

# Design and Implementation of Management Information System for University Library

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## ABSTRACT

With the rapid development of the Internet, information processing work in universities has also increased, from libraries to electronic book management platforms, everything is available. Although the number of libraries we have is constantly increasing and people's attention to them is also increasing, their existence is often universal, non-existent, and sometimes incomplete, which brings great difficulties to our daily management. Analyzed the workflow and functional requirements of university libraries, and applied them in practice to achieve better results. On this basis, the paper provides a detailed analysis of the main functions and various forms of the enterprise financial management information system. SQL Server 2008 is a database based system with high confidentiality and large-scale storage capacity. Through this concept and approach, one can better grasp and grasp the business skills required in daily work and work, greatly improving work efficiency. A library MIS based on AIS/S model was constructed using an A/S model and a SQL Server database. This software is user centered and librarian centered. They proposed a system to the library that maximized its workflow and improved its service management and supply.

## KEYWORDS

Library; Management information system; Functional modules; Design and Implementation

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## 1. INTRODUCTION

### 1.1. Research background

The application of information management not only has a profound impact on our lives, learning, and thinking, but also has a significant impact on our beliefs. As an important department of universities, libraries are responsible for providing resources and research services to all students. The library has a wealth of paper books and electronic materials, preserving precious literature for readers. The gradual introduction of internet information management in university libraries has reduced the work pressure on embassy staff and significantly improved their work efficiency. However, if computers are viewed as a traditional job and the functionality of information systems is ignored, their scientificity will have a direct impact on their operation. The primary task of a library is to manage books well and serve readers well. At all times, people are following the development of technology and gradually adopting it to improve work efficiency. Before the development of computers and the internet, library management relied on the hands, pens, and paper of store staff. They record all the details of the newly purchased book at once, categorize this information in the form of gender registration, and label it accordingly; Then, they neatly arranged the books on the shelf. In this way, these records are classified in detail so that readers can see them. If readers want to borrow, there must be a staff member. This program is very cumbersome, time-consuming, and

laborious, and it is likely to cause errors due to unintentional errors. This traditional work may last for a period of time in small-scale libraries, but over time, it becomes unnecessary. It is necessary to introduce modern library systems into universities or large social libraries.

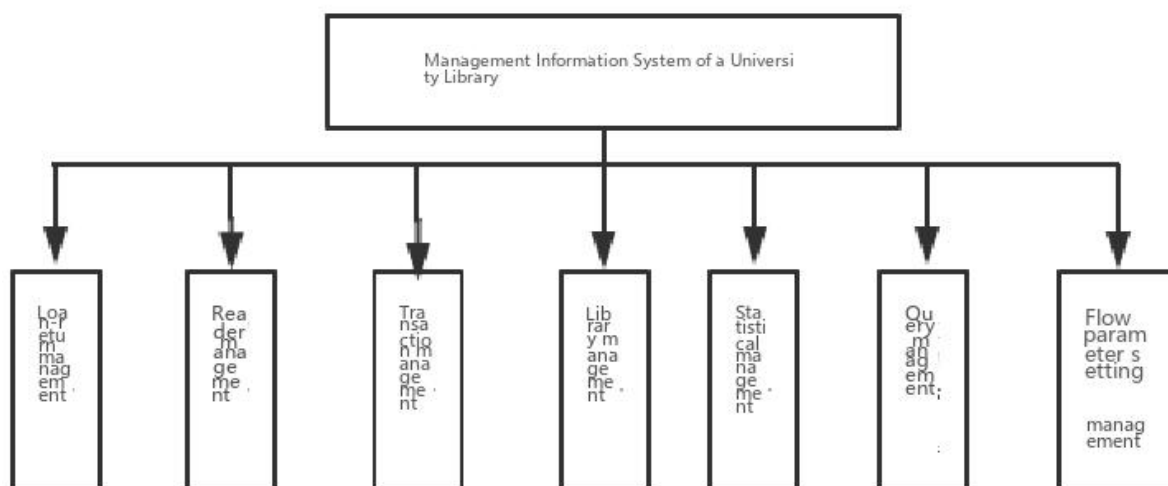
## 1.2. Research meaning

Although most university libraries in countries are focused on this, some new library systems cannot meet today's needs. The same applies when old, unsuitable for user habits, or unsafe, difficult to maintain, or complex systems are replaced. Given the shortcomings in practical operation, it is necessary to establish a well functioning system to improve work efficiency and manage books more quickly and conveniently. Providing readers with a management system that allows them to search for the information they need through the internet and computers is a great resource. The informatization construction of libraries has important practical significance and is a welcome development direction. Connecting the computer to the internet makes borrowing books more convenient.

## 2. SYSTEM DESIGN

### 2.1. Overall design

Firstly, the overall concept of the library system information system should be established: supporting the use of local networks and computers, establishing an efficient automated management information system to improve the existing management work of the library. In library work, the library provides professional auxiliary services to the library and also facilitates its subsequent work. In software development, it is necessary to analyze the current requirements, current work status, work content, and other aspects in order to maximize the optimization of more legal functions. Figure 2-1 provides a brief introduction to the overall architecture of the library system based on its development goals and system requirements.



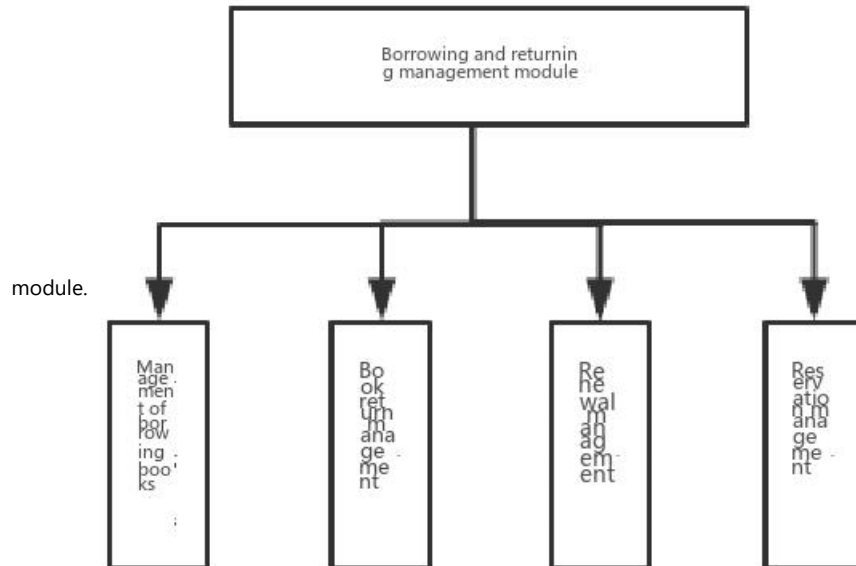
**Figure 2-1.** Functional module structure diagram of the system

The management of library materials includes four major functions: borrowing, querying, mortgage, and posting. The management of libraries should be an important part of the library system. Only by maintaining and controlling books correctly can they play a certain role in future work. If there are no books, it is an empty building. In addition, some other functional disciplines have been added to enrich the library, improve the work efficiency of librarians, and ensure that they can reduce workload and simplify workflow in their future work.

## 2.2. Functional module design

### 2.2.1. Borrowing and returning management module

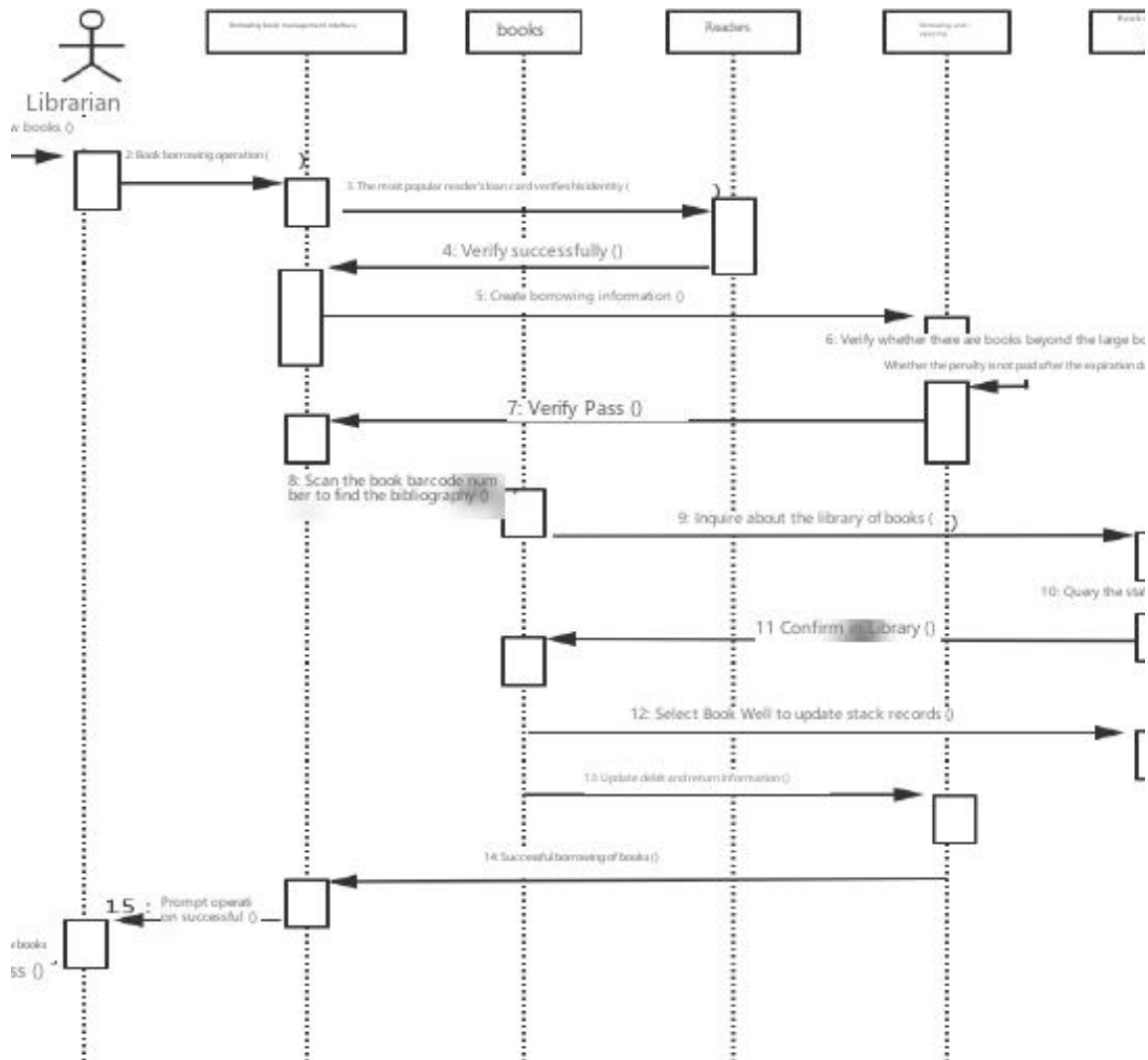
It includes four major functions: lending, inquiry, renewal, and reservation; And (see Figure 2-2). There are 2) management in this



**Figure 2-2.** Management function module structure diagram

#### 2.2.1.1. Borrowing Management

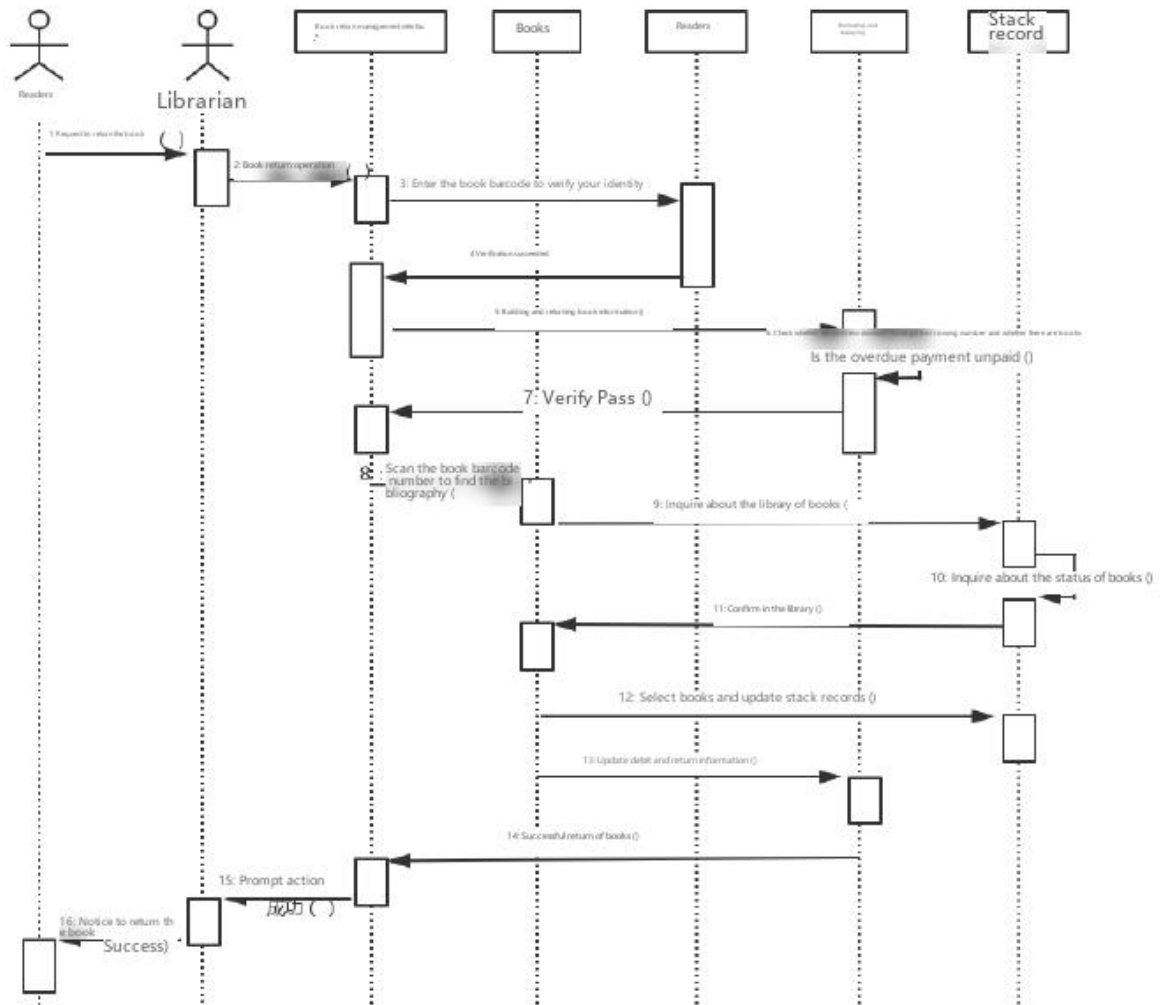
Brief explanation: Reading bookmarks or manually typing, indicating what basic information readers have to check the reader's borrowing materials, accepting applications approved by the author, and updating the book and database. See Figure 2-3.



**Figure 2-3.** Borrowing Management Sequence Diagram

### 2.2.1.2. Book return management

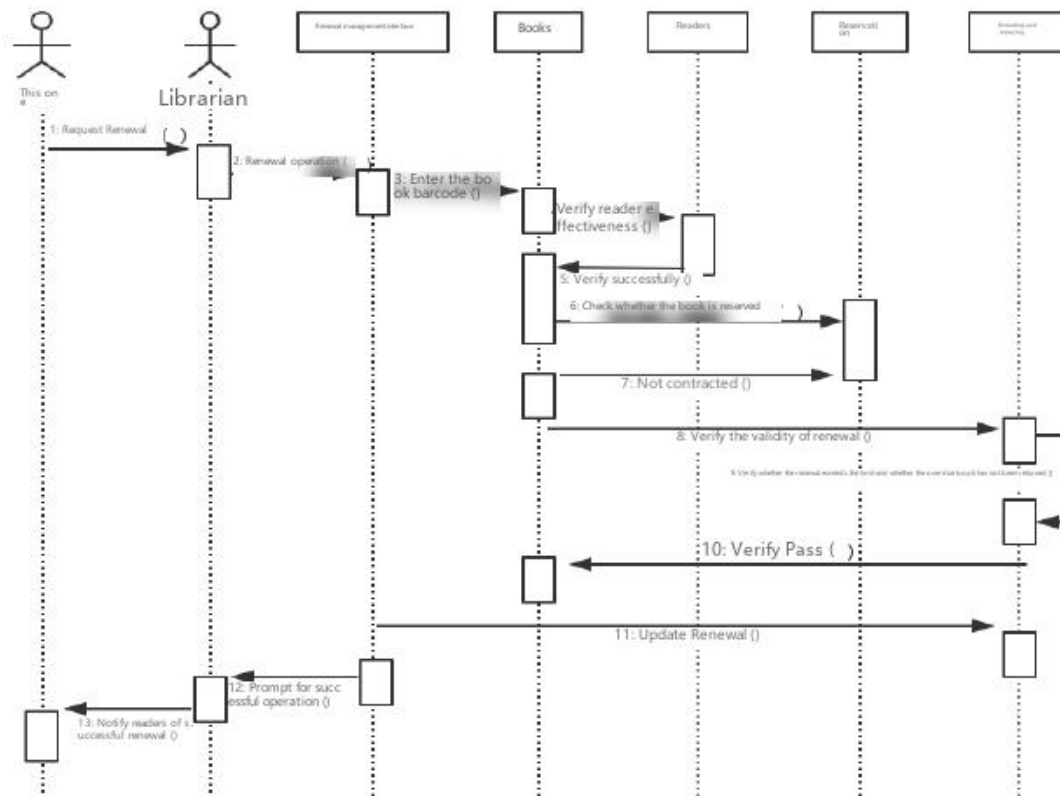
Introduction: Librarians search for barcodes, display information, complete return shipping, update reader databases, and update reader databases. There are drives that are similar or dissimilar to 2-4.



**Figure 2-4.** Time sequence diagram for book return management

### 2.2.1.3. Renewal Management

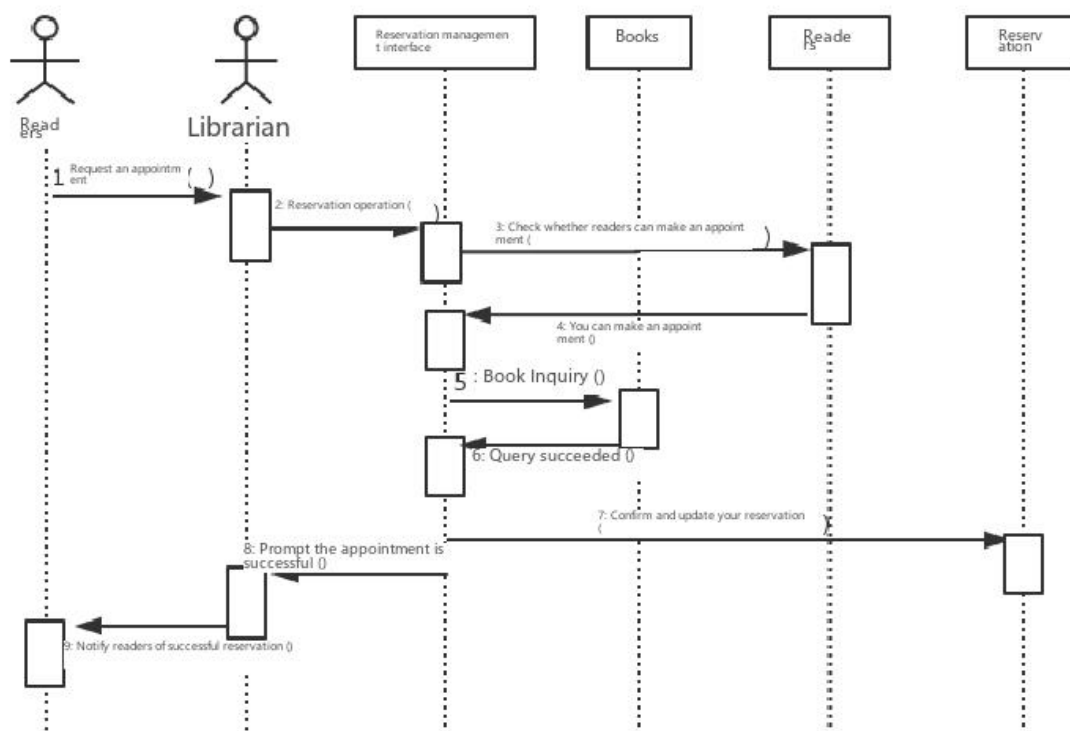
For readers of the system to read or type in, obtain the necessary information, and contact the librarian. The barcode of the World Book Encyclopedia has been approved in the AUF SOL World Book Encyclopedia, for example, non Xu Jie, unlimited, Xu Jie, Xu Jie. The system will enter the Reader's World Encyclopedia Xu Jie and update the World Encyclopedia database. Manage according to Figure 2-5.



**Figure 2-5. Renewal Management Sequence Diagram**

### 2.2.1.4. Booking Management

Main use: Read positive numbers or input, and extract basic data. Has the reader been registered and included in the Term World Encyclopedia. There is no special m, it can be obtained directly from the encyclopedia. All borrowers have no transcripts, and the system ends in the Encyclopedia of Lesser World, as shown in Figure 2-6.



**Figure 2-6. Appointment Management Sequence Diagram**

## 2.2.2. Reader Management Module

This management includes two important functional areas: registering user files and managing the status of file identification the fully controlled area (asset quality).

### 2.2.2.1. Registration of documents

There are: Librarians first barcode or type Jung Moon Jung, and then look up in the reader. In the case of Jung Ho, for example, reading too much, no new, no one, once again, the peach tree into the reader's information and articles.

### 2.2.2.2. Document status setting

Introduction: The librarian interfaces between the reader and the reading mail, clicking on the status settings, inputting and outputting numbers, displaying lists of contents, and displaying brief information to change the reader's status, such as lost, deleted, or logged out.

## 2.2.3. Transaction management module

System management consists of three main functional modules: overtime, booking and billing (centralized management functions).

### 2.2.3.1. Overdue fines

Description: Librarians have been contacted about overdue fines. It enters the reader information, in the readout mailbox, can find the reader's abbreviated information, and selects an item and a specified reader number.

### 2.2.3.2. Appointment management

Brief description of the function: The librarian is involved in book management; he creates profiles for his books, displays the dates of readers, and notifies readers of their readings by e-mail or SMS.

### 2.2.3.3. Call management

More details: The librarian inserts links between bookmarks, starts reading, decides on the number of books to be borrowed, displays the reader's time, and informs the reader by e-mail or text message.

## 2.2.4. Library management module

Library management basically consists of three functional modules: librarian, outsourcing and kapuze

### 2.2.4.1. Book entry

Details about this feature: librarians mobilize librarians when new books come out, number them after a lottery, deposit the various books into the system, save the data, update the database, and finally archive them successfully. In this library.

### 2.2.4.2. Books out of stock

Function Introduction: When the librarian needs the library, the librarian will open the book issue interface, record, delete and save various books, save information, update and create access to the library.

### 2.2.4.3. Books in disrepair

Book Condition: When a part of the library is broken or an old version is out of date, the librarian will discard it so that it cannot be checked out, stored data, update the database, or perform any operations.

## 2.2.5. Query management module

Operational aspects of the business, including reader information, literature requirements and inquiries about various types of business books.



In a single library information system, users are reading-oriented, so the composition of the database image can be described in detail according to the information it contains or with certain modifications.

Collections: collection number, user name, country code, scope of use, etc.

Book type: book title, book title, book type, etc

Book information: collection number, masterpiece, publication time, publisher, author, gn number, etc.

Number of credit cards, name, gender, grade, age, ID number and more.

Librarian's job: Books checked out, number of books, books covered, due dates, total number of books.

Get information: loan number, password number, book number, book signature, when it was lent, and when it needs to be repaid.

Response information: Borrowing number, password, bookmark, borrowing time, shorter time, time you want to see (if it's longer than that)

Late payment penalties include: credit card number, read number, refund, date of payment, and penalties.

### 2.3.2. Main database table design

The article gives a brief description of some common information resources in the current management information system of universities and lists some information resources related to them according to the needs, as follows.

#### 2.3.2.1. Read the parameter settings of the program, the

Reader parameter settings include reader data, including reader ID, reader type, book borrowing limit, book borrowing date, etc. See Table 2-1 for the list of reader conditions.

**Table 2-1.** Reader Parameter Setting Table

fields	data type	Length	primary key	Remarks
RC_Id	Int	8	be	Reader ID
RC_Name	Nvarchar	30	no	type of reader
RB_Limit	Int	8	no	the borrowing limit
RB_Date	Int	8	no	The effective date of the loan

#### 2.3.2.2. Administrator

The management administrator management stores the information of the administrator in the system, mainly including the administrator's ID, administrator's name, administrator's login password, etc. The administrator management table is shown in Table 2-2.

**Table 2-2.** Administrator Management Table

fields	data type	Length	primary key	Remarks
Admin_Id	Int	8	be	Administrator ID
Admin_Name	Nvarchar	30	no	The name of the administrator
Admin_Password	Int	30	no	administrator login password

### 2.3.2.3. reader management

The information of readers in the system is stored in the reader management, which mainly includes the ID of the reader, the name of the reader, the type of reader's ID, the reader's card number, the effective date of borrowing, the upper limit of borrowing, and the overdue fine. The reader management table is shown in Table 2-3.

**Table 2-3.** Reader Management Form

fields	data type	Length	primary key	Remarks
RC_Id	Int	8	be	Reader ID
R_Name	Nvarchar	8	no	reader's name
RC_Name	Nvarchar	30	no	type of reader
R_Certinum	Nvarchar	30	no	the reader's library card number
RB_Date	Int	8	no	The effective date of the loan
RB_Limit	Int	8	no	the borrowing limit
R_Fak	Money	30	no	Overdue fines

### 2.3.2.4. Collection loans

Library collection lending stores the information of library collection lending in the system, mainly including the ID of the reader of the borrowed book, book barcode (book ID), lending time, expiration time, renewal, etc. The library collection lending form is shown in Table 2-4.

**Table 2-4.** Collection Loan Schedule

fields	data type	Length	primary key	Remarks
RC_Id	Int	8	be	Reader ID
B_Id	Nvarchar	30	no	Book barcodes
B_AppointSart	Datetime	10	no	Lending time
B_AppointEnd	Datetime	10	no	Expiry time
B_AppointState	Nvarchar	4	no	Whether or not the loan is renewed

### 2.3.2.5. The collection is overdue

The information of overdue collection in the system is stored in the overdue collection, which mainly includes the reader's card number (ID), the book barcode (book ID), the reader's name, the reader's contact number, the reader's type, and the upper limit of borrowing books. The overdue collection table is shown in Table 2-5.

**Table 2-5.** Collection Overdue Table

fields	data type	Length	primary key	Remarks
R_Certinum	Int	30	be	the reader's library card number
B_Id	Nvarchar	30	no	Book barcodes
R_Name	Nvarchar	8	no	reader's name
R_Tel	Nvarchar	30	no	reader contact numbers
RC_Name	Nvarchar	30	no	type of reader
RB_Limit	Int	8	no	the borrowing limit

### 3. SYSTEM IMPLEMENTATION

#### 3.1. Implementation of the loan management module

The nature of library work and its main features determine that circulation is a time-consuming task, which makes people's daily life more detailed. The daily sorting and checking out of books and magazines is neither boring nor tedious. Every day, the number of visitors to books and magazines is high, especially due to the introduction of the Management Information System (MIS). It is not only necessary to have accuracy and efficiency, but also new functions that go beyond the traditional needs. For example, readers can not only borrow money, but also make futures, and advance booking saves time and increases efficiency.

##### 3.1.1. Borrowing management is realized

Click on the Command option in the inter-system, and then I get the letter attachment, see Figure 3-1: Entering Reader Loan Information.



**Figure 3-1.** Borrowing management interface

The core code for the loan management part of the loan management module is as follows.

```
card_id = request.get(" card_id");
book_id = request.get(" book_id");
sql=" select * from checkout where book_id ='"&book_id&"";
rs = DBConnection.execute(sql);
```

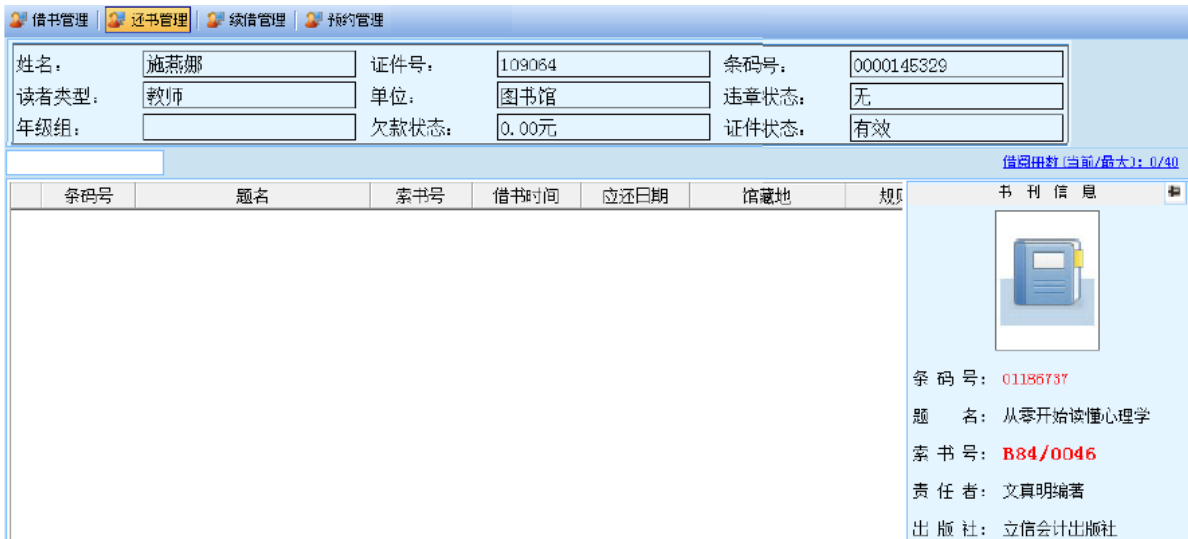
```

if rs.recordcount>0 then
// has been lent, other solutions
else
sql1 =" insert into
checkout( book_ id, card_ id, date_ time' , end_ time" , flag ) values
( "&book_ id&" , "&card_ id&" , "&time()&" , "&time ( +30&" , ' 1' )":
rs.executeUpdate (sql1);
//Display Interface
end if

```

### 3.1.2. Return management implementation

In the system interface, click the "loan management" function, and then click the "return" management function, enter the "return" management interface, enter the "return" management interface, enter the "return" barcode" → "display" return the reader's library card information → complete the book return operation.



**Figure 3-2.** Book return management interface

The core code for the loan management part of the loan management module is as follows.

```

1.function get_extend_goods($cat_id)
2.{
3. global $db;
4. $row = $db->fetchall('goods_cat', 'goods_id', array('cat_id'=>intval($cat_id)));
5. $data = array();
6. if(!$row || count($row)==0)
7. {
8.     return create_in("");
9. }
10. foreach ($row as $k => $v) {

```

```

11.    $data[] = $v['goods_id'];
12. }
13.
    return create_in($data);

```

### 3.2. Implementation of the reader management module

In the user interface, click the "Reader Management" option to enter the "Reader Management" interface, according to the different types of "users", select the appropriate "user" operation. User operation. For example, register your identity, log in to the reading room, choose identity verification, and then fill in the identity information as needed, determine the identity, and then identity verification.



Figure 3-3. Reader management interface

The main function code is as follows.

```

1.function check_login($is_ajax = 0)
2.{
3.    if(!isset($_SESSION['uid']) || intval($_SESSION['uid'])==0)
4.    {
5.        if(!isset($_COOKIE['user']) || trim($_COOKIE['user'])=="")
6.        {
7.            global $sym_fullurl;
8.            if($is_ajax ==1)
9.            {
10.                return 0;
11.            }
12.            else {
13.                redirect("login.html?return_url=".urlencode($sym_fullurl));
14.            }
15.        }
16.    else {

```

```

17.     session_start();
18.     $userinfo = json_decode($_COOKIE['user'], true);
19.     $_SESSION['uid']= ucode($userinfo['uid'], ym_token) ;
20.     $_SESSION['uname']= $userinfo['uname'];
21.
22.     return intval($_SESSION['uid']);
23. }
24. }
25. else {
26.     return intval($_SESSION['uid']);
27. }
28.<script type="text/javascript">
29. // Script code to validate that the input is not null
30. function checkForm(form) {
31.     if(form.username.value == "") {
32. alert ("User name cannot be empty!");
33.     form.username.focus();
34.     return false;
35. }
36.     if(form.password.value == "") {
37. alert ("Password cannot be empty!");
38.     form.password.focus();
39.     return false;
40. }
41.     return true;
42. }
43.</script>

```

### 3.3. Implementation of the transaction management module

Click the transaction management module on the system interface, then enter the transaction management interface, and select the required operation according to the way shown in Figure 3-4. For example, for overdue fines, click on the trading system, select overdue fines, follow the prompts, enter the basic information of readers in turn, select overdue fines, and make overdue fines.



**Figure 3-4.** Transaction Management Interface

The main function code is as follows.

```

1.function get_catIds($rows, $pid = 0, $level = 0, $id_name = 'id', $pid_name = 'pid')
2.{
3.  global $arr_ids ;
4.  if(empty($rows)) {return array();}
5.  $level++;
6.  foreach($rows as $key => $value)
7.  {
8.    if($value[$pid_name] == $pid)
9.    {
10.     $value['level'] = $level;
11.     $arr_ids[] = $value[$id_name];
12. unset($rows[$key]); //Remove the current node data to reduce useless traversal
13.     get_catIds($rows, $value[$id_name], $level);
14.    }
15.  }
16.  return $arr_ids;
17.}
18.for ($i = 0; $i < Count($ruleArr); $i++) {
19.if ($ruleArr[$i] <= 0) continue;
20.if (!$data[$i]) $data[$i] = 0;
21.$rslt|= $data[$i] << $usedBit;
22.$usedBit+= $ruleArr[$i];
23.}
24.} else {
25.for ($i = 0, $scent = Count($ruleArr); $i < $scent; $i++) {

```

```

26.$rslt.= sprintf('%0' . $ruleArr[$i] . 's', $data[$i]);
}

```

### 3.4. Implementation of the library management module

Click the "Book Management" button, click the "Book Management" button, click the "Figure 3-5" button, click the "Operation" button, and click the button. For example, to archive a book, you must first "enter the book" in the book management page, then fill in all the basic information of the book in sequence according to the required steps, and then click "Submit" after confirming that the information is correct, so that it can be archived.

The screenshot shows a web interface for book management. On the left is a navigation menu with '图书管理' (Book Management) selected, containing sub-items like '图书入库' (Book In), '图书出库' (Book Out), and '图书破损' (Book Damaged). The main area is titled '图书入库' (Book In) and contains a form for entering book information. The form has two columns of input fields: '图书编号' (Book ID), '出版社' (Publisher), '图书名称' (Book Name), '图书数量' (Book Quantity), '图书来源' (Book Source), and '经办人' (Handler). At the bottom of the form are two buttons: '重置' (Reset) and '提交' (Submit).

**Figure 3-5.** Book Management Interface

The main function code is as follows.

```

1.function get_extend_goods($cat_id)
2.{
3.  global $db;
4.  $row = $db->fetchall('goods_cat', 'goods_id', array('cat_id'=>intval($cat_id)));
5.  $data = array();
6.  if(!$row || count($row)==0)
7.  {
8.    return create_in("");
9.  }
10.  foreach ($row as $k => $v) {
11.    $data[] = $v['goods_id'];
12.  }
13.
14.  return create_in($data);
15.}

```

### 3.5. Implementation of the query management module

Click "Query Management" button, click "Query Management" button, click "Figure 3-6" and click the corresponding operation button. For example, you can query the reader's information by entering

the query management interface, selecting the query operation of the reader's information, selecting the category to be queried, typing and pressing the query button.

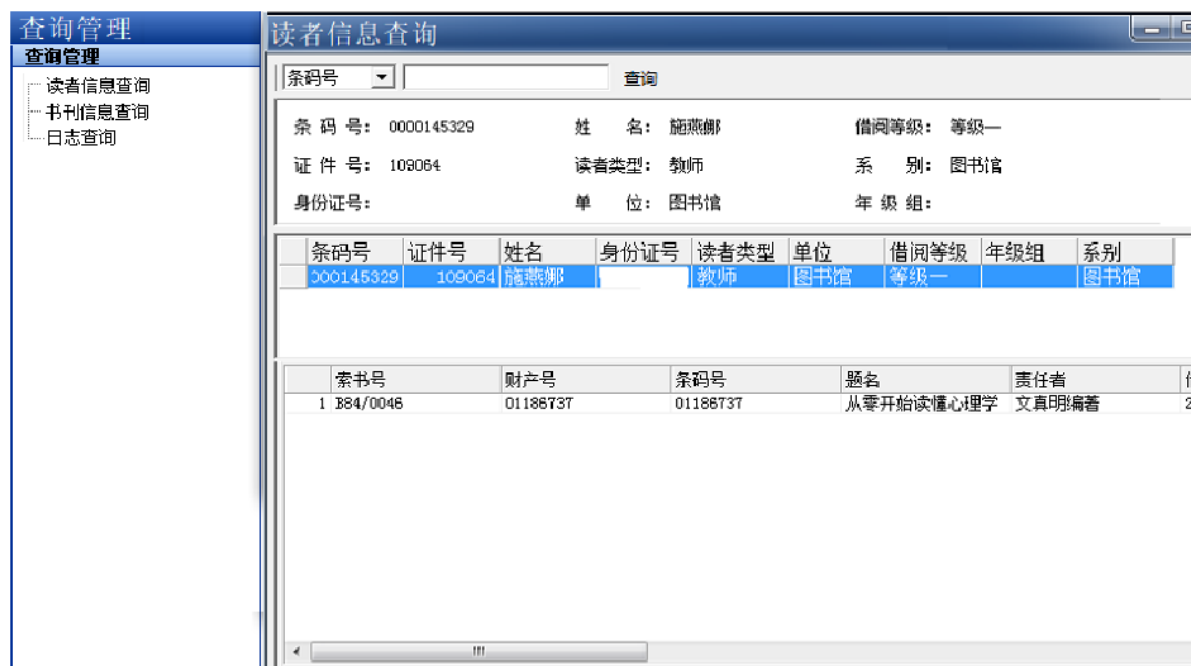


Figure 3-6. Query Management Interface

The main function code is as follows.

```
function get_extend_goods($cat_id)
{
    global $db;
    $row = $db->fetchall('goods_cat', 'goods_id', array('cat_id'=>intval($cat_id)));
    $data = array();
    if(!$row || count($row)==0)
    {
```

## 4. SYSTEM TESTING

In the MIS of Uni, there are seven construction modules. First, you need to build your own construction tree, and then other integration.

The purpose of the test is to find out the books of a school and pass the exam. The function that has been realized in this case. This can be achieved in one function. In addition, through the "system review", users and users can detect problems as early as possible, revise and improve the system and improve operational performance during their study.

Test purpose: strictly follow the time and timetable stipulated by the school; Talking about checking the availability and security of management information system when mistakes occur in university library.

### 4.1. Test methods for the system

There are two general tests: white and black.

#### 4.1.1. White box test

Testing is the so-called architecture, which runs in a running system to generate an internal operation, and then passes the test, the test, the large-scale product operation, and so on.

If most of the tests are done by programmers, then the field tests are also very good. The premise of the test sequence is that the testee can correctly understand the internal structure of the system.

#### 4.1.2. Beta black box

The black box test is corresponding to the white box test, but it is also relative. Blackbox, also called function testing, mainly tests the internal code of different modules without breaking away from the whole process of converting to system modules and methods. Therefore, the black box only contains the data input and output from the function, and does not transmit the external information normally.

Black box inspection should include everything that happened during the test, so it is necessary to check not only the data correctly, but also the types and processing methods of the data. The flexibility of the whole system depends on how users use the wrong data.

### 4.2. System test cases

Through the analysis of experimental data, it is proved that the information system of university library can meet the various needs of readers. Through many failed or unsatisfactory functional attempts, some functional characteristics were confirmed and corrected. A rough correction will make the final test pass completely.

Experiments were carried out at several points to achieve the goal of stability.

#### 4.2.1. The bank also borrowed a competency test.

Test objective: to test the effectiveness of the system, including the function type of debit book. Other functions are similar, so I won't say much below. The test assumes that the reader's information about the test is true, as shown in Table 4-1.

**Table 4-1.** Book Borrowing Function Test Cases

Use case number	001	Use case name book borrowing function test
Test target	To test whether the book lending function works properly, the	
	process description	Expected test results
owner ask measure try step suddenly	Scanning a reader's library card	displaying information about the reader's library card
	Scanning the barcode of a book	Book information entry is successful
	Click on Borrowing	Successful book borrowing

#### 4.2.2. Circulation parameter setting management function test

Test Objective: To test the effectiveness of the system functions, including the reader type setting function. Other functional test process is similar, will not be described in detail. Specific test cases as shown in Table 4-2.

**Table 4-2.** Reader Type Setup Functional Test Cases

Use case number	002	Use case name	Reader type setting function test
Test target	Test whether the reader type setting management function can work normally.		
	process description	Expected test results	
owner ask	Click reader type settings on the management homepage.	Displays the reader type setting directory.	
measure try	In the circulation parameter setting module for readers		
step suddenly	Type to add, delete, modify and other operations.	The operation is normal, and there is no abnormality during data processing.	

### 4.3. Test conclusions

In the test process, I mainly test the black box, test the functional modules in turn, and test that I got the file. The test shows that modules with different functions can meet the requirements of analysis and creatio

## 5. SUMMARY

Libraries are both a distribution center for cultural resources and a platform for books, and they play an important role in promoting cultural development. The joint library, in particular, has a social function that goes beyond its own role and has developed into a spiritual symbol of culture.

With the development of the times, the traditional manual management mode based on computer network will be gradually replaced by the new mode. With the advantages of fast, easy to find, reliable information management system, etc., the operational efficiency of the enterprise has been greatly improved.

This is an evolving process and has resulted in the establishment of a system of university libraries. To take full advantage of these opportunities and to improve the quality of teaching and learning, university information systems must be made more education-oriented and proactively designed.

This paper introduces the construction and realization of university libraries. The main content of this paper is to introduce the research background and significance of this topic, as well as the development status, problems and challenges of information systems concerned in the field of library management at home and abroad; On this basis, the technologies based on C/S structure, UML model tool, SQL Server database, JSP, AJAX are proposed; The model of a model is established. In this model, the critical area, as a model, generates the initial technical requirements and achieves the intended development purpose; The systematic way is to define the needs of readers and librarians in detail, so as to form their needs; Finally, the data structure of university library MIS is realized, the design of each functional module of the system is realized, and the preliminary test is carried out. These contributions include a list of MIS innovations and deficiencies, as well as a new vision for future work.

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