The Application of Computer Information Processing Technology in the Design of School Examination System

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Abstract — With the development of computer technology, more and more schools and training institutions in the society have begun to use the network teaching. In the school can use the basis of campus network, network teaching platform. The erection of other teaching test platform can use their own or lease the server operators to. With the continuous innovation and the accelerating pace of society and technology, more and more people need to use their free time learning, which gave birth to the emergence of network education platform. In schools in order to facilitate teaching, combining the education and modern network technology to better, many colleges and universities have their own system of examination system, which is a college should possess. Developed a set of test system using Microsoft Corp's ASP.NET technology, network examination can be carried on a number of subjects, the examination time is more free, saving a lot of manpower and material resources, reduce the work of teachers, improve the efficiency of the work, can be more fair and impartial examination. The system uses the browser mode or B/S mode to realize the automatic test, automatic marking, the establishment of database etc.. The system adopts B/S three layer structure mode, reduce the workload of system maintenance, can log on to the system, convenient for the teachers to establish database, the database is updated. Background using Microsoft Corp's SQL Server 2005 as the database, the interface shows the use of ASP.NET technology, both of which can be very good together, convenient data query and change. The system realizes the online automatic extraction, automatic marking, the examination question bank management, achievement upload, query results, and the results of the modification and other functions, can be convenient to test a series of network automation, realize the paperless examination, and has wide popularization prospect.

Keywords - The Database;ASP technology;Examination System;B/S

I. INTRODUCTION

With the development of computer and network technology, the network examination with rapid development, but the development is very fast. With the rapid development of social economy and culture, more and more people need to charge to supplement their knowledge, but also less likely to go to school, on the choice of the network teaching, or network correspondence, it is for the network education has brought the power of development. As a complete network teaching system, not just online teaching, online communication, online Q & A and other functions, but also have a network examination system, it will bring great convenience to the network to learn the graduation, but also to open network teaching save the test of funds, improve the quality of teaching in schools, to reduce the cost of teaching [1]. Now the examination system is not perfect but most objective questions test, the subjective test is still based on character matching, but also can test for a single subject, to a large extent limited the popularization and application of test system. Most existing systems are based on client server model, this kind of system maintenance cost is higher, the use is not convenient, limits the system using [2]. In the network examination system of advanced test and automatic test paper and the security is good, not only can test the choice of objective, subjective questions can also test, analysis of test question database and sharing is good[3]. This system is based on the existing problems of the existing school examination system, the network examination system based on B/S development of a browser mode, you can test a number of subjects, automatic test and automatic checking function, greatly improving the examination system of the school, promote the development of intelligent exam system and the network.

II. SCHOOL EXAMINATIONS SYSTEM ADOPTS COMPUTER INFORMATION PROCESSING TECHNOLOGY

This testing system is developed by the Microsoft Corp based on the.Net platform, using a development tool is Visual Studio 2008, using C# as the programming language, the database is SQL Server 2005, the latest technology by Microsoft Corp.NET3.5 platform (ASP.NET, ASP.NET MVC, ASP.NET AJAX, WCF, Silverlight, Moq etc.) and some of today's more popular open source frameworks (Castle, NUnit, Moq), using MVC mode, the site will be deployed to the IIS 7 Web server.

A. Web database technology

With the development of network, the network has been the development of all aspects of society. Internet is a web service has the most potential for development of information service in the Internet is the most popular, the most important, it is actually a large distributed hypermedia information database, [4] can store all kinds of information, and support online browse all kinds of information, greatly
facilitate the people to obtain information. These are benefited from the development of Web database, web database, greatly promoted the spread of network information.

The Web database is to use browsers and client in this way to use the database management system to manage the data, users can not make the database client installation, direct operation of the database system in the browser, so as to provide users with the most convenient mode of operation of the system, so as to promote the future of database management system development and test is convenient for the user, is convenient for system maintenance, reduce the maintenance cost, anytime anywhere in the network access, do not need to install the client can access.

All in all, the Web database technology at present, usually use the server or client extensions, in order to achieve access to the database. The client extension technology, usually is used in Sun, Netscape, Microsoft, Netscape, Sun three giants of the competition, and in the server extensions, which is JSP, PHP and ASP, but the three is not much difference in performance, mainly reflected the difference in the development platform, compatibility the.

The development of other related technologies, but also affect the development of Web database technology. In recent years, Web technology continues to improve and the development, then the future is likely to be integrated into the Web database in the future, this is a worthy research technology trends.

The Web database of the general mode of operation was shown in figure 1. As can be seen from the graph the necessary elements of a database: between the client browser, WEB server, database and the connection of client and server network. Figure 1 shows the data communication between the client and the database, the client sends a request to the server, the server response to client requests for processing, and then through the backstage database, the request data sent by the client feedback to the client, the client to perform the services and programs. The client is launched and information communication of the server, to realize the data transmission and data processing by the request of the client server, the data transmission through the network transmission, the client and server operation. This will greatly facilitate the client operation, and eliminates the need for system in the maintenance of the client. Figure 2 is the operation mode of Web database.

The B/S architecture English called Browser/Server, simply put, is the browser and the server structure, due to the continuous development of Internet application, this model has become more and more popular, in this mode the user does not need to install the client, the system comes with the IE browser can meet all requirements of the users, all the services are done in the background therefore, the formation of three layer structure model, the structure as shown in Figure 3, specifically, is the formation of the database layer, function logic layer and interface layer of three relatively independent structure. To reduce the amount of data increases the client, network transmission speed of [5]. To reduce the cost of maintenance system in the future, the system provides convenience for system upgrades and updates, users can experience the convenience of system better.

(1) The first layer presentation layer: Web browser
This layer is that layer is mainly transmitted data display and service requests, it is sending the service request, the request is sent to the server, then the server will transmit data to display data, result of the request, and to authenticate the user, these operations are processed in the presentation layer.

(2) The second function layers: Server
The server is located in the functional layer, the main function is to respond to the request of the presentation layer, logic of transaction processing system, the client's request and the database connection, through the instruction system to deal with the request of the client, and then sent to the database server, is an intermediate data conversion service, plays an important role in the whole system.

(3) The third layers: data layer, database server
The database server is mainly for data storage and data inquiry, data modification, in response to the server requests and so on a series of functions, are processed in this layer.

The development of network technology greatly promotes the development of this kind of mode, can be anywhere access, the popularity of the network makes the
data processing function, can easily modify, delete, increase system integration; SQL Server 2005 provides a powerful can be very good and system development tools ASP.NET
Server 2005 can support a large amount of data operation, the Microsoft Corp's SQL Server2005 database products are combined and ease of use is very good. Two kinds of fusion is used to, as a front display interface, a database of data storage and data processing, the ASP.NET technology was launched by the people's attention, provide a good development platform for the majority of programmers, has been developing quickly [6].

ASP.NET is a part of the.NET platform architecture, the platform of.NET is stable, reliable, use the common language runtime (CLR) and the class library (FCL), enterprise level Web application development Microsoft resides in the IIS and the use of HTTP, SOAP and Internet protocol is powerful and stable. As the key technology of ASP.NET:

(1) ASP.NET event driven; event driven control function, is the drag function, the programmer can directly drive a control to the window, do not write the controls, the controls can be directly used, directly to the control event driven, this is the ASP event driven function, reduce the the difficulty of the system development, and effectively avoid the occurrence probability of Bug procedures, improve the programming efficiency, but also improve the accuracy and reliability of [7] program.

(2) data binding technology: access to the data in the system is very important, is an important guarantee for reliable system, in the ASP.NET system provides a data binding controls DataSet components using this component can be very convenient to the database connection, data binding, the binding of data without the need to write code, Microsoft provided controls can connect the data as well as data binding completely encapsulated in the control of the program, the developers and the realization of the control function is transparent, does not require developers to know, you can directly use the [8].

(3) The data access technology: ASP.NET provides ADO.NET data access technology, ADO.NET provides two key components: The dataset and the.NET data provider (Data Provider), the main purpose is to design the ADO.NET component decomposition data access from data operation.

C. SQL Server 2005 database management system

The system of background database using Microsoft Corp's SQL Server 2005 as the backstage database, SQL Server 2005 can support a large amount of data operation, can be very good and system development tools ASP.NET system integration; SQL Server 2005 provides a powerful data processing function, can easily modify, delete, increase operational data; data security strategy of SQL Server 2005 powerful can ensure the data security and stability [9]. The support of a large number of read and write data, compared to the Access system to support more data read and write access, effectively solves the problem of system of large amount of data; data security tool SQL Server 2005 powerful can ensure the data security and integrity, and good scalability, to ensure data security strong. This system chooses SQL Server 2005 database system as a background of the system, can provide a powerful database support for the system [10].

Microsoft SQL Server 2005 database is not a database system, it is an integrated platform of database, provides massive data management, which provides the corresponding function for the storage and use of massive data. SQL Server 2005 provides data security strategy is reliable and stable, providing security for the massive data management. Another solution, SQL Server 2005 also provides data security, and integrated data analysis function, the maximum guarantee the reliability and security of system database. SQL Server 2005 can perform the following functions:

(1) The client / server architecture for real. SQL Server 2005, the full realization of the client server system, the true sense of the server service, and fusion.

(2) The Windows NT were the effective integration of database system, which can make full use of the related function of NT. In addition, the related function of NT integrated in SQL Server 2005, to ensure the seamless connection between the operating system and database, can be easily installed in any operating system that supports SQL Server2005, Microsoft's operating system to fully support the version of the database.

(3) The database scalability is strong, it can be very good to complete from the Windows95/98 to the Windows2000 Advanced Server upgrade. Has a good scalability, integration of [11] from low to high version of the Windows version of the complete.

(4) With the support of Web technology, users can easily publish the data in the database to the Web page. SQL Server 2005 can be a good support for web programs to provide data control language, data on the database through the controls can be released easily to display interface, with the support of good on the web program, and fusion.

III. SCHOOL EXAMINATIONS SYSTEM OVERALL DESIGN

A. What the user needs

This system uses the browser / client mode, do not need to install the client, database using Web database to ensure data security and integrity. Mainly to achieve the following functions:

(1) The user authority management system. The system uses three kinds of access to the system to realize the control, respectively is the administrator privileges, permissions and privileges of teachers students.

(2) The student module: mainly is aims at the student module, students can register for examination of the
module, students can test online, online query and analysis results and view the exam, and exam the focus and content, but students can only query student achievement, submitted to the operating authority, this module login permissions required to open students.

(3) The teacher module: This module is the main module of the system module, teachers can upload questions, test the information, perfect the exam, teachers can also upload test scores, test the information released what time what subjects for examination, the examination place, can also be online marking, automatic scoring function are all teachers modules are completed, the teacher authority can upload performance changes examination results, and published on the test results, the exam can be updated.

(4) The administrator module: the school teachers and students to conduct a comprehensive management, you can make changes to the database, delete outdated test. The whole system of the database can be any operation management, has the largest authority. The administrator is responsible for the normal operation of the whole system is responsible for processing and maintenance of common problems, on the authority of examination and approval system etc.

B. The technical index of the system design

(1) The high security. The system must have strong security and fault tolerance considerations, especially for database system database requires a higher safety factor, the highest security strategy using the data audit, prevent data loss and damage of database system.

(2) The high efficiency. The use of the network examination system can be carried out at any time online examination, to reduce the examination time requirements, can at any time to test, test sites also reduces the requirements, provide online marking function, reduces the work intensity of labor, increase efficiency.

(3) The versatility and scalability of the system uses the B/S structure has good universality, the system adopts.NET framework design, has a good scalability can function module of the system is insufficient to upgrade and update, and enhanced the expansibility of [12] system.

(4) Maintenance simple. The system uses the browser / client mode, the client does not need to install any program, only need a browser can make the operation of the system, the maintenance of the system as long as the maintenance of the server to client, greatly reduce the workload, reduce the maintenance cost, has very good prospects for promotion.

C. The overall system architecture

According to the design goal of user requirement analysis and system requirements, the overall structure of the system is shown in figure 4.

![Figure 4 The overall system structure](image)

The system can be designed as four modules: login module, the administrator module, teacher module and test module.

(1) Login module

The login module of the system is the first barrier to enter the system, the user can log in to the system with permission (such as administrator, teachers and students use the examination system. In the login screen to enter a user name and password, if it is a legitimate user login which is successful, then enter the main interface; if the illegal user or password is not correct, it returns an error message, and returns the login interface.

(2) The system management module

System management module mainly carries on the management to the system permissions, including rights and permissions for the cancellation of the management. System management module work flow was shown in figure 5.

The function of each module was follows:
The user module, refers to the system in the management of user information can change, or query, user information can also import and export volume. Registration and management of the authority management of key personnel to apply for permission to access open or permissions, this function only administrator privileges to have permissions, teachers and students.

![System management work flow chart](image)

Figure 5 System management work flow chart

D. The group algorithm design and implementation

The automatic generating test paper is the use of technology in the predefined topic good questions, random test. Of course, this kind of random question is prescribed, such as selecting the decimation ratio and subjective questions, as well as the test difficulty coefficient and so on, can be preset, random questions not aimless extraction.

1) Random question method. There is a test method to extract the most commonly used and most effective, can preset some necessary conditions, were randomly selected in the database, and then form a complete set of papers. In the process of tests in the sometimes can’t be a one-time completion, it requires a lot of extraction on extraction test, until the right questions to [13].

An implementation of this algorithm was follows:

The random test means in accordance with the provisions of the examination syllabus, examination were selected randomly in database, realize the type and amount of item set questions and the percentage of papers generated, random, this way is simple, but the coefficient of difficulty of the questions are difficult to control.

In accordance with the provisions of the establishment of the test group is two, such as M (T), P (Q) two groups to generate random numbers to read log file record number exceeds the specified value is returned in extraction, extraction to the right questions until now.

If M (T) = 0, then M (T) = M (T) - 1, 2;

The list is not full, then turned to the 1 generation, or success;

End algorithm, extract the test success.

2) backtracking method this method is an improvement to the random sampling method, in this way will the first failure of the selected records, the next will not be in the test sample to make the same mistake again, comparing method and random test, backtracking method to extract the test speed, and test success rate than random testing to be high.

The specific steps of this algorithm are as follows:

This is also a way of two groups were randomly selected from the test, but this approach requires linear scale data storage.

It will also build two group B (K) and C (O) were compared in the two groups of data, the middle set a flag to flag V (J) is selected to test, when the time of the test next time when labeling, extraction will no longer into the linear table in the save, which can increase the extraction rate of the test.

If U (X) = 0, then U (X) = U (X) - 1, 2;

If the LIST table is not full, steering, or test successful; End test question extraction algorithm successfully.

Item extraction module test system, according to the difficulty coefficient of test set, and combination of extraction and given range of settings, select different questions, can choose different test item extraction algorithm for extraction, and then the formation of paper, posted to the website of the school notice, a level a student faculty examination.

Key code is as follows:

```csharp
protected void Button1_Click(object sender, EventArgs e)
{
    int paperID = int.Parse(Request.QueryString["paperID"].ToString());
    PaperInfo paper = TestBO.LoadPaper(paperID);
    if (paper.State == 0)
    {
        TestBO.InitPaper(paper);
        paper.State = 1;
        paper.StartTime = DateTime.Now;
        TestBO.UpdatePaper(paper);
    }
    DateTime endTime = paper.StartTime.Value.AddMinutes(paper.Test.TotalTime);
    ViewState["end"] = endTime.ToString();
    TimeSpan ts = DateTime.Parse(ViewState["end"]).Subtract(DateTime.Now);
    ViewState["end"] = endTime.ToString();
    Label13.Text = "the end:" + ts.ToString().Substring(0, 8);
}
```

IV. THE SYSTEM TEST

A. The test environment

The hardware environment of the test was shown in table 1.
B. The test results

The basic function test: use different identity login, online exam, teachers, students and administrators were used for login, query log system with different permissions after each function is normal.

Concurrent test: at the same time a large number of different user login, pressure testing concurrency and the database server to test the system, the peak value after landing test system under different number of access to different people, and the whole system's load capacity.

Tolerance test: the use of different permissions to login system for all kinds of abnormal operation, add questions and other operations such as students, fault tolerance detection system and method, and whether the system fault tolerance etc..

The basic test: test the function of each module, to meet user requirements. Concurrent test: at the same time login examination for most people, concurrent test system. After testing, the concurrency of the system is good, can be test at the same time. Tolerance test: after entering the system deliberately wrong operation, testing of the system fault tolerance and treatment results.

Pressure test: test the system server, test server peak data, the test server load normal.

No overload [14]. Test results are shown in Table 2.

<table>
<thead>
<tr>
<th>The module</th>
<th>The test object</th>
<th>The test results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students function module</td>
<td>The online test</td>
<td>The test pass</td>
</tr>
<tr>
<td>The teacher function module</td>
<td>Results the query</td>
<td>The test pass</td>
</tr>
<tr>
<td>The administrator function module</td>
<td>Information management</td>
<td>The test pass</td>
</tr>
</tbody>
</table>

V. CONCLUSION

This paper mainly discusses the research and development of network examination system based on.NET 3.5 platform, the operation effect of the system, each function module of the system has basically reached the expected requirements, realizes the online examination system. Mainly completed the following work:

(1) A detailed analysis of the system requirements, prepare a detailed needs analysis document.

(2) The B/S system structure what using the three layer architecture model, make full use of the advantages of campus network, the system has been deployed on campus network; set up a special application server and data server to ensure the normal operation of the system, ensure that the large-scale use of the system can provide a good service; process re design of the three layer architecture model of the system and data transmission the data is greatly improved, and improve the system of school.

(3) The use of SQL Server 2005 to establish database and data table, with the verification of ASP.NET provides built-in data table, and use the ASP.NET built-in Sql-Membership-provider and Role-Provider model to simplify the management of members and the role of the.

(4) The browser mode can be more convenient access, reduce system maintenance, convenient for system extension and use. In the data transmission and sharing database, compared to the client has greatly improved. The function of automatic test system of data security and questions have been greatly improved, the function of the system automatically marking the examination and analysis are improved.

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