Based on B/ S of the three-tier architecture of the questions the management system

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Abstract: With the deep development of computer technology and network technology, long-distance education has become an important part of modern education. In order to lighten teachers' work of making up questions and check students' study condition more reasonably, a set of test questions management system is necessary. This article introduces a set of three-layer test question base management system based on B/S which is design by using ASP, NET and Access tools. The system can realize the dynamic addition, modification and managing intelligentization test paper of all kinds of test questions, which greatly lights teachers' work and meanwhile provide reformation thought for impersonal proposition.

Key words: ASP.NET, B/S, The questions, Three-tier architecture, ADO.NET, XML

1 Introduction
With further development of computer technology and network technology, the process of information development in all fields is continuously speeding. In daily work, the people are using compute system to handle various businesses, gather and collect information. The rise of Internet makes traditional information processing mode face challenges so all enterprises, schools and government departments need to make evolutionary and phased development plans and progressively improve present work procedure according to their existing IT investment, resource, application demand and competition environment to realize the working environment with speed, high efficiency and accuracy and make information transmitted rapidly and conveniently and shared, and to promote working efficiency and reduce office expense. Therefore, the exploration of question database system has been each teacher’s urgent demand[1].

To relieve teachers out of trivial and repetitious work, we must develop scientific and reasonable question database management system to make objective and scientific evaluation on teaching and students’ learning, the more importantly to change the past act “the person who teaches” and to regulate examination procedure of course and really realize the separation of teaching and examination. Based on a lot of referred relevant information, we design this system by ASP.NET

In line with making the best use of network resources and IT, this question database management system realizes the accessing of each kind of test questions by IT and effectively makes the best use of information resources, to be convenient for all teachers to rapidly obtain information and share resources, more rapidly feed back, to provide great support for office work and decision-making, to promote the standardization and systematization of test paper making by schools and provide one platform where teachers can view and transmit information swiftly and reliably. Finally it realizes real networking working environment and no paper working, and has very big practical significance and application value.

2 Systematic Relevant Technology and Analysis

2.1 ASP.NET Technology
ASP.NET is one protrusive programming frame of Microsoft based on universal language. It is one new generation of platform of compiling enterprise network programs, providing one entirely new network programming model for the people.

ASP.NWR is the platform based on .NET where the developers can use any language .NET is compatible with, and .NET Framework technologies can be used. In the design by ASP.NET we fully consider the development efficiency of programs. We can use WYSIWYG (What You See Is What You Get)
HTML editor or other programming tools to develop ASP.NET programs including Microsoft Visual Studio.NET version. We can gather designing, development, edit and running, greatly increasing the development efficiency of ASP.NET programs. In ASP.NET there are totally two programming models: Web Form and Web Service. Web Form model can be applied for making web pages based on form. With it, the developers can use embedded server components to make common interface elements, simple and highly efficient like in using VB to compile the programs based on form. Web service model is the unique of .NET, providing one method of enjoying the remote service of the server. WEB service makes possible the data exchange based on HTTP or XML between client and server or server and server. At the same time, Web Service is not designed specially aiming at one language or component technology, namely on whatever language and component model to be compiled based and on whatever platform to be run, the programs can enjoy the service of WEB Service.

2.2 ADO.NET Database Connection Technology

ADO.NET is the next generation of ADO. It uses XML as the core so it completely supports XML, and can lightly communicate with XML compatible application programs. ADO.NET provides one common interface for all OLE DB compatible data sources, making you conveniently link, retrieve, process and update data. The data sources can cover data warehouse, database, text file, XML data and so on.

ADO uses “connection directional transmission mode” to access data sources while ADO.Net uses “wireless connection transmission mode”. “Connection directional transmission mode” means when the user demands to access data sources, he must go through lengthy connection operation and ADO is to lock data sources, while others can’t access at one time; “Wireless connection transmission mode” means when the user demands to access data sources, he need not to go through lengthy connection operation, and by the added DataSet (data set) object in ADO.NET, ADONET need not to lock data sources and is to read the data in data sources into DataSet object, and each user has exclusive DataSet object, so the users need not to contend for data sources. The main components of ADO.NET are DataSet object and .NET data provider. .Net data provider includes connection object, command object, DataReader object and DataAdapter object[2], The structure is as shown in the Fig.1.

2.3 Design Principle of System

2.3.1 System Design Principles
(1) This system adopts the design concept of standardization and modularization.
(2) Practicability principle. Considering the real situation of various kinds of questions and storage method, we design universal storage method suitable for many kinds of questions.
(3) Humanized interface design principle. Humanized interface design principle makes general users use without training. It sticks to the design philosophy that as long as you can type, you can conveniently apply this system.
(4) Advancement principle. The development and design of this system is advanced enough to make this system not behind the times on the technology level even after a long time.

2.3.2 System environment

Development environment of this system:
- Technology platform: .NET2.0 framework of Microsoft Information server: Internet Information Service 6.0 version
- Development knowledge: ASP.NET technology framework, realize C# language is adopted.
- Development tool: Visual Studio 2005, Macromedia Dreamweaver8
- Database: Access
- Server operation system: Windows XP Professional operation system

3.3 System architecture

3.3.1 Traditional two-tiered architecture
In past application software development, CLIENT/SERVER systematic architecture was widely applied. Its characteristics are: application program logic is distributed at the ends of client and server, while data access and management are operated at the server side.
server; the client sends out accessing request of data sources while the server returns the result to the client. However, as for CLIENT/SERVER structure there are a lot of problems in system structure. For example, when the number of the client sharply increases, the performance of the server will greatly degrade due to over heavy load; once the demand of application changes, the application programs on the client and the server both need to be modified, bringing big inconvenience to application, maintenance and updating; a large amount of data transmission increases the load of network, etc.

3.3.2 Three-tiered architecture
So-called three-tiered architecture of this system is to add one “middle tier” or component tier between the client and the server. The three-tiered architecture we talk of is neither physic three tiers nor where three machines are simply placed, and nor it is only if it has B/S application. Thee tiers mean it logically, even if the three tiers are placed in one machine.

The application programs of the three-tiered architecture put transaction regulations, data accessing, validity check into the middle tier for processing. Generally, the client does not interact with the database, but establishes the connection with the middle tier through COM/DCOM, then interacts with database through middle tier, as shown in Fig. 2

![Fig. 2 three-tiered architecture structure](image)

(1).Presentation tier - process interaction and communication with users

Despite presentation tier is not more important than other tiers, but it almost gets all glory, because it is the only tier that the user can see. This tier is in charge of the interaction between the system and the user. In fact, the presentation tier is composed of two parts: Web client and Web server. Web client resides in the user’s computer, and generally is applied for receiving the form of Web browser (form). Web server is on the address of Web host, and applied for making dynamic Web pages and organizing the form of the system. The Web client communicate with the Web server through the mode of “request—respond”. The Web client sends the request to the Web server, and then the Web server responds according to the request [3].

(2).Procession logic tier—process the information that the user needs.

The functions of procession logic tier procession include the following three parts:

a. Access (obtain and save) the data in database tier.

b. Obtain data from presentation tier.

c. Execute necessary operation and/or process data.

Procession logic tier obtains data from database from database tier and process it according to the demand of the presentation tier. The procession logic tier also can obtain the data, provided by the presentation tier and process it according to the database tier.

(3). Data tier ——store all the data that this system processes.

Provide data service for procession logic tier or presentation tier.

3.4 System Configuration
The configuration of this system is mainly realized through the Web.Config configuration file of Web application software. Web.Config is under the root directory of this system. It is XML-format file and can be edited by any standard text editor or XML analyzer, but not be remote accessed by Web browser. The Web.Config configuration in used in three aspects

3.4.1 Save database connection string
We save database connection string in appSettings section of Web.config, convenient for every part of this system to call. At the same time, in the redeployment of this system, we only need to modify the database connection string here and.NET frame is to detect the changes in Web.Config at running, so the changes will get valid without restarting IIS.

3.4.2 Redirection at system error
In the Web.Config configuration file, we can customize the defaulted error pages through setting <customErrors>section.

```xml
<appSettings>
    <add key="ConnStr" value="PROVIDER=Microsoft.Jet.OLEDB.4.0;Data Source="/>
</appSettings>
```
The value of “defaultRedirect” property defines the default customized error pages, and we also can set different error pages according to different error value. Through the above setting, if 404 error appears (page can’t be find), it will turn to “error404.aspx”. When other errors appear, the page will turn to the default error page , “errorpage.htm”.

3.4.3 Set request and response coding.
In the Web.Config configuration file, through <globalization> section, we set system request and response coding, defaulted in simplified Chinese[4].

<globalization requestEncoding="gb2312" responseEncoding="gb2312"/>

3.5 Implementation scheme of this system
This system completely adopts B/S mode structure where all the management and updating of this system is operated in the server while no changing in the setting is needed for each client. B/S is one calculation method, developed from traditional CS. CS is one loosely coupled system in which dialogue happens through message transmission mechanism and the client sends the request to the server, then after some relevant transaction, the server sends back through transmission mechanism. BS mode furthers deepens the servers in CS mode and decomposes into application server (Web server) and several database servers, and at the same time simplify the client in CS, move calculation function of the client into the web server, only saving presentation function, so it becomes three-tiered distributed architecture, composed by presentation tier(Browser) 、function tier (Web Server) and database service tier (DATABASE Server), as shown in Fig.3

![Fig.3 three-tiered distributed architecture figure](image)

4 Design and realization of this system
This system is mainly divided into six functional modules, as shown in Fig.4

![Fig.4 system function module diagram](image)

Function Design:
(1) Inside web news: including the issuing, modification and deletion of news.
(2) Course management: including the adding, modification, and deletion of courses,
(3) Knowledge points: add, modify and delete knowledge points for various courses.
(4) Difficulty and score value: set the score value corresponding with degree of difficulty, convenient subsequent test question creation.
(5) Adding management of test question.

System log-on module. This module is to mainly complete detection on the user’s log-on and make corresponding setting of global variables through different logging on users.

System maintenance module.  This module is used for the setting of the user with administer authority. First this system sets one user with administer authority in database. It judges the user’s authority through his log-on. If he is administrator, he can enter this module and realize the registration management of the users (including username, user’s authority, users’ courses), complete the setting of the courses according to teaching plan and management on test items included in all courses. For convenient management, each type of question is corresponding with one form.

Course property management module. The user makes operation on his courses. After entry into this module, the user selects the courses to be operated on the left list. The course properties include knowledge points of some course and so on. Before
managing the database for some course, the user firstly enters all the information of this module, and then makes management selectively\(^\text{[5]}\).

Test question entering/management. This module is to mainly complete the entering, modification, inquiry, adding and deletion of the test questions of various types. According to different type of question in different subject and the difficulty degree of knowledge points, the user respectively enters test question and then saves the entered test questions directly into test question database against the latter test paper. For a large number of test questions, since the difficulty of modification on some test question is big, we adopt the method of combining with inquiry. We use fuzzy inquiry, ensuring to find the needed test question. Firstly we find the question number of test question and call out the relevant information, then make modification on this question. In addition, through inquiry, when the specialists create test paper, they can find the needed question conveniently and swiftly\(^\text{[6][7]}\).

5 Conclusions

Modern distance education with Internet as main method has become one of the trends in the development of today’s education. At home and abroad, database systems of network application in various schools have rapidly developed like bamboo shoots after a spring rain. The characteristic of this system is characterized by be developed based on ASP.NET frame, evidently different form the network database, developed on ASP or JSP. Firstly, ASP.NET is entirely new generation of system of realizing dynamic web pages. It uses one set of WEB server to set up powerful application program. It is one part of .NET, the new systematic structure in the development of Microsoft, and the combination of ASP and .Net. It provides programmable network form based on component and event drive, simplifying programming. Secondly, this system does not use the scrip language used in usual web page exploration any longer, but applies more perfect programming language, C#, avoiding the incurring amorphous masses and poor readability of code from the mix of script language and ASP code. At the same time, this system separates the interface design from program design with different files, promoting the reusability and maintainability. Thirdly, this system adopts compiled programming frame of ASP.NET, and runs the database code of common language runtime that has been compiled in the server. It can make early binding and execute compiling, which not only promotes the running efficiency of this system, but strengthens the security and secrecy.

In the development process of this system, there are still some defects, like the inserting of multi-diagram for comprehensive questions, and of special symbols and so on, which are not resolved ideally and remain to be improved in the future.

References: