UMS

UNIVERSITI MALAYSIA SABAH

KP14603 OBJECT ORIENTED PROGRAMMING

SEMESTER II

SESSION 2019/2020

INDIVIDUAL PROJECT REPORT

CALCULATOR

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INTRODUCTION

Calculator is a device that performs arithmetic operation. In this project I have created a simple calculator that can only do addition, subtraction, multiplication, and division operation. I choose to make this kind of project to improve my understanding in basic function of GUI and to understand more about Object Oriented Programming.

The purpose of this project is to provide a simple yet easy to use calculator. I hope with this project, people will feel more convenient and not stress out with calculation in their daily life.

OBJECTIVES

1. To perform number of calculations in response to user supplied input.

2. To make sure that all keys are correctly performing operation on the screen.

3. The create a simple and basic calculator to help people with calculation in their daily life.

JAVA CODE

```
/*
 * NAME: HANA MAGDELINA YUMIL
 * MATRIX NO: BI19110225
 * PROJECT: BASIC CALCULATOR
 */
package basic_calculator;

/**
 *
 * @author BI19110225
 */
public class calculator extends javax.swing.JFrame {

    /**
     * Creates new form calculator
     */

    double num, ans;
    int calculation;

    public calculator() {
        initComponents();
        jRadioButton1.setEnabled(false);
    }

    public void arithmetic_operation(){
        switch(calculation){

            case 1:
        ans = num + Double.parseDouble(jTextField1.getText());
        jTextField1.setText(Double.toString(ans));
        break;

        case 2:
        ans = num - Double.parseDouble(jTextField1.getText());
        jTextField1.setText(Double.toString(ans));
        break;

        case 3:
        ans = num * Double.parseDouble(jTextField1.getText());
        jTextField1.setText(Double.toString(ans));
        break;

        case 4:
```

```
    ans = num / Double.parseDouble(jTextField1.getText());
    jTextField1.setText(Double.toString(ans));
    break;
}
}
public void enabled(){
    jTextField1.setEnabled(true);

    jRadioButton1.setEnabled (false);
    jRadioButton2.setEnabled (true);

    jButton1.setEnabled(true);
    jButton2.setEnabled(true);
    jButton3.setEnabled(true);
    jButton4.setEnabled(true);
    jButton5.setEnabled(true);
    jButton6.setEnabled(true);
    jButton7.setEnabled(true);
    jButton8.setEnabled(true);
    jButton9.setEnabled(true);
    jButton10.setEnabled(true);
    jButton11.setEnabled(true);
    jButton12.setEnabled(true);
    jButton13.setEnabled(true);
    jButton14.setEnabled(true);
    jButton15.setEnabled(true);
    jButton17.setEnabled(true);
    jButton18.setEnabled(true);
    jButton19.setEnabled(true);
}

public void disabled() {
    jTextField1.setEnabled(false);

    jRadioButton1.setEnabled (true);
    jRadioButton2.setEnabled (false);

    jButton1.setEnabled(false);
    jButton2.setEnabled(false);
    jButton3.setEnabled(false);
    jButton4.setEnabled(false);
    jButton5.setEnabled(false);
    jButton6.setEnabled(false);
    jButton7.setEnabled(false);
    jButton8.setEnabled(false);
```

```
    jButton9.setEnabled(false);
    jButton10.setEnabled(false);
    jButton11.setEnabled(false);
    jButton12.setEnabled(false);
    jButton13.setEnabled(false);
    jButton14.setEnabled(false);
    jButton15.setEnabled(false);
    jButton17.setEnabled(false);
    jButton18.setEnabled(false);
    jButton19.setEnabled(false);

}

/**
 * This method is called from within the constructor to initialize the form.
 * WARNING: Do NOT modify this code. The content of this method is always
 * regenerated by the Form Editor.
 */
@SuppressWarnings("unchecked")
// <editor-fold defaultstate="collapsed" desc="Generated Code">
private void initComponents() {

    buttonGroup1 = new javax.swing.ButtonGroup();
    jTextField1 = new javax.swing.JTextField();
    jRadioButton1 = new javax.swing.JRadioButton();
    jRadioButton2 = new javax.swing.JRadioButton();
    jButton1 = new javax.swing.JButton();
    jButton2 = new javax.swing.JButton();
    jButton3 = new javax.swing.JButton();
    jButton4 = new javax.swing.JButton();
    jButton5 = new javax.swing.JButton();
    jButton6 = new javax.swing.JButton();
    jButton7 = new javax.swing.JButton();
    jButton8 = new javax.swing.JButton();
    jButton9 = new javax.swing.JButton();
    jButton10 = new javax.swing.JButton();
    jButton11 = new javax.swing.JButton();
    jButton12 = new javax.swing.JButton();
    jButton13 = new javax.swing.JButton();
    jButton14 = new javax.swing.JButton();
    jButton15 = new javax.swing.JButton();
    jButton17 = new javax.swing.JButton();
    jButton18 = new javax.swing.JButton();
    jButton19 = new javax.swing.JButton();
    jLabel1 = new javax.swing.JLabel();
```

```
setDefaultCloseOperation(javax.swing.WindowConstants.EXIT_ON_CLOSE);
setTitle("Calculator");
setLocation(new java.awt.Point(500, 250));
setResizable(false);
setType(java.awt.Window.Type.UTILITY);

jTextField1.setEditable(false);
jTextField1.setFont(new java.awt.Font("Consolas", 1, 23)); // NOI18N
jTextField1.setHorizontalAlignment(javax.swing.JTextField.RIGHT);

buttonGroup1.add(jRadioButton1);
jRadioButton1.setFont(new java.awt.Font("Consolas", 1, 11)); // NOI18N
jRadioButton1.setText("ON");
jRadioButton1.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jRadioButton1ActionPerformed(evt);
    }
});

buttonGroup1.add(jRadioButton2);
jRadioButton2.setFont(new java.awt.Font("Consolas", 1, 11)); // NOI18N
jRadioButton2.setText("OFF");
jRadioButton2.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jRadioButton2ActionPerformed(evt);
    }
});

jButton1.setFont(new java.awt.Font("Consolas", 1, 15)); // NOI18N
jButton1.setText("C");
jButton1.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jButton1ActionPerformed(evt);
    }
});

jButton2.setFont(new java.awt.Font("Consolas", 1, 14)); // NOI18N
jButton2.setText("<--");
jButton2.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jButton2ActionPerformed(evt);
    }
});
```

```
jButton3.setFont(new java.awt.Font("Consolas", 1, 15)); // NOI18N
jButton3.setText("+");
jButton3.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jButton3ActionPerformed(evt);
    }
});

jButton4.setFont(new java.awt.Font("Consolas", 1, 15)); // NOI18N
jButton4.setText("8");
jButton4.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jButton4ActionPerformed(evt);
    }
});

jButton5.setFont(new java.awt.Font("Consolas", 1, 15)); // NOI18N
jButton5.setText("7");
jButton5.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jButton5ActionPerformed(evt);
    }
});

jButton6.setFont(new java.awt.Font("Consolas", 1, 15)); // NOI18N
jButton6.setText("9");
jButton6.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jButton6ActionPerformed(evt);
    }
});

jButton7.setFont(new java.awt.Font("Consolas", 1, 15)); // NOI18N
jButton7.setText("-");
jButton7.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jButton7ActionPerformed(evt);
    }
});

jButton8.setFont(new java.awt.Font("Consolas", 1, 15)); // NOI18N
jButton8.setText("*");
jButton8.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jButton8ActionPerformed(evt);
```

```
    }
});

jButton9.setFont(new java.awt.Font("Consolas", 1, 15)); // NOI18N
jButton9.setText("5");
jButton9.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jButton9ActionPerformed(evt);
    }
});

jButton10.setFont(new java.awt.Font("Consolas", 1, 15)); // NOI18N
jButton10.setText("4");
jButton10.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jButton10ActionPerformed(evt);
    }
});

jButton11.setFont(new java.awt.Font("Consolas", 1, 15)); // NOI18N
jButton11.setText("6");
jButton11.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jButton11ActionPerformed(evt);
    }
});

jButton12.setFont(new java.awt.Font("Consolas", 1, 15)); // NOI18N
jButton12.setText("/");
jButton12.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jButton12ActionPerformed(evt);
    }
});

jButton13.setFont(new java.awt.Font("Consolas", 1, 15)); // NOI18N
jButton13.setText("2");
jButton13.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jButton13ActionPerformed(evt);
    }
});

jButton14.setFont(new java.awt.Font("Consolas", 1, 15)); // NOI18N
jButton14.setText("1");
```

```
jButton14.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jButton14ActionPerformed(evt);
    }
});

jButton15.setFont(new java.awt.Font("Consolas", 1, 15)); // NOI18N
jButton15.setText("3");
jButton15.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jButton15ActionPerformed(evt);
    }
});

jButton17.setFont(new java.awt.Font("Consolas", 1, 15)); // NOI18N
jButton17.setText(".");
jButton17.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jButton17ActionPerformed(evt);
    }
});

jButton18.setFont(new java.awt.Font("Consolas", 1, 15)); // NOI18N
jButton18.setText("0");
jButton18.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jButton18ActionPerformed(evt);
    }
});

jButton19.setFont(new java.awt.Font("Consolas", 1, 15)); // NOI18N
jButton19.setText("=");
jButton19.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
        jButton19ActionPerformed(evt);
    }
});

jLabel1.setFont(new java.awt.Font("Consolas", 0, 11)); // NOI18N
jLabel1.setForeground(new java.awt.Color(255, 0, 51));
jLabel1.setHorizontalAlignment(javax.swing.SwingConstants.RIGHT);

javax.swing.GroupLayout layout = new javax.swing.GroupLayout(getContentPane());
getContentPane().setLayout(layout);
layout.setHorizontalGroup(
```

```
            layout.createParallelGroup(javax.swing.GroupLayout.Alignment.LEADING)
            .addComponent(jTextField1)
            .addGroup(javax.swing.GroupLayout.Alignment.TRAILING, layout.createSequentialGroup()
                .addGroup(layout.createParallelGroup(javax.swing.GroupLayout.Alignment.LEADING)
                    .addComponent(jRadioButton2)
                    .addGroup(layout.createSequentialGroup()
                        .addComponent(jRadioButton1)
                        .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.RELATED)
                        .addComponent(jButton2)))
                .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.UNRELATED,
javax.swing.GroupLayout.DEFAULT_SIZE, Short.MAX_VALUE)
                .addComponent(jButton1, javax.swing.GroupLayout.PREFERRED_SIZE, 49,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.UNRELATED)
                .addComponent(jButton3, javax.swing.GroupLayout.PREFERRED_SIZE, 49,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addContainerGap())
            .addGroup(layout.createSequentialGroup()
                .addComponent(jButton5, javax.swing.GroupLayout.PREFERRED_SIZE, 49,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.UNRELATED)
                .addComponent(jButton4, javax.swing.GroupLayout.PREFERRED_SIZE, 49,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addGap(10, 10, 10)
                .addComponent(jButton6, javax.swing.GroupLayout.PREFERRED_SIZE, 49,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.RELATED)
                .addComponent(jButton7, javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE, Short.MAX_VALUE))
            .addGroup(layout.createSequentialGroup()
                .addComponent(jButton10, javax.swing.GroupLayout.PREFERRED_SIZE, 49,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.UNRELATED)
                .addComponent(jButton9, javax.swing.GroupLayout.PREFERRED_SIZE, 49,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addGap(10, 10, 10)
                .addComponent(jButton11, javax.swing.GroupLayout.PREFERRED_SIZE, 49,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.RELATED)
                .addComponent(jButton8, javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE, Short.MAX_VALUE))
            .addGroup(javax.swing.GroupLayout.Alignment.TRAILING, layout.createSequentialGroup()
                .addComponent(jButton14, javax.swing.GroupLayout.PREFERRED_SIZE, 49,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.UNRELATED)
```

```
                .addComponent(jButton13, javax.swing.GroupLayout.PREFERRED_SIZE, 49,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addGap(10, 10, 10)
                .addComponent(jButton15, javax.swing.GroupLayout.PREFERRED_SIZE, 49,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.RELATED)
                .addComponent(jButton12, javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE, Short.MAX_VALUE))
            .addGroup(layout.createSequentialGroup()
                .addComponent(jButton18, javax.swing.GroupLayout.PREFERRED_SIZE, 49,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.UNRELATED)
                .addComponent(jButton17, javax.swing.GroupLayout.PREFERRED_SIZE, 49,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addGap(10, 10, 10)
                .addComponent(jButton19, javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE, Short.MAX_VALUE))
            .addGroup(javax.swing.GroupLayout.Alignment.TRAILING, layout.createSequentialGroup()
                .addGap(0, 0, Short.MAX_VALUE)
                .addComponent(jLabel1, javax.swing.GroupLayout.PREFERRED_SIZE, 55,
javax.swing.GroupLayout.PREFERRED_SIZE))
        );
        layout.setVerticalGroup(
            layout.createParallelGroup(javax.swing.GroupLayout.Alignment.LEADING)
            .addGroup(layout.createSequentialGroup()
                .addComponent(jLabel1, javax.swing.GroupLayout.PREFERRED_SIZE, 10,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.RELATED)
                .addComponent(jTextField1, javax.swing.GroupLayout.PREFERRED_SIZE, 43,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.RELATED)
                .addGroup(layout.createParallelGroup(javax.swing.GroupLayout.Alignment.BASELINE)
                    .addComponent(jRadioButton1)
                    .addComponent(jButton1, javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE, Short.MAX_VALUE)
                    .addComponent(jButton3, javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE, Short.MAX_VALUE)
                    .addComponent(jButton2, javax.swing.GroupLayout.DEFAULT_SIZE,
javax.swing.GroupLayout.DEFAULT_SIZE, Short.MAX_VALUE))
                .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.RELATED)
                .addComponent(jRadioButton2)
                .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.RELATED)
                .addGroup(layout.createParallelGroup(javax.swing.GroupLayout.Alignment.BASELINE)
                    .addComponent(jButton4)
                    .addComponent(jButton5)
```

```
                .addComponent(jButton6)
                .addComponent(jButton7))
            .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.RELATED)
            .addGroup(layout.createParallelGroup(javax.swing.GroupLayout.Alignment.BASELINE)
                .addComponent(jButton9)
                .addComponent(jButton10)
                .addComponent(jButton11)
                .addComponent(jButton8))
            .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.RELATED)
            .addGroup(layout.createParallelGroup(javax.swing.GroupLayout.Alignment.BASELINE)
                .addComponent(jButton13)
                .addComponent(jButton14)
                .addComponent(jButton15)
                .addComponent(jButton12))
            .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.RELATED)
            .addGroup(layout.createParallelGroup(javax.swing.GroupLayout.Alignment.BASELINE)
                .addComponent(jButton17)
                .addComponent(jButton18)
                .addComponent(jButton19))
            .addContainerGap())
    );

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

private void jButton1ActionPerformed(java.awt.event.ActionEvent evt) {
    jTextField1.setText("");
}

private void jButton14ActionPerformed(java.awt.event.ActionEvent evt) {
  jTextField1.setText(jTextField1.getText() + "1");
}

private void jButton13ActionPerformed(java.awt.event.ActionEvent evt) {
    jTextField1.setText(jTextField1.getText() + "2");
}

private void jButton15ActionPerformed(java.awt.event.ActionEvent evt) {
    jTextField1.setText(jTextField1.getText() + "3");
}

private void jButton10ActionPerformed(java.awt.event.ActionEvent evt) {
    jTextField1.setText(jTextField1.getText() + "4");
}
```

```
private void jButton9ActionPerformed(java.awt.event.ActionEvent evt) {
    jTextField1.setText(jTextField1.getText() + "5");
}

private void jButton11ActionPerformed(java.awt.event.ActionEvent evt) {
    jTextField1.setText(jTextField1.getText() + "6");
}

private void jButton5ActionPerformed(java.awt.event.ActionEvent evt) {
    jTextField1.setText(jTextField1.getText() + "7");
}

private void jButton4ActionPerformed(java.awt.event.ActionEvent evt) {
    jTextField1.setText(jTextField1.getText() + "8");
}

private void jButton6ActionPerformed(java.awt.event.ActionEvent evt) {
    jTextField1.setText(jTextField1.getText() + "9");
}

private void jButton3ActionPerformed(java.awt.event.ActionEvent evt) {
    num = Double.parseDouble(jTextField1.getText());
    calculation = 1;
    jTextField1.setText("");
    jLabel1.setText(num + "+");
}

private void jButton7ActionPerformed(java.awt.event.ActionEvent evt) {
    num = Double.parseDouble(jTextField1.getText());
    calculation = 2;
    jTextField1.setText("");
    jLabel1.setText(num + "-");
}

private void jButton8ActionPerformed(java.awt.event.ActionEvent evt) {
    num = Double.parseDouble(jTextField1.getText());
    calculation = 3;
    jTextField1.setText("");
    jLabel1.setText(num + "*");
}

private void jButton12ActionPerformed(java.awt.event.ActionEvent evt) {
    num = Double.parseDouble(jTextField1.getText());
    calculation = 4;
    jTextField1.setText("");
```

```
    jLabel1.setText(num + "/");
}

private void jButton17ActionPerformed(java.awt.event.ActionEvent evt) {
    jTextField1.setText(jTextField1.getText() + ".");
}

private void jButton18ActionPerformed(java.awt.event.ActionEvent evt) {
    jTextField1.setText(jTextField1.getText() + "0");
}

private void jRadioButton2ActionPerformed(java.awt.event.ActionEvent evt) {
    disabled();
}

private void jButton19ActionPerformed(java.awt.event.ActionEvent evt) {
arithmetic_operation();
jLabel1.setText("");
}

private void jButton2ActionPerformed(java.awt.event.ActionEvent evt) {
    int length = jTextField1.getText().length();
    int number = jTextField1.getText().length()-1;
    String store;

    if(length > 0)
    {
        StringBuilder back = new StringBuilder(jTextField1.getText());
        back.deleteCharAt(number);
        store = back.toString();
        jTextField1.setText(store);
    }
}

private void jRadioButton1ActionPerformed(java.awt.event.ActionEvent evt) {
    enabled();
}

/**
 * @param args the command line arguments
 */
public static void main(String args[]) {
    /* Set the Nimbus look and feel */
    //<editor-fold defaultstate="collapsed" desc=" Look and feel setting code (optional) ">
    /* If Nimbus (introduced in Java SE 6) is not available, stay with the default look and feel.
```

```
         * For details see http://download.oracle.com/javase/tutorial/uiswing/lookandfeel/plaf.html
         */
        try {
            for (javax.swing.UIManager.LookAndFeelInfo info :
javax.swing.UIManager.getInstalledLookAndFeels()) {
                if ("Nimbus".equals(info.getName())) {
                    javax.swing.UIManager.setLookAndFeel(info.getClassName());
                    break;
                }
            }
        } catch (ClassNotFoundException ex) {

java.util.logging.Logger.getLogger(calculator.class.getName()).log(java.util.logging.Level.SEVERE,
null, ex);
        } catch (InstantiationException ex) {

java.util.logging.Logger.getLogger(calculator.class.getName()).log(java.util.logging.Level.SEVERE,
null, ex);
        } catch (IllegalAccessException ex) {

java.util.logging.Logger.getLogger(calculator.class.getName()).log(java.util.logging.Level.SEVERE,
null, ex);
        } catch (javax.swing.UnsupportedLookAndFeelException ex) {

java.util.logging.Logger.getLogger(calculator.class.getName()).log(java.util.logging.Level.SEVERE,
null, ex);
        }
        //</editor-fold>

        /* Create and display the form */
        java.awt.EventQueue.invokeLater(new Runnable() {
            public void run() {
                new calculator().setVisible(true);
            }
        });
    }

    // Variables declaration - do not modify
    private javax.swing.ButtonGroup buttonGroup1;
    private javax.swing.JButton jButton1;
    private javax.swing.JButton jButton10;
    private javax.swing.JButton jButton11;
    private javax.swing.JButton jButton12;
    private javax.swing.JButton jButton13;
    private javax.swing.JButton jButton14;
```

```
    private javax.swing.JButton jButton15;
    private javax.swing.JButton jButton17;
    private javax.swing.JButton jButton18;
    private javax.swing.JButton jButton19;
    private javax.swing.JButton jButton2;
    private javax.swing.JButton jButton3;
    private javax.swing.JButton jButton4;
    private javax.swing.JButton jButton5;
    private javax.swing.JButton jButton6;
    private javax.swing.JButton jButton7;
    private javax.swing.JButton jButton8;
    private javax.swing.JButton jButton9;
    private javax.swing.JLabel jLabel1;
    private javax.swing.JRadioButton jRadioButton1;
    private javax.swing.JRadioButton jRadioButton2;
    private javax.swing.JTextField jTextField1;
    // End of variables declaration
}
```

OBJECT ORIENTED CONCEPT IMPLEMENTATION

1. Encapsulation

Encapsulation allows us to protect the data stored in a class from system-wide access. As its name suggests, it safeguards the internal contents of a class like a real-life capsule.

1. public void arithmetic_operation()

```
public void arithmetic_operation(){
    switch(calculation){
```

2. public void enabled()

```
public void enabled(){
```

3.

3. public void disabled()

```
public void disabled() {
```

4. public void jButton…..

```
private void jButton1ActionPerformed(java.awt.event.ActionEvent evt) {
    jTextField1.setText("");
}

private void jButton14ActionPerformed(java.awt.event.ActionEvent evt) {
  jTextField1.setText(jTextField1.getText() + "1");
}

private void jButton13ActionPerformed(java.awt.event.ActionEvent evt) {
    jTextField1.setText(jTextField1.getText() + "2");
}

private void jButton15ActionPerformed(java.awt.event.ActionEvent evt) {
    jTextField1.setText(jTextField1.getText() + "3");
}

private void jButton10ActionPerformed(java.awt.event.ActionEvent evt) {
    jTextField1.setText(jTextField1.getText() + "4");
}

private void jButton9ActionPerformed(java.awt.event.ActionEvent evt) {
    jTextField1.setText(jTextField1.getText() + "5");
}
```

In above they all the data fields are private. which cannot be accessed directly. These fields can be accessed via public methods only. Fields are made hidden data fields using encapsulation technique of OOPs.

2. Object & Classes

A class is a user defined blueprint or prototype from which objects are created. It represents the set of properties or methods that are common to all objects of one type.

1. public class calculator extends javax.swing.JFrame {

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

3. Interface

Inside any implementation class, cannot change the variables declared in interface because by default, they are public, static and final. If there are two or more same methods in two interfaces and a class implements both interfaces, implementation of the method once is enough.

1. jButton*ActionPerformed(java.awt.event.ActionEvent evt) {

```
private void jButton3ActionPerformed(java.awt.event.ActionEvent evt) {
    num = Double.parseDouble(jTextField1.getText());
    calculation = 1;
    jTextField1.setText("");
    jLabel1.setText(num + "+");
}

private void jButton7ActionPerformed(java.awt.event.ActionEvent evt) {
    num = Double.parseDouble(jTextField1.getText());
    calculation = 2;
    jTextField1.setText("");
    jLabel1.setText(num + "-");
}

private void jButton8ActionPerformed(java.awt.event.ActionEvent evt) {
    num = Double.parseDouble(jTextField1.getText());
    calculation = 3;
    jTextField1.setText("");
    jLabel1.setText(num + "*");
}

private void jButton12ActionPerformed(java.awt.event.ActionEvent evt) {
    num = Double.parseDouble(jTextField1.getText());
    calculation = 4;
    jTextField1.setText("");
    jLabel1.setText(num + "/");
}
```

4. Inner class

In the above program, there are one nested class. Processor and RAM inside the outer class CPU. We can declare the inner class as protected. Hence, we have declared the RAM class as protected.

1. new calculator().setVisible(true)

```
public static void main(String args[]) {
    /* Set the Nimbus look and feel */
     Look and feel setting code (optional)

    /* Create and display the form */
    java.awt.EventQueue.invokeLater(new Runnable() {
        public void run() {
            new calculator().setVisible(true);
        }
```

5. Abstraction

Abstraction means using simple things to represent complexity. In Java, abstraction means simple things like objects, classes, and variables represent more complex underlying code and data. This is important because it lets avoid repeating the same work multiple times.

```
double num, ans;
int calculation;

public calculator() {
    initComponents();
    jRadioButton1.setEnabled(false);
}

public void arithmetic_operation(){
    switch(calculation){

        case 1:
    ans = num + Double.parseDouble(jTextField1.getText());
    jTextField1.setText(Double.toString(ans));
    break;

    case 2:
    ans = num - Double.parseDouble(jTextField1.getText());
    jTextField1.setText(Double.toString(ans));
    break;

    case 3:
    ans = num * Double.parseDouble(jTextField1.getText());
    jTextField1.setText(Double.toString(ans));
    break;

    case 4:
    ans = num / Double.parseDouble(jTextField1.getText());
    jTextField1.setText(Double.toString(ans));
    break;
}
```

READ AND WRITE IMPLEMENTATION

In this project I use JTextField. JTextField is a lightweight component that allows the editing of a single line of text. JTextField is intended to be source-compatible with java.awt.TextField where it is reasonable to do so. This component has capabilities not found in the java.awt.TextField class. The superclass should be consulted for additional capabilities.

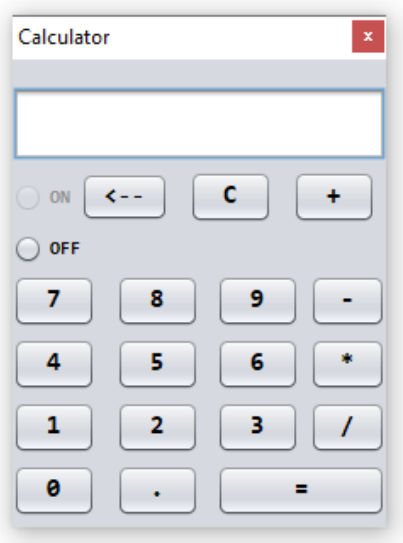
JTextField has a method to establish the string used as the command string for the action event that gets fired. The java.awt.TextField used the text of the field as the command string for the ActionEvent. JTextField will use the command string set with the setActionCommand method if not null, otherwise it will use the text of the field as a compatibility with java.awt.TextField.

```
    case 1:
ans = num + Double.parseDouble(jTextField1.getText());
jTextField1.setText(Double.toString(ans));
break;

case 2:
ans = num - Double.parseDouble(jTextField1.getText());
jTextField1.setText(Double.toString(ans));
break;

case 3:
ans = num * Double.parseDouble(jTextField1.getText());
jTextField1.setText(Double.toString(ans));
break;

case 4:
ans = num / Double.parseDouble(jTextField1.getText());
jTextField1.setText(Double.toString(ans));
break;
```

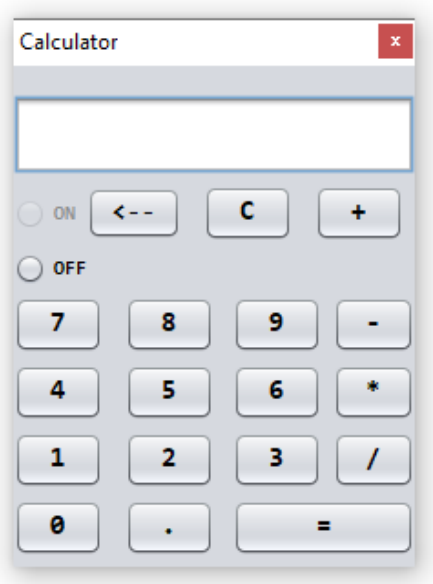
USER MANUAL

This user manual will show how to use this calculator.

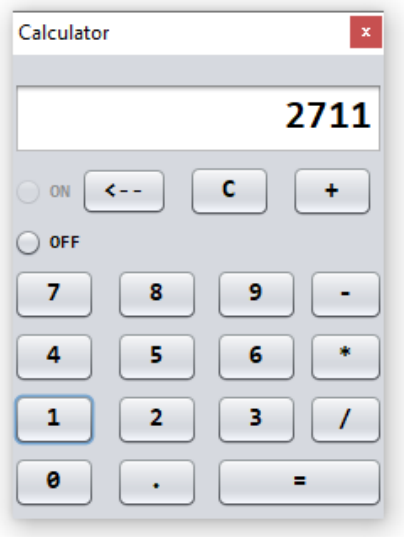
First step, run the project and you will see this GUI.



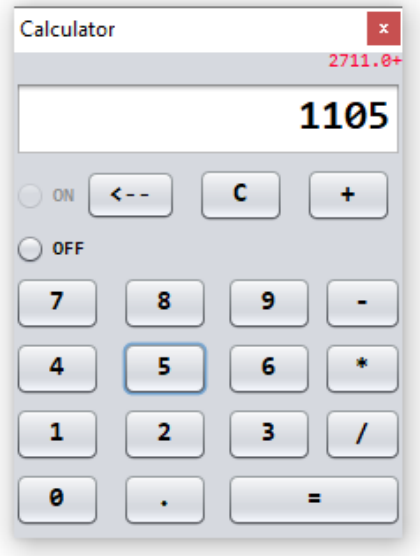
Second, click "ON" button to enable calculator



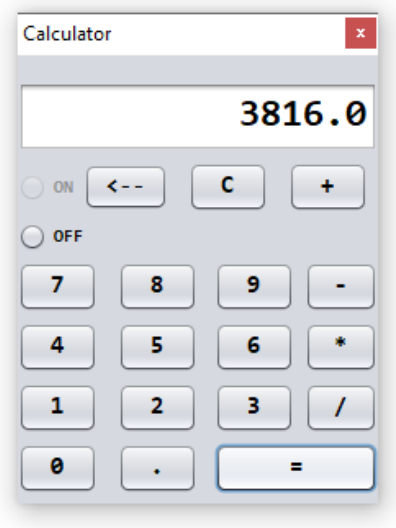
Third, click any number and click operation (for this example I use "+" operation)



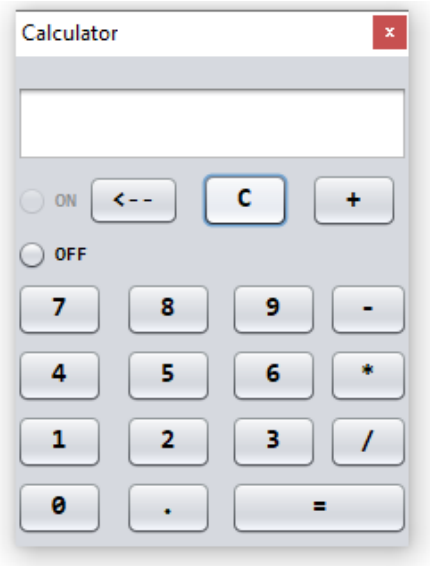
Fourth, number entered earlier will still able to see in pink. Enter next preferred number



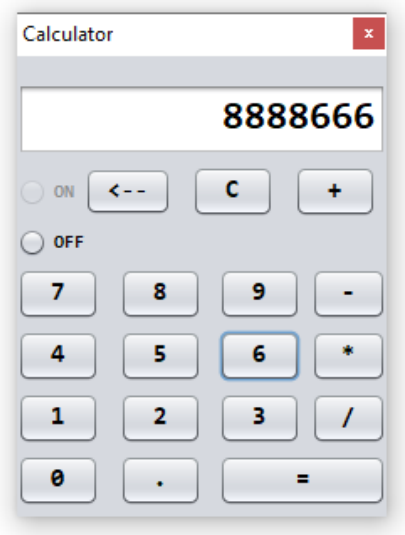
Fifth, click equal "=" button to get the answer

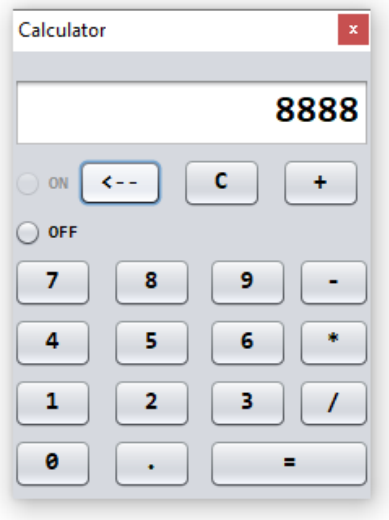


Sixth, if you want to erase old calculation just click on the "C" button



Seventh, if you are about to perform new calculation and you entered some wrong number just click on "←" button to erase it





Lastly, click "OFF" button to disable calculator

CONCLUSION

In conclusion, this is very simple and basic calculator app. Although this is a basic and simple calculator, I believe that this calculator can help people with calculation in their daily life. Last but not least, I will keep improving this calculator system if there are any doubt and complaints from user.