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**CLASS: SY MCA**

**ROLL NO: 54**

**LAB ASSIGNMENT 3** : Design a java application to demonstrate GUI and event handling using Swing to perform simple ans complext mathematical operations.

**<<SOURCE\_CODE>>**

import java.awt.\*;

import javax.swing.\*;

import java.awt.event.\*;

public class ScientificCalculator extends JFrame implements ActionListener {

    private static final long serialVersionUID = 1L;

    JTextField tfield;

    double temp, temp1, result, a;

    static double m1, m2;

    int k = 1, x = 0, y = 0, z = 0;

    char ch;

    JButton b1, b2, b3, b4, b5, b6, b7, b8, b9, zero, clr, pow2, pow3, exp,

            fac, plus, min, div, log, rec, mul, eq, addSub, dot, mr, mc, mp,

            mm, sqrt, sin, cos, tan;

    Container cont;

    JPanel textPanel, buttonpanel;

    ScientificCalculator() {

        cont = getContentPane();

        cont.setLayout(new BorderLayout());

        JPanel textpanel = new JPanel();

        tfield = new JTextField(25);

        tfield.setHorizontalAlignment(SwingConstants.RIGHT);

        tfield.addKeyListener(new KeyAdapter() {

            public void keyTyped(KeyEvent keyevent) {

                char c = keyevent.getKeyChar();

                if (c >= '0' && c <= '9') {

                } else {

                    keyevent.consume();

                }

            }

        });

        textpanel.add(tfield);

        buttonpanel = new JPanel();

        buttonpanel.setLayout(new GridLayout(8, 4, 2, 2));

        boolean t = true;

        mr = new JButton("MR");

        buttonpanel.add(mr);

        mr.addActionListener(this);

        mc = new JButton("MC");

        buttonpanel.add(mc);

        mc.addActionListener(this);

        mp = new JButton("M+");

        buttonpanel.add(mp);

        mp.addActionListener(this);

        mm = new JButton("M-");

        buttonpanel.add(mm);

        mm.addActionListener(this);

        b1 = new JButton("1");

        buttonpanel.add(b1);

        b1.addActionListener(this);

        b2 = new JButton("2");

        buttonpanel.add(b2);

        b2.addActionListener(this);

        b3 = new JButton("3");

        buttonpanel.add(b3);

        b3.addActionListener(this);

        b4 = new JButton("4");

        buttonpanel.add(b4);

        b4.addActionListener(this);

        b5 = new JButton("5");

        buttonpanel.add(b5);

        b5.addActionListener(this);

        b6 = new JButton("6");

        buttonpanel.add(b6);

        b6.addActionListener(this);

        b7 = new JButton("7");

        buttonpanel.add(b7);

        b7.addActionListener(this);

        b8 = new JButton("8");

        buttonpanel.add(b8);

        b8.addActionListener(this);

        b9 = new JButton("9");

        buttonpanel.add(b9);

        b9.addActionListener(this);

        zero = new JButton("0");

        buttonpanel.add(zero);

        zero.addActionListener(this);

        plus = new JButton("+");

        buttonpanel.add(plus);

        plus.addActionListener(this);

        min = new JButton("-");

        buttonpanel.add(min);

        min.addActionListener(this);

        mul = new JButton("\*");

        buttonpanel.add(mul);

        mul.addActionListener(this);

        div = new JButton("/");

        div.addActionListener(this);

        buttonpanel.add(div);

        addSub = new JButton("+/-");

        buttonpanel.add(addSub);

        addSub.addActionListener(this);

        dot = new JButton(".");

        buttonpanel.add(dot);

        dot.addActionListener(this);

        eq = new JButton("=");

        buttonpanel.add(eq);

        eq.addActionListener(this);

        rec = new JButton("1/x");

        buttonpanel.add(rec);

        rec.addActionListener(this);

        sqrt = new JButton("Sqrt");

        buttonpanel.add(sqrt);

        sqrt.addActionListener(this);

        log = new JButton("log");

        buttonpanel.add(log);

        log.addActionListener(this);

        sin = new JButton("SIN");

        buttonpanel.add(sin);

        sin.addActionListener(this);

        cos = new JButton("COS");

        buttonpanel.add(cos);

        cos.addActionListener(this);

        tan = new JButton("TAN");

        buttonpanel.add(tan);

        tan.addActionListener(this);

        pow2 = new JButton("x^2");

        buttonpanel.add(pow2);

        pow2.addActionListener(this);

        pow3 = new JButton("x^3");

        buttonpanel.add(pow3);

        pow3.addActionListener(this);

        exp = new JButton("Exp");

        exp.addActionListener(this);

        buttonpanel.add(exp);

        fac = new JButton("n!");

        fac.addActionListener(this);

        buttonpanel.add(fac);

        clr = new JButton("AC");

        buttonpanel.add(clr);

        clr.addActionListener(this);

        cont.add("Center", buttonpanel);

        cont.add("North", textpanel);

        setDefaultCloseOperation(JFrame.EXIT\_ON\_CLOSE);

    }

    public void actionPerformed(ActionEvent e) {

        String s = e.getActionCommand();

        if (s.equals("1")) {

            if (z == 0) {

                tfield.setText(tfield.getText() + "1");

            } else {

                tfield.setText("");

                tfield.setText(tfield.getText() + "1");

                z = 0;

            }

        }

        if (s.equals("2")) {

            if (z == 0) {

                tfield.setText(tfield.getText() + "2");

            } else {

                tfield.setText("");

                tfield.setText(tfield.getText() + "2");

                z = 0;

            }

        }

        if (s.equals("3")) {

            if (z == 0) {

                tfield.setText(tfield.getText() + "3");

            } else {

                tfield.setText("");

                tfield.setText(tfield.getText() + "3");

                z = 0;

            }

        }

        if (s.equals("4")) {

            if (z == 0) {

                tfield.setText(tfield.getText() + "4");

            } else {

                tfield.setText("");

                tfield.setText(tfield.getText() + "4");

                z = 0;

            }

        }

        if (s.equals("5")) {

            if (z == 0) {

                tfield.setText(tfield.getText() + "5");

            } else {

                tfield.setText("");

                tfield.setText(tfield.getText() + "5");

                z = 0;

            }

        }

        if (s.equals("6")) {

            if (z == 0) {

                tfield.setText(tfield.getText() + "6");

            } else {

                tfield.setText("");

                tfield.setText(tfield.getText() + "6");

                z = 0;

            }

        }

        if (s.equals("7")) {

            if (z == 0) {

                tfield.setText(tfield.getText() + "7");

            } else {

                tfield.setText("");

                tfield.setText(tfield.getText() + "7");

                z = 0;

            }

        }

        if (s.equals("8")) {

            if (z == 0) {

                tfield.setText(tfield.getText() + "8");

            } else {

                tfield.setText("");

                tfield.setText(tfield.getText() + "8");

                z = 0;

            }

        }

        if (s.equals("9")) {

            if (z == 0) {

                tfield.setText(tfield.getText() + "9");

            } else {

                tfield.setText("");

                tfield.setText(tfield.getText() + "9");

                z = 0;

            }

        }

        if (s.equals("0")) {

            if (z == 0) {

                tfield.setText(tfield.getText() + "0");

            } else {

                tfield.setText("");

                tfield.setText(tfield.getText() + "0");

                z = 0;

            }

        }

        if (s.equals("AC")) {

            tfield.setText("");

            x = 0;

            y = 0;

            z = 0;

        }

        if (s.equals("log")) {

            if (tfield.getText().equals("")) {

                tfield.setText("");

            } else {

                a = Math.log(Double.parseDouble(tfield.getText()));

                tfield.setText("");

                tfield.setText(tfield.getText() + a);

            }

        }

        if (s.equals("1/x")) {

            if (tfield.getText().equals("")) {

                tfield.setText("");

            } else {

                a = 1 / Double.parseDouble(tfield.getText());

                tfield.setText("");

                tfield.setText(tfield.getText() + a);

            }

        }

        if (s.equals("Exp")) {

            if (tfield.getText().equals("")) {

                tfield.setText("");

            } else {

                a = Math.exp(Double.parseDouble(tfield.getText()));

                tfield.setText("");

                tfield.setText(tfield.getText() + a);

            }

        }

        if (s.equals("x^2")) {

            if (tfield.getText().equals("")) {

                tfield.setText("");

            } else {

                a = Math.pow(Double.parseDouble(tfield.getText()), 2);

                tfield.setText("");

                tfield.setText(tfield.getText() + a);

            }

        }

        if (s.equals("x^3")) {

            if (tfield.getText().equals("")) {

                tfield.setText("");

            } else {

                a = Math.pow(Double.parseDouble(tfield.getText()), 3);

                tfield.setText("");

                tfield.setText(tfield.getText() + a);

            }

        }

        if (s.equals("+/-")) {

            if (x == 0) {

                tfield.setText("-" + tfield.getText());

                x = 1;

            } else {

                tfield.setText(tfield.getText());

            }

        }

        if (s.equals(".")) {

            if (y == 0) {

                tfield.setText(tfield.getText() + ".");

                y = 1;

            } else {

                tfield.setText(tfield.getText());

            }

        }

        if (s.equals("+")) {

            if (tfield.getText().equals("")) {

                tfield.setText("");

                temp = 0;

                ch = '+';

            } else {

                temp = Double.parseDouble(tfield.getText());

                tfield.setText("");

                ch = '+';

                y = 0;

                x = 0;

            }

            tfield.requestFocus();

        }

        if (s.equals("-")) {

            if (tfield.getText().equals("")) {

                tfield.setText("");

                temp = 0;

                ch = '-';

            } else {

                x = 0;

                y = 0;

                temp = Double.parseDouble(tfield.getText());

                tfield.setText("");

                ch = '-';

            }

            tfield.requestFocus();

        }

        if (s.equals("/")) {

            if (tfield.getText().equals("")) {

                tfield.setText("");

                temp = 1;

                ch = '/';

            } else {

                x = 0;

                y = 0;

                temp = Double.parseDouble(tfield.getText());

                ch = '/';

                tfield.setText("");

            }

            tfield.requestFocus();

        }

        if (s.equals("\*")) {

            if (tfield.getText().equals("")) {

                tfield.setText("");

                temp = 1;

                ch = '\*';

            } else {

                x = 0;

                y = 0;

                temp = Double.parseDouble(tfield.getText());

                ch = '\*';

                tfield.setText("");

            }

            tfield.requestFocus();

        }

        if (s.equals("MC")) {

            m1 = 0;

            tfield.setText("");

        }

        if (s.equals("MR")) {

            tfield.setText("");

            tfield.setText(tfield.getText() + m1);

        }

        if (s.equals("M+")) {

            if (k == 1) {

                m1 = Double.parseDouble(tfield.getText());

                k++;

            } else {

                m1 += Double.parseDouble(tfield.getText());

                tfield.setText("" + m1);

            }

        }

        if (s.equals("M-")) {

            if (k == 1) {

                m1 = Double.parseDouble(tfield.getText());

                k++;

            } else {

                m1 -= Double.parseDouble(tfield.getText());

                tfield.setText("" + m1);

            }

        }

        if (s.equals("Sqrt")) {

            if (tfield.getText().equals("")) {

                tfield.setText("");

            } else {

                a = Math.sqrt(Double.parseDouble(tfield.getText()));

                tfield.setText("");

                tfield.setText(tfield.getText() + a);

            }

        }

        if (s.equals("SIN")) {

            if (tfield.getText().equals("")) {

                tfield.setText("");

            } else {

                a = Math.sin(Double.parseDouble(tfield.getText()));

                tfield.setText("");

                tfield.setText(tfield.getText() + a);

            }

        }

        if (s.equals("COS")) {

            if (tfield.getText().equals("")) {

                tfield.setText("");

            } else {

                a = Math.cos(Double.parseDouble(tfield.getText()));

                tfield.setText("");

                tfield.setText(tfield.getText() + a);

            }

        }

        if (s.equals("TAN")) {

            if (tfield.getText().equals("")) {

                tfield.setText("");

            } else {

                a = Math.tan(Double.parseDouble(tfield.getText()));

                tfield.setText("");

                tfield.setText(tfield.getText() + a);

            }

        }

        if (s.equals("=")) {

            if (tfield.getText().equals("")) {

                tfield.setText("");

            } else {

                temp1 = Double.parseDouble(tfield.getText());

                switch (ch) {

                case '+':

                    result = temp + temp1;

                    break;

                case '-':

                    result = temp - temp1;

                    break;

                case '/':

                    result = temp / temp1;

                    break;

                case '\*':

                    result = temp \* temp1;

                    break;

                }

                tfield.setText("");

                tfield.setText(tfield.getText() + result);

                z = 1;

            }

        }

        if (s.equals("n!")) {

            if (tfield.getText().equals("")) {

                tfield.setText("");

            } else {

                a = fact(Double.parseDouble(tfield.getText()));

                tfield.setText("");

                tfield.setText(tfield.getText() + a);

            }

        }

        tfield.requestFocus();

    }

    double fact(double x) {

        int er = 0;

        if (x < 0) {

            er = 20;

            return 0;

        }

        double i, s = 1;

        for (i = 2; i <= x; i += 1.0)

            s \*= i;

        return s;

    }

    public static void main(String args[]) {

        try {

            UIManager

                    .setLookAndFeel("com.sun.java.swing.plaf.windows.WindowsLookAndFeel");

        } catch (Exception e) {

        }

        ScientificCalculator f = new ScientificCalculator();

        f.setTitle("ScientificCalculator");

        f.pack();

        f.setVisible(true);

    }

}

**<<OUTPUT>>**

