Министерство науки и высшего образования Российской Федерации

Пензенский государственный университет

Кафедра «Вычислительная техника»

**ОТЧЕТ**

по лабораторной работе №5

по курсу «Программирование на языке Java»

на тему «Многопоточность в Java»

Вариант №8

Выполнили студенты группы 20ВВП2:

Шадрин Д.А.

Приняли:

Юрова О. В.

Карамышева Н. С.

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**Цель работы:** научиться создавать многопоточные приложения c использованием стандартных средств языка Java.

**Лабораторное задание:**

Модифицировать приложение из предыдущей лабораторной работы, реализовав вычисление определенного интеграла в нескольких дополнительных потоках (число потоков определяется номером варианта), 15 снимая нагрузку с основного потока и предотвращая "подвисание" графического интерфейса. Варианты с номерами до 5 включительно реализуют многопоточность путем наследования от класса Thread, остальные реализуют интерфейс Runnable. Оформление лабораторной работы должно быть выполнено в соответствии с требованиями, приведенными в Приложении 2.

**Результат выполнения программы:**

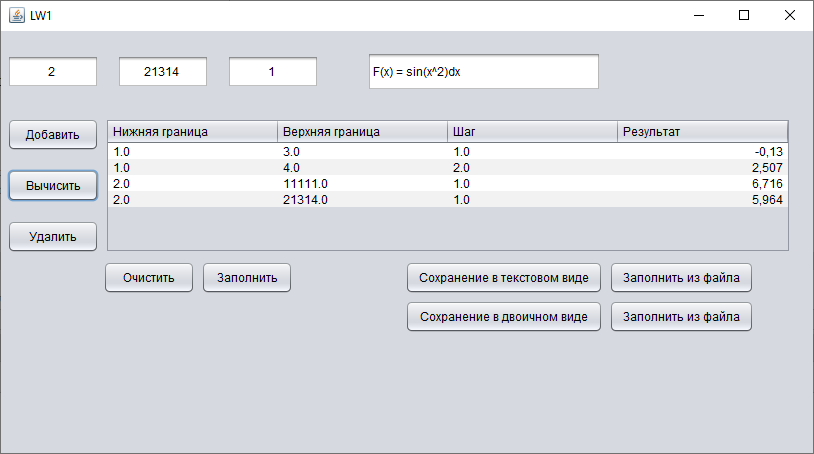


Рисунок 1 — Подсчет результата

**Вывод:** В ходе выполнения данной лабораторной работы я научился создавать многопоточные приложения c использованием стандартных средств языка Java.

**Листинг:**

/\*

\* Click nbfs://nbhost/SystemFileSystem/Templates/Licenses/license-default.txt to change this license

\* Click nbfs://nbhost/SystemFileSystem/Templates/GUIForms/JFrame.java to edit this template

\*/

import javax.swing.table.DefaultTableModel;

import static java.lang.Math.\*;

import java.util.\*;

import javax.swing.\*;

import java.io.\*;

import javax.swing.filechooser.FileNameExtensionFilter;

import java.net.Socket;

import java.net.UnknownHostException;

import java.util.logging.Level;

import java.util.logging.Logger;

/\*\*

\*

\* @author sdxop

\*/

public class LW\_UI extends javax.swing.JFrame {

Socket client;

/\*\*

\* Creates new form LW\_UI

\*/

public LW\_UI() throws IOException{

client = new Socket("localhost", 8081);

initComponents();

}

/\*\*

\* This method is called from within the constructor to initialize the form.

\* WARNING: Do NOT modify this code. The content of this method is always

\* regenerated by the Form Editor.

\*/

@SuppressWarnings("unchecked")

// <editor-fold defaultstate="collapsed" desc="Generated Code">//GEN-BEGIN:initComponents

private void initComponents() {

jTextField1 = new javax.swing.JTextField();

jTextField2 = new javax.swing.JTextField();

jTextField3 = new javax.swing.JTextField();

jScrollPane1 = new javax.swing.JScrollPane();

jTable1 = new javax.swing.JTable();

jButton1 = new javax.swing.JButton();

jButton2 = new javax.swing.JButton();

jButton3 = new javax.swing.JButton();

jTextField4 = new javax.swing.JTextField();

jButton4 = new javax.swing.JButton();

jButton5 = new javax.swing.JButton();

jButton6 = new javax.swing.JButton();

jButton7 = new javax.swing.JButton();

jButton8 = new javax.swing.JButton();

jButton9 = new javax.swing.JButton();

setDefaultCloseOperation(javax.swing.WindowConstants.EXIT\_ON\_CLOSE);

setTitle("LW1");

jTextField1.setHorizontalAlignment(javax.swing.JTextField.CENTER);

jTextField1.setText("Ниж. гран");

jTextField2.setHorizontalAlignment(javax.swing.JTextField.CENTER);

jTextField2.setText("Верх. гран");

jTextField2.setToolTipText("");

jTextField3.setHorizontalAlignment(javax.swing.JTextField.CENTER);

jTextField3.setText("Шаг");

jTable1.setModel(new javax.swing.table.DefaultTableModel(

new Object [][] {

},

new String [] {

"Нижняя граница", "Верхняя граница", "Шаг", "Результат"

}

) {

Class[] types = new Class [] {

java.lang.Object.class, java.lang.Object.class, java.lang.Object.class, java.lang.Double.class

};

boolean[] canEdit = new boolean [] {

true, true, true, false

};

public Class getColumnClass(int columnIndex) {

return types [columnIndex];

}

public boolean isCellEditable(int rowIndex, int columnIndex) {

return canEdit [columnIndex];

}

});

jScrollPane1.setViewportView(jTable1);

if (jTable1.getColumnModel().getColumnCount() > 0) {

jTable1.getColumnModel().getColumn(2).setResizable(false);

jTable1.getColumnModel().getColumn(3).setResizable(false);

}

jButton1.setText("Вычисить");

jButton1.addActionListener(new java.awt.event.ActionListener() {

public void actionPerformed(java.awt.event.ActionEvent evt) {

jButton1ActionPerformed(evt);

}

});

jButton2.setText("Удалить");

jButton2.addActionListener(new java.awt.event.ActionListener() {

public void actionPerformed(java.awt.event.ActionEvent evt) {

jButton2ActionPerformed(evt);

}

});

jButton3.setText("Добавить");

jButton3.addActionListener(new java.awt.event.ActionListener() {

public void actionPerformed(java.awt.event.ActionEvent evt) {

jButton3ActionPerformed(evt);

}

});

jTextField4.setEditable(false);

jTextField4.setText("F(x) = sin(x^2)dx");

jButton4.setText("Заполнить");

jButton4.addActionListener(new java.awt.event.ActionListener() {

public void actionPerformed(java.awt.event.ActionEvent evt) {

jButton4ActionPerformed(evt);

}

});

jButton5.setText("Очистить");

jButton5.addActionListener(new java.awt.event.ActionListener() {

public void actionPerformed(java.awt.event.ActionEvent evt) {

jButton5ActionPerformed(evt);

}

});

jButton6.setText("Сохранение\n в текстовом \nвиде");

jButton6.addActionListener(new java.awt.event.ActionListener() {

public void actionPerformed(java.awt.event.ActionEvent evt) {

jButton6ActionPerformed(evt);

}

});

jButton7.setText("Заполнить из файла");

jButton7.addActionListener(new java.awt.event.ActionListener() {

public void actionPerformed(java.awt.event.ActionEvent evt) {

jButton7ActionPerformed(evt);

}

});

jButton8.setText("Сохранение в двоичном виде");

jButton8.addActionListener(new java.awt.event.ActionListener() {

public void actionPerformed(java.awt.event.ActionEvent evt) {

jButton8ActionPerformed(evt);

}

});

jButton9.setText("Заполнить из файла");

jButton9.addActionListener(new java.awt.event.ActionListener() {

public void actionPerformed(java.awt.event.ActionEvent evt) {

jButton9ActionPerformed(evt);

}

});

javax.swing.GroupLayout layout = new javax.swing.GroupLayout(getContentPane());

getContentPane().setLayout(layout);

layout.setHorizontalGroup(

layout.createParallelGroup(javax.swing.GroupLayout.Alignment.LEADING)

.addGroup(layout.createSequentialGroup()

.addContainerGap()

.addGroup(layout.createParallelGroup(javax.swing.GroupLayout.Alignment.LEADING)

.addGroup(layout.createSequentialGroup()

.addComponent(jTextField1, javax.swing.GroupLayout.PREFERRED\_SIZE, 92, javax.swing.GroupLayout.PREFERRED\_SIZE)

.addGap(18, 18, 18)

.addComponent(jTextField2, javax.swing.GroupLayout.PREFERRED\_SIZE, 92, javax.swing.GroupLayout.PREFERRED\_SIZE)

.addGap(18, 18, 18)

.addComponent(jTextField3, javax.swing.GroupLayout.PREFERRED\_SIZE, 92, javax.swing.GroupLayout.PREFERRED\_SIZE)

.addGap(48, 48, 48)

.addComponent(jTextField4, javax.swing.GroupLayout.PREFERRED\_SIZE, 234, javax.swing.GroupLayout.PREFERRED\_SIZE)

.addContainerGap(javax.swing.GroupLayout.DEFAULT\_SIZE, Short.MAX\_VALUE))

.addGroup(layout.createSequentialGroup()

.addGroup(layout.createParallelGroup(javax.swing.GroupLayout.Alignment.LEADING)

.addComponent(jButton1, javax.swing.GroupLayout.PREFERRED\_SIZE, 92, javax.swing.GroupLayout.PREFERRED\_SIZE)

.addComponent(jButton3, javax.swing.GroupLayout.PREFERRED\_SIZE, 92, javax.swing.GroupLayout.PREFERRED\_SIZE)

.addComponent(jButton2, javax.swing.GroupLayout.PREFERRED\_SIZE, 92, javax.swing.GroupLayout.PREFERRED\_SIZE))

.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.RELATED)

.addComponent(jScrollPane1)

.addGap(22, 22, 22))))

.addGroup(javax.swing.GroupLayout.Alignment.TRAILING, layout.createSequentialGroup()

.addGap(102, 102, 102)

.addComponent(jButton5, javax.swing.GroupLayout.PREFERRED\_SIZE, 92, javax.swing.GroupLayout.PREFERRED\_SIZE)

.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.RELATED)

.addComponent(jButton4, javax.swing.GroupLayout.PREFERRED\_SIZE, 92, javax.swing.GroupLayout.PREFERRED\_SIZE)

.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.RELATED, 112, Short.MAX\_VALUE)

.addGroup(layout.createParallelGroup(javax.swing.GroupLayout.Alignment.TRAILING)

.addGroup(layout.createSequentialGroup()

.addComponent(jButton8, javax.swing.GroupLayout.DEFAULT\_SIZE, javax.swing.GroupLayout.DEFAULT\_SIZE, Short.MAX\_VALUE)

.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.RELATED)

.addComponent(jButton9))

.addGroup(layout.createSequentialGroup()

.addComponent(jButton6)

.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.RELATED)

.addComponent(jButton7)))

.addGap(59, 59, 59))

);

layout.setVerticalGroup(

layout.createParallelGroup(javax.swing.GroupLayout.Alignment.LEADING)

.addGroup(javax.swing.GroupLayout.Alignment.TRAILING, layout.createSequentialGroup()

.addGap(21, 21, 21)

.addGroup(layout.createParallelGroup(javax.swing.GroupLayout.Alignment.BASELINE)

.addComponent(jTextField3, javax.swing.GroupLayout.PREFERRED\_SIZE, 33, javax.swing.GroupLayout.PREFERRED\_SIZE)

.addComponent(jTextField2, javax.swing.GroupLayout.PREFERRED\_SIZE, 33, javax.swing.GroupLayout.PREFERRED\_SIZE)

.addComponent(jTextField1, javax.swing.GroupLayout.PREFERRED\_SIZE, 33, javax.swing.GroupLayout.PREFERRED\_SIZE)

.addComponent(jTextField4, javax.swing.GroupLayout.PREFERRED\_SIZE, 39, javax.swing.GroupLayout.PREFERRED\_SIZE))

.addGap(18, 27, Short.MAX\_VALUE)

.addGroup(layout.createParallelGroup(javax.swing.GroupLayout.Alignment.LEADING, false)

.addGroup(layout.createSequentialGroup()

.addComponent(jButton3, javax.swing.GroupLayout.PREFERRED\_SIZE, 33, javax.swing.GroupLayout.PREFERRED\_SIZE)

.addGap(18, 18, 18)

.addComponent(jButton1, javax.swing.GroupLayout.PREFERRED\_SIZE, 33, javax.swing.GroupLayout.PREFERRED\_SIZE)

.addGap(18, 18, 18)

.addComponent(jButton2, javax.swing.GroupLayout.PREFERRED\_SIZE, 33, javax.swing.GroupLayout.PREFERRED\_SIZE))

.addComponent(jScrollPane1, javax.swing.GroupLayout.PREFERRED\_SIZE, 0, Short.MAX\_VALUE))

.addGap(8, 8, 8)

.addGroup(layout.createParallelGroup(javax.swing.GroupLayout.Alignment.BASELINE)

.addComponent(jButton5, javax.swing.GroupLayout.PREFERRED\_SIZE, 33, javax.swing.GroupLayout.PREFERRED\_SIZE)

.addComponent(jButton4, javax.swing.GroupLayout.PREFERRED\_SIZE, 33, javax.swing.GroupLayout.PREFERRED\_SIZE)

.addComponent(jButton7, javax.swing.GroupLayout.PREFERRED\_SIZE, 33, javax.swing.GroupLayout.PREFERRED\_SIZE)

.addComponent(jButton6, javax.swing.GroupLayout.PREFERRED\_SIZE, 33, javax.swing.GroupLayout.PREFERRED\_SIZE))

.addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.RELATED)

.addGroup(layout.createParallelGroup(javax.swing.GroupLayout.Alignment.BASELINE)

.addComponent(jButton8, javax.swing.GroupLayout.PREFERRED\_SIZE, 33, javax.swing.GroupLayout.PREFERRED\_SIZE)

.addComponent(jButton9, javax.swing.GroupLayout.PREFERRED\_SIZE, 33, javax.swing.GroupLayout.PREFERRED\_SIZE))

.addGap(120, 120, 120))

);

pack();

}// </editor-fold>//GEN-END:initComponents

int flagForFill = 0; // Флаг, для того чтобы нельзя было повторно нажать кнопу заполнить

class Chooser {

String FileName;

public String SaveOpen(String NameFilter) {

JFileChooser chooser = new JFileChooser();

FileNameExtensionFilter txt = new FileNameExtensionFilter(

"Text File(txt)", "txt");

FileNameExtensionFilter bin = new FileNameExtensionFilter(

"Binary File(bin)", "bin");

chooser.addChoosableFileFilter(txt);

chooser.addChoosableFileFilter(bin);

int returnVal = chooser.showDialog(null, null);

if (returnVal == JFileChooser.APPROVE\_OPTION) {

FileName = chooser.getSelectedFile().getAbsolutePath();

}

return FileName;

}

}

public class ExceptionforRecIntegral extends Exception {

public ExceptionforRecIntegral(String description) {

JOptionPane.showMessageDialog(null, description, "ERROR", JOptionPane.ERROR\_MESSAGE);

}

}

ArrayList<RecIntegral> digits = new ArrayList<RecIntegral>();

public class RecIntegral implements Serializable {

public double Top, Bottom, Step, Res;

public void RecIntegral(double bottom, double top, double step, double res) {

this.Top = top;

this.Bottom = bottom;

this.Step = step;

this.Res = res;

}

}

public class Runner implements Runnable {

private int rwC;

private Runner(int rowCount) {

this.rwC = rowCount;

}

public void run() {

DefaultTableModel tbl = (DefaultTableModel) jTable1.getModel();

double bottom = (Double)tbl.getValueAt(rwC, 0);

double top = (Double)tbl.getValueAt(rwC, 1);

double step = (Double)tbl.getValueAt(rwC, 2);

double res = 0;

double resM = 0;

double resMs = 0; // last non integr

double fin\_mnoj = step / 2;

double n = (top - bottom) / step;

double xi = 0;

double xilast = 0;

for (int i = 1; i < n; ++i) {

xi = bottom + i \* step;

resM += sin(pow(xi, 2));

xilast = bottom + (i + 1) \* step;

}

if (xilast == top) {

res = fin\_mnoj \* (sin(pow(bottom + 0 \* step, 2)) + 2 \* (resM) + sin(pow(bottom + n \* step, 2)));

} else {

resMs += sin(pow(top - xi, 2));

res = fin\_mnoj \* (sin(pow(bottom + 0 \* step, 2)) + 2 \* (resM) + resMs);

}

tbl.setValueAt(res, rwC, 3);

}

}

public double integr(double nij, double verh, double step) {

double res = 0;

double resM = 0;

double resMs = 0; // last non integr

double fin\_mnoj = step / 2;

double n = (verh - nij) / step;

double xi = 0;

double xilast = 0;

for (int i = 1; i < n; ++i) {

xi = nij + i \* step;

resM += sin(pow(xi, 2));

xilast = nij + (i + 1) \* step;

}

if (xilast == verh) {

res = fin\_mnoj \* (sin(pow(nij + 0 \* step, 2)) + 2 \* (resM) + sin(pow(nij + n \* step, 2)));

} else {

resMs += sin(pow(verh - xi, 2));

res = fin\_mnoj \* (sin(pow(nij + 0 \* step, 2)) + 2 \* (resM) + resMs);

}

return res;

}

private void jButton3ActionPerformed(java.awt.event.ActionEvent evt) {//GEN-FIRST:event\_jButton3ActionPerformed

// TODO add your handling code here:

//Кнопка добаить

Vector data = new Vector();

DefaultTableModel tbl = (DefaultTableModel) jTable1.getModel();

try {

double a = Double.valueOf(jTextField1.getText()).doubleValue();

double b = Double.valueOf(jTextField2.getText()).doubleValue();

double c = Double.valueOf(jTextField3.getText()).doubleValue();

data.add(a);

data.add(b);

data.add(c);

if (a < 0.000001 || b < 0.000001 || c < 0.000001 || a > 1000000 || b > 1000000 || c > 1000000) {

throw new ExceptionforRecIntegral("Data entered incorrectly");

}

if (a > b) {

throw new ExceptionforRecIntegral("a > b");

}

if ((b - a) <= c) {

throw new ExceptionforRecIntegral("b - a >= c");

}

tbl.addRow(data);

RecIntegral save = new RecIntegral();

save.RecIntegral(a, b, c, 0);

digits.add(save);

} catch (ExceptionforRecIntegral e) {

e.printStackTrace();

}

}//GEN-LAST:event\_jButton3ActionPerformed

private void jButton2ActionPerformed(java.awt.event.ActionEvent evt) {//GEN-FIRST:event\_jButton2ActionPerformed

// TODO add your handling code here:

//Кнопка удалить

DefaultTableModel tbl = (DefaultTableModel) jTable1.getModel();

int indexROW = jTable1.getSelectedRow();

tbl.removeRow(indexROW);

digits.remove(indexROW);

}//GEN-LAST:event\_jButton2ActionPerformed

private void jButton1ActionPerformed(java.awt.event.ActionEvent evt) {//GEN-FIRST:event\_jButton1ActionPerformed

// TODO add your handling code here:

// Кнопка вычислить

DefaultTableModel tbl = (DefaultTableModel) jTable1.getModel();

// Vector row = tbl.getDataVector();

// for (int i = 0; i < tbl.getRowCount(); ++i) {

// Thread myThread = new Thread(new Runner(i));

// myThread.start();

// }

String nums = "";

int index = 0;

for (int i = 0; i < tbl.getRowCount(); i++){

nums += tbl.getValueAt(i, 0).toString() + ",";

nums += tbl.getValueAt(i, 1).toString() + ",";

nums += tbl.getValueAt(i, 2).toString() + ",";

index+=3;

}

try {

Scanner input = new Scanner(client.getInputStream());

PrintWriter output = new PrintWriter(client.getOutputStream());

output.println(nums);

output.flush();

for (int i = 0; i < tbl.getRowCount(); i++){

String str = input.nextLine();

String[] res = str.split(",");

tbl.setValueAt(Double.valueOf(res[0]), Integer.parseInt(res[1]), Integer.parseInt(res[2]));

}

} catch (IOException ex) {

Logger.getLogger(LW\_UI.class.getName()).log(Level.SEVERE, null, ex);

}

}//GEN-LAST:event\_jButton1ActionPerformed

private void jButton5ActionPerformed(java.awt.event.ActionEvent evt) {//GEN-FIRST:event\_jButton5ActionPerformed

// TODO add your handling code here:

// Очистить

DefaultTableModel tbl = (DefaultTableModel) jTable1.getModel();

for (int i = tbl.getRowCount(); i > 0; i--) {

tbl.removeRow(i - 1);

}

flagForFill = 1;

}//GEN-LAST:event\_jButton5ActionPerformed

private void jButton4ActionPerformed(java.awt.event.ActionEvent evt) {//GEN-FIRST:event\_jButton4ActionPerformed

// TODO add your handling code here:

// Заполнить

DefaultTableModel tbl = (DefaultTableModel) jTable1.getModel();

Object rowData[] = new Object[4];

if (flagForFill == 1) {

for (int i = tbl.getRowCount(); i > 0; i--) {

tbl.removeRow(i - 1);

}

for (int i = 0; i < digits.size(); ++i) {

rowData[0] = digits.get(i).Bottom;

rowData[1] = digits.get(i).Top;

rowData[2] = digits.get(i).Step;

tbl.addRow(rowData);

}

}

flagForFill = 0;

}//GEN-LAST:event\_jButton4ActionPerformed

private void jButton6ActionPerformed(java.awt.event.ActionEvent evt) {//GEN-FIRST:event\_jButton6ActionPerformed

// TODO add your handling code here:

//Сериализация в текстовом виде

ArrayList<String> ser = new ArrayList<String>();

Chooser chsr = new Chooser();

String Filename = chsr.SaveOpen("txt") + ".txt";

try {

FileOutputStream fout = new FileOutputStream(Filename);

BufferedOutputStream bufferFout = new BufferedOutputStream(fout);

ObjectOutputStream ObjFout = new ObjectOutputStream(bufferFout);

for (int i = 0; i < digits.size(); ++i) {

Object step = null, bottom = null, top = null;

RecIntegral node = digits.get(i);

top = node.Top;

bottom = node.Bottom;

step = node.Step;

ser.add(bottom.toString() + ' ' + top.toString() + ' ' + step.toString());

}

ObjFout.writeObject(ser);

ObjFout.close();

} catch (IOException ex) {

ex.printStackTrace();

}

}//GEN-LAST:event\_jButton6ActionPerformed

private void jButton7ActionPerformed(java.awt.event.ActionEvent evt) {//GEN-FIRST:event\_jButton7ActionPerformed

// TODO add your handling code here:

//заполнить из txt

DefaultTableModel tbl = (DefaultTableModel) jTable1.getModel();

Chooser chsr = new Chooser();

String Filename = chsr.SaveOpen("txt");

ArrayList<String> ser = new ArrayList<String>();

while (tbl.getRowCount() != 0) {

tbl.removeRow(tbl.getRowCount() - 1);

}

while (digits.size() != 0) {

digits.remove(digits.size() - 1);

}

try {

FileInputStream fin = new FileInputStream(Filename);

BufferedInputStream bufferFin = new BufferedInputStream(fin);

ObjectInputStream ObjFin = new ObjectInputStream(bufferFin);

ser = (ArrayList<String>) ObjFin.readObject();

for (int i = 0; i < ser.size(); i++) {

String str = ser.get(i),

strTop = " ",

strBottom = " ",

strStep = " ";

int size = str.length();

int j = 0;

while (str.charAt(j) != ' ') {

strBottom += str.charAt(j);

j++;

}

j++;

while (str.charAt(j) != ' ') {

strTop += str.charAt(j);

j++;

}

j++;

while (j != size) {

strStep += str.charAt(j);

j++;

}

RecIntegral node = new RecIntegral();

tbl.addRow(new Object[]{Double.parseDouble(strBottom), Double.parseDouble(strTop), Double.parseDouble(strStep), null});

node.RecIntegral(Double.parseDouble(strBottom), Double.parseDouble(strTop), Double.parseDouble(strStep), 0);

digits.add(node);

}

} catch (IOException ex) {

ex.printStackTrace();

} catch (ClassNotFoundException ex) {

ex.printStackTrace();

}

}//GEN-LAST:event\_jButton7ActionPerformed

private void jButton8ActionPerformed(java.awt.event.ActionEvent evt) {//GEN-FIRST:event\_jButton8ActionPerformed

// TODO add your handling code here:

//сохранить в bin

ArrayList<String> ser = new ArrayList<String>();

Chooser chsr = new Chooser();

String Filename = chsr.SaveOpen("bin") + ".bin";

try {

FileOutputStream fout = new FileOutputStream(Filename);

BufferedOutputStream bufferFout = new BufferedOutputStream(fout);

ObjectOutputStream ObjFout = new ObjectOutputStream(bufferFout);

for (int i = 0; i < digits.size(); ++i) {

Object step = null, bottom = null, top = null;

RecIntegral node = digits.get(i);

top = node.Top;

bottom = node.Bottom;

step = node.Step;

ser.add(bottom.toString() + ' ' + top.toString() + ' ' + step.toString());

}

ObjFout.writeObject(ser);

ObjFout.close();

} catch (IOException ex) {

ex.printStackTrace();

}

}//GEN-LAST:event\_jButton8ActionPerformed

private void jButton9ActionPerformed(java.awt.event.ActionEvent evt) {//GEN-FIRST:event\_jButton9ActionPerformed

// TODO add your handling code here:

//открыть бин

DefaultTableModel tbl = (DefaultTableModel) jTable1.getModel();

Chooser chsr = new Chooser();

String Filename = chsr.SaveOpen("bin");

ArrayList<String> ser = new ArrayList<String>();

while (tbl.getRowCount() != 0) {

tbl.removeRow(tbl.getRowCount() - 1);

}

while (digits.size() != 0) {

digits.remove(digits.size() - 1);

}

try {

FileInputStream fin = new FileInputStream(Filename);

BufferedInputStream bufferFin = new BufferedInputStream(fin);

ObjectInputStream ObjFin = new ObjectInputStream(bufferFin);

ser = (ArrayList<String>) ObjFin.readObject();

for (int i = 0; i < ser.size(); i++) {

String str = ser.get(i),

strTop = " ",

strBottom = " ",

strStep = " ";

int size = str.length();

int j = 0;

while (str.charAt(j) != ' ') {

strBottom += str.charAt(j);

j++;

}

j++;

while (str.charAt(j) != ' ') {

strTop += str.charAt(j);

j++;

}

j++;

while (j != size) {

strStep += str.charAt(j);

j++;

}

RecIntegral node = new RecIntegral();

tbl.addRow(new Object[]{Double.parseDouble(strBottom), Double.parseDouble(strTop), Double.parseDouble(strStep), null});

node.RecIntegral(Double.parseDouble(strBottom), Double.parseDouble(strTop), Double.parseDouble(strStep), 0);

digits.add(node);

}

} catch (IOException ex) {

ex.printStackTrace();

} catch (ClassNotFoundException ex) {

ex.printStackTrace();

}

}//GEN-LAST:event\_jButton9ActionPerformed

/\*\*

\* @param args the command line arguments

\*/

public static void main(String args[]){

/\* Set the Nimbus look and feel \*/

//<editor-fold defaultstate="collapsed" desc=" Look and feel setting code (optional) ">

/\* If Nimbus (introduced in Java SE 6) is not available, stay with the default look and feel.

\* For details see http://download.oracle.com/javase/tutorial/uiswing/lookandfeel/plaf.html

\*/

try {

for (javax.swing.UIManager.LookAndFeelInfo info : javax.swing.UIManager.getInstalledLookAndFeels()) {

if ("Nimbus".equals(info.getName())) {

javax.swing.UIManager.setLookAndFeel(info.getClassName());

break;

}

}

} catch (ClassNotFoundException ex) {

java.util.logging.Logger.getLogger(LW\_UI.class.getName()).log(java.util.logging.Level.SEVERE, null, ex);

} catch (InstantiationException ex) {

java.util.logging.Logger.getLogger(LW\_UI.class.getName()).log(java.util.logging.Level.SEVERE, null, ex);

} catch (IllegalAccessException ex) {

java.util.logging.Logger.getLogger(LW\_UI.class.getName()).log(java.util.logging.Level.SEVERE, null, ex);

} catch (javax.swing.UnsupportedLookAndFeelException ex) {

java.util.logging.Logger.getLogger(LW\_UI.class.getName()).log(java.util.logging.Level.SEVERE, null, ex);

}

//</editor-fold>

/\* Create and display the form \*/

java.awt.EventQueue.invokeLater(new Runnable() {

public void run() {

try {

new LW\_UI().setVisible(true);

} catch (IOException ex) {

Logger.getLogger(LW\_UI.class.getName()).log(Level.SEVERE, null, ex);

}

}

});

}

// Variables declaration - do not modify//GEN-BEGIN:variables

private javax.swing.JButton jButton1;

private javax.swing.JButton jButton2;

private javax.swing.JButton jButton3;

private javax.swing.JButton jButton4;

private javax.swing.JButton jButton5;

private javax.swing.JButton jButton6;

private javax.swing.JButton jButton7;

private javax.swing.JButton jButton8;

private javax.swing.JButton jButton9;

private javax.swing.JScrollPane jScrollPane1;

private javax.swing.JTable jTable1;

private javax.swing.JTextField jTextField1;

private javax.swing.JTextField jTextField2;

private javax.swing.JTextField jTextField3;

private javax.swing.JTextField jTextField4;

// End of variables declaration//GEN-END:variables

}