

# The Design and Implementation of Web-based One-stop Student Community Comprehensive Management System

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**Abstract.** In the background of the rapid development of information technology, it is necessary to build a scientific and reasonable educational administration management information system in order to create a good teaching environment, excellent school spirit and study style. Therefore, the author uses SSM of J2EE standard as the project framework and Javaweb technology to develop a comprehensive student community management system. The comprehensive community management system for students is based on the Internet to achieve regional coverage, which is not limited by time and space, and can further improve the efficiency of college management, manage and maintain information. The design of this system contributes to the process of scientific information management in colleges and universities in China.

**Keywords:** web; java; Comprehensive management of colleges and universities; One-stop student community.

## 1 Introduction

In order to realize the continuous development of the society, it is necessary to improve the reserve force of social talents and the service quality level of college students, which is also the inherent demand of the current higher education reform. The construction of one-stop student community can reasonably handle the daily affairs of college students, deepen the comprehensive management of student services, and promote the comprehensive quality growth of students, thus improving the quality of talents cultivated on campus. However, the current campus comprehensive management system is usually based on the fact that the school does not fully consider the needs of students, and it is difficult to achieve real convenience. [1]

According to the above analysis, the author of this paper thinks that a one-stop comprehensive management system of student community based on Web should be developed. On the premise of comprehensive management of the campus, establish a student community with students as the main body. In addition to the management functions of teachers and administrators, the functions developed for students include campus activity registration, inquiry of rewards and punishments, personal semester grading, result inquiry and curriculum inquiry. It will form an ideological guidance system integrating publicity, education, management and service, and strive to build a one-stop student community in the new era. In this paper, the functions of the system are integrated from the user's point of view, and the

system is generally divided into teacher's end, student's end and administrator's end, which can optimize the internal organization of the system and improve the user experience. Let teachers and students participate in the educational administration, which can improve the transparency and fairness of educational administration, and at the same time improve the efficiency of administrators' educational information management. [2]

## 2 Key Technologies

### 2.1 Spring framework

The inventor of Spring, Rod Johnson. The Spring is a declaration cycle management container for bean components in J2EE, and it is also an open source J2EE lightweight application development framework, providing IOC, AOP, MVC and many other important functional components in developing web applications. The Spring can reduce the complexity of the problems encountered in the development of enterprise applications. The important reason why spring framework is widely used is that it can design the layered architecture of web application system development, and allow developers to select the required individual components to use when using this framework. At the same time, spring also provides developers with an integrated framework for J2EE program development. Spring consists of seven modules, which constitute the core of Spring framework. Each module can be used separately or jointly, and the spring architecture diagram is shown in Figure 1. [3]

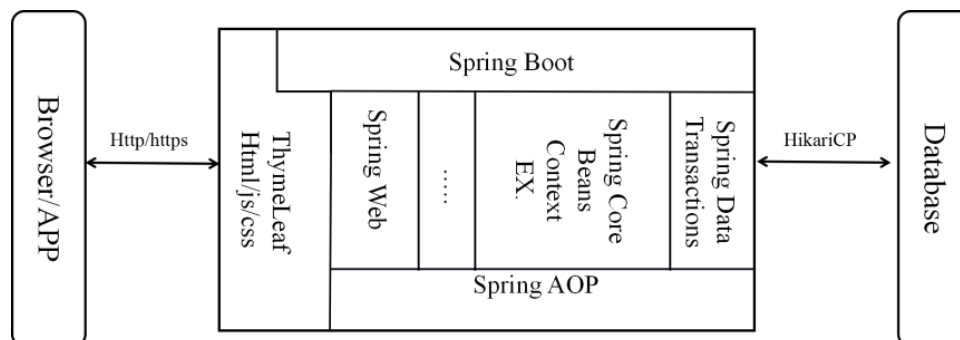


Fig. 1. Spring architecture diagram

### 2.2 Spring MVC mode

Many enterprise-level application development is based on MVC pattern, and Spring MVC is a tool specially designed for MVC architecture pattern. It can decouple and divide the modules in the WEB application according to MVC, which can effectively improve the efficiency of system development and reduce the complexity of application system expansion and maintenance. [4]

### 2.3 Hibernate

Hibernate is an open source lightweight ORM framework, which is responsible for object relationship mapping in the DAO layer of the overall application architecture. The method of

JAVA program operating database—JDBC is encapsulated. So developers only need to simply configure hibernate when configuring the operation function of adding, deleting and checking the database, which further improves the development efficiency of the system. [5]

## 2.4 Development environment

In this part, this paper briefly introduces the related technologies used in the development of one-stop student community comprehensive management system. This system is developed based on the framework of Struts 2.3+Spring Framework 5.3.2+Hibernate 5.3. The development environment is myeclipse9.0, the relational database is MySQL 8.0.28, and Navicat for MySQL is used to visualize the database. Choosing Apache Tomcat 9.0 for server deployment.

The key project used to configure the database of hibernate by creating persistent objects is hibernate.cfg.xml, and the configuration file mapping is defined as User.hbm.xml Some source codes of persistent object configuration files are shown in Figure 2. At this point, the complete SSH framework has been built. The choice of system architecture and key implementation technologies is very important. According to the analysis of the relevant technologies in the current era, it is considered that it is technically feasible to build a one-stop comprehensive management system for student communities based on the above technologies. [6]

```
<hibernate-mapping package = " com.cqnu.postgraduate.model">
<class name = "User" table = "user">
<id name = "username" type = "java.lang.String"></id>
<property name = "password" not-null = "true" type = "Java.Lang.String"></property>
</class>
</hibernate-mapping>
```

Fig. 2. Part of source code of persistent object configuration file

## 3 Demand analysis

The computer online teaching system is an enterprise application, so it is developed with J2EE mode and B/S architecture. The overall design diagram of the system is shown in Figure 3. The system adopts hierarchical architecture, which is divided into three parts: view display layer, business logic layer and data persistence layer. Among them, the view display layer includes javabean, action and actionservlet in J2EE program. It is developed by Struts2 tool, and the development language is CSS3+HTML5+JavaScript. The teachers and students send out all kinds of operation requests by accessing the function modules of the view display layer through their respective clients. After the client sends the request, it transmits the instruction to the business logic layer. The business logic layer is developed and designed by spring. The business logic layer is responsible for receiving the instructions from the client to perform all kinds of logical processing on the instructions. The business logic layer calls the data through the data persistence layer, returns the results to the client after completing the relevant operation instructions, and displays the operation results in the view display layer. The various

data processing functions in the system need the help of data persistence layer, which is processed by hibernate ORM framework. The data persistence layer includes object-oriented idea, data query engine and DAO layer that encapsulates JDBC. Only through hibernate can the system connect to MySQL database. [7]

As far as the network topology of this system is concerned, all kinds of clients can access the database servers, application servers and campus system clusters in the same local area network through the internet.

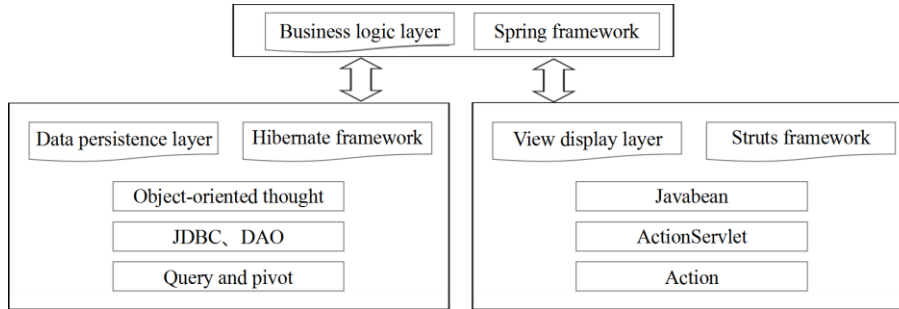


Fig. 3. The overall framework of the system

#### 4 Function realization

According to the main groups involved in campus management, the one-stop comprehensive management system of student community has designed three types of data ports, namely, teachers' terminal, administrators' terminal and students' terminal. [8]

All kinds of student records in the social integration system will be recorded in the student's individual evaluation results. This system involves performance points, including moral performance points and ontology performance points, which are combined with students' credit performance points in the educational administration system to form a personal overall semester score. The algorithm principle is designed by taking stylistic representation as an example. The stylistic performance score involves three aspects: basic score  $a$ , deduction score  $b$  and additional score  $c$ . The formula for calculating the stylistic score is  $v_3 = a + b + c_1$ . When the collective additional points of the whole professional class are 40 points higher than the average level, there will be additional points. Additional at this time is divided into

$C_2 = \frac{40 \times c_1}{\text{Class maximum additional score}}$ . As shown in formula 1. [9]

$$v_3 = \begin{cases} c_1, v_3 \leq 40 \\ \frac{40 \times c_1}{v_{\max 3}}, v_3 > 40 \end{cases} \quad (1)$$

The administrator users of this system should give different access rights according to the needs of different users, so as to ensure the normal operation of the system. In this paper, the one-to-one realization process of user login and permission management is introduced in

detail. Firstly, establish structs action, which can create the object of loginactionform.class and set the value. At the same time, create the corresponding object of loginaction.class and call it. The form of Login\_success.jsp will also be submitted in structs action. The system configuration file of uses Struts-cofig.xml to read, while the two modules that need to respond are login\_success.jsp and login\_error.jsp.

In the function of student file management, the highest-level administrator needs to input student status information. The entry of student status information is divided into two ways: external import of learning information network and manual data entry. First, the file xueji\_mgmt.jsp is used to process the request of learning and managing business, and then xj\_mgt\_Action is used to obtain the login authority. If the login is unsuccessful, the login can be continued by re-executing FindUserOfDeof. The page is a mgt.jsp file, enter String username indeptdist to call the function of xuej service, encapsulate the user object by xueji Dao, and then you can list and display the relevant student status information. Finally, after initializing the student users, the student status information is stored in the corresponding database DB by completing the design of Xueji List.jsp, and the results are returned to the management page xueji\_mgmt.jsp.

When the system is implemented, it is necessary to consider whether the response capability of the system can keep up with the increase of information data scale. So in this paper, the situation that the total number of users is less than 200 and the amount of data is not more than 400KB is tested. The concurrent test case table of the system is shown in Table 1. According to the test information, when the number of concurrent users is equal to 200, the highest CPU occupancy rate is 46.9%, and the response time is less than 500ms.

**Table 1.** Concurrent Test Case Set

Test condition	Virtualized user login		
Concurrency	Estimated response time	CPU occupancy rate	Measured time
20	<300ms	8.6%	100ms
50	<300ms	19.5%	140ms
100	<300ms	24.7%	170ms
150	<300ms	31.2%	210ms
200	<500ms	46.9%	260ms

Tests were conducted in the campus, and systematic data performance tests were conducted among students, teachers and administrators according to a certain proportion. The number of tests was 5, and the first result was that when the data response time was 46ms, the bit error rate was 0.10%, the data scale of the integrated platform was 120.6, and the number of queries accumulated to 12,465. The fifth measurement results show that the data response time is 60ms, the bit error rate is 0.24, the data size is 113.2, and the number of queries is 16581.

When the system transaction response time is tested, the operating speed is tested by modifying the concurrent stress test of more than 5~30 gears. It can be seen that the fluctuation range of response time caused by different pressure conditions is also quite different, because it has little impact on the actual user experience of the system. So it will be optimized later. The experimental data can basically show that the system meets the design requirements of the integrated community of college campus. [10]

## 5 Conclusions

In this paper, the Internet technology is used to establish a one-stop community for college students, and a series of optimization strategies and functional research and development are put forward to improve the comprehensive information management level of the campus. It is hoped that college administrators can realize the role of information construction in education management through this system, and continue to improve and implement the relevant technical system. But in the follow-up improvement work, I hope that the teaching management system can improve different functional systems according to different branches, and support the long-term and stable upgrade and repair of the system. In addition, the one-stop community system in this paper is aimed at general comprehensive universities, and there may still be a big gap in the business needs of specialized colleges, so the sharing of the system needs to be improved.

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