Design and Implementation of Delphi-based Book Information Management System

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Abstract

Library is a gathering place of information resources. The abundant information resources gathered in libraries are necessary for economic development. With the rapid growth of national economy, the development of library information management is an inevitable trend. The study of this paper, combining the method of system analysis and design, establishes an effective library information management system. It uses the database technology to manage book resources, which not only reduces the management workload, but also sets up a scientific standard for work assignment, and eventually optimizes library information management. Due to the convenience and standardization of Delphi language environment, programming based on Delphi has a higher application value. Therefore, the study of this paper uses the Delphi language environment in the design of the inbound module, read program, library management and reader information management program, library circulation module program, user management module interface presentation program, and terminal interface login window. The study aims to optimize the operation of the library information management system and improve the actual efficiency of library management in our country.

Keywords: Book Management, Design Direction, Presentation Mode, Delphi Language Environment.

1. BACKGROUND

1.1 Literature review

Delphi language environment is a famous Rapid Application Development tool on Windows platform, the system model of which resembles the prevalent Borland Turbo Pascal of DOS era (Diao, 2017). One of the earliest running versions was developed and put into trial by the Borland Borland in 1995. Delphi is a new visualized programming language environment, which can provide good application tools for the design and implementation of library management system (Zhao, 2017). And through the use of Microsoft Windows graphical user interface (GUI) it can show the design ideas. The reusable object-oriented programming Language, can be regarded as the fastest compiler and the most advanced database technology in today’s world (Pan, 2017). Then, using the Delphi language environment to compile book management system is an improvement of function based on user demand, and an optimization of system operation effect.

1.2 Purpose

The traditional library management system USES very few functions of the modern library management process, and the program of the traditional system is very complicated (Liu, 2016). This study tries to design different standard-compliant function models to clear up the many functional requirements between system managers and users, and then lays down a whole functional framework of the system (Fan et al., 2016). This study aims to improve the operation efficiency of the library information management system by optimizing programming and try to get the right optimizing direction through analysis based on practical application, so as to provide theoretical reference for book management model renovation.

2. FUNCTIONAL FRAMEWORK OF LIBRARY MANAGEMENT SYSTEM

In the framework of library management system, two basic functions need to be realized. The first function module is the end-user login module, in this function module the level management to end-users, and user access review needs to implemented, so as to provide corresponding library services (Yu, 2015). This function module can be considered as the basic function of the system. It is also a key content of this module to provide registration
password management and operation guidance for all users. In the actual operation process, the operation efficiency of the login platform is essential to identify whether the expected management effect can be achieved. When the fast login and effective management can be achieved in this login module, the system operation is considered as effective. And there are also occasions when a system running redundancy or slowdown happens.

The second function module is the library management module which is designed mainly for the managers of the system. Seven functions needs to be completed in this model: user interface, reader management, book category, inbound management, book information, library circulation, book information query and so son. As shown in Table 1.

<table>
<thead>
<tr>
<th>Operation interface</th>
<th>Reader</th>
<th>Category</th>
<th>Book storage</th>
<th>Book information</th>
<th>Borrowed again</th>
<th>Book inquiries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer interaction</td>
<td>Identity</td>
<td>species</td>
<td>Update</td>
<td>content</td>
<td>Lend</td>
<td>Book number</td>
</tr>
<tr>
<td>Input method</td>
<td>Entry</td>
<td>Types of</td>
<td>time</td>
<td>Overview</td>
<td>return</td>
<td>Title</td>
</tr>
<tr>
<td>Running result</td>
<td>modify</td>
<td>subject</td>
<td>location</td>
<td>Connotation</td>
<td>times</td>
<td>The author</td>
</tr>
</tbody>
</table>

First of all, the interface and the reader management page are mainly designed for the operation of the interface. In this model, the user identity recognition, and the corresponding input mode, with interactive rendering surface running effect of the system need to be achieved. The most basic functional requirements for the model is that it has to be simple and practical (Lin and Hao, 2015). Thirdly, in the books information change management, the management is mainly for new books and books canceled. This function is to ensure that the catalog update is clearly visible. It is an important fundamental function. Finally, in the book circulation management, it is necessary to accurately describe the time when books are lent and returned and record the book type and the borrower, so as to build up an effective management. The main direction of book information query management is to provide users with fast and convenient catalog query service, which involves the directory with the author, title, book number, visual information, content abstract, etc.

3. THE DESIGN OF LIBRARY MANAGEMENT SYSTEM IN DELPHI LANGUAGE ENVIRONMENT

3.1 System process design

The system process is an integral part of the implementation of the framework and is an important prerequisite. In the Delphi language environment, the design of the library management system first needs to put the realization of all functions as the direction, and design the corresponding procedures, documents, databases, documents, and manual operation procedures. Each process unit is in a separate operation stage, and is also in a structure system of interaction with other unit. Thus an internal environment with strong correlation is formed in the groups of functional modules. In the book information query module, a user can easily enter the book information query window by clicking the query button. This window is to let the reader queries all books in the library, in order to understand the desired book's number, title, author, publishing house, circulation situation, and so on (Lu et al., 2017).

In the management system, the most frequently used function is the query function. Therefore, the actual operation effect of the query system can also be reflected from the operation mode of this window, which also determines the application effect of a management system. The operation flow is shown in Figure 1.

![Diagram of System Operation Process Design](image)

Figure 1. System Operation Process Design Framework Structure
3.2 The design scheme of the system functional module

In the process of designing various functional modules for the system, it is necessary to comprehensively analyze the method in which the system structure is completed. The feasibility of this method determines the objective conditions of the application of the system. We need to analyze the books information management and its characteristics based on the system functions, clarify the elements of each function, so that the corresponding expression form can be clearly defined. In particular, it is necessary to strengthen the internal relations between system units so as to improve the functional elements of each part. In the first flow, the reader needs to apply to the management before he or she can borrow one or more books. The management issues the application information to the administrator (Feng, 2017). In the second flow, the administrator accepts the application, feeds the information back to the reader, and then gives the executive order to the management. And then the management sends the book information and the book documents to the reader. In the above two basic operating flows, the forward flow is for user to borrow books and the reverse flow is to return the books. The operation and processing mode are the same. And the preliminary design of the above-mentioned functional modules can be completed in the Delphi language environment.

3.3 Database structure function design direction

According to the requirement analysis of management system, this database model can be defined as relational model. According to the conversion of use direction, the function output of subordinate level can also be carried out, and the corresponding terminal service index is designed to meet the user's demand. On this basis, the four database management content modules are designed as book category, login user, book and borrow information. Firstly, the login module contains three pieces of information: password, account and access. Secondly, the user database is mainly used to store user's personal information and account registration information (Liang, 2017). Thirdly, book information database includes: book number, category, title, author, publication date, publishing house, pricing, remarks, etc. Finally, the information database includes user account, book number, number of books, date of return, time of possession, expiration, penalty, remarks, etc. In the design of corresponding functions, the related demand analysis model is applied in this study:

\[ Y = C(Y-T) + I(Y, i) + G(i) + M \]  

In this model, \( C \) represents the design direction of the login module; \( L \) represents the direction of database storage requirements; \( G \) represents the information variables in the library information database; \( M \) represents the relevant variables of the borrowing information database. Thus, the value can be verified in variable scope of time \( T \). And finally, the requirements of the management system are clearly defined.

3.4 The program design of database management process

The basic demand to design the database management process is to implement the ways that enable user to use a function. In short, it helps the users to realize their collection of data, search, update, query and other operation and finally get the results they want. The performance of the database determines the quality of the system's application efficiency, and vice versa (Zhu, 2017). The fluency is to guarantee the realization of the user experience. The access efficiency and space utilization ratio of file and data determines the degree of user experience. It is also a comprehensive measure for completeness, share-ability, consistency, confidentiality, security of desired information. The quantization of data storage type and standard, and the creation of complete information input and output function for the database are also necessary measures to achieve this experience. On this basis, the basic function and development direction of the database needs to be completed to ensure the smooth operation of the system and the completion of user information processing.

3.5 The direction of data dictionary function development

As one of the system function module, data dictionary is designed based on users' demand which include: system user data, book inbound data, reader's personal data, inquiry, library circulation data and other functions which are in need. Firstly, system user data level mainly focuses on the completion the book using relationship between the librarians and users, in the form of identity data. In data item, user's password is an important way to complete this function (Li et al., 2016). Secondly, the book inbound data is mainly used to generate a book catalog, and used in the design of basic information presentation of the books including author, title, book number, date of publication, publishing houses, pricing, brief introduction and other data information. Thirdly, the readers personal
data function module, mainly focuses on analysis of the identity information of the borrowers and readers, including all the contents of readers’ personal information, such as name, gender, ID number, member number, reading tendency, and circulation history, etc. The corresponding query function is also the measure unit and standard based on the readers’ information, including the overall query function expression form in three models of borrowing information, readers’ information, and book information. Library circulation data is the type of data that linked with borrowing information, including membership number, borrowing number, date of return, time of possessing and other basic information content, which is also a supplementary to the function of the system.

4. DESIGN AND IMPLEMENTATION OF DELPHI-BASED BOOK INFORMATION MANAGEMENT SYSTEM

4.1 The login window of terminal operation interface

In the login window of the terminal operation interface, you need to verify the member user’s identity, and it is also the first portal to launch the system before user gets into the book inquiry and borrowing process (Chen et al., 2016). The user name and password needs to be matched in the login window, so as to launch the login function of an administrator or a general user. When a user or administrator enters a password that does not match the account, a security command prompt will be issued, and the verification code will be needed until the user completes the input of correct password. The execution flow is shown as follow:

```html
< shadow > -root(open)
</shadow > <style type="text/css"> </style>
style { display: none; }
<script language="javascript" type="text/javascript">
function clearText(field)
{   if (field.defaultValue == field.value) field.value = "";
    elseif (field.value == ") field.value = field.defaultValue; }
</script>
link { display: none; }
script { display: none; }
<style type="text/css"> .STYLE4 { font-size:18px }
</style>

4.2 User management module interface information expression

User management in terminal side, mainly includes management personnel’ operation. In the design of the corresponding procedures, the convenience in operation and administrative rights are main direction, supplemented by regulating users’ access of operation. The design includes: adding or removing designated administrator, edit administrator access, update administrator access. In the user window, it is also necessary to design relevant functions, and the functions used by different administrators should be taken to evaluate the performance of the system. The function procedure is shown as follow:

```
< head >
    < title > Administrator login information entry </ title >
    < meta http-equiv = "Content-Type" content = "text/html; charset = gb312" >
    < meta content = "Edit administrator privileges" name = "keywords" >
    < meta name = "description" content = "Update administrator permissions" >
    < link href = " / skin/default/images/zyx.css" rel = "stylesheet" type = "text/css" >
< script language="javascript" type="text/javascript">
function clearText(field)
{   if (field.defaultValue == field.value) field.value = "";
    elseif (field.value == ") field.value = field.defaultValue; }
</script>
```
4.3 The book circulation module program

The important function of library management system is to manage the circulation of books. When the user chooses to enter the book number, he or she can read the relevant information from the book information and finds out the circulation status of the book before he or she sets the corresponding controls. For books that have been lent out, a user can check the number of borrowers and the expected return time (Hu et al., 2014). At the same time, the total number of books and the number of days the book is held is required to show in its function. And a basic function of payment and fine calculation is required. Users can choose to go back or confirm an operation, thus they have an option before they choose to not borrow or return books. After a user inputs a borrower’s number, he or she can check whether the number can borrow the books, if such operations can be completed, the user is qualified to borrow a book. In this module, the system first checks whether the borrower conforms to the borrowing conditions, including whether the card number is correct and whether there is a timely return. The operation procedure is shown as follows:

```html
<div class="header wrap">
    <div class="topBar clearfix">
    </div>
    <option value="kmjs">Title retrieval</option>
    <option value="btjs">The title retrieval</option>
    <option value="qwjs">The full text retrieval</option>
    <script> Audiojs("ueoption val
    </script>
</div>
</div>
```

4.4 Library management and reader information management procedures

The main function of library management module is to provide new book entry and update, maintain the change of book information update, and optimize the classification of all books. The reader management module is responsible for the establishment and maintenance of reader information database, while completing the setting of the reader's identity, and finally completing the statistics collection of various readers' identities. In these two modules, a new data reader user can be created, deleted or edited simultaneously, so as to fetch reader information in the information table. The program is shown as follows:

```javascript
<script type="text/javascript">
    var _gaq = _gaq || [];
    _gaq.push(['_setAccount', 'UA-2219013-23']);
    _gaq.push(['_trackPageview']);
    (function()
        var ga = document.createElement('script');
        ga.type = 'text/javascript';
        ga.async = true;
        ga.src = ('https:' == document.location.protocol) + '.google-analytics.com/ga.js';
        var s = document.getElementsByTagName('script')[0];
        s.parentNode.insertBefore(ga, s);
    )();
</script>
```

4.5 The read program of new book inbound management function

This model is responsible for the entry of book information. Information about the book can be entered into the system, including title, category, author, publishing house, publication date, price, remark information, confirmation of inbound delivery operation. This inbound management module is designed to maintain specific information on books, including the title, category, author, publishing houses, price, remark information, etc (Hong et al., 2011). At the same time, the functions of the book category are supplemented to realize the management of relevant books. With the books that added or deleted, the model counts up the types of current books. When the library is not returned in time or the book has a long shelf time, then there is a need for new book inbound management, and at the same time update information about books need to be input, so as to improve the efficiency of management of the total books and system running effect.
5. CONCLUSION

To sum up, the actual function of a good books and materials management system lies in optimizing the content search, books and information updates, as well as the optimal management of users (administrator/member). The Delphi language environment provides a basic language environment for such programming, with the corresponding design standard achieved during the programming. All the programming on book information management system mentioned in this paper is merely theoretical design. The relevant practical studies remains to be verified on the mainstream network platform and against port, to identify its security and reliability in design.

REFERENCES

Fan Z.G., Huang Y.Z., Ma T.D., Shen L., Jia Q.Z. (2016). Physical and chemical testing laboratories how to effectively establish LIMS system. Physical and Chemical Testing (Chemistry), 52 (02), 204-207.
Feng J. (2017). Fuzzy comprehensive evaluation method in Liaoning University of Technology library management system application and research, Journal of Library and Information Sciences in Agriculture, 29 (06), 44-46.
Zhu Y.Q. (2017). WeChat small program in the library mobile service application practice - take the game as an example, Library Forum, (07), 1-7.