Design of Campus Resource Sharing Platform based on SSM Framework

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Abstract. In view of the low utilization rate of learning resources and high repetition rate of resources in the university, this paper aims to design a learning resource sharing service platform to make it more convenient for undergraduate students to acquire learning resources. In this paper, the design principles of the platform are introduced in detail through the description of the design framework, the design of database and the implementation technology.

1. Introduction

Currently, there is no systematic and comprehensive resource sharing service platform for undergraduate students to acquire various learning resources, which leads to the phenomenon of low utilization rate of learning resources and high repetition rate of resources. The ultimate goal of this paper is to design a campus cloud resource sharing service platform to resolve this problem. The platform will enable undergraduate students to acquire learning resources in a more convenient and comprehensive way through scattered learning resources integration.

Through the campus resource sharing system, we can search the learning materials we need online at any time and any place. We can also discuss problems through the mode of regional discussion. Resources can be divided into explicit resources and implicit resources. Explicit resources are ordinary uploaded resources, which can be directly searched by users. Invisible resources can be obtained through discussion and evaluation, which is more convenient for users to learn.

2. Development Technique

The resource sharing system adopts MVC mode, which can separate the page display, domain logic and database access, making it convenient for developers to develop and maintain the system and redevelop the system. When making frame selection, we compared common MVC framework, SSH framework and SSM framework. In the end, we chose the SSM integration framework (the integration of three open-sourcing frameworks, Spring MVC + Spring + Mybatis, or SSM for short). The SSM...
integration framework can be very convenient, and the university develops powerful Web applications. At the same time, it is also a typical MVC framework. It divides the whole system into four layers: presentation layer (JSP and related JS), control layer, service layer and database access layer.

MyBatis is an excellent data persistence framework. It supports custom SQL, storing procedures, and advanced mapping. MyBatis framework has both the advantages of Hibernate and JDBC. Programmers can write SQL statements by themselves to facilitate optimization of SQL statements, while avoiding almost all JDBC codes and manually setting parameters and obtaining result sets.

![MyBatis Functional Diagram](image)

**Fig 1. MyBatis Functional Diagram**

3. **Design of Function Module**

The overall design of the system includes five modules: user management, role management, resource management, comment management and classification management. User management module includes: user registration, user information modification, user basic information query. The background administrator has the functions of adding users, querying all users and managing user status.

![User Management Module](image)

**Fig 2. User Management Module**

Role management module includes: permission management module (only open to the administrator), the role's addition, deletion, modification and check, role's authorization. Classification management module includes: add, delete and modify classification.

Resource management module includes: learning resource upload, download, description, sorting optimization of resources, resource classification.

Comment management module includes: resource comment, topic discussion, comment reply, comment review.
4. Design of Database

4.1 The design of database structure

The operating objects of the resource-sharing platform include resources, resource categories, comments, etc.

The analysis abstracts the platform into five entities: user, role, resource, comment and classification. The specific relationships among the entities are as follows (Enumeration only):

- A user can publish multiple resources, a resource is only published by one person, with a one-to-many relationship.
- A learning resource can be operated by multiple users, and a user can operate multiple resources with many-to-many relationships.
- A classification can only belong to one large classification, a large classification can have multiple small classifications, the relationship is one-to-many.

4.2. The design of logical structure

The DBMS product factors should be considered during logical design stage. The task of system logic design is to transform the E-R diagram designed at the conceptual design stage into the logical structure supported by the selected DBMS products. It mainly involves transforming E-R graph into relational model, model optimization, database schema definition and user subschema design.

The E-R graph was transformed into the relational model as follows:

- User (user ID, user name, password, name, user number, last login time, login IP, user status, notes, system skin, mailbox, phone)
- Comments (comment ID, comment content, comment time, user ID, file ID, reply ID)
- Approval (approval ID, approval opinion, approval result, comment ID, user ID)
- Learning resources (learning resource ID, sharing, browsing times, upload times, profile, download times, file name, file path, classification ID, user ID)
- Operation (operation ID, behavior: F_Behavior, occurrence time: F_Date, user ID, file ID)
- Classification (classification ID, type, remarks, superior classification ID)
- Roles (role ID, role permissions, new permissions, modify permissions, delete permissions, query permissions)

![Fig 4. Database E-R Diagram](image-url)
permissions, role name)
(Notes: the main code marked with underline, and the outer code marked with pane)

5. Design of Resource Sharing Platform
The resource sharing system adopts B/S three-layer mode, which consists of front-end and background. The front section adopts techniques such as Ace framework + Bootstrap + JQuery + AJAX + CSS and JS encapsulation. The background is mainly SpringMVC + Mybatis + Spring and Shiro.

![Diagram of System Registration Process]

5.1 Persistent layer
According to the basic framework of resource-sharing service system, the persistent layer is the compilation of MyBatis. Mybatis framework is divided into two different components, DAO and SQLMap, in which DAO component abstracts the representation location and mode of data access layer and persistent layer of application.\[^9\]

The DAO component is a data access interface that exists between the business logic and the database resources to establish a connection with the database.

In a resource-sharing system, another component in the persistent layer, the SQL Map component, performs SQL statement execution and Java object return through the configured XML file. The configuration file includes the basic configuration and custom configuration of mybatis-config.xml file.

5.2 Control Layer
The control layer carries out the course of data acquisition and process, which mainly includes two major categories of Controller and Service. The Controller class makes a request to fetch various types of data and the request data of the front-end user. The Controller class method naming and the request path is unique.

There is also a business logic layer in the control layer that implements logical processing of data. It is divided into logical interface class Manager and implementation class ManagerImpl.
5.3 Presentation layer

The presentation layer mainly implements two functions, the first is to realize user data input, and the second is to display the data requested by the user. In the preceding JSP page, the data is displayed by CSS style, JQuery, ajax and other basic methods. Take file upload as an example, file upload, query, delete, modify, and so on will appear. The implementation method is to write the entire front-end framework for CSS style, JQuery implements some data processing and verification, and ajax implements asynchronous update of data.

![Fig 6. Login Interface Presentation](image)

6. Conclusion

This paper aims to design a "campus cloud" resource sharing service platform to improve the efficiency of undergraduate students' access to learning resources. Through the research of SSM framework, this paper determines the development of campus resource sharing system by SSM framework. The development process of the whole system is described in detail from database design to data persistence layer, control layer and presentation layer of the whole framework. Finally, the platform will realize user management, campus resource management, campus resource classification management, comment management and other functions, so that college students can acquire learning resources more conveniently and comprehensively.

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