EX: 10 12-09-19	DESIGN OF SCIENTIFIC CALCULATOR

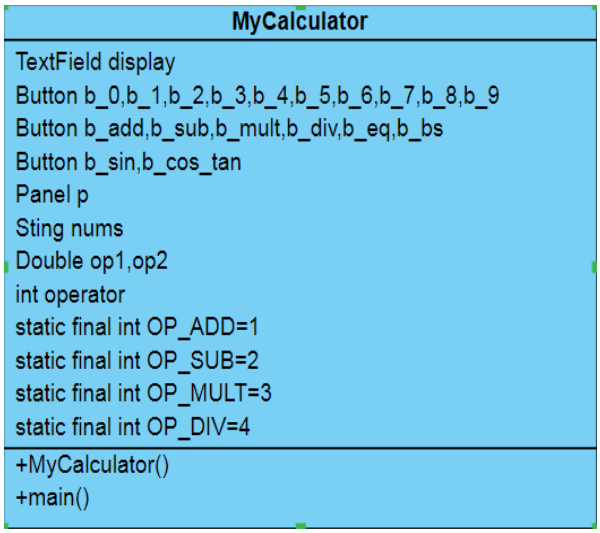
Aim:

To design a calculator using event-driven programming paradigm of Java with Decimal and Scientific manipulations.

Algorithm:

Step 1: Declare a package calc.
Step 2: Declare the class MyCalculator that extends Frame and implements WindowListener and Action Listener.
Step 3: Add textfield, required buttons, panel, and static members.
Step 4: In the constructor, link WindowListener, ActionListener and Panel to the class and add buttons to the panel.
Step 5: Use ActionListener to perform the required actions.

Class Diagram:



Program:

MyCalculator.java

```
/*developed by: Sanjai Kumar
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*/
package calc;
    import java.awt.*;
    import java.awt.event.ActionEvent;
    import java.awt.event.ActionListener;
```

```
import java.awt.event.WindowEvent;
import java.awt.event.WindowListener;
public class MyCalculator extends Frame implements
WindowListener, ActionListener{
	TextField display;
	Button b_0,b_1,b_2,b_3,b_4,b_5,b_6,b_7,b_8,b_9;
	Button b_add,b_sub,b_mult,b_div,b_eq,b_bs;
	Button b_sin,b_cos,b_tan;
	Panel p;
	String nums;
	Double op1,op2;
	int operator;
	static final int OP_ADD=1;
	static final int OP_SUB=2;
	static final int OP_MULT=3;
	static final int OP_DIV=4;
	static final int OP_SIN=5;
	static final int OP_COS=6;
	static final int OP_TAN=7;

	public  MyCalculator() {
		this.addWindowListener(this);
		this.setLayout(new GridLayout(2,1));
		nums="0";

		display=new TextField("0");
		display.setEditable(false);
		this.add(display);

		p=new Panel();
		p.setLayout(new GridLayout(5,4));
		this.add(p);

		b_0= new Button("0");
		b_0.addActionListener(this);
		p.add(b_0);
		b_1= new Button("1");
		b_1.addActionListener(this);
		p.add(b_1);
		b_2= new Button("2");
		b_2.addActionListener(this);
		p.add(b_2);
		b_add= new Button("+");
```

```
b_add.addActionListener(this);
p.add(b_add);
b_3= new Button("3");
b_3.addActionListener(this);
p.add(b_3);
b_4= new Button("4");
b_4.addActionListener(this);
p.add(b_4);
b_5= new Button("5");
b_5.addActionListener(this);
p.add(b_5);
b_sub= new Button("-");
b_sub.addActionListener(this);
p.add(b_sub);
b_6= new Button("6");
b_6.addActionListener(this);
p.add(b_6);
b_7= new Button("7");
b_7.addActionListener(this);
p.add(b_7);
b_8= new Button("8");
b_8.addActionListener(this);
p.add(b_8);
b_mult= new Button("X");
b_mult.addActionListener(this);
p.add(b_mult);
b_9= new Button("9");
b_9.addActionListener(this);
p.add(b_9);
b_eq= new Button("=");
b_eq.addActionListener(this);
p.add(b_eq);
b_bs= new Button("<-");
b_bs.addActionListener(this);
p.add(b_bs);
b_div= new Button("/");
b_div.addActionListener(this);
p.add(b_div);
b_sin=new Button(" sin ");
b_sin.addActionListener(this);
p.add(b_sin);
b_cos=new Button(" cos ");
b_cos.addActionListener(this);
```

```
        p.add(b_cos);
        b_tan=new Button(" tan ");
        b_tan.addActionListener(this);
        p.add(b_tan);

}
public static void main(String[] args) {
        MyCalculator mc = new MyCalculator();
        mc.setSize(400, 500);
        mc.setTitle("Calculator");
        mc.setVisible(true);

}
@Override
public void windowOpened(WindowEvent e) {
        // TODO Auto-generated method stub

}
@Override
public void windowClosing(WindowEvent e) {
        System.exit(0);
}
@Override
public void windowClosed(WindowEvent e) {
        // TODO Auto-generated method stub

}
@Override
public void windowIconified(WindowEvent e) {
        // TODO Auto-generated method stub

}
@Override
public void windowDeiconified(WindowEvent e) {
        // TODO Auto-generated method stub

}
@Override
public void windowActivated(WindowEvent e) {
        // TODO Auto-generated method stub

}
@Override
```

```
public void windowDeactivated(WindowEvent e) {
	// TODO Auto-generated method stub

}
@Override
public void actionPerformed(ActionEvent e) {
	if(e.getSource()==b_0)
	{
		nums=nums+"0";
		display.setText(nums);
	}
	else if(e.getSource()==b_1)
	{
		nums=nums+"1";
		display.setText(nums);
	}
	else if(e.getSource()==b_2)
	{
		nums=nums+"2";
		display.setText(nums);
	}
	else if(e.getSource()==b_3)
	{
		nums=nums+"3";
		display.setText(nums);
	}
	else if(e.getSource()==b_4)
	{
		nums=nums+"4";
		display.setText(nums);
	}
	else if(e.getSource()==b_5)
	{
		nums=nums+"5";
		display.setText(nums);
	}
	else if(e.getSource()==b_6)
	{
		nums=nums+"6";
		display.setText(nums);
	}
	else if(e.getSource()==b_7)
	{
```

```
            nums=nums+"7";
            display.setText(nums);
    }
    else if(e.getSource()==b_8)
    {
            nums=nums+"8";
            display.setText(nums);
    }
    else if(e.getSource()==b_9)
    {
            nums=nums+"9";
            display.setText(nums);
    }
    else if(e.getSource()==b_bs)
    {
            nums=nums.substring(0, nums.length()-1);
            display.setText(nums);
    }
    else if(e.getSource()==b_add)
    {
            op1=Double.parseDouble(nums);
            nums="0";
            display.setText(nums);
            operator=OP_ADD;

    }
    else if(e.getSource()==b_sub)
    {
            op1=Double.parseDouble(nums);
            nums="0";
            display.setText(nums);
            operator=OP_SUB;

    }
    else if(e.getSource()==b_mult)
    {
            op1=Double.parseDouble(nums);
            nums="0";
            display.setText(nums);
            operator=OP_MULT;

    }
    else if(e.getSource()==b_div)
```

```
{
        op1=Double.parseDouble(nums);
        nums="0";
        display.setText(nums);
        operator=OP_DIV;

}
else if(e.getSource()==b_eq)
{
        switch(operator)
        {
                case OP_ADD:
                        op2=Double.parseDouble(nums);
                        nums=" "+(op1+op2);
                        display.setText(nums);
                        break;
                case OP_SUB:
                        op2=Double.parseDouble(nums);
                        nums=" "+(op1-op2);
                        display.setText(nums);
                        break;
                case OP_MULT:
                        op2=Double.parseDouble(nums);
                        nums=" "+(op1*op2);
                        display.setText(nums);
                        break;
                case OP_DIV:
                        op2=Double.parseDouble(nums);
                        nums=" "+(op1/op2);
                        display.setText(nums);
                        break;
        }
}
else if(e.getSource()==b_sin)
{
        op1=Double.parseDouble(nums);
        nums=" "+ Math.sin((op1*Math.PI)/180);
        display.setText(nums);
        operator=OP_SIN;
}
else if(e.getSource()==b_cos)
{
        op1=Double.parseDouble(nums);
```

```
                nums=" "+ Math.cos((op1*Math.PI)/180);
                display.setText(nums);
                operator=OP_COS;
            }
            else if(e.getSource()==b_tan)
            {
                op1=Double.parseDouble(nums);
                nums=" "+ Math.tan((op1*Math.PI)/180);
                display.setText(nums);
                operator=OP_TAN;
            }

        }
    }
```

Output:

Result:

Thus a java console application that uses event-driven programming paradigm of Java to design a calculator with decimal and scientific manipulations is verified.