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Abstraction

The java calculator project using swing is a desktop application design to perform basic arithmetic operations. This project leverages java's swing framework to graphical user interface (GUI) that enhance user interaction and usability. The primary objective is to provide user with a simple, intuitive, and functional calculator that can handle mathematical tasks.

KEY FEATURES INCLUDE:

Programming language: java

GUI framework: swing

Development environment: Eclipse/IDLE

CODING

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

class cal implements ActionListener {
double number, answer;
int calculation;
JFrame frame;
JLabel label = new JLabel();
JTextField textField = new JTextField();
JRadioButton onRadioButton = new JRadioButton("on");
JRadioButton offRadioButton = new JRadioButton("off");
JButton buttonZero = new JButton("0");
JButton buttonOne = new JButton("1");
JButton buttonTwo = new JButton("2");
JButton buttonThree = new JButton("3");
JButton buttonFour = new JButton("4");
JButton buttonFive = new JButton("5");
JButton buttonSix = new JButton("6");
JButton buttonSeven = new JButton("7");
JButton buttonEight = new JButton("8");
```

```
JButton buttonNine = new JButton("9");
JButton buttonDot = new JButton(".");
JButton buttonClear = new JButton("C");
JButton buttonDelete = new JButton("DEL");
JButton buttonEqual = new JButton("=");
JButton buttonMul = new JButton("x");
 JButton buttonDiv = new JButton("/");
 JButton buttonPlus = new JButton("+");
JButton buttonMinus = new JButton("-");
 JButton buttonSquare = new JButton("x\u00B2");
 JButton buttonCube = new JButton("x\u00B3");
        JButton buttonReciprocal = new JButton("1/x");
        JButton buttonSqrt = new JButton("\u221A");
        JButton buttonLog = new JButton("log");

        Color pink = new Color(239, 71, 111);
        Color yellow = new Color(255, 209, 102);
        Color green = new Color(6, 214, 160);
        Color pastel = new Color(7, 59, 76);
        cal() {
            prepareGUI();
            addComponents();
            addActionEvent();
```

```
        }
        public void prepareGUI() {
            frame = new JFrame();
            frame.setTitle("Calculator");
            frame.setSize(390, 490);
            frame.getContentPane().setLayout(null);
            frame.getContentPane().setBackground(yellow);
            frame.setResizable(false);
            frame.setLocationRelativeTo(null);
            frame.setVisible(true);

frame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
        }


        public void addComponents() {
            label.setBounds(250, 0, 50, 50);
            label.setForeground(Color.black);
            frame.add(label);

            textField.setBounds(10, 40, 350, 40);
            textField.setFont(new Font("Arial", Font.BOLD,
20));
```

```
        textField.setEditable(false);

textField.setHorizontalAlignment(SwingConstants.RIGHT);
        frame.add(textField);

        onRadioButton.setBounds(10, 95, 60, 40);
        onRadioButton.setSelected(true);
        onRadioButton.setFont(new Font("Arial",
Font.BOLD, 14));
        onRadioButton.setBackground(yellow);
        onRadioButton.setForeground(Color.black);
        frame.add(onRadioButton);

        offRadioButton.setBounds(10, 120, 60, 40);
        offRadioButton.setSelected(false);
        offRadioButton.setFont(new Font("Arial",
Font.BOLD, 14));
        offRadioButton.setBackground(yellow);
        offRadioButton.setForeground(Color.black);
        frame.add(offRadioButton);

        ButtonGroup buttonGroup = new ButtonGroup();
        buttonGroup.add(onRadioButton);
        buttonGroup.add(offRadioButton);
```

```
        buttonSeven.setBounds(10, 230, 80, 40);
        buttonSeven.setFont(new Font("Arial", Font.BOLD,
20));
        buttonSeven.setBackground(pastel);
        buttonSeven.setForeground(Color.white);
        frame.add(buttonSeven);

        buttonEight.setBounds(100, 230, 90, 40);
        buttonEight.setFont(new Font("Arial", Font.BOLD,
20));
        buttonEight.setBackground(pastel);
        buttonEight.setForeground(Color.white);
        frame.add(buttonEight);

        buttonNine.setBounds(200, 230, 80, 40);
        buttonNine.setFont(new Font("Arial", Font.BOLD,
20));
        buttonNine.setBackground(pastel);
        buttonNine.setForeground(Color.white);
        frame.add(buttonNine);

        buttonFour.setBounds(10, 290, 80, 40);
```

```
        buttonFour.setFont(new Font("Arial", Font.BOLD,
20));
        buttonFour.setBackground(pastel);
        buttonFour.setForeground(Color.white);
        frame.add(buttonFour);

        buttonFive.setBounds(100, 290, 90, 40);
        buttonFive.setFont(new Font("Arial", Font.BOLD,
20));
        buttonFive.setBackground(pastel);
        buttonFive.setForeground(Color.white);
        frame.add(buttonFive);

        buttonSix.setBounds(200, 290, 80, 40);
        buttonSix.setFont(new Font("Arial", Font.BOLD,
20));
        buttonSix.setBackground(pastel);
        buttonSix.setForeground(Color.white);
        frame.add(buttonSix);

        buttonOne.setBounds(10, 350, 80, 40);
        buttonOne.setFont(new Font("Arial", Font.BOLD,
20));
        buttonOne.setBackground(pastel);
```

```
        buttonOne.setForeground(Color.white);
        frame.add(buttonOne);

        buttonTwo.setBounds(100, 350, 90, 40);
        buttonTwo.setFont(new Font("Arial", Font.BOLD,
20));
        buttonTwo.setBackground(pastel);
        buttonTwo.setForeground(Color.white);
        frame.add(buttonTwo);

        buttonThree.setBounds(200, 350, 80, 40);
        buttonThree.setFont(new Font("Arial", Font.BOLD,
20));
        buttonThree.setBackground(pastel);
        buttonThree.setForeground(Color.white);
        frame.add(buttonThree);

        buttonDot.setBounds(200, 410, 80, 40);
        buttonDot.setFont(new Font("Arial", Font.BOLD,
20));
        buttonDot.setBackground(pastel);
        buttonDot.setForeground(Color.white);
        frame.add(buttonDot);
```

```
        buttonZero.setBounds(10, 410, 180, 40);
        buttonZero.setFont(new Font("Arial", Font.BOLD,
20));
        buttonZero.setBackground(pastel);
        buttonZero.setForeground(Color.white);
        frame.add(buttonZero);

        buttonEqual.setBounds(300, 350, 60, 100);
        buttonEqual.setFont(new Font("Arial", Font.BOLD,
20));
        buttonEqual.setBackground(green);
        frame.add(buttonEqual);

        buttonDiv.setBounds(300, 110, 60, 40);
        buttonDiv.setFont(new Font("Arial", Font.BOLD,
20));
        buttonDiv.setBackground(green);
        frame.add(buttonDiv);

        buttonLog.setBounds(220, 110, 60, 40);
        buttonLog.setFont(new Font("Arial", Font.BOLD,
12));
        buttonLog.setBackground(green);
        frame.add(buttonLog);
```

```
        buttonSqrt.setBounds(10, 170, 60, 40);
        buttonSqrt.setFont(new Font("Arial", Font.BOLD,
18));
        buttonSqrt.setBackground(green);
        frame.add(buttonSqrt);

        buttonMul.setBounds(300, 230, 60, 40);
        buttonMul.setFont(new Font("Arial", Font.BOLD,
20));
        buttonMul.setBackground(green);
        frame.add(buttonMul);

        buttonMinus.setBounds(300, 170, 60, 40);
        buttonMinus.setFont(new Font("Arial",
Font.BOLD, 20));
        buttonMinus.setBackground(green);
        frame.add(buttonMinus);

        buttonPlus.setBounds(300, 290, 60, 40);
        buttonPlus.setFont(new Font("Arial", Font.BOLD,
20));
        buttonPlus.setBackground(green);
        frame.add(buttonPlus);
```

```
        buttonSquare.setBounds(80, 170, 60, 40);
        buttonSquare.setFont(new Font("Arial",
Font.BOLD, 20));
        buttonSquare.setBackground(green);
        frame.add(buttonSquare);

        buttonCube.setBounds(150, 170, 60, 40);
        buttonCube.setFont(new Font("Arial", Font.BOLD,
20));
        buttonCube.setBackground(green);
        frame.add(buttonCube);

        buttonReciprocal.setBounds(220, 170, 60, 40);
        buttonReciprocal.setFont(new Font("Arial",
Font.BOLD, 15));
        buttonReciprocal.setBackground(green);
        frame.add(buttonReciprocal);

        buttonDelete.setBounds(150, 110, 60, 40);
        buttonDelete.setFont(new Font("Arial",
Font.BOLD, 12));
        buttonDelete.setBackground(pink);
        buttonDelete.setForeground(Color.white);
```

```
        frame.add(buttonDelete);

        buttonClear.setBounds(80, 110, 60, 40);
        buttonClear.setFont(new Font("Arial", Font.BOLD,
12));
        buttonClear.setBackground(pink);
        buttonClear.setForeground(Color.white);
        frame.add(buttonClear);

    }


    public void addActionEvent() {
        onRadioButton.addActionListener(this);
        offRadioButton.addActionListener(this);
        buttonClear.addActionListener(this);
        buttonDelete.addActionListener(this);
        buttonDiv.addActionListener(this);
        buttonSqrt.addActionListener(this);
        buttonSquare.addActionListener(this);
        buttonReciprocal.addActionListener(this);
        buttonMinus.addActionListener(this);
        buttonSeven.addActionListener(this);
```

```
    buttonEight.addActionListener(this);
    buttonNine.addActionListener(this);
    buttonMul.addActionListener(this);
    buttonFour.addActionListener(this);
    buttonFive.addActionListener(this);
    buttonSix.addActionListener(this);
    buttonPlus.addActionListener(this);
    buttonOne.addActionListener(this);
    buttonTwo.addActionListener(this);
    buttonThree.addActionListener(this);
    buttonEqual.addActionListener(this);
    buttonZero.addActionListener(this);
    buttonDot.addActionListener(this);
    buttonLog.addActionListener(this);
    buttonCube.addActionListener(this);
    //buttonFib.addActionListener(this);
    //buttonArm.addActionListener(this);
    //buttonSeries.addActionListener(this);

}

@Override
public void actionPerformed(ActionEvent e) {
```

```
            Object source = e.getSource();

            if (source == onRadioButton) {
                enable();
            }

            else if (source == offRadioButton) {
                disable();
            }
            else if (source == buttonClear) {
                label.setText("");
                textField.setText("");
            }
            else if (source == buttonDelete) {
                int length = textField.getText().length();
                int number = length - 1;
                if (length > 0) {
                    StringBuilder back = new
StringBuilder(textField.getText());
                    back.deleteCharAt(number);
                    textField.setText(back.toString());
                }
                if (textField.getText().endsWith("")) {
```

```
            label.setText("");
        }
    } else if (source == buttonZero) {
        if (textField.getText().equals("0")) {
            return;
        } else {
            textField.setText(textField.getText() + "0");
        }
    }
    else if (source == buttonOne) {
        textField.setText(textField.getText() + "1");
    } else if (source == buttonTwo) {
        textField.setText(textField.getText() + "2");
    } else if (source == buttonThree) {
        textField.setText(textField.getText() + "3");
    } else if (source == buttonFour) {
        textField.setText(textField.getText() + "4");
    } else if (source == buttonFive) {
        textField.setText(textField.getText() + "5");
    } else if (source == buttonSix) {
        textField.setText(textField.getText() + "6");
    } else if (source == buttonSeven) {
        textField.setText(textField.getText() + "7");
```

```
            } else if (source == buttonEight) {
                textField.setText(textField.getText() + "8");
            } else if (source == buttonNine) {
                textField.setText(textField.getText() + "9");

            }else if (source == buttonDot) {
                if (textField.getText().contains(".")) {
                    return;
                } else {
                    textField.setText(textField.getText() + ".");
                }
            }
            else if (source == buttonPlus) {
                String str = textField.getText();
                number =
Double.parseDouble(textField.getText());
                textField.setText("");
                label.setText(str + "+");
                calculation = 1;
            } else if (source == buttonMinus) {
                String str = textField.getText();
                number =
Double.parseDouble(textField.getText());
```

```
                textField.setText("");
                label.setText(str + "-");
                calculation = 2;
            } else if (source == buttonMul) {
                String str = textField.getText();
                number =
Double.parseDouble(textField.getText());
                textField.setText("");
                label.setText(str + "X");
                calculation = 3;
            } else if (source == buttonDiv) {
                String str = textField.getText();
                number =
Double.parseDouble(textField.getText());
                textField.setText("");
                label.setText(str + "/");
                calculation = 4;
            } else if (source == buttonSqrt) {
                number =
Double.parseDouble(textField.getText());
                Double sqrt = Math.sqrt(number);
                textField.setText(Double.toString(sqrt));

            } else if (source == buttonSquare) {
```

```
                String str = textField.getText();
                number =
Double.parseDouble(textField.getText());
                double square = Math.pow(number, 2);
                String string = Double.toString(square);
                if (string.endsWith(".0")) {
                    textField.setText(string.replace(".0", ""));
                } else {
                    textField.setText(string);
                }
                label.setText("(sqr)" + str);
            }
            else if (source == buttonCube) {
                String str = textField.getText();
                number =
Double.parseDouble(textField.getText());
                double cube = Math.pow(number, 3);
                String string = Double.toString(cube);
                if (string.endsWith(".0")) {
                    textField.setText(string.replace(".0", ""));
                } else {
                    textField.setText(string);
                }
```

```
                label.setText("(sqr)" + str);
            }else if (source == buttonReciprocal) {
                number =
Double.parseDouble(textField.getText());
                double reciprocal = 1 / number;
                String string = Double.toString(reciprocal);
                if (string.endsWith(".0")) {
                    textField.setText(string.replace(".0", ""));
                } else {
                    textField.setText(string);
                }
            }else if (source== buttonLog) {
                    String str=textField.getText();

        number=Double.parseDouble(textField.getText());
                    Double log=Math.log(number);
                    String string=Double.toString(log);
                     if (string.endsWith(".0")) {
                         textField.setText(string.replace(".0", ""));
                       } else {
                         textField.setText(string);
                       }
            }
```

```
            else if (source == buttonEqual) {
                switch (calculation) {
                    case 1:
                        answer = number +
Double.parseDouble(textField.getText());
                        if (Double.toString(answer).endsWith(".0"))
{

textField.setText(Double.toString(answer).replace(".0", ""));
                        } else {

textField.setText(Double.toString(answer));
                        }
                        label.setText("");
                        break;
                    case 2:
                        answer = number -
Double.parseDouble(textField.getText());
                        if (Double.toString(answer).endsWith(".0"))
{

textField.setText(Double.toString(answer).replace(".0", ""));
                        } else {

textField.setText(Double.toString(answer));
```

```
                    }
                    label.setText("");
                    break;
                case 3:
                    answer = number *
Double.parseDouble(textField.getText());
                    if (Double.toString(answer).endsWith(".0"))
{
textField.setText(Double.toString(answer).replace(".0", ""));
                    } else {

textField.setText(Double.toString(answer));
                    }
                    label.setText("");
                    break;
                case 4:
                    answer = number /
Double.parseDouble(textField.getText());
                    if (Double.toString(answer).endsWith(".0"))
{
textField.setText(Double.toString(answer).replace(".0", ""));
                    } else {
 textField.setText(Double.toString(answer));
                    }
                    label.setText("");
```

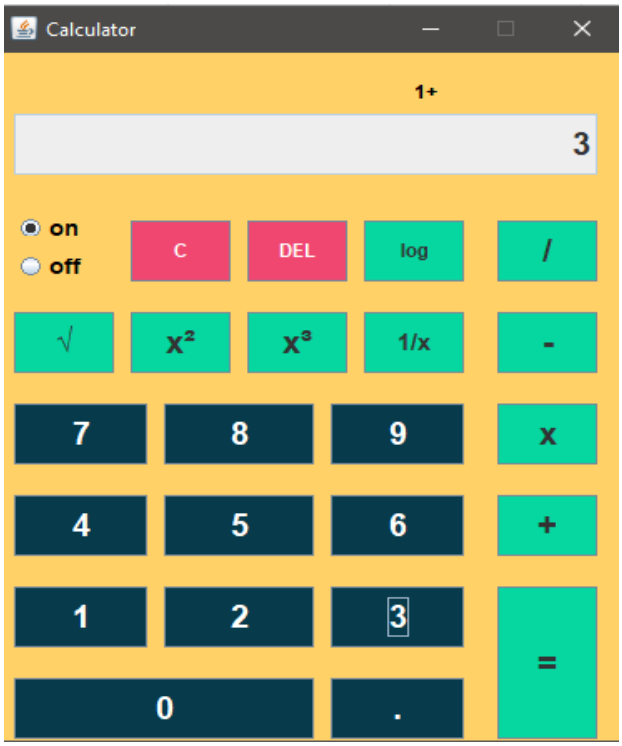
```
                break;
            }
        }
    }
    public void enable() {
        onRadioButton.setEnabled(false);
        offRadioButton.setEnabled(true);
        textField.setEnabled(true);
        label.setEnabled(true);
        buttonClear.setEnabled(true);
        buttonDelete.setEnabled(true);
        buttonLog.setEnabled(true);
        buttonDiv.setEnabled(true);
        buttonSqrt.setEnabled(true);
        buttonSquare.setEnabled(true);
        buttonCube.setEnabled(true);
        buttonReciprocal.setEnabled(true);
        buttonMinus.setEnabled(true);
        buttonSeven.setEnabled(true);
        buttonEight.setEnabled(true);
        buttonNine.setEnabled(true);
        buttonMul.setEnabled(true);
        buttonFour.setEnabled(true);
```

```
        buttonFive.setEnabled(true);
        buttonSix.setEnabled(true);
        buttonPlus.setEnabled(true);
        buttonOne.setEnabled(true);
        buttonTwo.setEnabled(true);
        buttonThree.setEnabled(true);
        buttonEqual.setEnabled(true);
        buttonZero.setEnabled(true);
        buttonDot.setEnabled(true);
    }
    public void disable() {
        onRadioButton.setEnabled(true);
        offRadioButton.setEnabled(false);
        textField.setText("");
        label.setText(" ");
        buttonClear.setEnabled(false);
        buttonDelete.setEnabled(false);
        buttonLog.setEnabled(false);
        buttonDiv.setEnabled(false);
        buttonSqrt.setEnabled(false);
        buttonSquare.setEnabled(false);
        buttonCube.setEnabled(false);
        buttonReciprocal.setEnabled(false);
```

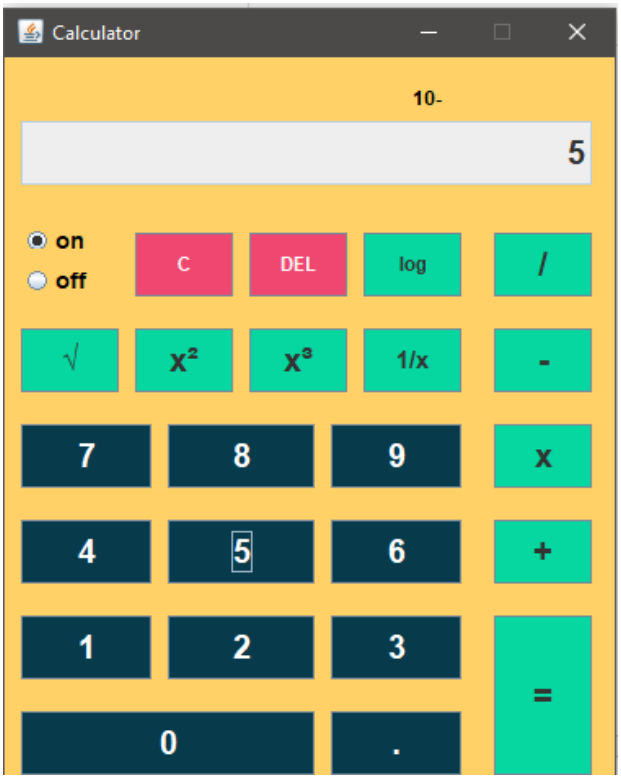
```
        buttonMinus.setEnabled(false);
        buttonSeven.setEnabled(false);
        buttonEight.setEnabled(false);
        buttonNine.setEnabled(false);
        buttonMul.setEnabled(false);
        buttonFour.setEnabled(false);
        buttonFive.setEnabled(false);
        buttonSix.setEnabled(false);
        buttonPlus.setEnabled(false);
        buttonOne.setEnabled(false);
        buttonTwo.setEnabled(false);
        buttonThree.setEnabled(false);
        buttonEqual.setEnabled(false);
        buttonZero.setEnabled(false);
        buttonDot.setEnabled(false);
    }
    public static void main(String[] args)
    {
            new cal();
    }
}
```

OUTPUT:

ADDITION



SUBRACTION



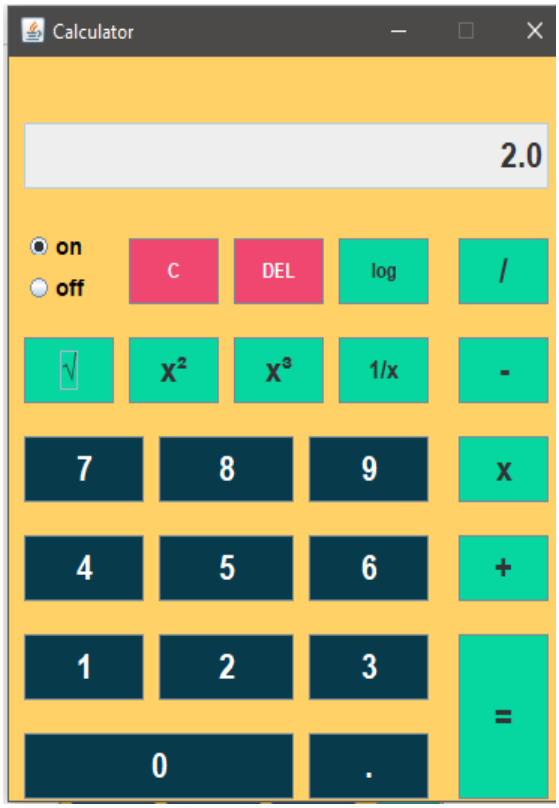
MULTIPLICATION

DIVISION

Square root

cube

Root

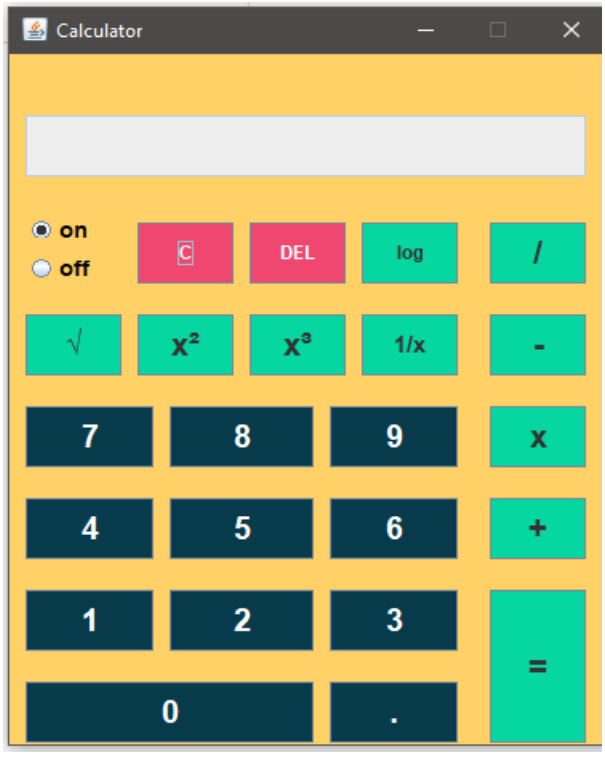


Log


Calculator
5
on
off
C
DEL
log
/
√
x²
x³
1/x
-
7
8
9
x
4
5
6
+
1
2
3
=
0
.


Calculator
1.6094379124341003
on
off
C
DEL
log
/
√
x²
x³
1/x
-
7
8
9
x
4
5
6
+
1
2
3
=
0
.

On


Calculator
on
off
C
DEL
log
/
√
x²
x³
1/x
-
7
8
9
x
4
5
6
+
1
2
3
=
0
.

off


Calculator
on
off
C
DEL
log
/
√
x²
x³
1/x
-
7
8
9
x
4
5
6
+
1
2
3
=
0
.

Future scope:

In future, this application will be enhanced and shown betterment according their user's needs. Some features will be additional added to their respective groups.

- **Scientific calculator**: implement scientific function like trigonometric, logarithmic, and exponential functions to make the calculator more versatile.
- **Statistical functions:** implement functionalities like mean, median, mode, standard deviation, etc. …

Conclusion

The java calculator project using swing showcases essential programming skills and GUI development .it provides a user – friendly interface for basic arithmetic operations, serving as a practical example of event-driven programming. Making it a versatile and valuable application for diverse users