Development of Reader Service System for Digital Library

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Abstract. Digital library is an extensible knowledge network system based on computer communication and sharing in the network environment. To meet the needs of digital library, a reader oriented reader service system for digital library is developed by using computer technology, communication technology and network technology. The system includes user management, book borrowing and returning, book reservation, book display, book review and other functions. Combined with the push function of mobile phone, the system realizes the purpose of carrying out book borrowing service for readers more efficiently. Through the integration of library service and digital communication, the reader service system of digital library can make readers enjoy digital information resources conveniently and quickly at any time and any place.

1. Introduction
Digital library is a library which uses digital technology to process and store all kinds of illustrated documents [1-2]. It is an extensible knowledge network system based on the network environment [3-4]. Digital library can provide users with convenient, fast and high-level information services [5]. To meet the needs of digital library, a reader oriented reader service system for digital library is developed by using computer technology, communication technology and network technology. The system includes user management, book borrowing and returning, book reservation, book display, book review and other functions. Combined with the push function of mobile phone, the system realizes the purpose of carrying out book borrowing service for readers more efficiently.

2. Design of the Reader Service System
At present, digital library is gradually developed from information-based processing and simple human-computer interface to knowledge-based processing and extensive understanding between machines [6-7]. It is the premise of the design of the digital library service system to focus on the readers, so that the readers can make more efficient use of computers and networks to search and use library resources in a wider range. The reader oriented reader service system for digital library is constructed by C/S mode, including server, client and database. The main functions of the system are as follows:

(1) Provide readers with information of all kinds of library collections;
(2) Provide readers with convenient and fast book retrieval and book borrowing service;
(3) Remind readers of the return date of the borrowed items in time;
(4) Provide book short review which is convenient for readers to further understand books and the communication between readers;
(5) Digitalization of readers’ borrowing behavior to provide guidance for the library’s book purchasing work.

The server side interface is shown in Figure 1. The server side work area includes the system log display area, the server address setting area and the client connection display area. The functions of each area are as follows:

(1) The system log display area is used to display client request, server response and system error log;
(2) The server address setting area is used to set the IP address and port number of the server, and set the server to start listening and stop listening;
(3) The client connection display area is used to display the currently connected client information.

After entering the server software interface, the monitoring IP address and port number can be set. This address allows clients to access the server. Turn on listening to start receiving connection and access requests from clients; turn off listening to stop receiving connection and access requests from clients.

![Figure 1. Server Side](image1)

Figure 1. Server Side

![Figure 2. Client Side](image2)

Figure 2. Client Side

The client login interface is shown in Figure 2. After opening the client software, the login interface is shown. Correctly input the user name (if the user name already exists) and password, and click the "login" button to enter the client software system. If the user name or password is not entered correctly, a prompt dialog box will pop up, indicating that the input information is wrong. According
to the different permissions given to readers by the backstage database system, the system will give readers different operating functions.

3. Functions Development

The service of digital library is guided by the concept of knowledge, which transmits digital information such as text, image and voice through the Internet, so as to share information resources. As a reader oriented system, its function is formulated and developed from the perspective of the reader's demand for information and the convenience for the reader to obtain information, including information query function, book borrowing and returning function, book reservation function, information display function and reader comment function.

![Figure 3. Inquiry Function](image)

![Figure 4. Borrowing and Returning Function](image)
The information inquiry function is used for readers’ information retrieval and inquiry of books they need. As shown in Figure 3, books can be searched by title, ISSN, keywords and other ways. The summary, subject, author, publishing house, room, language and other information of the searched books are displayed on the inquiry page. At the same time, the number of times the book has been borrowed in the past three years, the date of each borrowing, the length of borrowing, and the current status of whether it can be borrowed are all presented directly for readers' reference. One of the outstanding advantages of the reader service system of digital library is that it provides two-dimensional code of the searching information, which is convenient for the reader to scan by mobile phone. In this way, readers can easily access the basic information of the searched books on the mobile phone, which saves the time of readers and improves the efficiency.

The interface of book borrowing and returning function is shown in Figure 4. This page is sorted by time and displays the specific information of all borrowed and returned books of the login user, including book name, borrowing date, last return date, borrowed days, remaining borrowed days and book summary. If the remaining days that can be borrowed do not exceed the set threshold value, a message will be pushed to the reader user through the mobile phone to remind the reader to return or renew the book on time.

The interface of book appointment function is shown in Figure 5. This page displays the book booking information of the login user. According to the book borrowing and returning information in the database, it can provide the book appointment function that readers are interested in but not in the library. Once the book is returned, the appointment user can receive the push message from him or her mobile phone in time to remind him or her to go to the library to borrow it. If the book appointed is not borrowed in time, the information of the lent and returned will be sent to the appoint reader.

The function of book display function is to display the connotation of a book and the views of different readers according to the readers' evaluation of the book, as shown in Figure 6. The book display function is related to the book review function, which can show the book better from the perspective of readers. The readers who have read it can present their ideas, comments and suggestions about the book in the interface. The readers who have not yet read the book are often able to gain new perspectives from the comments of the readers who have read it. In this way, the book resource can be efficiently used.

Figure 5. Appointment Function
The function of book comment is to allow readers to comment on the contents of the books they read, and publish the comments in the system for other readers to refer to, as shown in Figure 7. In the background of this function interface, the security detection function is embedded to detect whether the comments made by the login users conform to the laws and ethics. The collection of book comments is beneficial to understand readers’ evaluation of books and readers’ preferences from the perspective of readers, so as to facilitate the library’s purchase and management of books.
4. Conclusions
Digital library has been widely concerned in the world, and it is the inevitable outcome of the development of Library in the era of network. The reader service system of digital library can make readers enjoy digital information resources conveniently and quickly at any time and any place. From the point of view of readers, this paper puts forward a design method of reader service system of digital library based on readers' needs, and develops corresponding software system. Combined with the popularity of mobile phones, the developed system can serve the readers better.

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