武汉纺织大学

Web应用开发课程设计

**基于SSM的学生选课系统**

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# 1 需求分析

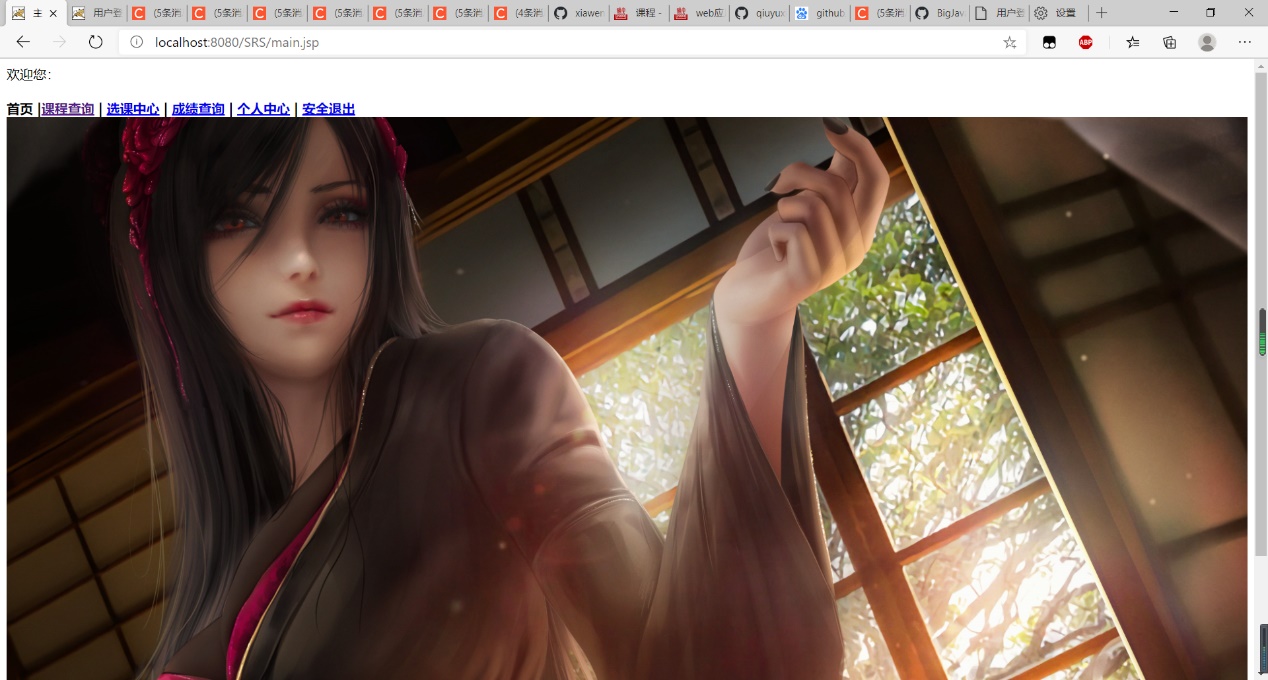
后端采用SSM框架实现简单的学生选课系统，实现学生用户以下功能：登陆、查看所有课程、选课、退选、成绩查询统计、修改密码等。

## 1.1用户登陆

前端界面进行登录，用户名，密码和验证码

## 1.2主界面

当用户名及密码正确时，进入系统主界面，如下：



## 1.3各项功能

### 1.3.1 登录

进入系统时的登录界面，需输入正确的用户名和密码，否则无法登录，

出现错误时会显示错误信息，例如用户名不正确，密码不正确等

### 1.3.2 课程查询

直接点击课程查询，进入课程查询界面，把所有课程都展现出来

### 1.3.3 选课

当选择3时，**如果当前用户所属的角色是收银员，则显示提示信息，“当前用户没有执行该项功能的权限”**，如果当前的用户角色是管理员角色，则显示如下子菜单：

### 1.3.4 退选

当选择4时，显示“请输入当前用户的原密码：”，若原密码不正确，则提示“原密码输入不正确，请重新输入”，输入正确后，显示“请设置新的密码：”，输入的密码必须满足必要的复杂性，如果不符合要求，则提示“您的密码不符合复杂性要求（密码长度不少于6个字符，至少有一个小写字母，至少有一个大写字母，至少一个数字），请重新输入：”，输入成功后，显示“请输入确认密码：”，若两次输入不一样，则提示“两次输入的密码必须一致，请重新输入确认密码：”，输入成功后，修改数据库中的用户表，并提示“您已成功修改密码，请谨记”，返回主界面。**用户在数据库中存放时不要明文的方式进行存放，可以采用某种加密算法（如MD5加密）存放加密后的密文**。

### 1.3.5 修改密码

需要输入3个文本框，分别为旧密码，新密码和确认密码，点击确认按钮，如果修改密码失败，则会弹出错误信息，比如旧密码不正确，或者密码不一致等，修改密码成功则会回到主界面，重新选择其它功能。

### 1.3.6 退出

清除cookie和session，并自动弹出到登录界面，下次需要重新登录。

### 1.3.7 \*\*\*\*

每个功能按编号往后递增描述

# 2 系统设计

## 2.1用户用例图

系统分为收银员，管理员两个角色，各角色的用户用例如下图2-1所示：

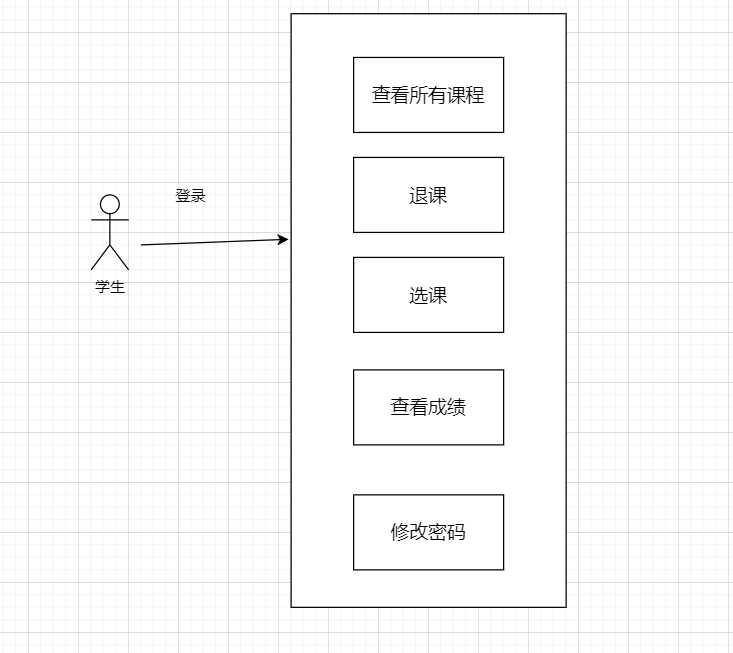


图2-1 用户用例图

## 2.2 ER图

数据库设计3张表，学生表，课程表，课程分数表，对应的ER图如图3-1所示。

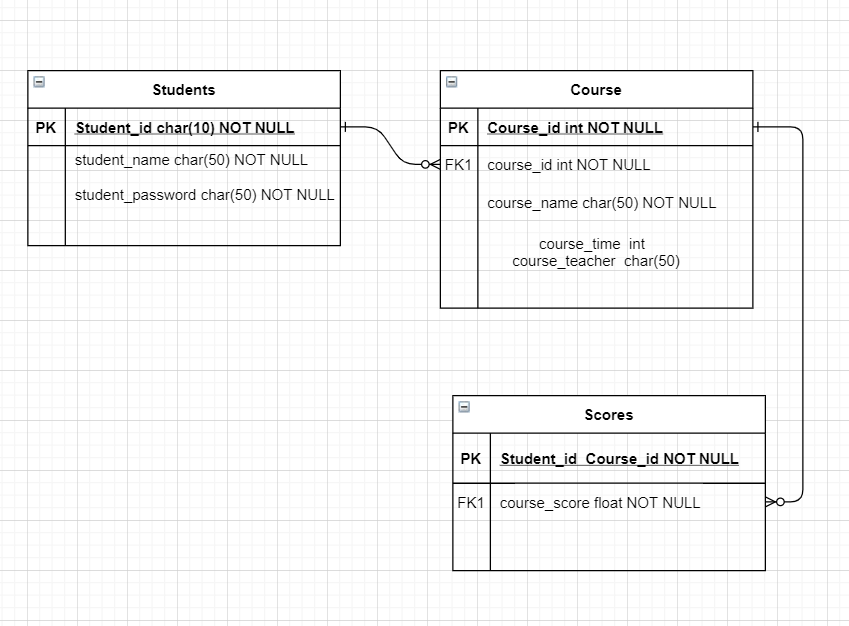
%3Cmx%3D%26quot%3B16%26quot%3B%20height%3D%26quot%3B16%26quot%3B%20align%3D%26quot%3Btop%26quot%3B%26gt%3B%26amp%3Bnbsp%3B%26lt%3Bfont%20size%3D%26quot%3B1%26quot%3B%20face%3D%26quot%3BTahoma%26quot%3B%26gt%3B%26lt%3Bspan%20style%3D%26quot%3Bfont-size%3A%2013px%26quot%3B%26gt%3B%26lt%3Bb%26gt%3Bname%20varchar(10)%26lt%3B%2Fb%26gt%3B%26lt%3B%2Fspan%26gt%3B%26lt%3B%2Ffont%26gt%3B%22%20entity.column.oldName%3D%22chrName%22%20entity.column.decimals%3D%22%22%20entity.column.autoIncreament%3D%22%22%20entity.column.unsigned%3D%22%22%20entity.column.bin%3D%22%22%20entity.column.ascii%3D%22%22%20entity.column.unicode%3D%22%22%20entity.column.PK%3D%22false%22%20entity.column.unique%3D%22%22%20entity.column.isNotNull%3D%22%22%20entity.column.defaultValue%3D%22%22%20entity.column.comment%3D%22%E5%AF%86%E7%A0%81%22%20entity.column.enum%3D%22%22%20entity.column.set%3D%22%22%20entity.column.enumSetValue%3D%22%22%20id%3D%225%22%3E%3CmxCell%20style%3D%22text%3Bhtml%3D1%3BstrokeColor%3Dnone%3BfillColor%3Dnone%3BspacingLeft%3D4%3BspacingRight%3D4%3Boverflow%3Dhidden%3Brotatable%3D0%3BportConstraint%3Deastwest%3BfontSize%3D12%3BverticalAlign%3Dmiddle%3B%22%20vertex%3D%221%22%20parent%3D%222%22%3E%3CmxGeometry%20y%3D%2278%22%20width%3D%22310%22%20height%3D%2226%22%20as%3D%22geometry%22%2F%3E%3C%2FmxCell%3E%3C%2Fmysql.column%3E%3Cmysql.column%20entity.column.tableName%3D%22uses%22%20entity.column.name%3D%22role%22%20entity.column.datalen%3D%2220%22%20entity.column.dataType%3D%22VARCHAR%22%20label%3D%22%26lt%3Bimg%20title%3D%26quot%3BPrimary%20Key%26quot%3B%20src%3D%26quot%3Bimages%2Fspacer.gif%26quot%3B%20width%3D%26quot%3B16%26quot%3B%20height%3D%26quot%3B16%26quot%3B%20align%3D%26quot%3Btop%26quot%3B%26gt%3B%26amp%3Bnbsp%3B%26lt%3Bfont%20size%3D%26quot%3B1%26quot%3B%20face%3D%26quot%3BTahoma%26quot%3B%26gt%3B%26lt%3Bspan%20style%3D%26quot%3Bfont-size%3A%2013px%26quot%3B%26gt%3B%26lt%3Bb%26gt%3Bname%20varchar(10)%26lt%3B%2Fb%26gt%3B%26lt%3B%2Fspan%26gt%3B%26lt%3B%2Ffont%26gt%3B%22%20entity.column.oldName%3D%22chrName%22%20entity.column.decimals%3D%22%22%20entity.column.autoIncreament%3D%22%22%20entity.column.unsigned%3D%22%22%20entity.column.bin%3D%22%22%20entity.column.ascii%3D%22%22%20entity.column.unicode%3D%22%22%20entity.column.PK%3D%22false%22%20entity.column.unique%3D%22%22%20entity.column.isNotNull%3D%22%22%20entity.column.defaultValue%3D%22%22%20entity.column.comment%3D%22%E8%A7%92%E8%89%B2%22%20entity.column.enum%3D%22%22%20entity.column.set%3D%22%22%20entity.column.enumSetValue%3D%22%22%20id%3D%226%22%3E%3CmxCell%20style%3D%22text%3Bhtml%3D1%3BstrokeColor%3Dnone%3BfillColor%3Dnone%3BspacingLeft%3D4%3BspacingRight%3D4%3Boverflow%3Dhidden%3Brotatable%3D0%3BportConstraint%3Deastwest%3BfontSize%3D12%3BverticalAlign%3Dmiddle%3B%22%20vertex%3D%221%22%20parent%3D%222%22%3E%3CmxGeometry%20y%3D%22104%22%20width%3D%22310%22%20height%3D%2226%22%20as%3D%22geometry%22%2F%3E%3C%2FmxCell%3E%3C%2Fmysql.column%3E%3Cmysql.table%20entity.table.tableName%3D%22product%22%20label%3D%22product%22%20id%3D%227%22%3E%3CmxCell%20style%3D%22swimlane%3BfontStyle%3D0%3BchildLayout%3DstackLayout%3Bhorizontal%3D1%3Bhtml%3D1%3BstartSize%3D26%3BfillColor%3D%23b0e3e6%3BhorizontalStack%3D0%3BresizeParent%3D1%3BresizeParentMax%3D0%3BresizeLast%3D0%3Bcollapsible%3D1%3BmarginBottom%3D0%3BswimlaneFillColor%3D%23ffffff%3Balign%3Dcenter%3BfontSize%3D13%3BstrokeColor%3D%230e8088%3Brounded%3D0%3Bshadow%3D1%3Bcomic%3D0%3Bglass%3D0%3BgradientDirection%3Dsouth%3BgradientColor%3D%23ffffff%3B%22%20vertex%3D%221%22%20connectable%3D%220%22%20parent%3D%221%22%3E%3CmxGeometry%20x%3D%2260%22%20y%3D%22210%22%20width%3D%22310%22%20height%3D%22130%22%20as%3D%22geometry%22%2F%3E%3C%2FmxCell%3E%3C%2Fmysql.table%3E%3Cmysql.column%20entity.column.tableName%3D%22product%22%20entity.column.name%3D%22barcode%22%20entity.column.dataType%3D%22VARCHAR%22%20entity.column.PK%3D%22true%22%20label%3D%22%26lt%3Bimg%20title%3D%26quot%3BPrimary%20Key%26quot%3B%20src%3D%26quot%3Bimg%2Fdb%2Fkey1.png%26quot%3B%20width%3D%26quot%3B16%26quot%3B%20height%3D%26quot%3B16%26quot%3B%20align%3D%26quot%3Btop%26quot%3B%26gt%3B%26amp%3Bnbsp%3B%26lt%3Bfont%20size%3D%26quot%3B1%26quot%3B%20face%3D%26quot%3BTahoma%26quot%3B%26gt%3B%26lt%3Bspan%20style%3D%26quot%3Bfont-size%3A%2013px%26quot%3B%26gt%3B%26lt%3Bb%26gt%3Bid%20int%20primary%20key%26lt%3B%2Fb%26gt%3B%26lt%3B%2Fspan%26gt%3B%26lt%3B%2Ffont%26gt%3B%22%20entity.column.oldName%3D%22id%22%20entity.column.datalen%3D%2210%22%20entity.column.decimals%3D%22%22%20entity.column.autoIncreament%3D%22%22%20entity.column.unsigned%3D%22%22%20entity.column.bin%3D%22%22%20entity.column.ascii%3D%22%22%20entity.column.unicode%3D%22%22%20entity.column.unique%3D%22%22%20entity.column.isNotNull%3D%22NOT%20NULL%22%20entity.column.defaultValue%3D%22%22%20entity.column.comment%3D%22%22%20entity.column.enum%3D%22%22%20entity.column.set%3D%22%22%20entity.column.enumSetValue%3D%22%22%20id%3D%228%22%3E%3CmxCell%20style%3D%22text%3Bhtml%3D1%3BstrokeColor%3Dnone%3BfillColor%3Dno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omment%3D%22%22%20entity.column.enum%3D%22%22%20entity.column.set%3D%22%22%20entity.column.enumSetValue%3D%22%22%20id%3D%2218%22%3E%3CmxCell%20style%3D%22text%3Bhtml%3D1%3BstrokeColor%3Dnone%3BfillColor%3Dnone%3BspacingLeft%3D4%3BspacingRight%3D4%3Boverflow%3Dhidden%3Brotatable%3D0%3BportConstraint%3Deastwest%3BfontSize%3D12%3BverticalAlign%3Dmiddle%3B%22%20vertex%3D%221%22%20parent%3D%2212%22%3E%3CmxGeometry%20y%3D%22156%22%20width%3D%22280%22%20height%3D%2226%22%20as%3D%22geometry%22%2F%3E%3C%2FmxCell%3E%3C%2Fmysql.column%3E%3Cmysql.column%20entity.column.tableName%3D%22saleDetail%22%20entity.column.name%3D%22saleTime%22%20entity.column.datalen%3D%22%22%20entity.column.dataType%3D%22DATETIME%22%20label%3D%22%26lt%3Bimg%20title%3D%26quot%3BPrimary%20Key%26quot%3B%20src%3D%26quot%3Bimages%2Fspacer.gif%26quot%3B%20width%3D%26quot%3B16%26quot%3B%20height%3D%26quot%3B16%26quot%3B%20align%3D%26quot%3Btop%26quot%3B%26gt%3B%26amp%3Bnbsp%3B%26lt%3Bfont%20size%3D%26quot%3B1%26quot%3B%20face%3D%26quot%3BTahoma%26quot%3B%26gt%3B%26lt%3Bspan%20style%3D%26quot%3Bfont-size%3A%2013px%26quot%3B%26gt%3B%26lt%3Bb%26gt%3Bname%20varchar(10)%26lt%3B%2Fb%26gt%3B%26lt%3B%2Fspan%26gt%3B%26lt%3B%2Ffont%26gt%3B%22%20entity.column.oldName%3D%22count%22%20entity.column.decimals%3D%22%22%20entity.column.autoIncreament%3D%22%22%20entity.column.unsigned%3D%22%22%20entity.column.bin%3D%22%22%20entity.column.ascii%3D%22%22%20entity.column.unicode%3D%22%22%20entity.column.PK%3D%22false%22%20entity.column.unique%3D%22%22%20entity.column.isNotNull%3D%22%22%20entity.column.defaultValue%3D%22%22%20entity.column.comment%3D%22%22%20entity.column.enum%3D%22%22%20entity.column.set%3D%22%22%20entity.column.enumSetValue%3D%22%22%20id%3D%2219%22%3E%3CmxCell%20style%3D%22text%3Bhtml%3D1%3BstrokeColor%3Dnone%3BfillColor%3Dnone%3BspacingLeft%3D4%3BspacingRight%3D4%3Boverflow%3Dhidden%3Brotatable%3D0%3BportConstraint%3Deastwest%3BfontSize%3D12%3BverticalAlign%3Dmiddle%3B%22%20vertex%3D%221%22%20parent%3D%2212%22%3E%3CmxGeometry%20y%3D%22182%22%20width%3D%22280%22%20height%3D%2226%22%20as%3D%22geometry%22%2F%3E%3C%2FmxCell%3E%3C%2Fmysql.column%3E%3CmxCell%20id%3D%2220%22%20value%3D%221..n%22%20style%3D%22edgeStyle%3DentityRelationEdgeStyle%3BfontSize%3D12%3Bhtml%3D1%3BendArrow%3DERoneToMany%3BstrokeWidth%3D2%3BstrokeColor%3D%236c8ebf%3BexitX%3D1%3BexitY%3D0.25%3BentryX%3D0%3BentryY%3D0.5%3B%22%20edge%3D%221%22%20source%3D%224%22%20target%3D%2214%22%20parent%3D%221%22%3E%3CmxGeometry%20relative%3D%221%22%20as%3D%22geometry%22%2F%3E%3C%2FmxCell%3E%3CmxCell%20id%3D%2221%22%20value%3D%221..n%22%20style%3D%22edgeStyle%3DentityRelationEdgeStyle%3BfontSize%3D12%3Bhtml%3D1%3BendArrow%3DERoneToMany%3BstrokeWidth%3D2%3BstrokeColor%3D%236c8ebf%3BexitX%3D1%3BexitY%3D0.5%3BentryX%3D0%3BentryY%3D0.5%3B%22%20edge%3D%221%22%20source%3D%228%22%20target%3D%2216%22%20parent%3D%221%22%3E%3CmxGeometry%20relative%3D%221%22%20as%3D%22geometry%22%2F%3E%3C%2FmxCell%3E%3C%2Froot%3E%3C%2FmxGraphModel%3E

图3-1 数据库ER图

## 2.3 UML类图（Class Diagram）

对于用户功能模块，共设计如下6个类。

* VO实体类User：与数据库结构进行映射的类。主要由属性，setter, getter方法组成，VO类中的属性与表中的字段相对应，每一个VO类的对象都表示表中的每一条记录
* DAO接口IUserDAO：主要定义操作的接口，定义一系列数据库的原子性操作，例如增删改查（通常称为CRUD）等。
* DAO实现类映射文件Mapper：DAO接口的真实实现类，通过配置映射文件，主要完成具体数据库操作，但不负责数据库的打开和关闭。
* 业务逻辑类UserService：对于数据层的原子操作进行整合。还要负责数据库的打开与关闭（不管是否出异常，数据库都要关闭）
* 业务逻辑实现类 UserServiceImpl：实现业务逻辑类的功能，对于数据层的原子操作进行整合。
* Util类：实现一些单独的功能，比如产生验证码图片，对数据进行MD5加密等
* Controller类UserController: 程序的控制器,比如控制登录，退出，课程查询等功能

各类的结构及类之间的关系如图2-5所示：

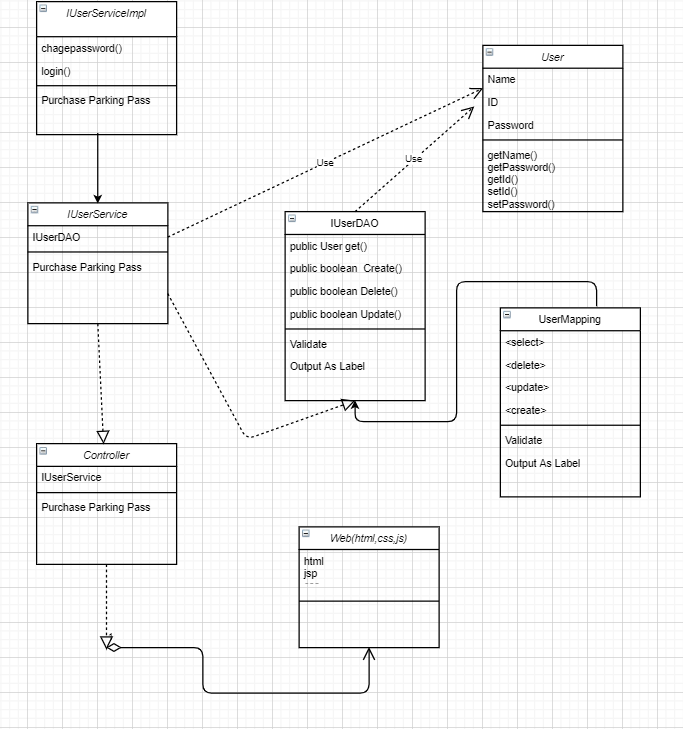
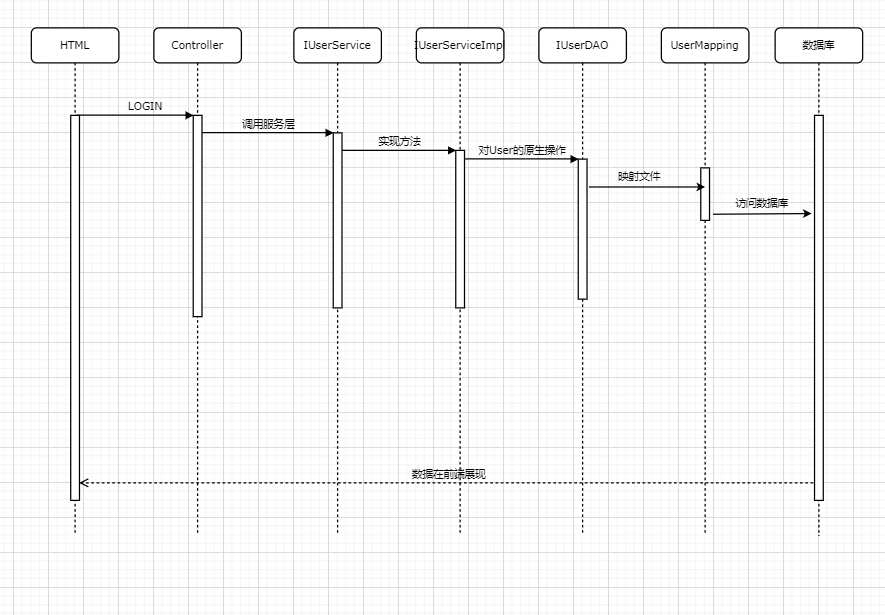


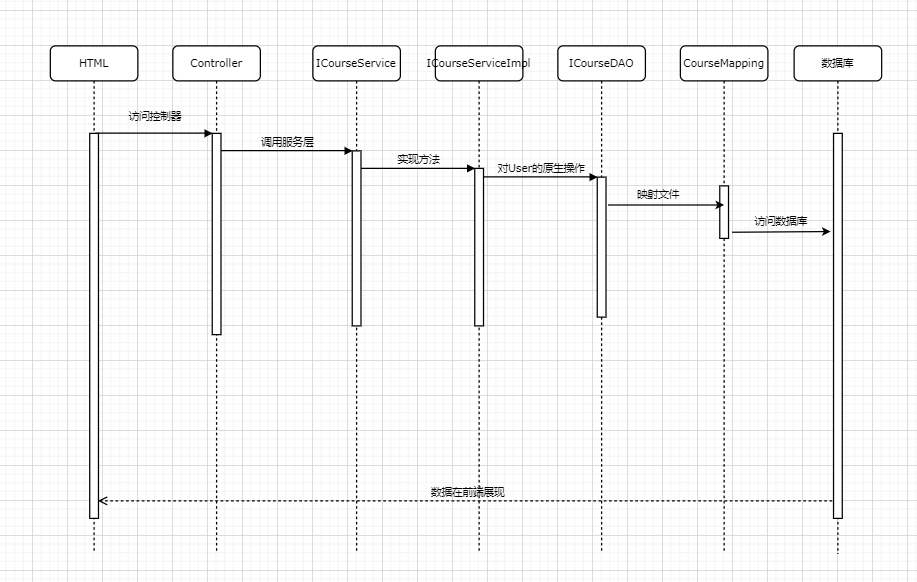
图2-5 用户功能类图

## 2.4 UML时序图（Sequence Diagram）

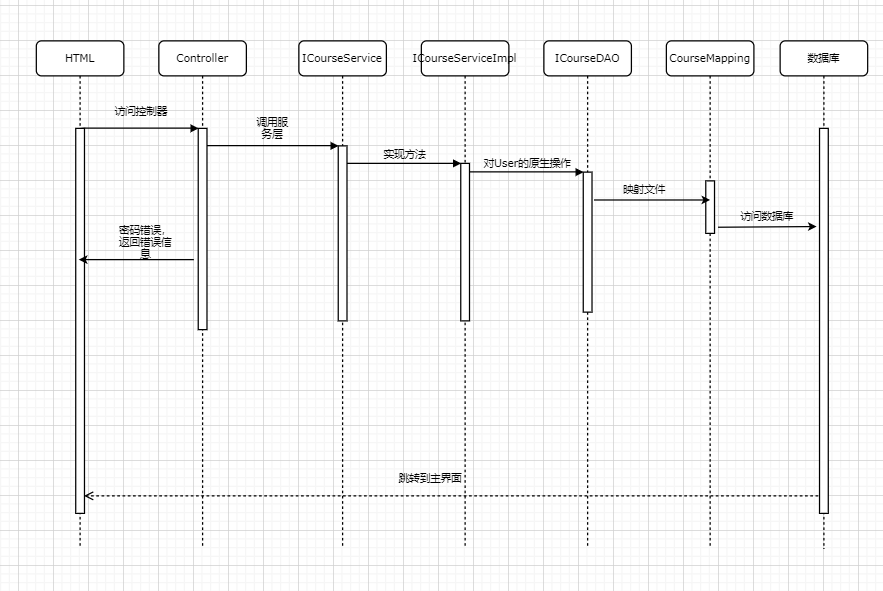
### 2.4.1 系统登录



### 2.4.2 课程查询模块

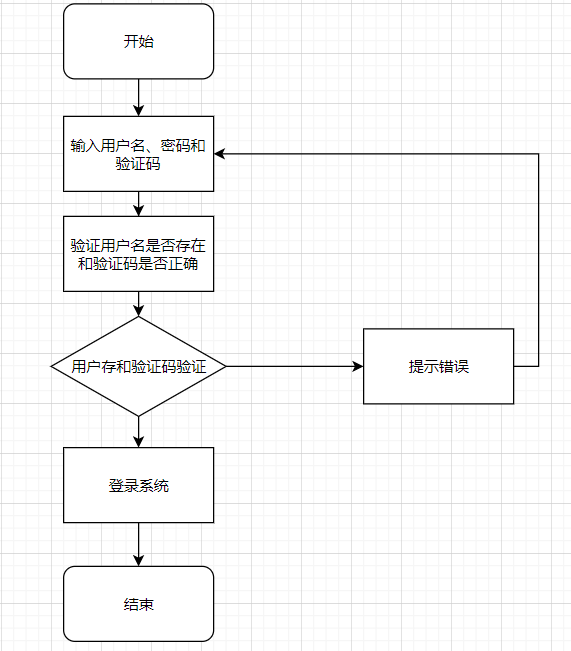


### 2.4.3 修改密码模块

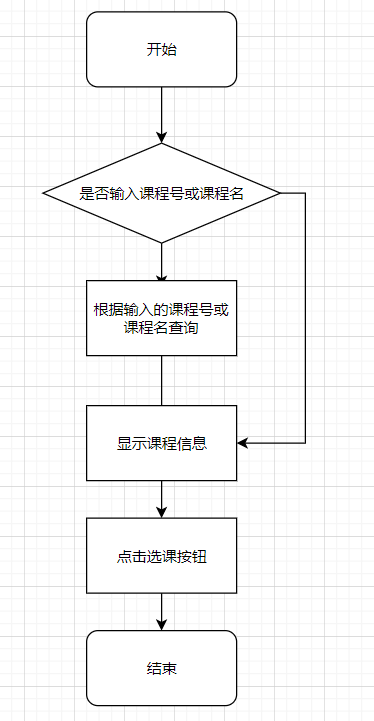


## 2.5活动图

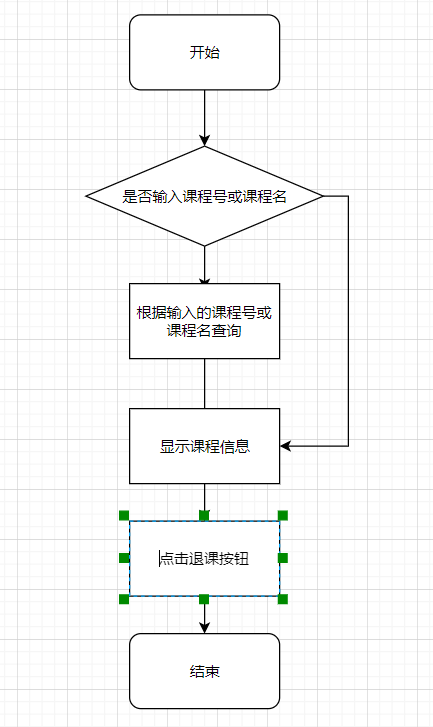
登录操作需要验证用户名，密码，只有当用户名和密码同时存在即用户存在的情况下才能成功登录系统，否则会提示错误信息，具体流程如图2-6所示。



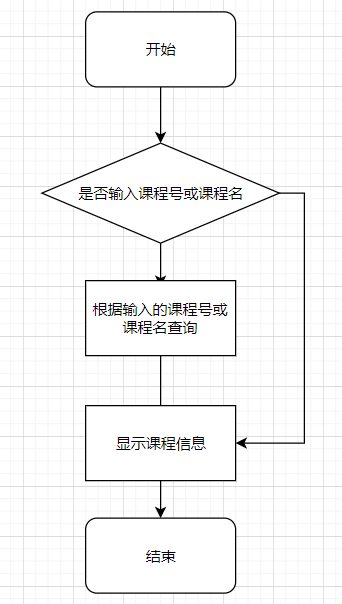
### 2.5.1学生选课界面



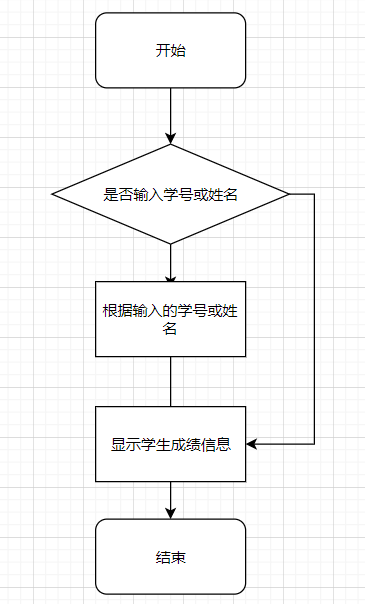
### 2.5.2学生退课课界面



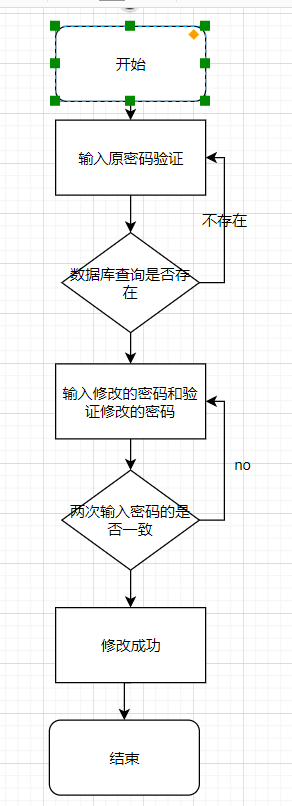
### 2.5.3课表查询界面



### 2.5.4成绩查询界面

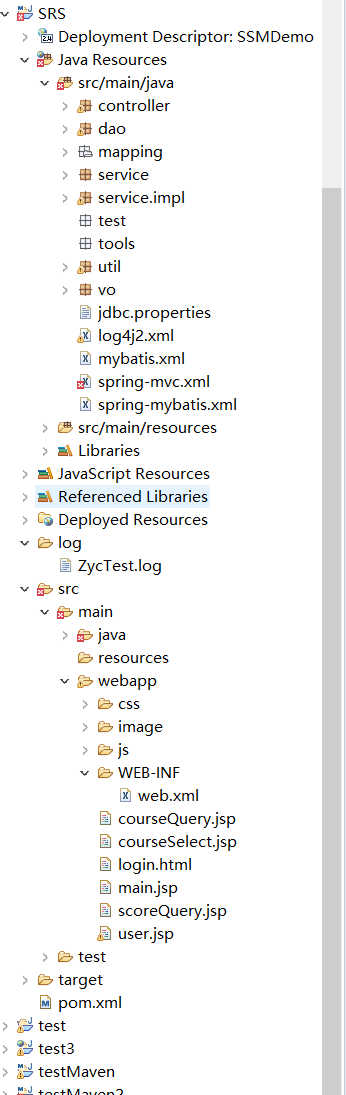


### 2.5.5修改密码界面



# 3 系统实现

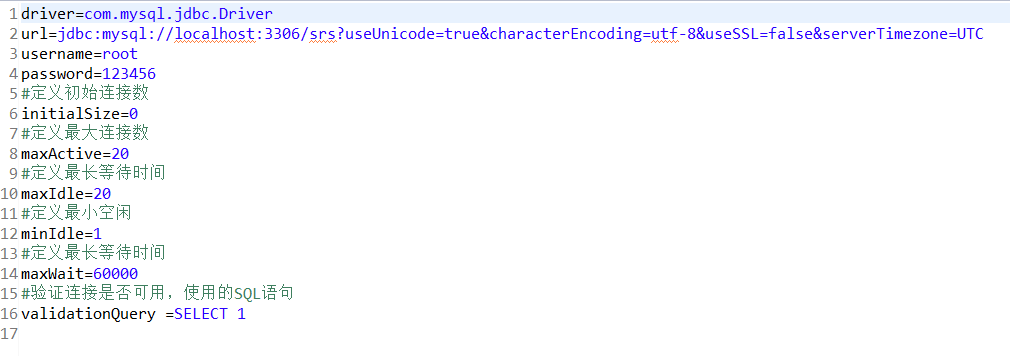
## 3.1 项目结构



## 3.2 配置文件

### 3.2.1 jdbc.properties文件

该配置文件主要是以文件形式保存数据库的驱动类名称，连接数据库的URL地址，访问数据库的用户名及对应的密码，程序运行时会读取该文件相关信息，避免硬编码，当相关信息发生变化时，只需修改配置文件而不用修改源代码，增加程序的可扩展型。



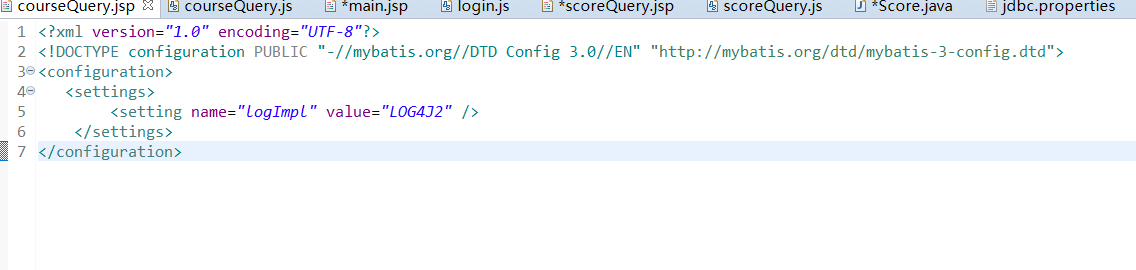
### 3.2.2 log4j.properties文件

描述该文件作用，并对里面的配置进行解释



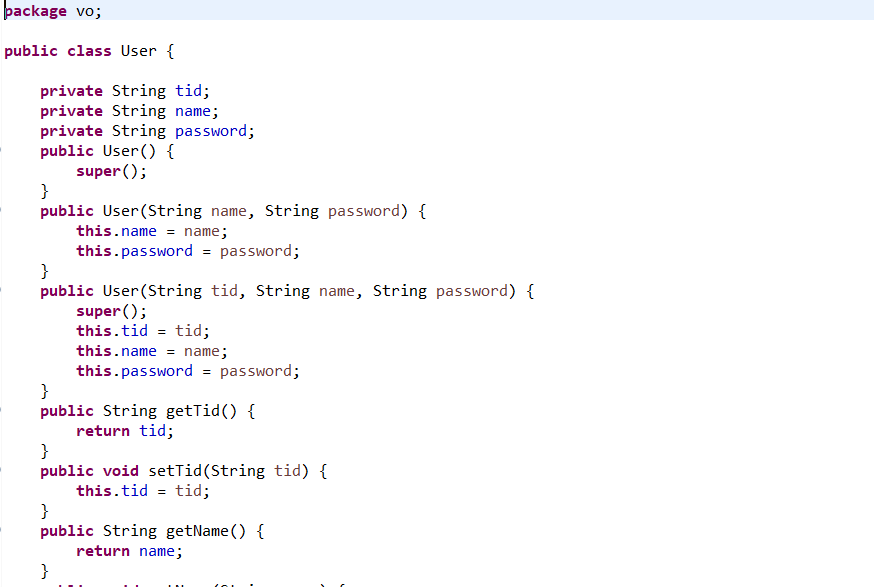
### 3.2.3 mybatis.xml文件

描述该文件作用，并对里面的配置进行解释

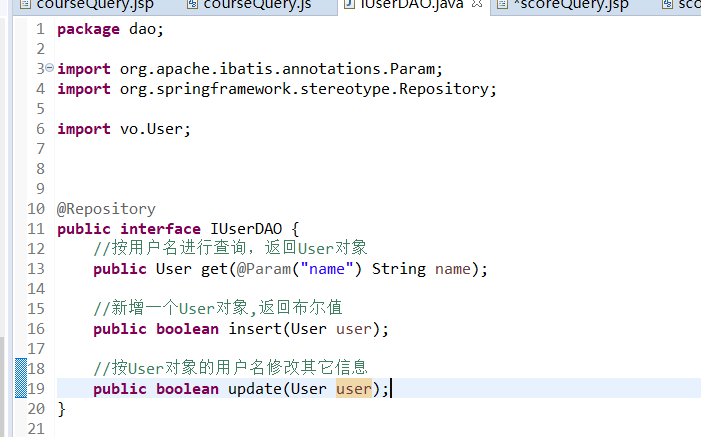


## 3.3 VO类User.java

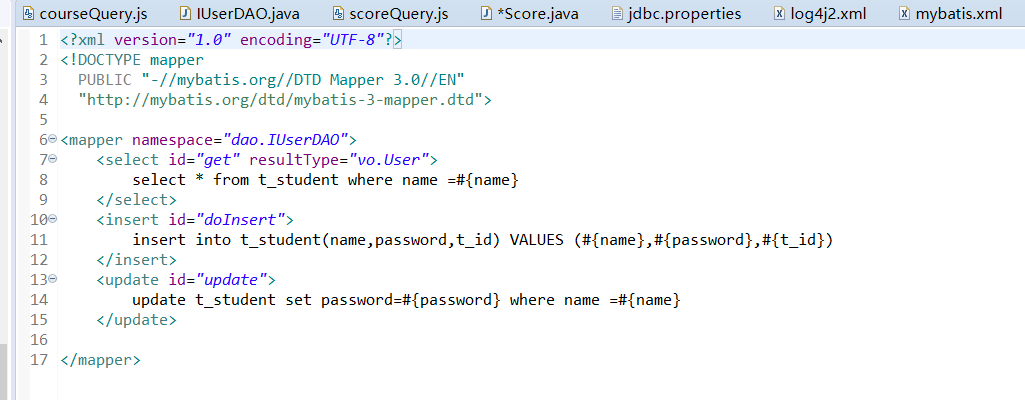
描述该文件作用，并对里面的关键代码进行解释



## 3.4 DAO接口类IUserDAO.java



## 3.5 接口映射文件UserMapper.xml



## 3.6 工具包Util

### 3.6.1 CreateImage

产生验证码图片



### 3.6.2 MD5Util.java

该类主要实现对数据库中的用户密码进行MD5加密，描述该文件作用，并对里面的关键代码进行解释

**public** **class** MD5Util {

**public** **static** String md5(String str) {

**byte**[] digest = **null**;

**try** {

MessageDigest md5 = MessageDigest.*getInstance*("md5");

digest = md5.digest(str.getBytes("utf-8"));

} **catch** (NoSuchAlgorithmException e) {

e.printStackTrace();

} **catch** (UnsupportedEncodingException e) {

e.printStackTrace();

}

//16是表示转换为16进制数

String md5Str = **new** BigInteger(1, digest).toString(16);

**return** md5Str;

}

**public** **static** **void** main(String[] args) {

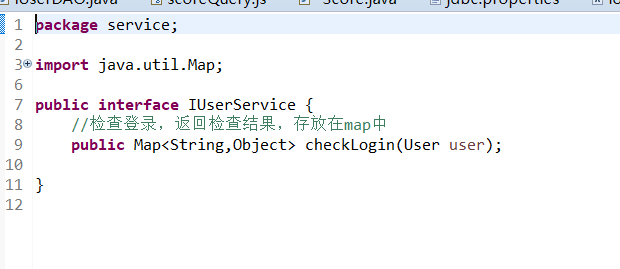
System.***out***.println(*md5*("admin"));

}

}

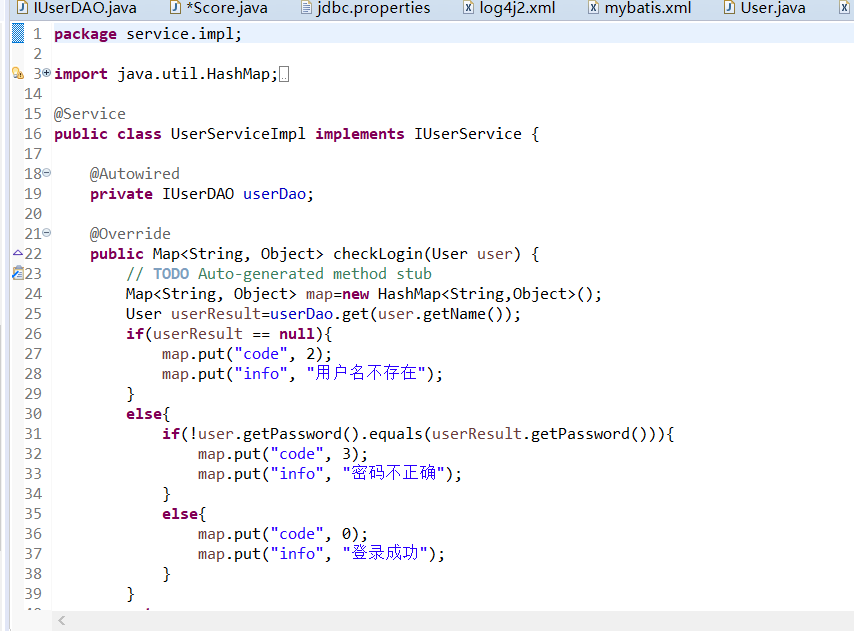
## 3.7 服务层UserService.java

描述该文件作用，并对里面的关键代码进行解释



## 3.8 UserServiceImpl.java

描述该文件作用，并对里面的关键代码进行解释



## 3.9 UserController.java

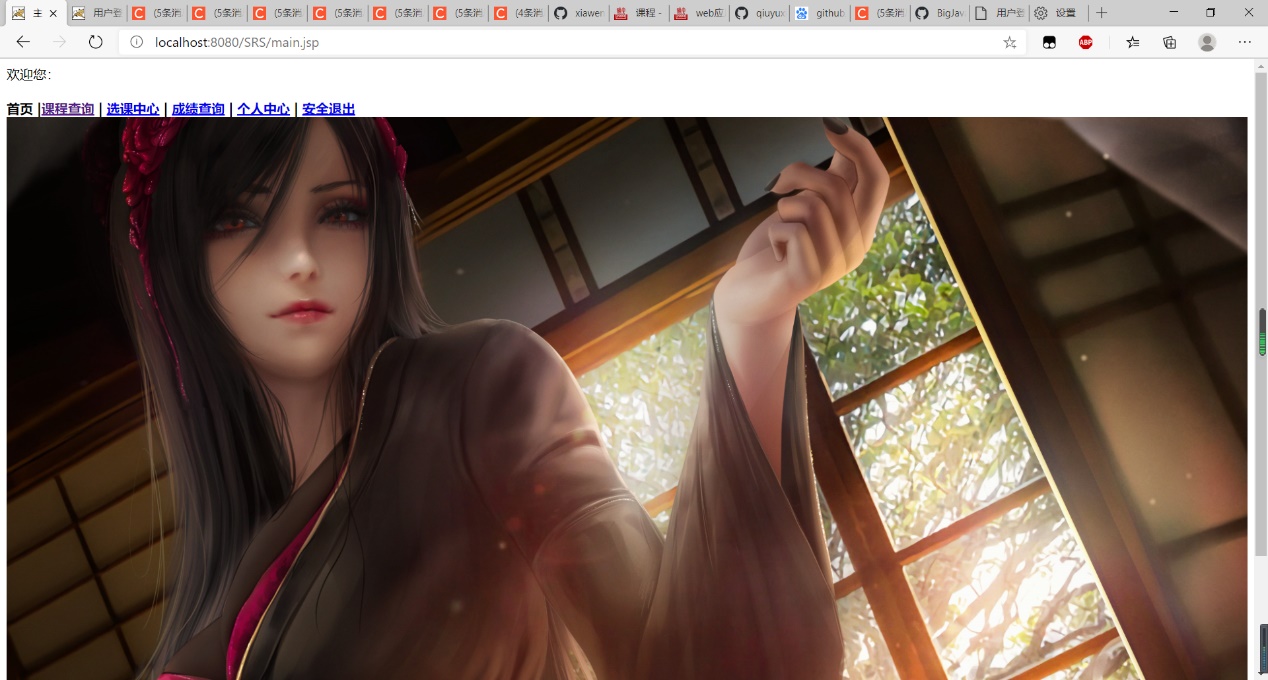


# 4 系统测试

登录



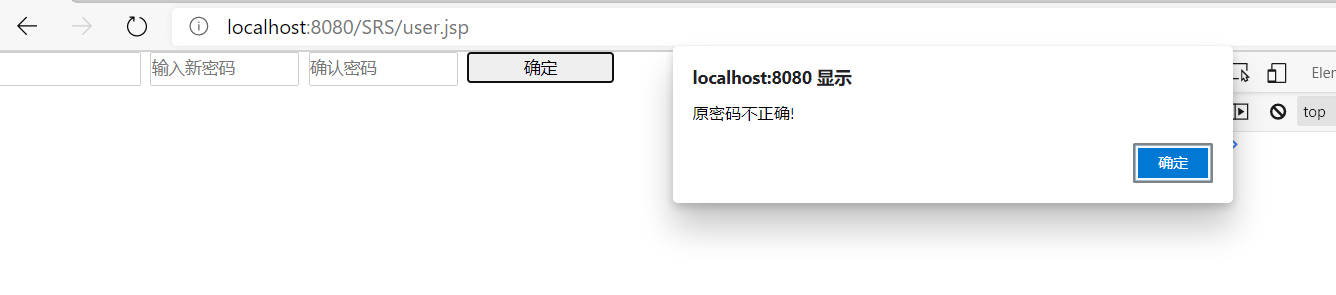
主页面

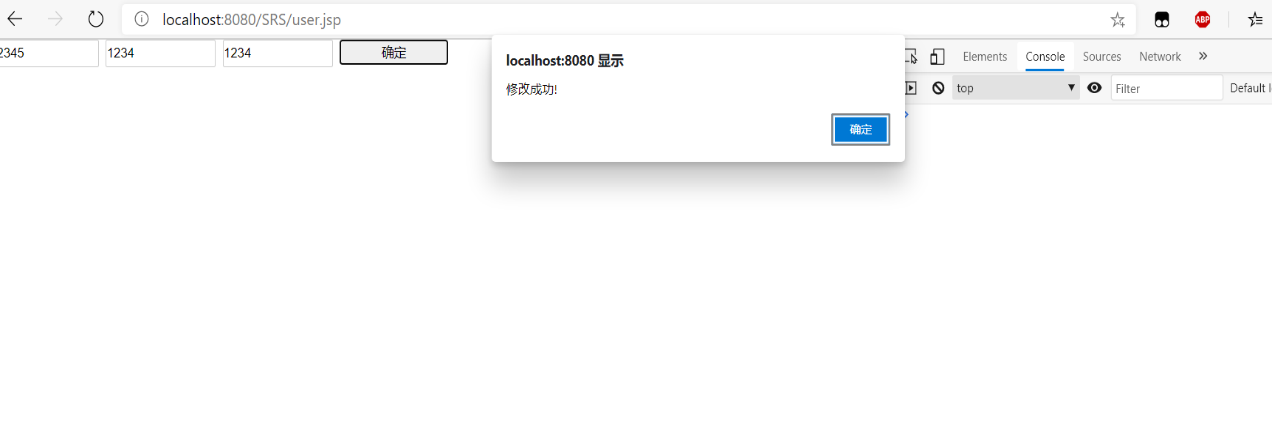


课程查询



修改密码





# 5 系统总结

这门课实用性非常强，从前端到后端，前端需要的基础知识html,css,javascript,然后一些框架的使用Ajax，vue，jQuery,boodstrap等，后端本学期主要是mybatis，spring-mvc，SSM框架等，数据库MySQL，服务器tomcat的使用等。如果能够完全掌握，一定能够在社会中有很好的发展，但是这门课需要下很大功夫，需要投入足够的尽力。

我觉得我自己存在的问题就是前端方面的不足，html,css还好，后面的JavaScript就没有掌握的很好，所以界面等方面做的不是很美观，甚至只是应付。在平时学习中都感觉还好，没什么大问题，结果导致最后两天才处理大作业，大意了，只能匆匆应付一下了。

这个课程设计说实话没什么技术含量，就看熟练程度和平时的学习掌握程度了，然后一些细节的地方，**不管平时成绩的话**，我给自己**65-75**分吧，毕竟应付了事了，有些功能没有实现，就增加按钮功能，实现增加删除就可以了。

遇到的问题和平时都差不多，只是一时想不起来重新去解决，很浪费时间，比如映射文件的配置，控制器接收参数，访问数据库错误，界面很丑等等,后面自己再花时间把这个搞好一点，起码得看得过去。

以后的发展方向肯定是计算机的，应该是软件Java，python方向，过年的时候准备考研了，目标院校武汉理工，加油吧，打工人!