《数据库系统》实验报告

实验名称：嵌入式 SQL

成　　绩：

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实 验 日 期 ： 2017 年 5 月 21 日

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一、实验目的

熟悉使用高级语言访问数据库(Mysql 或 Sql Server)的过程，通过嵌入式 SQL 对数据库进行查询操作

实验环境：

- Mysql 或 SqlServer 数据库
- 自行选择高级语言和开发工具，可以使用 C、Java、PHP 等语言

二、实验内容

在实验一所建立的数据库基础上，用高级语言编写程序，完成要求的查询。可以通过命令行或可视化界面实现。程序需要能够输入待执行查询的序号，待执行查询需要的参数列表。

以命令行程序为例，程序的命令行参数为：

student_query –q <Number> -p [Parameters]

其中，Number代表待执行查询的序号，Parameters为第Number号查询需要的参数列表。

待执行查询的序号和内容如下：

[1]：选择了课程号为CNO的学生学号

查询需要输入的参数：CNO。

[2]：学号为 SNO 的学生选择的所有课程的课程号和成绩。

查询需要输入的参数：SNO。

[3]：选择了课程名为 CNAME 的学生的姓名

查询需要输入的参数：CNAME。

[4]：姓名为 SNAME 的学生所选所有课程的课程名，学时，学分和开课学期号

查询需要输入的参数：SNAME。

[5]：查询成绩在 SCORE 分以上的学生姓名、课程号和成绩

查询需要输入的参数：SCORE。

[6]：统计选课平均分低于 SCORE 的学生学号和成绩

查询需要输入的参数：SCORE

[7]：统计姓名为 SNAME 的学生选修的课程数

查询需要输入的参数：SNAME

[8]：查询课程名为 CNAME 的课程的最高分、最低分和平均分

查询需要输入的参数：CNAME。

三、实验结果

1、程序实现的具体过程：

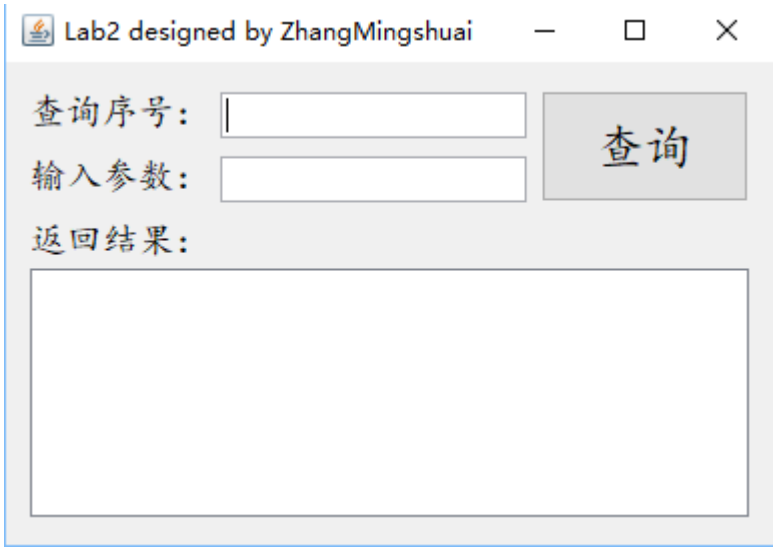
首先利用 JDBC 驱动连接到数据库，如下图：

```
public class GetConnection {
    static Connection connect;
    public static Connection get() {
        try {
            Class.forName("com.mysql.jdbc.Driver");
            System.out.println("Success loading Mysql Driver!");
        } catch (Exception e) {
            System.out.print("Error loading Mysql Driver!");
            e.printStackTrace();
        }
        try {
            connect = DriverManager.getConnection("jdbc:mysql://localhost:3306/sct", "root", "1234");
            System.out.println("Success connect Mysql server!");
        } catch (Exception e) {
            System.out.print("get data error!");
            e.printStackTrace();
        }
        return connect;
    }
}
```

然后将 8 个所要进行查询的语句先写好，其中还未得到的参数用?来表示

```
    store = new ArrayList<String>();
    store.add("select snumber from sc where cnumber = ? ");
    store.add("select cnumber,score from sc where snumber=?");
    store.add("select student.sname from sc,student,course " +
            "where sc.snumber=student.snumber and sc.cnumber=course.cnumber " +
            "and course.cname=?");
    store.add("select c.cname,c.chours,c.credit,c.csemster" +
            " from course as c,sc,student where sc.snumber=student.snumber " +
            "and sc.cnumber=c.cnumber and student.sname=?");
    store.add("select student.sname,sc.cnumber,sc.score from sc,student where"+
            " sc.snumber=student.snumber and score>?");
    store.add("select snumber,avg(score) from sc group by snumber having avg(score)<?");
    store.add("select count(*) from sc,student where student.snumber=sc.snumber "+
            "and student.sname=?");
    store.add("select max(score),min(score),avg(score) from sc group by cnumber " +
            "having cnumber in (select cnumber from course where cname=?)");
}
```

然后对于问号处参数的取值我通过 UI 界面的输入来获取，UI 界面如下：



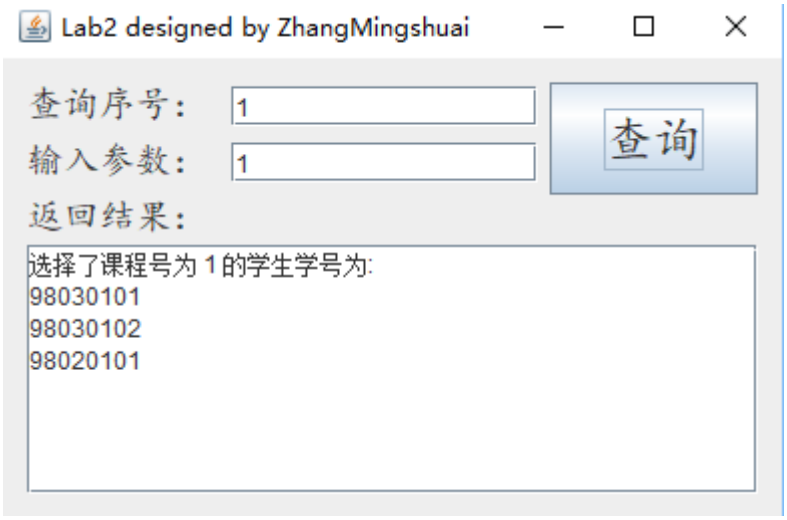
通过 UI 界面的输入值，获取到查询的序号和对应的参数值，返给 Java 程序进行处理，首先获取 connect，用于与数据库相连，然后通过 prepareStatement 预构造 sql 语句，通过 setString 将其中的?设置为 java 变量中对应的值，然后执行 executeQuery 获取结果集 ResultSet，再依据输入的不同查询序号，返回不同的文字结果信息。如下图：

```
Connection my = GetConnection.get();
java.sql.PreparedStatement ps = my.prepareStatement(store.get(id));
ps.setString(1, param);
ResultSet rs = ps.executeQuery();
switch (id) {
case 0:
    result.append("选择了课程号为"+ param +" 的学生学号为:\n");
    while(rs.next()){
        result.append(rs.getString(1)+"\n");
    }
    break;
case 1:
    result.append("学号为"+ param +" 的学生选择的所有课程号和成绩为:\n");
    while(rs.next()){
        result.append(rs.getString(1)+"    "+rs.getString(2)+"\n");
    }
    break;
```

2、测试结果

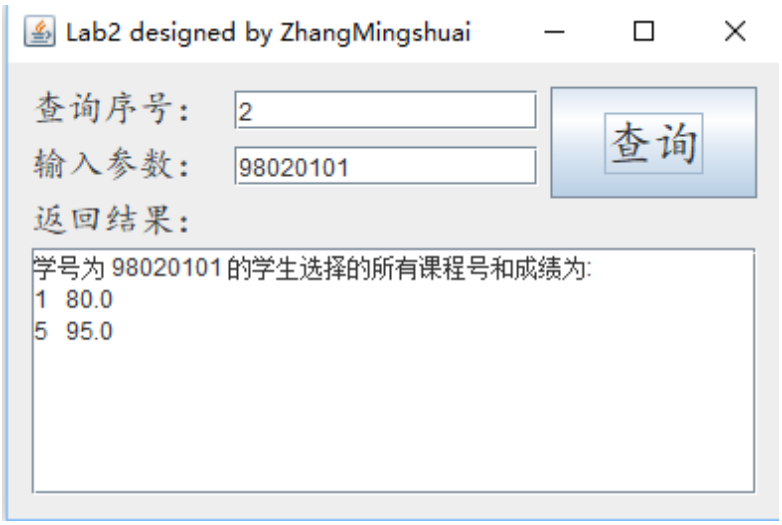
[1]：选择了课程号为CNO的学生学号

查询需要输入的参数：CNO。



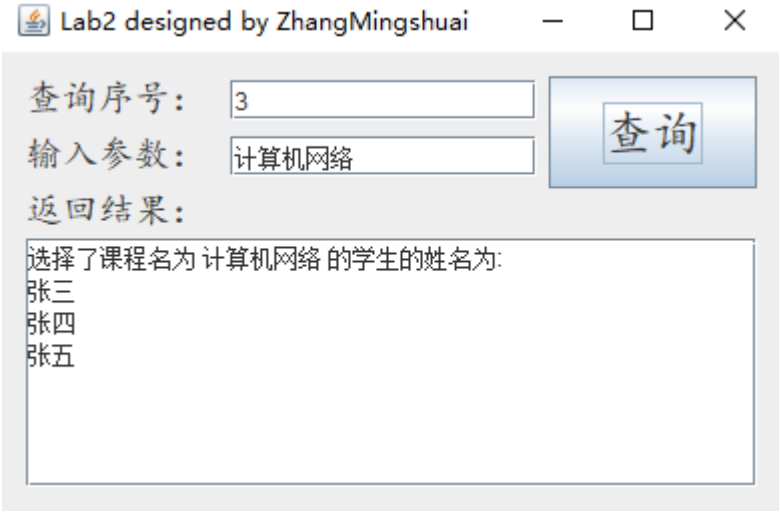
[2]：学号为 SNO 的学生选择的所有课程的课程号和成绩。

查询需要输入的参数：SNO。



[3]：选择了课程名为 CNAME 的学生的姓名

查询需要输入的参数：CNAME。



[4]：姓名为 SNAME 的学生所选所有课程的课程名，学时，学分和开课学期号

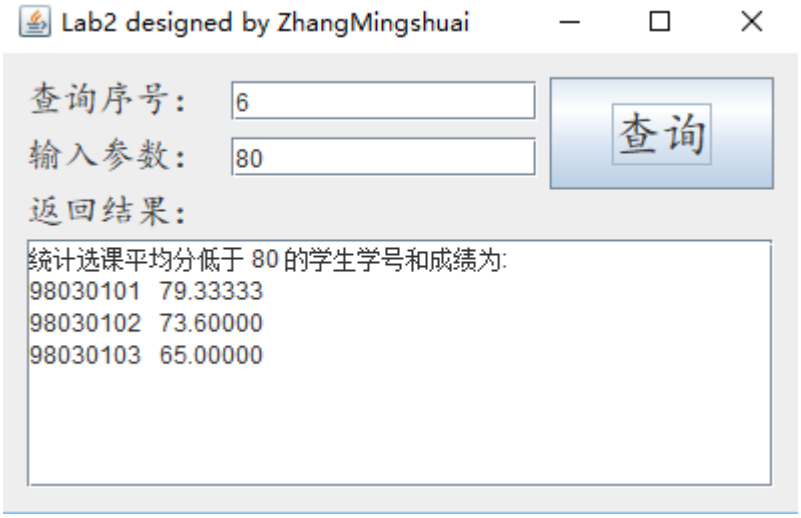
查询需要输入的参数：SNAME。

[5]：查询成绩在 SCORE 分以上的学生姓名、课程号和成绩

查询需要输入的参数：SCORE。

[6]：统计选课平均分低于 SCORE 的学生学号和成绩

查询需要输入的参数：SCORE

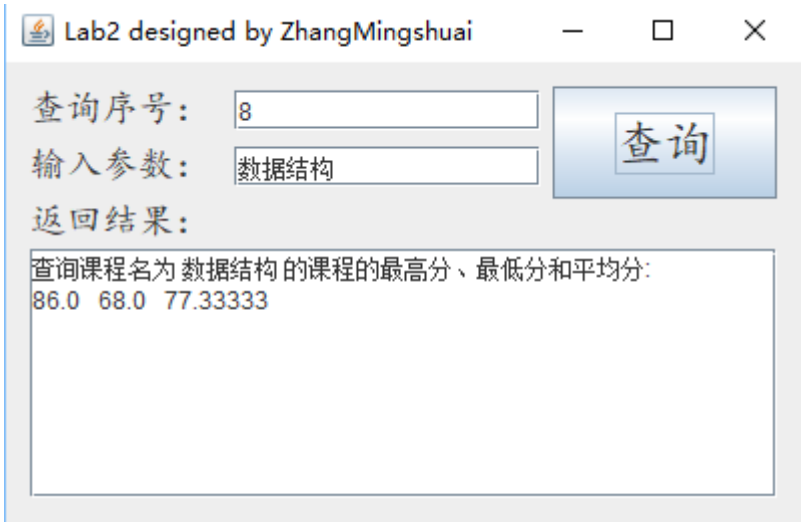


[7]：统计姓名为 SNAME 的学生选修的课程数

查询需要输入的参数：SNAME

[8]：查询课程名为 CNAME 的课程的最高分、最低分和平均分

查询需要输入的参数：CNAME。



四、程序代码

未输入参数的 8 个 sql 语句如下（在 java 中使用时用？暂时代替未传入参数，以后用 setString 将该？与指定 java 变量进行绑定）：

```
1 select snumber from sc where cnumber=
2 select cnumber,score from sc where snumber=
3 select student.sname from sc,student,course where sc.snumber=student.snumber and
  sc.cnumber=course.cnumber and course.cname=
4 select c.cname,c.chours,c.credit,c.csemster from course as c,sc,student where
  sc.snumber=student.snumber and sc.cnumber=c.cnumber and student.sname=
5 select student.sname,sc.cnumber,sc.score from sc,student where
  sc.snumber=student.snumber and score>
6 select snumber,avg(score) from sc group by snumber having avg(score)<
7 select count(*) from sc,student where student.snumber=sc.snumber
  and student.sname=
8 select max(score),min(score),avg(score) from sc group by cnumber having cnumber
  in (select cnumber from course where cname=)
```

程序源代码：

GetConnection.java

```
package com.zhangmingshuai;

import java.sql.Connection;
import java.sql.DriverManager;
```

```
/**
 * CreateDate：2017-5-20 下午 11:26:13
 * Location：HIT
 * Author: Zhang Mingshuai
 * TODO
 * return
 */
public class GetConnection {
    static Connection connect;
    public static Connection get() {
        try {
            Class.forName("com.mysql.jdbc.Driver");
            System.out.println("Success loading Mysql Driver!");
        } catch (Exception e) {
            System.out.print("Error loading Mysql Driver!");
            e.printStackTrace();
        }
        try {
            connect =
DriverManager.getConnection("jdbc:mysql://localhost:3306/sct", "root", "1234");
            System.out.println("Success connect Mysql server!");
        } catch (Exception e) {
            System.out.print("get data error!");
            e.printStackTrace();
        }
        return connect;
    }
}
```

Search.java

```
package com.zhangmingshuai;

import java.io.UnsupportedEncodingException;
import java.sql.Connection;
import java.sql.ResultSet;
import java.sql.SQLException;
import java.util.ArrayList;

import sun.applet.Main;

import com.mysql.jdbc.PreparedStatement;
import com.sun.java_cup.internal.runtime.Scanner;
import com.sun.java_cup.internal.runtime.Symbol;
import com.sun.org.apache.xpath.internal.Arg;

/**
 * CreateDate：2017-5-20 下午 02:00:08
 * Location：HIT
 * Author: Zhang Mingshuai
 * TODO
```

```
 * return
 */
public class Search {

    private ArrayList<String> store;
    private int id;
    private String param;
    public Search(int id, String param){
        this.id = id;
        this.param = new String(param);
        store = new ArrayList<String>();
        store.add("select snumber from sc where cnumber = ? ");
        store.add("select cnumber,score from sc where snumber=?");
        store.add("select student.sname from sc,student,course " +
                "where sc.snumber=student.snumber and sc.cnumber=course.cnumber "
+
                "and course.cname=?");
        store.add("select c.cname,c.chours,c.credit,c.csemster" +
                " from course as c,sc,student where sc.snumber=student.snumber "
+
                "and sc.cnumber=c.cnumber and student.sname=?");
        store.add("select student.sname,sc.cnumber,sc.score from sc,student
where"+
                " sc.snumber=student.snumber and score>?");
        store.add("select snumber,avg(score) from sc group by snumber having
avg(score)<?");
        store.add("select count(*) from sc,student where
student.snumber=sc.snumber "+
                "and student.sname=?");
        store.add("select max(score),min(score),avg(score) from sc group by
cnumber " +
                "having cnumber in (select cnumber from course where cname=?)");
    }

    public String getResult() throws SQLException{
        StringBuffer result= new StringBuffer();
//      System.out.println(param);
        Connection my = GetConnection.get();
        java.sql.PreparedStatement ps = my.prepareStatement(store.get(id));
        ps.setString(1, param);
        ResultSet rs = ps.executeQuery();
        switch (id) {
        case 0:
            result.append("选择了课程号为 "+ param +" 的学生学号为:\n");
            while(rs.next()){
                result.append(rs.getString(1)+"\n");
            }
            break;
        case 1:
            result.append("学号为 "+ param +" 的学生选择的所有课程号和成绩
为:\n");
```

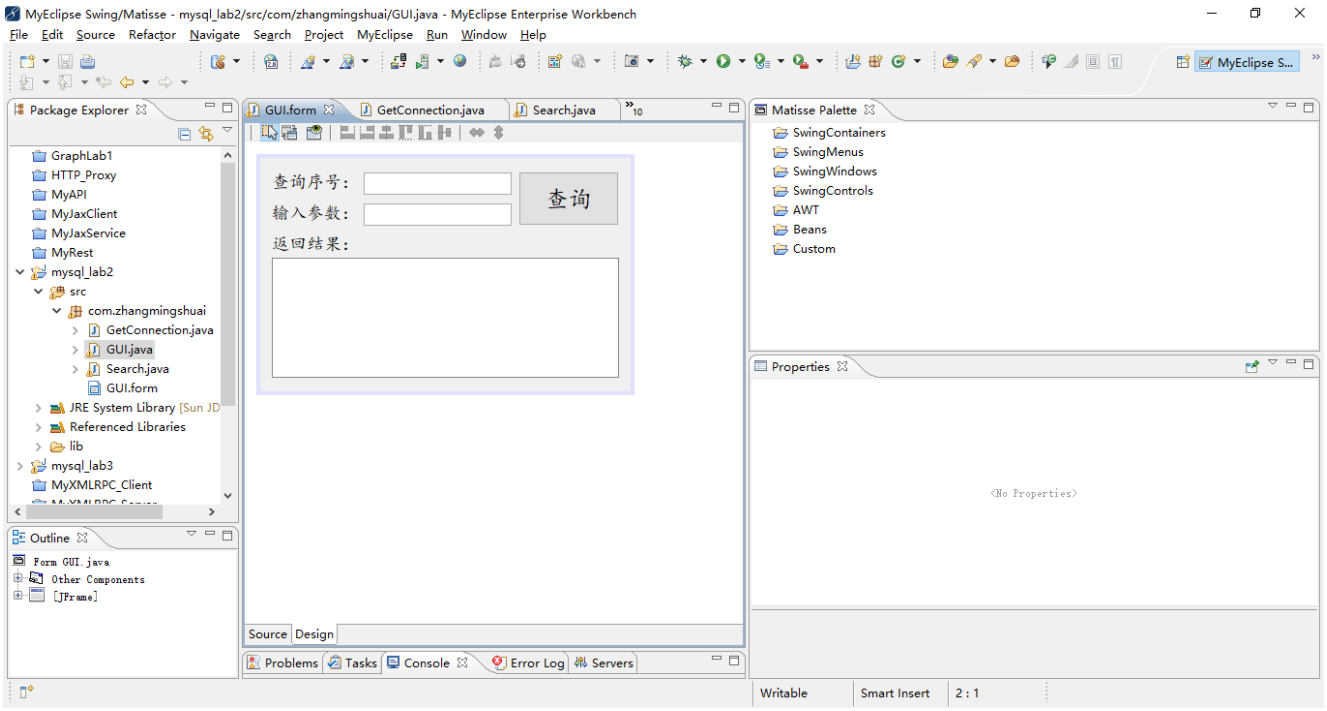
```
            while(rs.next()){
                result.append(rs.getString(1)+"   "+rs.getString(2)+"\n");
            }
            break;
        case 2:
            result.append("选择了课程名为 "+ param +" 的学生的姓名为:\n");
            while(rs.next()){
                result.append(rs.getString(1)+"\n");
            }
            break;
        case 3:
            result.append("姓名为 "+ param +" 的学生所选所有课程的课程名，学时，
学分和开课学期号为:\n");
            while(rs.next()){
                result.append(rs.getString(1)+"   "+rs.getString(2)+
                        "   "+rs.getString(3)+"   "+rs.getString(4)+"\n");
            }
            break;
        case 4:
            result.append("查询成绩在 "+param+" 分以上的学生姓名、课程号和成绩
为:\n");
            while(rs.next()){
                result.append(rs.getString(1)+"   "+rs.getString(2)+"
"+rs.getString(3)+"\n");
            }
            break;
        case 5:
            result.append("统计选课平均分低于 "+ param +" 的学生学号和成绩
为:\n");
            while(rs.next()){
                result.append(rs.getString(1)+"   "+rs.getString(2)+"\n");
            }
            break;
        case 6:
            result.append("统计姓名为 "+ param +" 的学生选修的课程数:\n");
            while(rs.next()){
                result.append(rs.getString(1)+"\n");
            }
            break;
        case 7:
            result.append("查询课程名为 "+param+" 的课程的最高分、最低分和平均
分:\n");
            while(rs.next()){
                result.append(rs.getString(1)+"   "+rs.getString(2)+"
"+rs.getString(3)+"\n");
            }
            break;
        default:
            result.append("illegal input!");
        }
        return result.toString();
```

```
    }

}
```

GUI.java(我的 GUI 界面通过 matisse 插件基于 swing 下的 jFrame 框架进行制作的，只需在面板上进行控件拖动，界面做好后保存自动生成代码)

制作面板如下：



得到的自动生成代码如下：

```
/*
 * GUI.java
 *
 * Created on __DATE__, __TIME__
 */

package com.zhangmingshuai;

import java.sql.SQLException;

/**
 *
 * @author  __USER__
 */
public class GUI extends javax.swing.JFrame {

    /** Creates new form GUI */
    public GUI() {
        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.
 */
//GEN-BEGIN:initComponents
// <editor-fold defaultstate="collapsed" desc="Generated Code">
private void initComponents() {

    jTextField1 = new javax.swing.JTextField();
    jTextField2 = new javax.swing.JTextField();
    jButton1 = new javax.swing.JButton();
    jLabel1 = new javax.swing.JLabel();
    jLabel2 = new javax.swing.JLabel();
    jScrollPane1 = new javax.swing.JScrollPane();
    jTextArea1 = new javax.swing.JTextArea();
    jLabel3 = new javax.swing.JLabel();

    setDefaultCloseOperation(javax.swing.WindowConstants.EXIT_ON_CLOSE);
    setTitle("Lab2 designed by ZhangMingshuai");

    jButton1.setFont(new java.awt.Font("楷体", 0, 24));
    jButton1.setText("\u67e5\u8be2");
    jButton1.addActionListener(new java.awt.event.ActionListener() {
        public void actionPerformed(java.awt.event.ActionEvent evt) {
            try {
                jButton1ActionPerformed(evt);
            } catch (SQLException e) {
                // TODO Auto-generated catch block
                e.printStackTrace();
            }
        }
    });

    jLabel1.setFont(new java.awt.Font("楷体", 0, 18));
    jLabel1.setText("\u67e5\u8be2\u5e8f\u53f7\uff1a");

    jLabel2.setFont(new java.awt.Font("楷体", 0, 18));
    jLabel2.setText("\u8f93\u5165\u53c2\u6570\uff1a");

    jTextArea1.setColumns(20);
    jTextArea1.setRows(5);
    jScrollPane1.setViewportView(jTextArea1);

    jLabel3.setFont(new java.awt.Font("楷体", 0, 18));
    jLabel3.setText("\u8fd4\u56de\u7ed3\u679c\uff1a");

    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()

.addGroup(

layout

        .createParallelGroup(

                javax.swing.GroupLayout.Alignment.LEADING)

        .addComponent(

                jLabel1)

        .addComponent(

                jLabel2))

.addPreferredGap(

javax.swing.LayoutStyle.ComponentPlacement.RELATED)

.addGroup(

layout

        .createParallelGroup(

                javax.swing.GroupLayout.Alignment.LEADING,

                false)

        .addComponent(

                jTextField1)
```

```
        .addComponent(
                jTextField2,
                javax.swing.GroupLayout.DEFAULT_SIZE,
                153,
                Short.MAX_VALUE))
.addPreferredGap(
javax.swing.LayoutStyle.ComponentPlacement.RELATED)
.addComponent(
jButton1,
javax.swing.GroupLayout.DEFAULT_SIZE,
104,
Short.MAX_VALUE))
                                                .addComponent(
                                                        jScrollPane1,
javax.swing.GroupLayout.DEFAULT_SIZE,
                                                        359,
Short.MAX_VALUE)
                                                .addComponent(jLabel3))
                                        .addContainerGap()));
    layout
            .setVerticalGroup(layout
                    .createParallelGroup(
                            javax.swing.GroupLayout.Alignment.LEADING)
                    .addGroup(
                            layout
                                    .createSequentialGroup()
                                    .addContainerGap()
                                    .addGroup(
                                            layout
                                                    .createParallelGroup(
javax.swing.GroupLayout.Alignment.LEADING)
                                                    .addGroup(
                                                            layout
.createSequentialGroup()
```

```
.addGroup(
layout
        .createParallelGroup(
                javax.swing.GroupLayout.Alignment.BASELINE)
        .addComponent(
                jLabel1)
        .addComponent(
                jTextField1,
                javax.swing.GroupLayout.PREFERRED_SIZE,
                javax.swing.GroupLayout.DEFAULT_SIZE,
                javax.swing.GroupLayout.PREFERRED_SIZE))
.addPreferredGap(
javax.swing.LayoutStyle.ComponentPlacement.RELATED,
javax.swing.GroupLayout.DEFAULT_SIZE,
Short.MAX_VALUE)
.addGroup(
layout
        .createParallelGroup(
                javax.swing.GroupLayout.Alignment.BASELINE)
        .addComponent(
                jLabel2)
        .addComponent(
                jTextField2,
                javax.swing.GroupLayout.PREFERRED_SIZE,
                javax.swing.GroupLayout.DEFAULT_SIZE,
```

```
                javax.swing.GroupLayout.PREFERRED_SIZE))
.addPreferredGap(
javax.swing.LayoutStyle.ComponentPlacement.RELATED)
.addComponent(
jLabel3)
.addGap(
4,
4,
4))
                                                    .addGroup(
                                                            layout
.createSequentialGroup()
.addComponent(
jButton1,
javax.swing.GroupLayout.PREFERRED_SIZE,
56,
javax.swing.GroupLayout.PREFERRED_SIZE)
.addPreferredGap(
javax.swing.LayoutStyle.ComponentPlacement.RELATED)))
                                        .addComponent(
                                                jScrollPane1,
javax.swing.GroupLayout.PREFERRED_SIZE,
                                                124,
javax.swing.GroupLayout.PREFERRED_SIZE)
                                        .addContainerGap(
javax.swing.GroupLayout.DEFAULT_SIZE,
                                                Short.MAX_VALUE)));

    pack();
}// </editor-fold>
//GEN-END:initComponents
```

```
    private void jButton1ActionPerformed(java.awt.event.ActionEvent evt)
            throws SQLException {
        jTextArea1.setText("");
        String id = jTextField1.getText();
        String param = jTextField2.getText();
        Search mySearch = new Search(Integer.valueOf(id) - 1, param);
        jTextArea1.setText(mySearch.getResult());

        // TODO add your handling code here:
    }

    /**
     * @param args the command line arguments
     */
    public static void main(String args[]) {
        java.awt.EventQueue.invokeLater(new Runnable() {
            public void run() {
                new GUI().setVisible(true);
            }
        });
    }

    //GEN-BEGIN:variables
    // Variables declaration - do not modify
    private javax.swing.JButton jButton1;
    private javax.swing.JLabel jLabel1;
    private javax.swing.JLabel jLabel2;
    private javax.swing.JLabel jLabel3;
    private javax.swing.JScrollPane jScrollPane1;
    private javax.swing.JTextArea jTextArea1;
    private javax.swing.JTextField jTextField1;
    private javax.swing.JTextField jTextField2;
    // End of variables declaration//GEN-END:variables

}
```