南开大学

JAVA 语言与应用

图形化计算器实验报告

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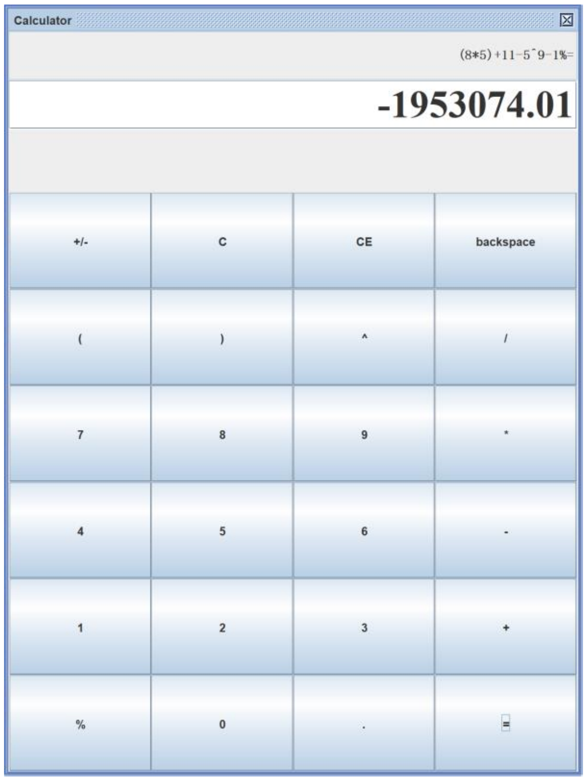
一、概述：

本作业为图形化计算器。本作业实现的功能有：加减乘除、括号运算、小数运算、乘方运算、负数运算、百分数、退格、清除上一次输入数字等

二、运行展示：

运行效果截图：



```
(8*5)+11-5^9-1%=
-1953074.01
```

附录：完整代码

```
package Interface;

import cacu.Caculor;

import javax.swing.*;

import java.awt.*;
import java.awt.event.*;
```

```
public class Interface extends JFrame{

        public Interface(String title) {
                super(title);

                GridLayout textLayout = new GridLayout(2,1);
                JPanel textPanel = new JPanel(textLayout);
                JTextField preTextField = new JTextField("0");

        preTextField.setEditable(false);

        preTextField.setHorizontalAlignment(JTextField.RIGHT);
                preTextField.setFont(new Font("宋体", Font.BOLD, 14));
                preTextField.setBounds(0, 0, 500, 20);

                JTextField numlineField=new JTextField("0");

        numlineField.setBounds(22,22,500,50);

        numlineField.setHorizontalAlignment(JTextField.RIGHT);

        numlineField.setFont(new Font("Times New Roman",Font.BOLD,40));

        textPanel.add(preTextField);
        textPanel.add(numlineField);

                GridLayout butGridLayout=new GridLayout(6,4);
                JPanel butPanel=new JPanel(butGridLayout);

        butPanel.setPreferredSize(new Dimension(600,600));
                {
                        butPanel.add(new JButton("+/-"));
                        butPanel.add(new JButton("C"));
                        butPanel.add(new JButton("CE"));
                        butPanel.add(new JButton("backspace"));
                        butPanel.add(new JButton("("));
                        butPanel.add(new JButton(")"));
                        butPanel.add(new JButton("^"));
                        butPanel.add(new JButton("/"));
                        butPanel.add(new JButton("7"));
                        butPanel.add(new JButton("8"));
                        butPanel.add(new JButton("9"));
                        butPanel.add(new JButton("*"));
```

```
			butPanel.add(new
JButton("4"));
			butPanel.add(new
JButton("5"));
			butPanel.add(new
JButton("6"));
			butPanel.add(new
JButton("-"));
			butPanel.add(new
JButton("1"));
			butPanel.add(new
JButton("2"));
			butPanel.add(new
JButton("3"));
			butPanel.add(new
JButton("+"));
			butPanel.add(new
JButton("%"));
			butPanel.add(new
JButton("0"));
			butPanel.add(new
JButton("."));
			butPanel.add(new
JButton("="));
		}

		class buttonListener
implements ActionListener{
			@Override
			public void
actionPerformed(ActionEvent e){
				String
what=((JButton) e.getSource()).getText();

	preTextField.setText(numlineFie
ld.getText()+"=");

	switch(what){

	case "CE":

	int
tmp=numlineField.getText().length()-1;

	while(tmp>0){


	if(numlineField.getText().charAt
(tmp)<'0'||numlineField.getText().charAt
(tmp)>'9'){

			break;

		}

		tmp--;

	}

	numlineField.setText(numlineFie
ld.getText().substring(0,tmp+1));

	break;

	case "C":

	numlineField.setText("0");

	break;

	case"+/-":
```

```
numlineField.setText(numlineField.getText().equals("0") ? "0" : "-"+numlineField.getText());
break;
case "=":
numlineField.setText(new Caculor().caculate(numlineField.getText()));
break;
case "backspace":
if(numlineField.getText().length()==1) {
numlineField.setText("0");
    break;
}
numlineField.setText(numlineField.getText().equals("0") ? "0" : numlineField.getText().substring(0,numlineField.getText().length()-1));
break;
default:
numlineField.setText(numlineField.getText().equals("0") ? what : numlineField.getText() + what);
                    }
                }
            }

    this.add(BorderLayout.NORTH,textPanel);
    this.add(BorderLayout.SOUTH,butPanel);
        for (int i=0;i<24;i++) {
            ((JButton) butPanel.getComponent(i)).addActionListener(new buttonListener());
        }
    }
    public static void main(String[] args) {
       Interface startInterface=new Interface("Calculator");
    startInterface.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
        startInterface.setSize(600, 800);
    startInterface.setUndecorated(true); // 去掉窗口的装饰
```

```
            startInterface.getRootPane().setWindowDecorationStyle(JRootPane.PLAIN_DIALOG);//采用指定的窗口装饰风格

            startInterface.setVisible(true);
            }
}

package cacu;

import java.util.Stack;

public class Caculor {

    //stack of numbers
    private Stack<Double> numbers = new Stack<Double>();
    //stack of operands
    private Stack<Character> operands = new Stack<Character>();


    public String caculate(String exp) {
        String tmp=cacuExpressions(exp).toString();
        numbers.clear();
        operands.clear();
        return tmp;
    }

    //get the priority of the operator
    private int getPriority(char op) {
        switch (op) {
            case '+':
            case '-':
                return 1;
            case '*':
            case '/':
                return 2;
            case '^':
                return 3;
            default:
                return -1;
        }
    }

    //calculate the number of operators in a string expression
    private int getOperatorNum(String exp) {
        int num = 0;
        for (int i = 0; i < exp.length(); i++) {
            if (exp.charAt(i) == '+' || exp.charAt(i) == '-' || exp.charAt(i) == '*' || exp.charAt(i) == '/' || exp.charAt(i) == '^') {
                num++;
            }
        }
        return num;
    }

    //calculate the top two numbers and the top operator, no input validation
    private void cacuTwoNumbers() {
        double num1 = numbers.pop();
        double num2 = numbers.pop();
        switch (operands.pop()) {
            case '+':
                numbers.push(num2 + num1);
                break;
            case '-':
                numbers.push(num2 - num1);
                break;
            case '*':
                numbers.push(num2 * num1);
                break;
            case '/':
                numbers.push(num2 / num1);
                break;
            case '^':
numbers.push(Math.pow(num2, num1));
                break;
        }
    }

    private void numfixer(String exp,int i,int j){
        Double tmp;
        if(i==0&&exp.charAt(i-1) == '-'){
            numbers.push(0.0);
        }
        tmp = exp.charAt(j-1)=='%'?Double.parseDouble(exp.substring(i, j-1))/100:Double.parseDouble(exp.substring(i, j));

        numbers.push(tmp);
    }

    //caculate the result of the infix expression
    private Double cacuExpressions(String exp) {
        int num = getOperatorNum(exp);
        if (num == 0) {
            return Double.parseDouble(exp);
        }
        if(num == 1) {
            for (int i = 0; i < exp.length(); i++) {
                if (exp.charAt(i) >= '0' && exp.charAt(i) <= '9') {
                    int j = i;
                    while (j < exp.length() && ((exp.charAt(j) >= '0' && exp.charAt(j) <= '9')
                            ||exp.charAt(j) =='.'||exp.charAt(j) == '%')) {
                        j++;
                    }
                    numfixer(exp,i,j);
                    i = j - 1;
                }else{
operands.push(exp.charAt(i));
                }
            }
            cacuTwoNumbers();
            return numbers.pop();
        }
        for (int i = 0; i < exp.length(); i++) {
            if (exp.charAt(i) >= '0' && exp.charAt(i) <= '9') {
                int j = i;
                while (j < exp.length() && ((exp.charAt(j) >= '0' && exp.charAt(j) <= '9')
                        ||exp.charAt(j) =='.'||exp.charAt(j) == '%')) {
                    j++;
                }
                numfixer(exp,i,j);
                i = j - 1;
            } else {
                if (exp.charAt(i) == '(') {
operands.push(exp.charAt(i));
                } else if (exp.charAt(i) == ')') {
                    while (operands.peek() != '(') {
                        cacuTwoNumbers();
                    }
                    operands.pop();
                } else {
                    while (!operands.empty() && (getPriority(exp.charAt(i)) <= getPriority(operands.peek()))) {
                        cacuTwoNumbers();
                    }
operands.push(exp.charAt(i));
                }
            }
        }
        while (!operands.empty()) {
            cacuTwoNumbers();
        }
        return numbers.pop();
    }



}
```