

Research of the Course Selection System for University Student Based on SSM Framework

Yumei Xiong

Electronic & Information School, Shanghai Dianji University, Shanghai, China
xiongym@sdju.edu.cn

Abstract: With the development of computer network technology, the enrollment scale of universities is constantly expanding. How to improve the utilization of information resources and handle a variety of teaching information has become a key focus of university management work. Student course selection plays an important role in academic management, and there is an urgent need to use network technology to build a university course selection system and achieve information management of course selection in universities. This can play a good promoting role in further improving the development of course selection in universities and enriching their experience in course selection. This article proposes an online course selection management system based on SSM. The paper provides a detailed introduction to system analysis, database design, system implementation, and system applications. Finally, using JSP technology, SSM framework, and SQL database to achieve all the functions of the system, experiments have shown that the system has good applicability.

Keywords: Course Selection System; SQL database; JSP technology; SSM.

1. Introduction

With the advent of the digital era and the comprehensive popularization of information networks, computer application technology has become a powerful driving force for social development and a key technology for achieving economic and social information management. Therefore, colleges and universities have increased their efforts in campus digitization and information management construction, but there are still several shortcomings in their practical application: for example, due to lagging management, there is a lack of supporting management models; Single function, unable to cover many aspects of university management; The usability is not strong, and many practical problems cannot be solved. The course selection management information system can help us improve the quality and efficiency of academic management [1].

The online course selection system can help schools break away from the traditional management mode of handwritten records. Utilizing computer systems for information management of students, teachers, and courses not only saves manpower and material resources, but also improves work efficiency, allowing administrators and teachers to work more efficiently. Secondly, for students, they do not need to be in school and can view courses and complete course selection anytime and anywhere through a computer, which is very convenient [2].

The online course selection system can take university course selection to a new level. The system's course selection status can be updated in real-time, which is important for students, but traditional management methods cannot achieve this. The university course selection system can be widely and comprehensively promoted through the Internet, allowing all students to understand and familiarize themselves with the convenience and efficiency of the university course selection system. It provides services for students, teachers, and school managers, saving manpower, material resources, and time, and improving work efficiency.

The paper provides a detailed introduction to system

analysis, database design, system implementation, and system applications. The system utilizes JSP technology, SSM framework, and SQL database to achieve all the functions of the system. Experiments have shown that the system has good applicability.

2. Database design

Database design refers to the design and optimization of the logical mode and physical structure of the database for a given application environment, and the establishment of the database and its application system, so that it can effectively store and manage data to meet the application needs of various users, including information management requirements and data operation requirements. Information management requirements refer to which data objects should be stored and managed in the database; Data operation requirements refer to the operations performed on data objects, such as query, add, delete, modify, and statistics [3].

2.1. Requirement Analysis

Nowadays, most universities have developed course selection systems that are suitable for their own teaching models. When setting up a course selection system, it is not only necessary to meet the most basic course selection requirements, but also to have its own characteristics. The basic principle followed by the system is convenience and flexibility. The basic requirement for course selection is to adapt to the teaching requirements of the school, so that the distribution of students, courses, teachers, and classrooms is reasonable and orderly. Not only do students complete their own course selection according to the requirements, but it can also improve the work efficiency of the academic affairs office.

The course selection system has the following functional requirements: first, obtain information about students, teachers, courses, and classrooms from the system; Second, Obtain the school's curriculum requirements, such as course setting, number limit, venue requirements, etc. for each semester, and students can complete course selection based

on their course selection needs.

Firstly, it is necessary to input various data of teachers, classrooms, and classes into the system. If there is data in the existing academic management system, it can also be directly called, which can effectively avoid duplicate data entry; Secondly, it is to collect teachers' course selection needs. Before selecting courses, the online system automatically solicits teachers' course selection requirements, and teachers fill them out on their own, greatly saving manpower and material resources. Thirdly, by adding functions such as pre-scheduling, post scheduling, and manual addition of courses, the course selection system will appear more convenient and friendly, and different course settings require different arrangements. Finally, optimize the query and printing function of the course schedule. Teachers, students, and teaching management personnel can always find the corresponding curriculum on the internet and download and print it according to their own requirements.

2.2. Conceptual Structure Design

In the process of database design, the process of abstracting user requirements into conceptual models is called conceptual structure design. Conceptual models are used to model the information world. There are many approaches for representing conceptual models, with the most commonly used being the Entity Relationship approach. This approach uses ER diagrams to describe the conceptual model of the real world, which is also known as the ER diagram [4].

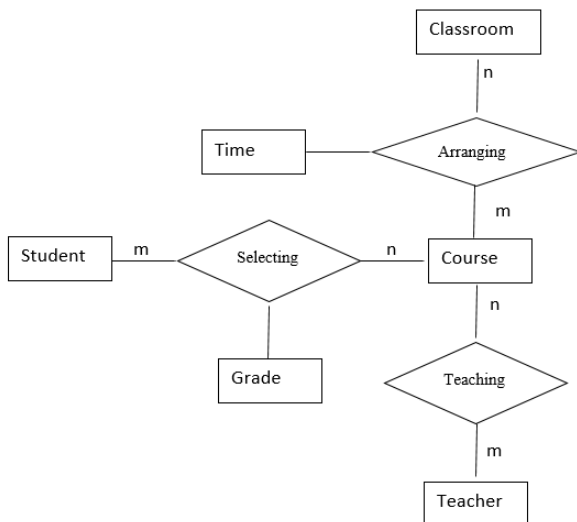


Figure 1. E-R diagram of Student Course Selecting System

We analyze the functional requirements of the student course selection system, classify and organize the collected data, determine the entities, their attributes, and the types of relation between them, and form an ER diagram. The student course selection system includes the following entities and attributes:

Student: Student ID, Name, Gender, Age, Mobile Phone, Login Password.

Course: Course ID, Course Name, Prerequisite Course ID, Teacher ID, Credits, Maximum Number of Students.

Teacher: Teacher ID, Name, Mobile phone, Password, Operation Permissions.

Classroom: Classroom ID, Classroom Name.

Selecting Courses: Student ID, Course ID, Grade.

Teaching: Teacher ID, Course ID.

Arranging: Classroom ID, Course ID, Time.

The complete ER diagram of the student course selection

system is as Fig 1.

2.3. Logic Structure Design

The task of logical structure design is to transform the ER diagram designed during the conceptual structure design phase into a logical structure that is consistent with the data model supported by the database management system. The database we have chosen is SQL server, which supports a relational data model [5].

(1) One-to-One relationship can be transformed into an independent relational model or merged with a corresponding relational model at either end.

(2) One-to-Many relationship can be transformed into an independent relational Model or merged with the corresponding relational model on the many- end.

(3) Many-to-many relationship can be transformed into a relational model. The attributes of a relationship are the primary key of the entities associated the relationship and the attributes of the relationship itself; The primary key of a relationship is a combination of entity primary keys.

The ER diagram is converted into a relational model as follows:

Student (Student ID, Name, Gender, Age, Mobile Phone, Login Password).

Course (Course ID, Course Name, Prerequisite Course ID, Teacher ID, Credits, Maximum Number of Students).

Teacher (Teacher ID, Name, Mobile phone, Password, Operation Permissions).

Classroom (Classroom ID, Classroom Name, Maximum Number of Students).

Selecting Courses (Student ID, Course ID, Grade).

Teaching (Teacher ID, Course ID).

Arranging (Classroom ID, Course ID, Time).

2.4. Design of data tables

Based on the requirements analysis of the course selection system, the ER diagram of the system, and the design principles of database tables, create the following data tables for the system:

Table 1. Student-Table

Serial number	Column name	data type	constraint
1	Student ID	varchar	Not null, primary key
2	Student name	varchar	Not null
3	Gender	varchar	Not null
4	Age	INT	Not null
5	Mobile Phone	varchar	Not null
6	Login Password	varchar	Not null

Table 2. Course-Table

Serial number	Column name	data type	constraint
1	Course ID	varchar	Not null, primary key
2	Course Name	varchar	Not null
3	Prerequisite Course ID	varchar	Not null
4	Teacher ID	varchar	Not null
5	Credits	varchar	Not null
6	Maximum Number of Students	varchar	Not null

Table 3. Teacher-Table

Serial number	Column name	data type	constraint
1	Teacher ID	varchar	Not null, primary key
2	Teacher Name	varchar	Not null
3	Mobile phone	varchar	Not null
4	Password	varchar	Not null
5	Operation Permissions	varchar	Not null

Table 4. Classroom-Table

Serial number	Column name	data type	constraint
1	Classroom ID	varchar	Not null, primary key
2	Classroom Name	varchar	Not null
3	Maximum Number of Students	varchar	Not null

Table 5. Selecting Course-Table

Serial number	Column name	data type	constraint
1	Student ID	varchar	Not null, primary key
2	Course ID	varchar	Not null, primary key
3	Grade	varchar	Not null

Table 6. Teaching-Table

Serial number	Column name	data type	constraint
1	Teacher ID	varchar	Not null, primary key
2	Course ID	varchar	Not null, primary key

Table 7. Arranging-Table

Serial number	Column name	data type	constraint
1	Classroom ID	varchar	Not null, primary key
2	Course ID	varchar	Not null, primary key
3	Time	DATETIME	Not null

3. System Implementation

After research, requirement analysis, conceptual structure design, logical structure design, and physical structure design, the system utilizes JSP technology, SSM framework, and SQL database to achieve all the functions of the system. Create a database using data definition language, establish data tables, import data, and implement, test, and run it in the SQLSERVER database management system. Can perform maintenance work such as data analysis, modification, adjustment, and subsequent development work on the database.

In a database management system, we need to use a data definition language to create databases, basic tables, indexes, views, and import data.

First, Use SQL statements to create student tables, course-tables, teacher-tables, classroom-tables, course selection-tables, teaching-tables and arranging-tables, and define the names, data types, lengths, and data integrity of each column.

Second, Use SQL statements to create indexes for student-table, course-table and teacher-table separately. Finally, create a complete course selection view using SQL statements.

4. System Testing

The purpose of online course selection system testing is to ensure that the system's functionality and performance meet expectations and meet actual course selection needs. The test content includes:

(1) Functional testing of the system: testing whether the system can perform course selection normally, including viewing and managing student course selection information, and prompting error messages.

(2) System performance testing: Testing whether the system can maintain efficiency and stability when processing large amounts of data and requests, as well as whether it can handle different types of course selection data and requests.

(3) Provide user feedback and improvement suggestions: Through testing, users can obtain feedback and improvement suggestions on the system, in order to improve and optimize the functionality and performance of the system [6].

Data inserting, deletion, modification, and query functions: We can use SQL statements to insert, delete, and modify data in the system. The various query operations proposed by users can be achieved by querying corresponding information from the database through SQL statements.

The testing basically covered all the main functional modules of the system, with each function tested multiple times and all passed. After various tests, the system has achieved all the required functions, with good system performance and high safety factor, achieving the expected results.

5. Conclusion

The implementation of networked management in various schools is an inevitable trend in the development of modern society. Only by relying on modern information management technology and network operation technology, and fully improving management efficiency and ability, can we meet the basic requirements of modern social progress. The course selection system is an important component of the school's educational management system platform. The online course selection system is a huge reform of traditional course selection methods, which not only ensures students' independent course selection to the greatest extent, but also ensures the correctness, rationality, and effectiveness of course arrangements.

This paper studies and designs a student course selection system based on the SSM framework. Students can select courses independently according to school requirements and their hobbies, and view and modify the selected courses at any time, which is very convenient. The system meets the operational requirements of high specificity, low cost, convenience and practicality, as well as easy management. It can not only effectively complete student course selection, but also save the management cost of the school, improve the overall management efficiency of the school, and have broad development space in university network management

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