionPerformed(java.awt.event.ActionEvent evt) {
    SecValue = txtDisplay.getText();
    txtDisplay.setText("");
    Calculation ();
}

public void Calculation () {

    double FirstNum = Double.valueOf(FirstValue);
    double SecNum = Double.valueOf(SecValue);
    double result = 0.0;

    switch(operator)
    {
```

```
            case "+" :
            result = FirstNum + SecNum;
            break;

            case "-" :
            result = FirstNum - SecNum;
            break;

            case "*" :
            result = FirstNum * SecNum;
            break;

            case "/" :
            result = FirstNum / SecNum;
            break;

        }

        txtDisplay.setText(String.valueOf(result));

}

    public static void main(String args[]) {
```

```
    java.awt.EventQueue.invokeLater(new Runnable() {
        public void run() {
            new Calculator().setVisible(true);
        }
    });
}

// Variables declaration - do not modify
private javax.swing.JButton btAdd;
private javax.swing.JButton btCancel;
private javax.swing.JButton btDecimal;
private javax.swing.JButton btDelete;
private javax.swing.JButton btDiv;
private javax.swing.JButton btEight;
private javax.swing.JButton btEqual;
private javax.swing.JButton btFive;
private javax.swing.JButton btFour;
private javax.swing.JButton btMul;
private javax.swing.JButton btNine;
private javax.swing.JButton btOne;
private javax.swing.JButton btSeven;
private javax.swing.JButton btSix;
private javax.swing.JButton btSubt;
private javax.swing.JButton btThree;
```

```
    private javax.swing.JButton btTwo;
    private javax.swing.JButton btZero;
    private javax.swing.JTextField txtDisplay;
    // End of variables declaration
}
```

OBJECT ORIENTED CONCEPT IMPLEMENTATION

1) ENCAPSULATION

- A programming mechanism that binds together code and the data it manipulates, and that keeps both safe from outside interference and misuse. In an object oriented language, code and data can be bound together in such a way that a self-contained black box is created.

a) private void btDeleteActionPerformed

```
private void btDeleteActionPerformed(java.awt.event.ActionEvent evt) {

    String number = txtDisplay.getText().toString();
    if (number.length() > 0)
    {
        number = number.substring(0, number.length() - 1);
        txtDisplay.setText(number);
    }
}
```

b) public void Calculation

```
public void Calculation () {

    double FirstNum = Double.valueOf(FirstValue);
    double SecNum = Double.valueOf(SecValue);
    double result = 0.0;

    switch(operator)
    {

        case "+" :
        result = FirstNum + SecNum;
        break;

        case "-" :
        result = FirstNum - SecNum;
        break;

        case "*" :
        result = FirstNum * SecNum;
        break;

        case "/" :
        result = FirstNum / SecNum;
        break;

    }
```

Both are public and private data fields. Private data fields cannot be accessed directly. While public data fields can be accessed via public.

2) OBJECTS AND CLASSES

A class is a template that defines the form of an object. It specifies both data and the code that will operate on that data. Java uses a class specification to construct objects. Objects are instances of a class. Thus, a class is essentially a set of plans that specify how to build an object. A class is a logical abstraction.

public class Calculator extends javax.swing.JFrame

```
public class Calculator extends javax.swing.JFrame {

    DefaultListModel<String> Number;

    String FirstValue = "";
    String SecValue = "";
    String operator = "";
```

3) INTERFACE

It is a set of methods that will implemented by a class. It is similar to abstract classes, except that no method can include a body. It is a collection of abstract methods. A class implements an interface, thereby inheriting the abstract methods of the interface. Along with abstract methods, an interface may also contain constants, default methods, static methods, and nested types.

```
    private void btCancelActionPerformed(java.awt.event.ActionEvent evt) {
        txtDisplay.setText("");
        operator = "";
        FirstValue = "";
        SecValue = "";
    }
```

4) INNER CLASS

Java inner class or nested class is a class which is declared inside the class or interface. We use inner classes to logically group classes and interfaces in one place so that it can be more readable and maintainable. Additionally, it can access all the members of outer class including private data members and methods.

```
public static void main(String args[]) {

    java.awt.EventQueue.invokeLater(new Runnable() {
        public void run() {
            new Calculator().setVisible(true);
        }
    });
}
```

5) ABSTRACTION

Abstraction is a process of hiding the implementation details and showing only functionality to the user. Another way, it shows only essential things to the user and hides the internal details. In Java, abstraction means simple things like objects, classes, and variables represent more complex underlying code and data.

```
private void btEqualActionPerformed(java.awt.event.ActionEvent evt) {
    SecValue = txtDisplay.getText();
    txtDisplay.setText("");
    Calculation ();
}
```

READ AND WRITE IMPLEMENTATION

For this project, I use JFrame form. JFrame is a class of the javax.swing package that is extended by java.awt.frame. This is the top-level window, with border and a title bar. JFrame class has various methods which can be used to customize it. JFrame is a top-level container that provides a window on the screen. A frame is actually a base window on which other components rely, namely the menu bar, panels, labels, text fields, buttons, etc. Almost every other Swing application starts with the JFrame window. Unlike a frame, JFrame has the option to hide or close the window with the help of the method setDefaultCloseOperation(int).

```
package calculator;

/*
    Name      : Nur Alani Rifhan Binti Roslan
    Matric no : BI19110104
*/

public class Calculator extends javax.swing.JFrame {


    String FirstValue = "";
    String SecValue = "";
    String operator = "";

    public Calculator() {
        initComponents();
        this.setLocationRelativeTo(null);
    }
```

USER MANUAL

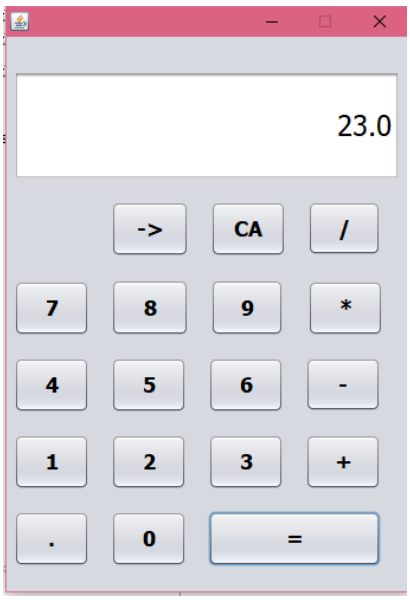
The calculator we have programmed uses simple coding. In this program, the operators come after the operands. No parentheses are used, simply number keys and operators.

1) Open all file in Java Software.
2) Compile and Run the program.
3) To carry out a simple operation, begin by typing your first operand into the keyboard. The number you entered will appear on the screen.

   For example :

   Example : A Basic Calculation // 7 + 16

   - Press the '7' digit key
   - Press the addition operator '+'
   - Press the '1' digit key
   - Press the '6' digit key
   - Lastly press the '=' the equal key.
   - If all is entered correctly, the number '23.0' will appear on the screen as shown in figure below.



CONCLUSION

I learned a great deal about how to code to accomplish a given goal. It seems that in the professional world, a lot of work like this will be necessary. Accuracy and efficiency were key, and I were able to get a first-hand experience at dealing with buggy code. Bugs are not good! It is important to consider all possible scenarios and error-prone cases when writing code. After this in the future I will learn to fully understand the existing code and hardware system before beginning to write my code. This will make the coding process less difficult, and it will improve the overall learning experience.