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Research Article

Software Project Management Teaching Case System Development

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Abstract

With the rapid development of Internet technology, online learning platform has gradually become an important part of education. The teaching case management system aims to provide a platform for communication and sharing of teaching resources, solve the problem of scattered and fragmented teaching resources, improve resource accessibility and utilization efficiency, and support centralized management of teaching resources and interaction and cooperation among users. This paper develops a fully functional teaching case management system based on the needs of modern Internet technology and education informatization. The system integrates the web page development technology of the Internet, through the standardized and procedural design concept, and based on in-depth analysis of educational practice needs. The system mainly includes user management module, teaching case management module, and teaching case forum module, providing a convenient, efficient, interactive, and quality oriented platform for teachers and students to share and access teaching case resources. The final output of the project can support the centralized management of teaching resources and the cooperation between users, and can help teachers and students choose teaching resources more pertinently, at the same time, optimize the management, sharing and utilization of teaching cases, and promote the sharing and interaction of resources. This project not only implements a fully functional teaching case management system, but also explores the development practice of modern web applications, which has important theoretical and practical significance for promoting educational informatization and improving teaching interactivity.

Keywords

Education Informatization, Knowledge Management, Spring Boot Framework

1. Introduction

In order to enable teachers and students to share and conveniently access teaching case resources in a timely manner, establish an efficient, interactive, and quality oriented teaching case service platform, which can effectively solve the problem of resource dispersion and fragmentation, improve the accessibility and utilization efficiency of resources [1]. So the research on this topic can promote the development of education and teaching towards a more modern and intelligent direction. The final output of this project can support the centralized management of teaching resources and cooperation among users, help teachers and students choose teaching resources more targeted, optimize the management, sharing, and utilization process of teaching cases, and promote resource sharing and interaction [2, 3]. How to achieve resource sharing and multi-dimensional interaction on this teaching case resource system platform to promote communication and

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cooperation among teachers and between teachers and students is a topic worthy of research [4].

Currently, with the advancement of educational informatization, more and more universities have recognized the importance of teaching case resources in improving teaching quality and student practical abilities. In this context, educational institutions of some universities and enterprises have tried to develop and use the web-based teaching case management system, such as "Chinese University Moose, School Online" and "Smart Teaching Case Library" in universities. These platforms aim to provide a convenient platform for teachers and students, realize the centralized management, retrieval, sharing and discussion of teaching cases, and provide an interactive learning platform for teachers and students [5, 6]. Through these systems, users can easily find suitable teaching cases according to their needs, thereby better supporting the teaching and learning process.

From the perspective of the designer of the teaching case system, the system's functions can comprehensively meet the needs of teachers and students, how to achieve efficient updating and quality control of teaching case resources, and how to promote interaction and communication between users through the system [7, 8]. In addition, there may be differences in the specific needs of different universities and educational institutions, which requires detailed requirement analysis during system design and implementation to ensure that the system can fully meet the actual needs of the target user group. This is more conducive to achieving centralized management and efficient sharing of teaching case resources [9].

From the perspective of users of the teaching case management system, simplicity, efficiency, and practicality ensure that users are easy to get started with and can quickly find the required cases [10, 11]. A good system should provide an intuitive interface, powerful search function, and download function for learning materials. Web based design allows users to easily access it on any device. At the same time, by integrating interactive communication tools, we encourage discussions and experience sharing among users, enhance the learning experience, and thus enhance the overall educational effectiveness [12].

Although these management systems have some interoperability in basic principles, they often lack interoperability due to the large amount of data and teaching cases that need to be supported behind the systems [13, 14]. In addition, the development of the system must conduct detailed requirement analysis based on different key areas [15]. Therefore, this study will focus on specific usage scenarios and categories of existing data materials, exploring these specific requirements from multiple perspectives, rather than just staying at the level of building a general management system. The purpose of doing so is to ensure that the developed system not only meets current needs but also lays a solid foundation for the sustainable development of the project.

2. Related Theories and Technical Support

This chapter delves into the theoretical foundation, architecture design, technology selection, and methodology applied in the development of this management project, and introduces the technical foundation and architecture design for building the project.

2.1. Teaching Case Method

The application of teaching case method in the field of education in China is becoming increasingly widespread, and cases can be formally divided into three types: textual cases, video cases, and situational cases. The three types of cases progress in content and function at the upper level. On the one hand, they provide feedback on strengthening students' understanding of "basic concepts, basic theories, and basic methods" in teaching, and on the other hand, they guide the role of cases to improve students' practical operational abilities. The depth and breadth of students' mastery of theory are constantly strengthened with the deepening of practice. More importantly, in this process, students gradually form divergent and jumping thinking patterns, and their practical operational abilities are also constantly improving. Especially in disciplines with strong practicality. By using real or constructed situational cases, this teaching method effectively connects theory and practice, narrowing the gap between the two. The practical application of cases not only stimulates students' interest in learning, but also plays an important role in cultivating their critical thinking, problem-solving ability, and decision-making ability. This method enables students to learn and apply knowledge in a more realistic environment by providing complex scenarios that are close to real life.

In the implementation process of the teaching case method, the active participation and interactive communication of students are highly respected. Students are no longer passive containers of knowledge in this process, but have become the main body of deepening their understanding and application of knowledge through active exploration and discussion. At the same time, the role of teachers has undergone a significant transformation, shifting from being traditional knowledge transmitters to guides and coordinators of learning. Teachers encourage students to think deeply and deepen their understanding of the learning content by asking questions and guiding discussions. To ensure the effective application of teaching cases, it is necessary to monitor them through a series of evaluation mechanisms, including student participation and depth of case analysis, and adjust teaching methods based on feedback to support continuous progress of students. Through this approach, the teaching case method not only deepens students' understanding of knowledge, but also significantly enhances their ability to solve practical problems, laying a solid foundation for their academic and career development.

2.2. Knowledge Management System

A web-based knowledge management system is a software platform that is accessed and operated through a web browser, providing users with an integrated and convenient management tool. Firstly, one of the main characteristics of this system is its accessibility and cross platform capability. Users only need to access the system anytime and anywhere through a web browser, and the convenient access method allows users to view and manage business data at any time, greatly improving the flexibility and efficiency of work.

The system provides rich functions, including creation, editing, data management and storage, retrieval and browsing, classification, and sharing, to meet various management and usage needs of users. At the same time, users can make personalized settings based on their work habits, making the system more in line with practical application scenarios. In addition, it also emphasizes security and data protection. A series of security measures have been taken, such as data encryption, access control, etc., to ensure the security and privacy of user data. The web-based management system provides users with a convenient, efficient, and secure management platform, promoting the digitization and intelligence of management work.

2.3. SSM Framework

The SSM framework set is integrated from two open-source frameworks, Spring and MyBatis. The Spring framework is used for business layer development of the system, serving as an object management container. SpringMVC is responsible for front-end and back-end interaction, forwarding user requests to the backend and returning processing results to the page. MyBatis is used to implement data operations and is located in the data access layer of the web system. The process starts from the user interface, where user requests through the browser are processed through the controller layer and then passed to the business logic layer. After the business logic layer completes processing, it interacts with the database through the data access object layer.

2.4. Springboot Backend Framework

Spring Boot is an open-source Java infrastructure framework used to create independent, production level Spring applications. It is embedded with servers such as Tomcat, Jetty, or Undertow, and does not require an external Servlet container. Spring Boot is not a replacement for Spring, but a tool closely integrated with the Spring framework to enhance the Spring developer experience. It integrates a large number of commonly used third-party library configurations, and these third-party libraries in Spring Boot applications can be almost out of the box with zero configuration. It provides a large number of automatic configurations aimed at simplifying the development process, while also providing settings that are agreed upon over configuration, but can also be adjusted according to needs. It makes launching and running Spring based projects faster, providing developers with a fast and configurable development experience.

2.5. Vue Front-End Framework

Vue.js is an open-source JavaScript framework used to build user interfaces and single page applications. It adopts a bottom-up incremental development design, and Vue is a very lightweight tool with responsive programming and componentization characteristics. Responsive programming means that when creating a view, data can be bound to the DOM, and when the data changes, the DOM will be updated accordingly. The componentization feature makes each component have its own view and logic, making building large-scale applications easier. Vue has rich plugins and peripheral libraries, such as Vue router, whose basic function is to map each path to the corresponding component and switch between components by modifying the route.

2.6. MySQL Database

MySQL is an open-source relational database management system that can handle multiple data types and supports advanced features including transaction processing, subqueries, triggers, views, and more. It is known for its performance, reliability, and ease of use, transaction security, and on-demand scalability advantages. And due to its cross platform nature, MySQL can run on multiple operating systems and is suitable for applications of all sizes.

2.7. Java Programming Language

Java is a popular object-oriented programming language known for its ability to write once and run everywhere, meaning that Java code can run on any platform that supports Java, emphasizing data security and program modularity. Java has a wide range of applications, including server-side applications, Android development, big data processing, and other fields.

2.8. Element Plus Component Library

Element Plus is a UI component library designed for Vue 3, providing a range of prefabricated and highly customizable UI elements and components, such as buttons, dialog boxes, input boxes, notifications, menus, and various other form elements and layout components, to help developers quickly build and discover modern web interfaces.

3. Requirement Analysis of Software Project Management Teaching Case System Development

The functional requirements of this system are based on the

different roles played by users, and two identities, administrator and ordinary user with different access and operation abilities, are set up in the system. Ordinary users can access forums, information, and other interfaces by visiting web pages to obtain further corresponding services; Administrators can modify data for the system to provide users with more comprehensive and targeted service requirements.

3.1. User Management Function

The user information management function mainly includes the user's personal information and account content management operations, in order to complete the user's personalized data recording operation, display the differences between users, and provide basic data support for subsequent social functions such as forums. The administrator role in this module has the authority to manage all user information accordingly. The specific function points are introduced as follows:

Administrator users can enter the system webpage through the website and enter the set and approved administrator account and its corresponding password, identity, and other information in the login box of the user management interface to complete the account creation for ordinary users. Ordinary users are not allowed to register their own accounts and can only use administrator assigned accounts. When a user has a registered account, they can log in by entering their username and password and use the corresponding follow-up services provided by the system.

Different information fields are provided based on the initial role of each user account, forming a user basic data table. After obtaining the role created by the administrator, users can view existing information or edit and modify new information fields on the user information page. Administrators can modify the roles or information of existing users in the user information editing module.

3.2. Teaching Case Resource Management Function

The teaching case resource management function module aims to provide users with relevant information on case knowledge. As this module requires corresponding super administrator permissions, the super administrator is directly responsible for all new upload and maintenance modification operations. This major feature includes data management functions relative to super administrators and data downloading and viewing functions relative to users. Super administrators achieve the goal of persistently storing relevant electronic materials by uploading them. In addition, users can download public materials on their own for learning. The specific small functions are introduced as follows:

Super administrators can upload new materials and add descriptions and information on the transparency of the materials; At the same time, it is possible to modify or delete the description or file content of existing information.

Any logged in user can filter through preset options or customize keywords in the data list interface to help the system blur the selection of data and display a list of search results.

On the basis of the above query function, logged in users can select the target information they are interested in in in the information list interface and view it online. The system will display a summary description of the information and a preview of the specific file content.

Information is divided into two types: public information and non-public information. Users can choose to download public information and save it to a designated location on their personal computer. The downloaded materials are divided into Word and PDF versions according to the type of upload, and the downloaded content is consistent with the preview content. Users are prohibited from downloading non-public versions.

3.3. Forum Management Function

The forum management module provides users with a platform to publish personal articles or questions, and also supports comment operations between different users, thus building a free, equal, and transparent online communication platform for users. Users can share their problems or experiences in knowledge learning to achieve mutual assistance. The specific functions are summarized and introduced as follows:

Logged in users can add and post their personal posts in the forum section, and edit their viewpoints and content in the posts. At the same time, users can manage their published posts, including modification and deletion operations. At the same time, in the post list interface, users can enter keywords in the search box to assist the system in matching and retrieving relevant post lists.

Users can post their own comments at the bottom of the page while viewing the details of the post, expressing their views on the content or sharing the questions raised in the post. They can also like the post. Users can delete published comment content, but cannot modify it.

Administrators can view all posts and comments in the forum separately on the system forum management page. Similarly, administrators can directly add, delete, modify, and check any existing information without verifying the poster's information.

4. Design of Functional Modules for Teaching Case Management System

After in-depth analysis of the requirements of the teaching case management system, the user roles of the system are clearly divided into two main categories: administrator and ordinary users, to ensure that different user groups can perform corresponding functions according to their roles. In

order to systematically organize and manage teaching cases and related specific functions, the system is divided into three core functional modules, namely "User Management Module", "Teaching Case Management Module", and "Teaching Case Forum Module". These modules constitute the basic functional architecture of the system.

4.1. IUser Management Module Design

The homepage function of the information management module is responsible for the overall management of all data information of users and websites. This module will include the part of user management self information data and the part of administrator management of all user information in the website. This module involves frequent interaction with the database, mainly utilizing the process of reading database information, organizing and transmitting it to the front-end display by the backend system. When the user makes any changes, the system will use the listening class to notify the backend system and execute the corresponding modification operations.

This module involves three major parts: login and registration submodule, user information management submodule, and system permission management submodule. Due to the adoption of similar business logic and code implementation, only the most core permission management submodule of the system will be displayed here.

The user management module is a key component of the teaching case management system, mainly responsible for handling user registration, login, personal information management, and permission allocation. By simplifying the registration process, new users can easily create accounts, while the system ensures the uniqueness of the username and encrypts the password, ensuring the accuracy, security, and privacy of user information, while providing appropriate permission management for users of different roles. When a user initiates any request, from the front-end to the back-end, the system will perform corresponding operations to transfer data information to the database for storage, and record the time of each operation. Administrators have extensive permissions in this module, including reviewing user information, modifying user roles and permissions, etc., to ensure the rational allocation and use of system resources.

There are three sub modules in this module, namely "Login Registration Sub Module", "System Permission Management Sub Module", and "User Information Management Sub Module". In the login registration submodule, JWT token technology is used to generate tokens and store them in Redis during login. Interceptors are used to uniformly verify tokens for logged in users browsing other pages, while the login registration page is released. In the user information management submodule, ThreadLocal is used to provide thread local variables to store data, ensuring thread safety.

4.2. Design of Teaching Case Management Module

The teaching case management module provides a centralized management platform, enabling teachers, students, and administrators to efficiently upload, edit, organize, and retrieve various forms of teaching cases, including multimedia resources such as text, images, and videos. In this module, the administrator is responsible for resource review and classification management, and has all permissions for teaching cases; Teachers can upload cases, edit their uploaded teaching cases, update their content, and delete them if they are no longer applicable; And students can only browse, search, and download resources.

4.3. Forum Management Module Design

The forum management module provides users with an open communication platform, enabling them to share, leave messages, like and other functions. Any user in this module can upload new posts or comments and like their favorite content. Ordinary users can only modify or delete post content and comment messages that are bound to their identity; Administrators can modify or delete any post content without the need for identity binding verification. This module also uses the system permission management function.

5. Conclusion

This paper develops a fully functional teaching case management system based on the needs of modern Internet technology and education informatization. The system integrates the web page development technology of the Internet, through the standardized and procedural design concept, and based on in-depth analysis of educational practice needs. The system mainly includes user management module, teaching case management module, and teaching case forum module, providing a convenient, efficient, interactive, and quality oriented platform for teachers and students to share and access teaching case resources.

Abbreviations

DOM: Document Object Model

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Conflicts of Interest

There is no conflict of interest.

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