

# Design and Implementation of Library Information Management System

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## Abstract

**With the increasing number of books, the workload of library management is increasing. The traditional way of library management is time-consuming, laborious and prone to errors. In order to reduce the workload of library managers, it is necessary to build a management system with perfect functions and information. The system adopts PHP language, MySQL database and MVC model structure. The basic functions of the system include: user information management, book information management, borrowing management, etc. Through the use of the system can improve the efficiency of the librarian's office, realize the normalization, scientific and efficient of library management.**

## Keywords

**Book system, PHP, MySQL, MVC, borrowing.**

## 1. Introduction

Great changes have taken place in our life since entering the 21st century. In the intelligent society, people's pursuit of knowledge is increasing, so the demand for books is also increasing. Among them, the library is the main institution for people to obtain books. The library provides people with books to borrow. If the library still manages books manually, there will be a lot of mistakes, low efficiency and delay the students who queue up to borrow books. The manual management mode is relatively closed, which is not conducive to the readers to find the required books and materials, nor to the operators to view the situation of borrowing and returning books. Therefore, in order for operators to efficiently manage the basic information of books and readers, it is necessary to get the assistance of computer to design a scientific and efficient library management system software. Libraries can use this software to improve office efficiency.

## 2. Summary

### 2.1. System Design Background and Significance

With the development of computer technology, people's management of book information is constantly improving, and relevant information management systems have emerged. Books are very important in 's daily life. Now most small bookstores record their book information by handwriting. When users borrow books, the operator takes out pen and paper for registration. This method has disadvantages. It not only causes a waste of funds in the library, but also delays the 's time. It is not easy to save, but also easy to lose information, The most important thing is that the operator can't timely feed back to the readers whether the books have not been borrowed, the books and materials needed by the readers can't be found in time in a short time, and it's troublesome to update the book information by handwriting. In short, there are many disadvantages in handwriting. If the operator records the book information carelessly, it will also cause the omission and false alarm of the book. Therefore,

we should use computers to manage information. Computers can provide us with information timely and quickly. Therefore, we should design a book information management system to improve the office efficiency of Library operators and help users who need to manage books to manage their own book information more conveniently, efficiently and systematically.

## **2.2. Research Status**

With the rapid development of computer technology, more and more small bookstores and ordinary libraries begin to use computer technology to understand the current library management system. There are many library management systems in the market with complete functions, which can hold a lot of data information. However, those small libraries often lack funds. They can't afford to buy the system on the market or hire professionals to manage the system. Therefore, small libraries do not have a suitable system to manage these books. They still have to use pen and paper to record customers' borrowing information. However, with the continuous increase of books, small libraries will be busy. Therefore, we need to develop a small and medium-sized book information management system, which is feasible. Small and medium-sized library management system also has many advantages: clear and concise interface, strong universality, simple use and so on.

## **2.3. Main Work**

The main work of the library information management system will be divided into the following six steps: the first step is to consult the literature or journals related to the library management system at home and abroad, understand the development background and research status of the system in these articles, and think about the significance of developing the system. The second step is to conduct in-depth research on the library management system on the market, and summarize the advantages and disadvantages of the system. The third step is to select phpstorm as the development tool, Navicat as the development database, use PHP language to realize the system function module, and adopt MVC design mode. The fourth step is to study PHP Technology in detail, analyze the demand analysis and database design of the system, and complete the establishment of tables in the database and insert corresponding data. The fifth step is to write the function code of each module in PHP language. The sixth step is to test the black box of the system, find the problems in the system and solve them.

## **2.4. Introduction to Related Technologies**

### **2.4.1. PHP Technology**

PHP is a script language executed on the server. It is very convenient to operate the database on the Internet web page and has good cross platform compatibility. In addition, PHP language also supports a variety of system platforms. Its version update speed is also very fast. The software also has the special function of free editor. PHP language is easy to integrate with existing web pages.

### **2.4.2. MySQL Database**

MySQL Database can be closely combined with PHP language. Because MySQL is small and fast, many enterprises now use MySQL database. MySQL supports cross platform use and object-oriented. Its security is very high, and the storage capacity of the database is also very large.

## **3. Systems Analysis**

### **3.1. Requirement Analysis**

According to the survey, the library information management system needs two types of users: ordinary users and administrators. The permissions of administrators and users are different. The system requirements of the two are analyzed as follows:

### 3.1.1. Ordinary Users of the System

Ordinary users of the system need to have the functions of viewing book information, borrowing information and renewing books; You need to have the ability to modify your personal information after logging in, such as reporting the loss of your account and changing your password.

### 3.1.2. System Administrator

The system administrator needs to have the management function of ordinary user account, book information and borrowing information; You need to have the functions of modifying personal information, reporting loss of account, modifying password and deleting account for ordinary user account; It needs to have the functions of searching, adding, modifying and deleting book information; You need to have the operation function of borrowing or returning books to readers.

## 3.2. Feasibility Analysis

With the development of computer technology in the 21st century, the Internet has become very convenient. Querying books through the Internet is the development direction of library management system. The new library information management system based on PHP will update the data information more accurately and timely. Both users and administrators can use the computer to access the system and get convenient services. In terms of technical difficulty, with the guidance of tutors and the enthusiastic help of roommates, we can successfully solve various difficulties encountered in the development of the system. Therefore, the technology is feasible. In terms of economy, the development cost of the system is relatively low, the application software is free, and only one computer with medium configuration is required, but the functional performance of the system is very strong, which can meet the normal needs of users. The use of this system can greatly improve the efficiency of library administrators in querying books, which is not only convenient for administrators but also convenient for readers, and greatly reduce labor and material resources. Therefore, the economy is feasible.

## 3.3. Module Design

According to the demand description of library information management system, the functions of the system are as follows. The book information management module includes the addition of book information, the modification of book information, the query of book information, the deletion of book information, etc. The borrowing management module includes borrowing and returning books. The user management module includes adding users, deleting users, finding users, modifying user information, reporting the loss of users, etc. The administrator module includes managing books, managing users, managing borrowing information, etc.

## 4. Database Design

According to the system function design and actual requirements, the following data items are designed. User information includes user account, password, name, class, status and last login time. Administrator information includes administrator account, password, status, last login time and authority. Book information includes book serial number, book name, author, publishing house, publishing time, price, international standard book number and work introduction. Borrowing information: including book serial number, user account number, borrowing time and return time.

## 5. Design and Implementation of Main Functional Modules of the System

### 5.1. User Login

The user enters the login interface of the library management system, and can enter the background of the system after logging in. The user enters the login interface, enters the account, password and verification code, and clicks the "login" button to trigger the checklogin () method on the logincontroller.class.php page. The user uses the post method to receive the data from login.html, and uses the JSON method to judge whether the data meets the specification. If it meets the specification, it first judges whether the verification code is correct, and if it is not, it will prompt "verification code error"; If it is correct, judge whether the account and password filled in are correct. If it is incorrect, you will be prompted with "account or password error"; If it is correct, then judge the status of the logged in user. If the user is in the loss reporting status, it will prompt "the loss of this account has been reported, please contact the administrator for solution". If the user is in the normal status, it will prompt "Hello, classmate!" and the user can successfully enter the background of the system.

### 5.2. Library Information Management

The administrator can view all book information in the book information interface, and can add, delete, modify and query the book information.

#### 5.2.1. New Book Information

Click the "add book" button to trigger the "add" method, load the new book information page with the help of the cache mechanism in smart, fill in the book information on this page, click "add" and trigger the JS verification method to verify whether the information is completely filled in. If the information is not completely filled in, you will be prompted with "please enter complete information"; If the information is completely filled in, you will be prompted with "add successfully", and the book information will be inserted into the book\_Info table. Click the "reset" button to fill in the new book information again.

#### 5.2.2. Modify Book Information

Click "modify" to trigger the "Edit" method, and load the edit book information page with the help of the cache mechanism in Smarty. On this page, the detailed information of the book is obtained through the post method. After the information is modified, click "confirm" to update the book through the bookmodel\_ For the book information in the info table, if the modified book number is consistent with that in the data table, the "modification succeeded" pop-up box will pop up; if it is inconsistent, the "modification failed" pop-up box will pop up.

#### 5.2.3. Delete Book Information

Click the "delete" button to trigger the "delete" method, obtain the ID of the book information to be deleted through the post method, and delete the book information from the book according to the ID\_Delete in info table and "delete succeeded" pops up.

#### 5.2.4. Query Book Information

After selecting the field to query, enter the corresponding search content, click "search" to trigger the "index" method, receive the transmitted data according to the get method, and display the book information according to the fuzzy query.

### 5.3. User Management

After entering the user information interface, the administrator can view all user information, add, delete, modify and query user information, and report the loss and enable the user account.

#### 5.3.1. Add User Information

Click the "add user" button to trigger the "add" method, and load the new user information page with the help of the cache mechanism in smart. Fill in the user ID, password, name, class and

other user information on the page. Click "add" to trigger the JS verification method to verify whether the information is completely filled in. If the information is incomplete, you will be prompted with "please fill in the information completely"; If the information is completely filled in, you will be prompted with "add successfully", and the user information will be inserted into the user table. Click the "reset" button to re fill in the user information to be added.

### 5.3.2. Query User Information

After selecting the field to be queried, enter the corresponding search content, click the "search" button to trigger the "index" method, receive the transmitted data according to the get method, and display the user information according to the fuzzy query.

### 5.3.3. Delete User Information

Click the "details" operation button to enter the user information page, then click the "delete account" button to trigger the "delete" method, obtain the ID of the user information to be deleted through the post method, delete the user information from the user table according to the ID, and pop up "delete succeeded".

### 5.3.4. Modify User Information

Click "details" to enter the user information page, click "modify account" to trigger the "changeinfo" method, and load the modified user information page with the help of the cache mechanism in smart. On this page, the user's name, class and other information are obtained through the post method. After completing the information modification, click "confirm" to update the user information in the user table through the usermodel, If the modified user account is consistent with that in the data table, the "modification succeeded" pop-up box will pop up. If it is inconsistent, the "modification failed" pop-up box will pop up. Modify the user password, click "modify password", use the post method to receive the user userid and the password PWD to be modified, encrypt the password MD5, enter the new password and click "confirm" to prompt that the modification is successful, and update the user table at the same time.

### 5.3.5. Loss Reporting User

Click the "loss report account" button to trigger the "lost" method. Use post to receive the ID of the user information and query whether the user exists in the database. If so, modify the user's status to change to the loss report status. To enable a user, click the "enable account" button to trigger the "open" method, use the post method to receive the ID of the user's information, and query whether the user exists in the database. If so, modify the user's status to become enabled.

## 5.4. Borrowing Management

The administrator enters the borrowing management interface to complete the reader's borrowing and returning operation. The administrator enters the reader ID and book number on the borrowing page and selects the operation of borrowing or returning books. Finally, click the "OK" button to trigger the "manage" method. The post method is used to receive the reader ID, book number and the information of borrowing or returning books. First, check the integrity of the data, and then judge whether to borrow or return books. If it is borrowing books, it is in the borrowing information table(border\_list table)Query whether it has been lent out. If not, save the basic information into the borrowing form. If it is successfully saved, it indicates that the lending is successful. If it is a book return, query whether there is the user's lending record in the borrowing form. If so, delete the current lending record, indicating that the book return is successful. The administrator enters the user's borrowing details page, can see the user's borrowing information, and click "renew" Button triggers the "prolong" method, uses the post method to receive bookid and userid, prompts "renewal succeeded", and updates the back\_date field in the borrowing form. If it is a book overdue, it prompts "overdue book cannot be renewed".

## 6. System Test

The system mainly realizes the function of modifying and querying the basic information of books and users, with the function of renewing books by users, and the function of maintaining books and user information by administrators. Many black box tests have been carried out in the process of designing the system. The purpose of the test is to find out and solve as many errors as possible in the early development process, so as to avoid the final failure. Testing the finished product brings great difficulties. After some testing, all pages of the system can be displayed normally, data can be transferred between various functional modules, relevant pages can jump to each other, and the connection and operation of the database can be completed normally.

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