JAVA Lab
Lab Experiment No 11

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Aim: To write a Java program to illustrate the usage of built in layout manager.

Problem statement:

Write a Java program to create a simple calculator using java AWT elements. Use a grid layout to arrange buttons for the digits and basic operation +, -, /, *. Add a text field to display the results.

Theory:

<u>Explain grid layout manager in detail.</u>

Grid Layout class represents a layout manager with a specified number of rows and columns in a rectangular grid. The Grid Layout container is divided into an equal-sized of rectangles, and one of the components is placed in each rectangle. Every rectangle cell has the same size therefore, they contain a component, which fills the entire cell. When the user changes or adjusts the size of the container, the size of each rectangles changes accordingly.

Constructors of the class:

GridLayout(): It Creates a grid layout with a default of one column per component, in a single row.

GridLayout(int rw, int cl): It creates a grid layout with the specified number of rows and columns.

GridLayout(int rw, int cl, int hgap, int vgap): It creates a grid layout with the specified number of rows and columns with horizontal and vertical gap.

Commonly Used Methods:

addLayoutComponent(String str, Component cmp): Adds the specified component with the specified name to the layout.

setColumns(int cl): Sets the number of columns in this layout to the specified value.

layoutContainer(Container pr): Lays out the specified container using this layout.

toString(): Returns the string representation of this grid layout’s values.

<u>How to add buttons and handle the event of clicking the buttons i.e. explain listeners.</u>

To add button in the java we follow the syntax

Button name_button = new Button(“Label_on_button”);

The event listener is the feature of java that handles the several events for the several objects. Classes for helping in implementing event listeners are present in the java.awt.event.*; package. All the operations are controlled by the events generated by these buttons.

To handle the events generated by these buttons you add action listeners

e.g. button_name.addActionListener(this);.

When the action event occurs, that object's actionPerformed method is invoked.

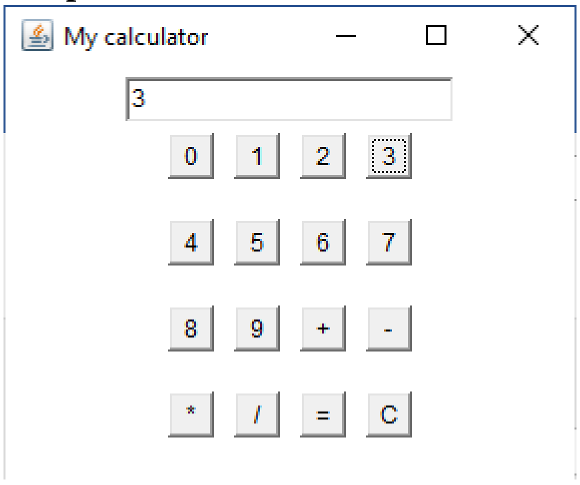
```
actionPerformed(ActionEvent e)
{
        //code
}
```

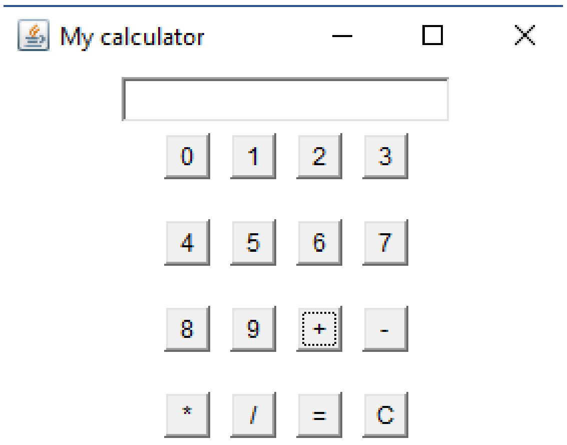
Program:

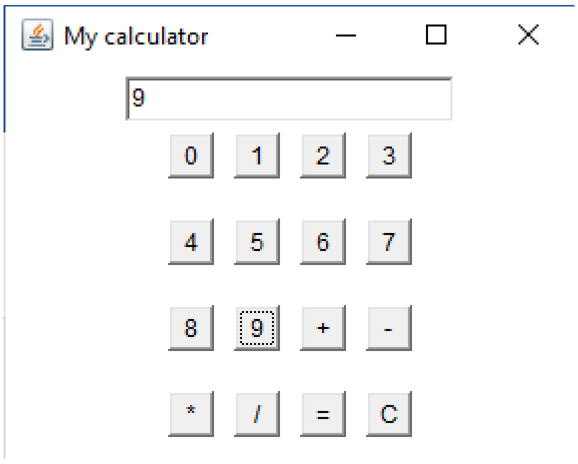
```
import java.awt.*;
import java.awt.event.*;
public class calculator implements ActionListener
{
    int c,n;
    String s1,s2,s3,s4,s5;
    Frame f;
    Button b1,b2,b3,b4,b5,b6,b7,b8,b9,b10,b11,b12,b13,b14,b15,b16,b17;
    Panel p;
    TextField tf;
    GridLayout g;
    calculator()
    {
        f = new Frame("My calculator");
        f.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
        f.setLayout(new FlowLayout());
        p = new Panel();

        //Assigning buttons
        b1 = new Button("0");
        b1.addActionListener(this);
        b2 = new Button("1");
        b2.addActionListener(this);
        b3 = new Button("2");
        b3.addActionListener(this);
        b4 = new Button("3");
        b4.addActionListener(this);
        b5 = new Button("4");
        b5.addActionListener(this);
        b6 = new Button("5");
        b6.addActionListener(this);
        b7 = new Button("6");
        b7.addActionListener(this);
        b8 = new Button("7");
        b8.addActionListener(this);
        b9 = new Button("8");
        b9.addActionListener(this);
        b10 = new Button("9");
        b10.addActionListener(this);
        b11 = new Button("+");
        b11.addActionListener(this);
        b12 = new Button("-");
        b12.addActionListener(this);
        b13 = new Button("*");
        b13.addActionListener(this);
        b14 = new Button("/");
        b14.addActionListener(this);
        b15 = new Button("=");
        b15.addActionListener(this);
        b16 = new Button("C");
        b16.addActionListener(this);
        //Text field to display
        tf = new TextField(20);
        f.add(tf);
        //Setting the layout
        g = new GridLayout(4,4,10,20);
        p.setLayout(g);
        //Adding buttons to it
        p.add(b1);p.add(b2);p.add(b3);p.add(b4);p.add(b5);p.add(b6);p.add(b7);p.add(b8);p.add(b9);
        p.add(b10);p.add(b11);p.add(b12);p.add(b13);p.add(b14);p.add(b15);p.add(b16);
        f.add(p); f.setSize(300,300);  f.setVisible(true);
    }
    public void actionPerformed(ActionEvent e)
    {
        //Performing calculations
        if(e.getSource()==b1)
        {
            s3 = tf.getText();
            s4 = "0";
            s5 = s3+s4;
            tf.setText(s5);
        }
        if(e.getSource()==b2)
        {
            s3 = tf.getText();
            s4 = "1";
            s5 = s3+s4;
            tf.setText(s5);
        }
        if(e.getSource()==b3)
        {
            s3 = tf.getText();
            s4 = "2";
            s5 = s3+s4;
            tf.setText(s5);
        }
        if(e.getSource()==b4)
        {
            s3 = tf.getText();
            s4 = "3";
            s5 = s3+s4;
            tf.setText(s5);
        }
        if(e.getSource()==b5)
        {
            s3 = tf.getText();
            s4 = "4";
            s5 = s3+s4;
            tf.setText(s5);
        }
        if(e.getSource()==b6)
        {
            s3 = tf.getText();
            s4 = "5";
            s5 = s3+s4;
            tf.setText(s5);
        }
        if(e.getSource()==b7)
        {
            s3 = tf.getText();
            s4 = "6";
            s5 = s3+s4;
            tf.setText(s5);
        }
        if(e.getSource()==b8)
        {
            s3 = tf.getText();
            s4 = "7";
            s5 = s3+s4;
            tf.setText(s5);
        }
        if(e.getSource()==b9)
        {
            s3 = tf.getText();
            s4 = "8";
            s5 = s3+s4;
            tf.setText(s5);
        }
        if(e.getSource()==b10)
        {
            s3 = tf.getText();
            s4 = "9";
            s5 = s3+s4;
            tf.setText(s5);
        }
        if(e.getSource()==b11)
        {
            s1 = tf.getText();
            tf.setText("");
            c=1;
        }
         if(e.getSource()==b12)
        {
            s1 = tf.getText();
            tf.setText("");
            c=2;
        }
        if(e.getSource()==b13)
        {
            s1 = tf.getText();
            tf.setText("");
            c=3;
        }
        if(e.getSource()==b14)
        {
            s1 = tf.getText();
             tf.setText("");
```

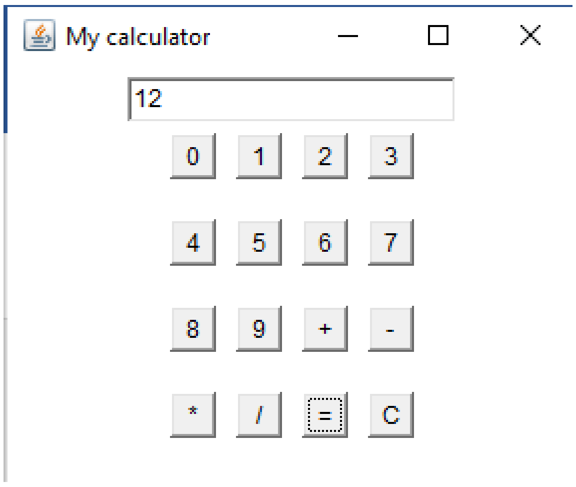
```
            c=4;
        }
        if(e.getSource()==b15)
        {
            s2 = tf.getText();
            if(c==1)
            {
                n = Integer.parseInt(s1)+Integer.parseInt(s2);
                tf.setText(String.valueOf(n));
            }
            else
            if(c==2)
            {
                n = Integer.parseInt(s1)-Integer.parseInt(s2);
                tf.setText(String.valueOf(n));
            }
            else
            if(c==3)
            {
                n = Integer.parseInt(s1)*Integer.parseInt(s2);
                tf.setText(String.valueOf(n));
            }
            if(c==4)
            {
                try
                {
                    int p=Integer.parseInt(s2);
                    if(p!=0)
                    {
                        n = Integer.parseInt(s1)/Integer.parseInt(s2);
                        tf.setText(String.valueOf(n));
                     }
                     else
                        tf.setText("infinite");
                }
                catch(Exception i){}
            }
            if(c==5)
            {
                n = Integer.parseInt(s1)%Integer.parseInt(s2);
                tf.setText(String.valueOf(n));
            }
        }
        if(e.getSource()==b16)
        {
            tf.setText("");
        }
    }
    public static void main(String[] abc)
    {
        calculator v = new calculator();
    }
}
```

Output:


My calculator
3
0
1
2
3
4
5
6
7
8
9
+
-
*
/
=
C


My calculator
0
1
2
3
4
5
6
7
8
9
+
-
*
/
=
C


My calculator
9
0
1
2
3
4
5
6
7
8
9
+
-
*
/
=
C


My calculator
12
0
1
2
3
4
5
6
7
8
9
+
-
*
/
=
C