

Design and Implementation of a Book Borrowing Management System Based on Intelligent Recommendation Algorithm

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Abstract: A library is an institution that collects and organizes book materials for people to read and reference. The design of this system is aimed at information-based management of the library's borrowing function, enabling it to achieve the practical goal of improving the work efficiency of administrators. The book borrowing management system in this article adopts a B/S architecture, PHP language, and MySQL database. The administrator of this system can manage the library's book information, reader information, and borrowing and returning information; Readers and users can query book information, modify personal information, and report the loss of their own documents. Unlike general book borrowing management systems, this system uses intelligent recommendation algorithms to recommend books to readers based on their borrowing records. The article provides a detailed introduction to the technical architecture used in the development of the system, as well as a description of various functions of the system. It also studies the functional requirements, usage process, architecture, and database table design of the book borrowing management system.

Keywords: PHP; MySQL database, Intelligent recommendation algorithm, Book borrowing.

1. Introduction

The main research content of this project is to design and implement a book borrowing management system, highlighting the functions of book borrowing management to replace traditional manual management methods. After multiple rounds of literature review and understanding of the current situation of book borrowing management, I consulted numerous excellent works of others and conducted in-depth research on book borrowing management. While creating your own system, continuously refine and improve it by understanding and researching the research results of others. After multiple studies and improvements, this project not only has the common functions of a general book borrowing management system, but also provides users with more innovative functions and experiences, so that the system can meet the needs of a variety of people as much as possible, truly integrating practicality and convenience into the use of the system. Therefore, this topic is divided into two major sections - administrators and readers, and the main content of the study is to revolve around these two sections.

In terms of Chinese public libraries, the number of institutions in the Chinese public library industry in 2021 was 3217, while the number of valid library cards in Chinese public libraries in 2020 was 102.51 million. The total collection of books in Chinese public libraries in 2021 was 1261.78 million. If the library's corresponding book borrowing management only follows traditional manual management due to the huge borrowing population and large book collection, it will be a huge, slow, low-speed, and consuming result.

Therefore, in terms of improving efficiency and liberating labor, having a book borrowing management system in a library is a very correct choice. For management personnel, it is possible to standardize the management of tens of

thousands of books or readers with just one computer, which greatly improves their work efficiency and reduces their work pressure. For readers, using this system can make it more convenient and efficient to search for book information, and even achieve difficult offline operations. Simply put, the book borrowing management system provides a more convenient and efficient way for information addition, deletion, modification, and retrieval operations, as well as more management activities, compared to manual operations.

This project aims to develop a book borrowing management system, which aims to improve the work efficiency of administrators, facilitate user information interaction, simplify the management process of managers and the information query process of readers, make information management more standardized, programmed, and automated, thereby improving the processing speed and accuracy of information, and achieving timeliness, sharing, and accuracy of information.

The book borrowing management system is a system that has emerged to facilitate book management and facilitate readers' borrowing of books. The book borrowing management system has been applied in some libraries in China, with significant results. On the one hand, measurable direct effects have been achieved, such as saving manpower and reducing costs; On the other hand, it is the intangible effect achieved, such as improving the management level of the library and promoting modernization of management. However, today's libraries still face a series of problems such as a large number of readers borrowing and returning books, as well as difficulties in accessing book information. For example, how to timely provide book information, accurately grasp reader information, how to achieve automation of book circulation, replace a large number of manual operations, and liberate human labor. The solution to the above problems requires the design and implementation of a more powerful

book borrowing management system.

2. Overview of relevant technologies

2.1. Overview of PHP Language

PHP (Hypertext Preprocessor), also known as the "Hypertext Preprocessor", is a server-side embedded scripting language that supports seamless operation on multiple platforms [1]. It has the characteristics of multiple programming languages such as C, Java, and Perl, and has fast porting speed and rich function library functions. It can be embedded in HTML, which is conducive to learning. Therefore, it is widely recognized by users. The PHP website created in the Apache environment has become one of the most popular web sites among users today.

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This system is mainly used for serving teachers and students on campus. In this system, book information in the library can be queried, and there are even corresponding cultural festivals and other announcements, which can effectively help the library improve service quality and management efficiency.

In the creation of a book lending management system, PHP was chosen as the development language precisely because it has many characteristics such as simplicity, object-oriented, interpretive, high performance, architecture independence, portability, etc. It not only facilitates system development, but also facilitates the later management and maintenance of the system, providing users with a good management platform.

The main layout method used is DIV+CSS, which can achieve the separation of webpage content and presentation. It has the characteristics of simplifying page code, improving the efficiency of webpage production and maintenance, and webpage loading speed. CSS (Cascading Style Sheets) is a series of formatting rules used to control page content and appearance; DIV and TABLE are both tags in the HTML language. DIV+CSS is based on the powerful data conversion capabilities of HTML, which can meet the more demands of future network applications. The design of multiple pages in this system adopts DIV+CSS technology, achieving exquisite pages and perfect and reasonable layout, making the website more beautiful and practical. Because the front-end page is simple and convenient to use, the backend can also connect to the database through a combination of PHP and Apache.

2.2. Overview of Dreamweaver

The web development tool used in this system is Adobe Dreamweaver CS5 (DW), which can automatically update all pages. DW is a web code editor that integrates web page creation and website management, and can easily create cross platform and cross browser web pages. Not only is it convenient and fast to create files and write code within the software, but when using external files, DW will automatically detect and prompt whether to copy the external files to the site to maintain the integrity of the site. If the file is renamed, the system will automatically update all links

related to the file, ensuring the integrity of the original connection relationship [2]. CS5 has an adaptive grid that allows for multiple screens for preview before release, greatly improving work efficiency. Both the 'Real Time View' and 'Real Time Code' panels can display HTML5 code, while also providing a better understanding of the work.

2.3. Overview of MySQL Database

MySQL is an open source relational database management system with the characteristics of small size, low cost, and fast speed. Its development is mainly based on the Linux operating system, so the MySQL database has become a free open source database [3].

This system mainly uses Navicat for MySQL software for database design. Based on the Windows platform, it frees the minds of PHP database designers, reduces development costs, and improves development efficiency. Navicat for MySQL quickly creates, accesses, and shares information in a secure and easier way.

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In the design and implementation of this project, first create the necessary tables in Navicat for MySQL, then use PHP scripting language to connect to the database and prepare corresponding SQL query statements. Send the SQL statements to the MySQL server to process the result set, and then query all the result sets based on the search criteria you enter. Convenient, fast, and highly efficient compared to traditional manual operations.

3. Design of a Book Borrowing Management System

This system is a book borrowing management system, and the design goal of this system is directional. As long as it is to reduce the work pressure of librarians, improve work efficiency, and informationization and automation of book management work. At the same time, in order to improve the circulation rate of information, simplify the way users obtain information, and facilitate users to quickly obtain information. Provide a platform for administrators to perform management work and readers to obtain information, meeting the needs of different users.

The system adopts a B/S structure, which is easy to maintain and upgrade. The B/S architecture is the architecture mode of the browser and server. The user work interface is implemented through the WWW browser, with very few transactions implemented on the front-end and the main transaction logic implemented on the server side. This mode concentrates the core part of system function implementation on the server, simplifying the development, maintenance, and use of the system. In recent years, the performance of hardware products has been continuously improved, and the network environment has been continuously optimized. Information management systems are increasingly inclined towards B/S architecture [4,5], which makes it more convenient for end users to use information management systems.

By analyzing the system functional requirements of this project, an E-R diagram was designed. The E-R diagram of

the book borrowing management system includes multiple entities such as books, readers, administrators, book categories, and library cards. The administrator has a many to many relationship with the book, the administrator has a one to many relationship with the reader, the book category has a one to many relationship with the book, and the reader has a one to one relationship with the library card.

4. Conclusion

Book borrowing management is a tedious and complex task, which increases the difficulty of daily management due to various factors such as the diverse types of book materials, the large number of borrowers, and the uncertainty of borrowing and returning dates. Combining book borrowing management with such an information-based, convenient, and automated management system will greatly reduce the difficulty and complexity of book borrowing management, achieve the integration of people and computers, and be more beneficial for information collection, maintenance, use, and flow. Systematic information management also continuously optimizes daily management work, helping people achieve overall planning goals .

After several months of design and implementation of the book borrowing management system, although the entire system design is closely related to daily learning content, completing a design independently is still slightly insufficient. I was at a loss when encountering problems at the beginning, and then became proficient in problem-solving strategies. It was an exciting process for me to transition from a shallow concept to a deeper understanding and completion of the system I designed. This graduation project has brought me many feelings and left behind many things worth experiencing. In the process of personally conducting my graduation project, I discovered many shortcomings, such as not having a very detailed grasp of professional knowledge, not having a very deep understanding, and staying in a state of partial understanding in many aspects. This also led me to encounter many problems that I found difficult to solve during

the completion of my graduation project, such as incomplete writing of SQL query statements, There are many duplicates in the results found; There are also errors caused by syntax errors when writing PHP scripting languages; When there is a server connecting to the database, there is a disconnection situation; And errors in the use of regular expressions. All of these indicate that my mastery of the major is not comprehensive enough, but after seeking help from multiple sources, consulting teachers and classmates, answering questions on Baidu, and consulting corresponding books, all of these many problems were easily solved. When I finished my graduation project, I undoubtedly had a strong sense of achievement. After completing this graduation project, my mastery of professional knowledge has surpassed before, and I have also reduced a lot of anxiety when facing problems. I have learned to calm down, face difficulties, be independent, and patiently solve problems.

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