Research on Intelligent Faculty Management Information System Based on Component Technology and Software Architecture Technology

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Abstract: With the rapid development of science and technology, management information system plays an increasingly important role in the construction of university information technology, which has a certain degree of influence on the information of students, teachers and school administrators. In modern software engineering, software development technology based on component technology has become one of the important means of MIS development, and it has become the main development direction of university MIS. The campus management system based on component technology is an object-oriented, comprehensive application, designed and implemented based on computer. At present, many institutions in China use this system software to complete the tasks of student information and related data. Therefore, in order to meet the needs of school management and improve the level of management personnel is of great significance, this paper introduces the campus management system based on the component technology, through the analysis, research and discussion of the key engineering procedures used in the development process of the system.

Keywords: Component technology. Software architecture technology. Intelligent faculty and department management information system.

1 INTRODUCTION

With the continuous development of computer technology, management information system has become an indispensable and important part of socio-economic development, and the development of management information system is very important in the construction of information technology, which is of great significance in the systematization, standardization and automation of school management[1]. The use of management system software for scientific and reasonable information inquiry and maintenance of students and teachers is necessary for the effective operation of university management. To achieve the efficient management mode, the management of higher education institutions can provide the reference basis and relevant data analysis to the decision makers quickly and accurately, so as to improve the teaching efficiency and work quality, and realize the informationization of the management of higher education institutions. In the development of higher education management system, it is necessary to take into account the application environment to ensure that the information system can meet the needs of school management and teaching, and it can also enable the managers to change from heavy and complicated manual operation to information system processing [2].

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2 BASIC BUILDING BLOCK TECHNOLOGIES

2.1 CORBA Technology

CORBA is a development standard published by the Object Management Group (OMG) to support the collaborative nature of application systems, and it is a development technology for management information systems. With the rapid development of information technology such as computer technology and network communication, CIS system has been widely used in the field of school management, which provides a more convenient and accurate way to share information resources, data processing and analysis[3].The specific interaction between CORBA management components, applied in the management information system, can not only realize the integration of information resources and data, but also free management staff from the heavy and complex data processing work [4].

The most important part of the CORBA system is the Object Request Broker (ORB), whose core function is to store object requests in the database. Its main purpose is to process and classify data and add managed objects to the corresponding application software according to different types, different times and other attributes. As a middleware, ORB is responsible for establishing a client-server relationship between components and components. Its main function is to analyze, manage and operate object requests, and transmit relevant data information submitted by users to the server so that administrators can make reasonable and correct decisions in a timely manner.

2.2 JavaBeans and EJB Technology

EJB technology is a kind of Web-based management information system and networked information processing system, which is mainly composed of server, database and so on. It has powerful functions, it can realize data storage and query as well as logical analysis, it can realize fast and accurate data transmission, it has good generality, and it can meet the objectives required by management information system in practical application. EJB technology has great significance in management information system, which can not only realize the effective and rational use of internal and external resources, but also improve the efficiency, reduce the cost of personnel and equipment, and at the same time, it can promote the development of communication and coordination among various departments[5].

JavaBeans has a great role in the development work on the computer in terms of its structure design, while other technologies are different in that they are easy to use, convenient and fast and can meet the needs of users to complete the characteristics, such as virtual reality technology in BIM and C# language processing system, Web server, etc. are based on the support of the software to achieve the function, rather than directly using BIM technology, so in the development of school management information system, we used JavaBeans as the main application software to develop the technology college management information system, the main advantage is: it can realize the analysis, processing and query of data of all aspects of school information management system.

JavaBeans and EJB extend all the advantages of Java, including portability and security, and apply them to component-based software development. During the software development

process, the system can realize the functions of storing, analyzing, processing and using the project information and data of the management information system [6].

2.3 COM/DCOM Technology Analysis

COM/DCOM technology is a system of standardized component interfaces developed by Microsoft on the basis of OLE, which exchanges information between users and suppliers and between vendors in graphic and textual ways. In the management information system, the development and implementation of the school management system can be applied to achieve student management, teachers' work and the work of the logistical support department. This technology mainly adopts the object-oriented structure design method to complete the analysis and processing of campus network data resources, establish a complete and highly maintainable system model according to the network connection requirements, and convert it into digital graphical information flow by logical modeling and physical modeling, so that the development of management information system can be realized. The simplicity and ease of entry into the COM building block development process makes COM/DCOM technology one of the most popular interface technologies today[7].

COM components are COM objects in the form of DLLs or EXEs that provide a set of specific functions and are managed in the computer's memory through the COM interface. the relationship between the COM interface, COM objects, and COM components is shown in Figure 1.

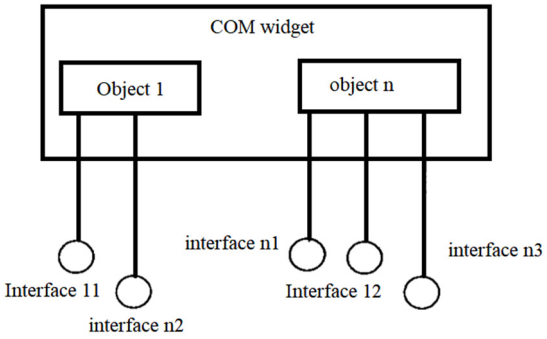

Figure 1. Relationship between components

The services (i.e. functions) in the COM interface include the creation and withdrawal of global memory, access to data, etc. The interface is defined in the IDL file and the main code is as follows:

```
#include "Database.h”
[
object;
uuid(6C606690-6D1A-11D2-9F6B-0080C83058E0)
helpstring("IDataManager Interface") ,
pointer.default(unique) ,
]
interface IDataManager: IUnknown{
```

```
[helpstring("method Name")]
HRESULT Name(long*ID);
[helpstring ("method GetFileData")]
HRESULT GetFileData(long *Filename);
[helpstring ( method OpenMappingFile")]
HRESULT OpenMappingFile( );
[helpstring ("method CloseMappingFile")]
HRESULT CloseMappingFile();
};
```

3 DESIGN OF COM/DCOM BASED APPLICATION SYSTEM ARCHITECTURE

3.1 Process View of Application Software

The application software is a very important and meaningful step in the process of management information system development, which is crucial for the whole system. It is necessary to strictly follow the corresponding process when performing specific operations. The first thing to consider is the issue of user access rights and menu settings [8]. When performing specific operations, the restrictions on user access rights should be fully considered, and data security should be ensured. Then there is the data entry, output and editing. Finally, the system development process requires a comprehensive analysis of the technical issues and application software, database and other aspects.

3.2 Research on Management Information System of Intelligent Colleges and Departments

Software architecture is an important part of developing management information system, which determines whether the system can play its proper function and meet the current and future development needs. It is necessary to make a reasonable choice of data storage methods, types and methods when carrying out database design. It is necessary to determine the table type or usable fields used according to the actual situation of the school and the application environment, and also to take into account the different speed and transmission quality requirements of information transfer between different departments and the corresponding measures. In addition, system security issues need to be considered. Therefore, the following issues need to be considered in the system development process, including reasonable planning for security confidentiality, data security and database storage methods. Combined with the idea of software componentization[8]. The multi-level software architecture of the COM/DCOM-based faculty management information system studied in this paper is shown in Figure 2.

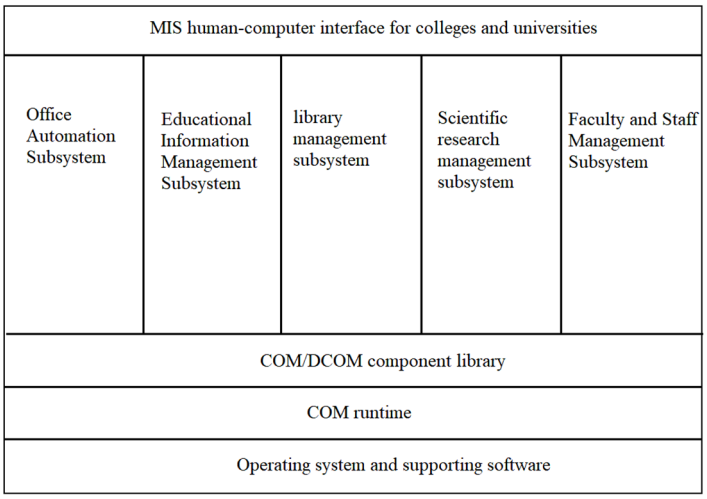

Figure 2. Multi-level software architecture of university faculty management information system

3.3 Design of Intelligent Faculty MIS System Database

System authentication. Authentication means that the user logs into the system by first entering the user name and password, and then verifies them in the database in the background. If the user name and password are correct, the system is logged in, otherwise no operation can be performed. If you enter the wrong password, you need to re-enter it.

System authorization control. In the process of system development, in order to ensure the safety, stability and normal operation of the information system, it must be strictly checked. The management authority is realized through authorization and control, that is, the authority management module in the system checks the user authority, and controls the access to the resource according to the user's authority to the resource.

The integrity of the system data is subject to constraints. Integrity means that the data structure is incomplete and the content is incomplete. The design and development of the MIS system database needs to be maintained reasonably effectively, firstly to ensure that the tables have good relationships with each other. Secondly, information sharing must be carried out in strict accordance with the operational procedures; and finally, the quality of the software must be constantly checked to ensure that they function properly. Technical specifications such as required formats, files, and data integrity should be in line with the regulations and specifications, and should be easy to modify and update without affecting the overall performance[9].

The system data must be backed up, and the MIS system database is designed and implemented to be constantly maintained and updated in the process of data usage. The data of faculties and departments are usually long-term non-public content, so they must be backed up, arranged and managed properly: firstly, the original data information should be properly protected. Secondly, for some important documents (including reports, etc.) should be regularly checked and reviewed; finally, a special database or software system should be set up to store such

information for access when it is used, and the MIS system should be constantly updated and improved in the process of design.

According to the above description, the database design model of the intelligent faculty MIS system is shown in Figure 3:

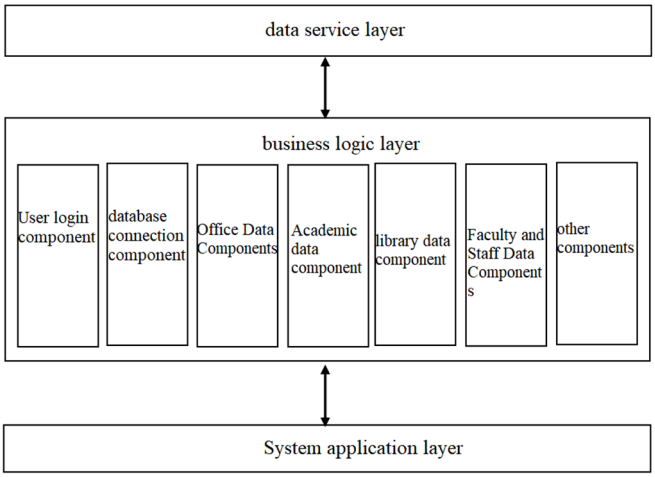

Figure 3. System database design model

4 INTELLIGENT FACULTY MANAGEMENT INFORMATION SYSTEM DESIGN

The management information system is designed to collect, analyze and integrate the information of departments and improve the overall efficiency of the university by sharing data among departments through information technology. In the development process, it is necessary to consider the modularity and scalability of the system functions and the connection between each subsystem. The overall functional module structure of this system is shown in Figure 4:

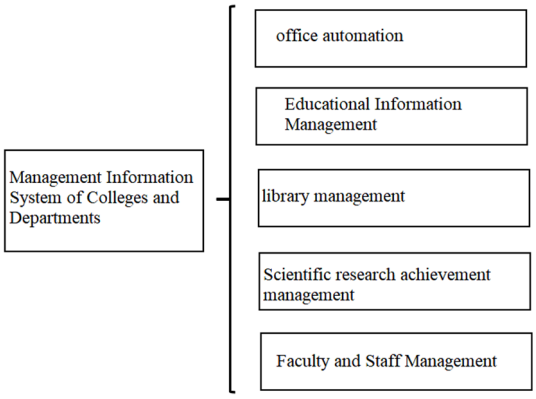

Figure 4. Overall functional module structure diagram

Office automation subsystem function module. The main functions realized include file transfer and leading office. The file transmission is mainly realized through the computer, printer and other equipments. In the system, the document is mainly transmitted, including files and forms. A large number of projects were used in the development of school management information systems. In order to improve the efficiency and quality of the project, the modular structure design method is adopted to build the university management system model, and the required data table structure and related information processing flow of the database are determined according to the demand analysis. The leadership office is mainly to complete the tasks of school affairs arrangement, work report, resource reservation, etc. The development of school management information system can realize the efficient use of personnel, funds and resources.

Academic information management. Academic management information system is an important part of the university, and it is largely related to the teaching activities of the college. Therefore, it is very urgent to organize and analyze its information effectively. In this paper, this system is divided into three modules, which are enrollment management, academic registration and grade management and teaching management[10].

Library management function module. The library management personnel function has the highest information volume, data security and confidentiality requirements. In the development process of management information system, it is necessary to take full account of the security and confidentiality of information so as to ensure the normal and orderly development of library management.

Scientific research management function module. The development of the management information system enables the management of research projects and the sharing of information resources, which allows to design the corresponding functional modules according to its own school situation and its own characteristics. In the project management system, the main purpose of using this system is to improve the school's ability to search and retrieve information about students, teachers and other personnel, and it also provides other departments with more information about the work of each school.

5 SYSTEM TEST

5.1. System Test and Analysis

After optimizing the deployment of the system and completing relevant functional tests, the management of the system can be realized, thus improving the work efficiency and providing convenience for schools, teachers and students. Based on this paper to the university department management system development technology research as an example, in the analysis of the current domestic and foreign technology development status of the project needs and feasibility analysis, and determined that this paper to use object-oriented method to design a template software platform to achieve the construction and maintenance of the website. According to the specific function modules, the structured life cycle method is used to make detailed planning of each stage involved in the system. Finally, the prototype test verifies that the proposed solution can meet the actual work needs and performance objectives.

5.2. System Test Environment

(1) Network environment

With the development of network technology, computer technology is constantly updated, university management information system development and use more convenient, and it can meet the requirements of students, teachers and other relevant personnel on information needs. The university information management system studied in this paper mainly relies on a ready-made university campus network environment, uses VisualBasic development technology, uses Java language and MySQL database to construct the university management information system.

(2) System deployment access hardware environment

The server side adopts Dell PowerEdge R720 as the platform, adopts J2EE architecture and JIS technology of SQLServer, realizes the development based on framework structure, and uses java language for web design, database and other operations. This system is based on the university management information system as an example to study the application of JavaScript scripting language, mainly divided into the foreground and the background two parts, which realizes the development of the university management information system. Table 1 shows the hardware configuration.

Table 1. Hardware configuration

project	Related Settings
Operating system	Windows2008 or later
CPU model	Xeon E5-2620
Memory type	ECC DDR3
Memory capacity	32G
Hard disk capacity	B8TBSAS
Optical drive	DVD-ROM
database	SQL Server 2005

This system adopts B/S structure mode, adopts object-oriented development method, mainly carries on the modular structure design to the management information system. The user mainly through the browser to access, and through the browser to access, the user can view and modify personal information in the management information system; Administrators can also operate some important files of the school and test them. The configuration of the client environment is shown in Table 2

Table 2. Client environment configuration

project	Related Settings
Operating system	Windows XP and Windows 7
CPU model	Intel Core i3 3220 has a 3.3GHz main frequency
Memory capacity	2GB DDR3
Hard disk capacity	500GB
Display size	20 inch CCFL widescreen
browser	Internet Explorer 6.0 or later, Firefox, and Chrome

5.3. System Test Content and Method

System test is an important link in the process of software development, the system test content includes the system interface, the system function modules, the system concurrent access response and other aspects, and according to the test scheme designed the specific function of the system. Through the detailed analysis of the technology used in the software development process and related technologies, the problems are found. This system is based on B/S structure of university management information system development, using JAVA technology, MYSQL as the background database. The software mainly realizes the maintenance of student information and courses and other modules. By using the test method to analyze the problems raised and give improvement measures and suggestions, so as to improve its operating efficiency and performance stability. In terms of specific functions, the university management information system based on B/S structure is designed on the basis of Oracle data center, which realizes the maintenance of all kinds of data information, and uses SQL statements to check and modify. This paper takes the test case of the system home page interface as an example, as shown in Table 3.

Table 3. Home page interface test cases

Test case number	T001
Test item	Interface display
Test title	The system home page is displayed
Importance level	high
prerequisite	Install Internet Explorer 6.0
input	There is no
Operation content	You can access the system using Internet Explorer 6.0
Expected output	Normal display
Actual result	Normal display

5.4. Test Results

According to the test results, we can see that all the functions of the system have been realized, but there are still some problems in the running process. For these defects still need to be further improved to achieve the practicability, reliability and stability of the university management information system project requirements. After the completion of the project, continuous optimization and maintenance can improve students' work efficiency and quality level. The test results show that: (1) the system is safe, stable and safe in operation, and the data transmission is not interfered with and damaged, and no human factors cause irreparable. (2) The system is flexible and can realize the application of student information, curriculum arrangement and teaching materials while meeting the requirements of school management information construction.

6 CONCLUSION

In summary, with the advancement of education reform, management information system plays an increasingly important role in higher education institutions, and it is essential for the development of modern teaching and management in schools at a certain stage. Based on this background to develop and design research on management information technology in higher education institutions, this paper mainly elaborates on the process of management system development and, component technology and database technology as well as the relationship between components, and provides a comprehensive analysis on the development of management information system in higher education institutions, which provides a reference for its better application in practical applications in the future.

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