Development and research on remote online education information system based on Web

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Abstract

Remote education is a way of developing education-teaching activities, which transmits outstanding teaching resources to massive students scattered in different time and space by the Internet, satellite and other methods of communication technologies. The Internet is the most convenient way to participate in distance learning. This paper applies B/S three-layer architecture and ADO data access technology to complete the design of the remote online education information system based on Web. The system according to the actual business needs of remote education, carry on the design based on the role of application and division of the task, and it composed of modules of courseware on demand, online management, online examination, online exercise, teacher management, student management, etc.

Keywords: remote online education, information system, Internet

1 Introduction

With the development of the society, people's demand for knowledge become stronger and stronger, we need more convenient ways of learning. Therefore, more and more people choose the Internet as a way of obtaining information. Remote education [1-4] is an autonomous learning way, which emphasizes the importance of student-oriented and practices the separation of teaching and learning. It is a new education way, which carries on a large scale teaching activities to transmit outstanding teaching resources to massive remote students scattered in different time and space. Compared with any kind of education mode, remote education puts more emphasis on technicality and scale, at the same time, the Internet is the most convenient way to participate in distance learning. Because the students thought, the web can receive all kinds of education resources actively. Therefore, to establish a web-based powerful remote education information system with advanced technology is a must.

Based on B/S three layer architecture and ADO data access technology, this paper designed a remote online education information system based on Web, which realized the five main teaching functions of network classroom, classroom live, courseware on demand, intelligent test and performance management [5], and put forward a real-time interactive teaching mode with an organic combination of live classroom and text interactive.

2 Structure design of remote education information system

2.1 SYSTEM WORKING MODEL

The objects and their associations of the system platform are referred to as the basic elements. The analysis of the system-working model is to determine the relevance between objects and object properties, and relevance between objects themselves. Make clear of the relevance between the events and give the object model and function model in the platform, thus to grasp the key features of the platform. This system consists of client and server, the system objects are divided into three categories correspondingly:

1. Client object - browser: the main part of client operating entity with standard properties and methods.

Browser Extension: the optional part of client operating entity. With standard properties and methods when the subject type is determined.

2. Server object - Web server: the main part of server functional entity with standard properties and methods.

Web server extension: the optional part of server functional entity. With standard properties and methods when the subject type is determined. Concrete object of Web server extension applied in this system is ASP (Active Server pages) object.

Back server: the independent server functional entity with standard properties and methods. Mainly includes the database management server, file transfer server and streaming media server.

Gateway: the server functional entity interface with standard properties and methods.

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Agent: the server functional entity interface with standard properties and methods.

3. Protocol Packets: the transport entity of client and server with standard properties and methods. The correlation between the object is shown in Figure 1.
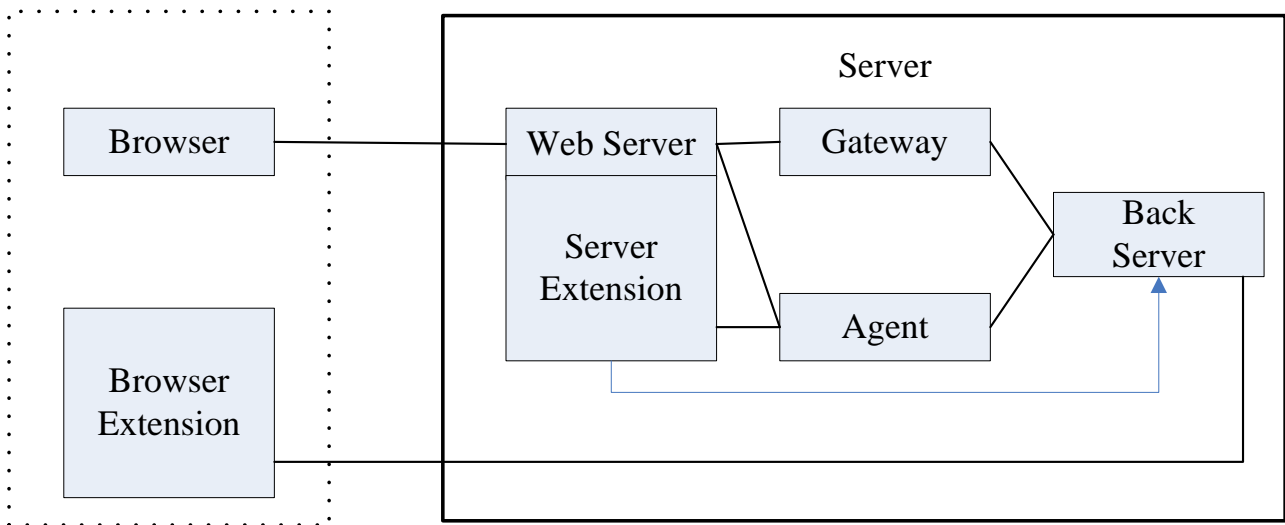

FIGURE 1 Object association diagram of system working model

According to different functions, the system is divided into several modules, and communication between modules is realized by interfaces. This design method can make the system structure more compact, the development more simple and clear and running more stable and reliable. System functional model diagram is shown in Figure 2.
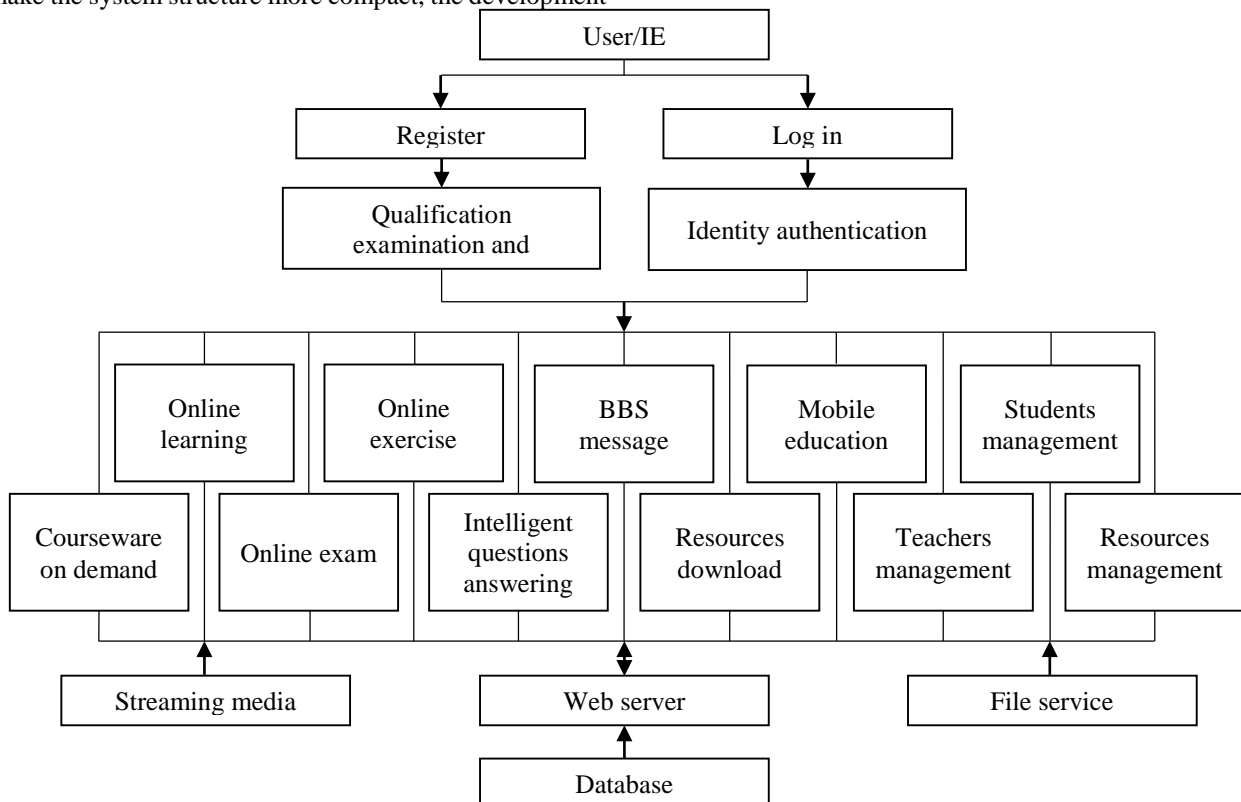

FIGURE 2 System functional model diagram

2.2 SYSTEM ARCHITECTURE DESIGN

B/S mode is a new MIS system platform model based on the Web technology. It decomposes traditional C/S mode server into a data server and one or more application servers (Web server), to make a three layers structure of client/server system. Three layer structures is in terms of the case of master-slave type C/S structure, as shown in Figure 3.
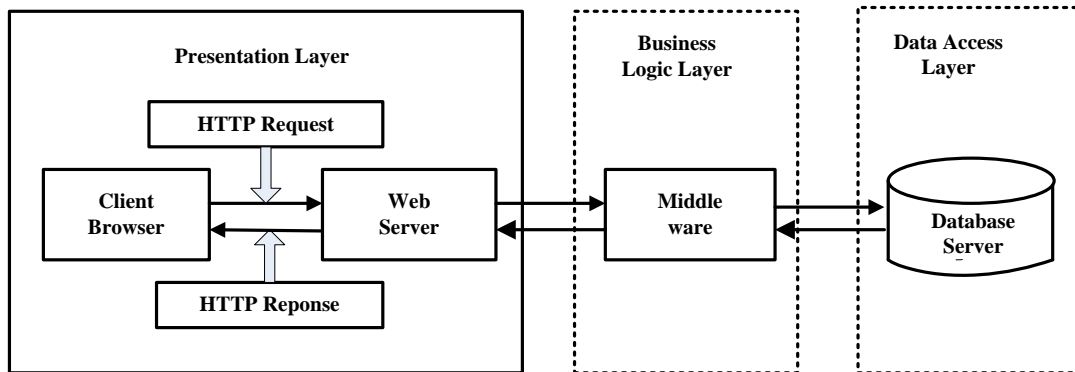
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FIGURE 3 Three layer structure diagram

Three layer structure brings out the client's business logic part and put it in a running server specially, which is called business logic layer (be called as BLL for short). The layer near the user side is called presentation layer (be called as PL for short), and its responsibility is to assemble the data to a format. It not only includes the Web browser in the Web application, the Web server is also included [6-8], this layer provides information and data which can be displayed to the browser. The data access of database is called Data Access Layer (be called DAL for short). When a user submits the request, BLL layer is in response to user request and completes the transaction process. When it comes to database access, BLL layer needs to establish a connection with the database server for data access. As the connections in the database refers to connections established between BLL and database, and BLL layer connections can be shared, thus increases the number of users who can have access to the database.

B/S structure simplifies the client, and it does not need to install different client applications on different clients like C/S mode. Instead, it only needs to install the browser, which can simplify the development and maintenance of the system. System developers need not again to design and develop different client applications for different levels of users since all the functions are realized on a Web server. One more step we need to do is to set permissions for each group of users on different functions. It allows the user operation be more simple. For C/S mode, the client application has its own particular specifications and users need to accept the special training. Whereas when adopting B/S mode, the client is just a simple and easy browser software. Both policy makers and operational personals can use it directly without any training. This characteristic of B/S mode leads to less limiting factors for platform management and maintenance. B/S is particularly suited to online information release and make the traditional MIS function expanded which cannot be achieved by C/S mode. And this new online information release function is needed for the modern distance education management, which makes the most of the distance education management paperwork be replaced by electronic documents, thus the efficiency of the remote management is improved. It also can play the advantages of distance education, simplify educational administration and other management procedures and save manpower and material resources.

Three layers structure has the easy expansion advantage. Due to the separation of the processing logic and webpage content, whatever changes of the business rules will not affect the front-end web content, and it is helpful for future maintenance. And the HTTP request will be through the firewall, which can block out many improper or malicious invasions.

This system adopts the three-layer structure based on B/S architecture. It is the server application system of execution. The client just needs to run standard browser software to complete all of the applications and functions. System object structure diagram is shown in Figure 4.
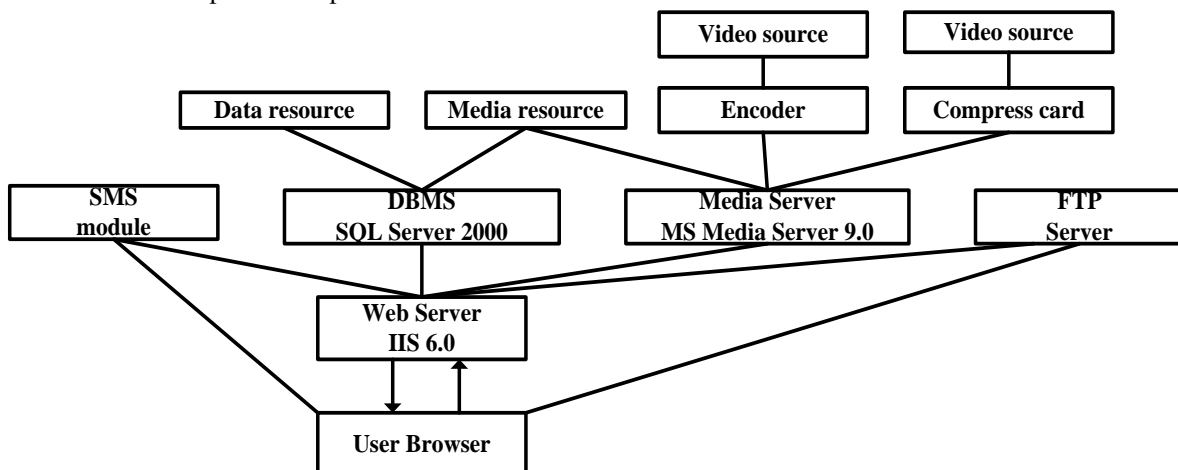
FIGURE 4 System object structure

3 Database design

3.1 THE DATABASE TABLE DESIGN

1) The users table is mainly used to save the user information with Id number automatically allocated by the system so as not to be confused with other users. It includes the fields of username, login password, user's gender, age, phone number and corresponding user type. The primary key in the table is the Id number, the building model is shown in Table 1.

TABLE 1 The user table model

Field name	Description	Type	Length	Empty	Primary key
Id	User id	Varchar	25	No	Yes
Name	Username	Varchar	25	No	No
Password	User password	Varchar	20	No	No
Sex	User's gender	Varchar	10	Yes	No
Age	User's age	Int	4	Yes	No
Grade	User level	Varchar	20	Yes	No
Phone	User tel	Varchar	20	Yes	No
Type	User type	Varchar	10	Yes	No

2) CD-ROM resources information table. This table is used to store all the CD data in a database and convenient for management and operation of the administrator. It includes field such as CD serial number, CD version, CD grade, CD discipline, CD type, CD name, and size of CD resources, upload time and other detailed information. The building model is shown in Figure 2.

TABLE 2 Resource information table

Field name	Description	Type	Length	Empty	Primary key
Id	Number	Varchar	25	No	Yes
Banben	Version	Varchar	500	No	No
Class	Grade	Varchar	100	No	No
Xueke	Discipline	Varchar	100	No	No
Type	Type	Varchar	100	No	No
Name	Name	Varchar	100	No	No
Daxiao	Size	Varchar	10	No	No
Date	Date	Datetime	8	No	No
Other	Remark	Varchar	500	Yes	No

3.2 JSP DATABASE CONNECTION TECHNOLOGY

1. Load JDBC driver: be sure to load driver before using the database. You can accomplish this task by applying for Name method of Class type, as follows:

Class. For Name ("Driver Name");

Driver Name is the name of JDBC driver to be loaded. The name can be determined according to the driver types provided by database vendors.

2. Establish a connection to the database: after loading the driver, establish a connection to the database, which needs to adopt the get Connection method of Driver Manager type. The form is generally as follows:

Connection conn=Driver Manager. Get Connection (URL, user, password)

The URL is a string representing data sources to be connected, i,e, the location of the database, the format is as follows:

jdbc: driver: database

3. Execute queries or other commands: as the database connection is established, you can use the SQL command. Before sending SQL commands, you need to create a Statement object, this object is responsible for the sending of SQL statements to the database. After creating the Statement object, the SELECT query can be executed by execute Query method of the object. This method can return one Result Set object, which includes the query result. If you want to perform insert, update, delete command, then execute Update method of Statement object can be used to establish the Statement object syntax format as follows:

Statement sql=con.create Statement ()

Perform a variety of SQL statement syntax formats as follows:

*Result Set rs=sql. Execute Query ("select * from table")*

4. Handle the Result Set: Result Set object receives the result of executing the SELECT query. This object provides a variety of methods for accessing the database. Within each of the Result Set object, there is a record pointer. With the help of the movement of the pointer, you can traverse the data items of the object. Syntax format is as follows:

While (rs.next())
{
Rs.get String ("name");
Rs.get Int("age");
}

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5. Close the connection: after the operation, you need to close the database connection in a timely manner to release the resources occupied. The order of closing objects is as follows:

1) Close Result Set, syntax format: rs.close();
2) Close Statement, syntax format: *sql.close();*
3) Close the connection, syntax format: *con.close().*

4 Implementation of remote education information system

4.1 OVERALL DESIGN OF SYSTEM FUNCTION

According to the standard reference model of remote education technology standard system of our country. A typical remote education system must contain three parts: the backbone system, management system and teaching resource database. The backbone system is composed of support system and supporting system. Support system is mainly responsible for the necessary functions in daily remote education teaching, which mainly refers to teacher instruction, and student's online learning functions,

including the network classroom, courseware on demand, online classes, mobile education, intelligent test and result management part. Supporting system aims to better cooperate with teaching, add a few auxiliary functions to meet the needs of individualized learning. It is an auxiliary system and plays a sidetrack role in remote education system, yet an indispensable part. Supporting system mainly includes news and announcement, online exercise, score inquiry, resources download and BBS part.

A complete and reliable system must be able to realize effective management and control for users and resources. Distance education system is no exception. It requires giving necessary control and monitoring of the process and quality of teaching and learning as well as user permissions and media resources. In order to realize reliable management of the system, the users are divided into teachers, students and administrators [9], each given different permissions and enter the system from three different paths (as shown in Figure 5). Different users with different permissions have different functions and operation interfaces to ensure the reliable operation of the system and normal and orderly conduct of online teaching.
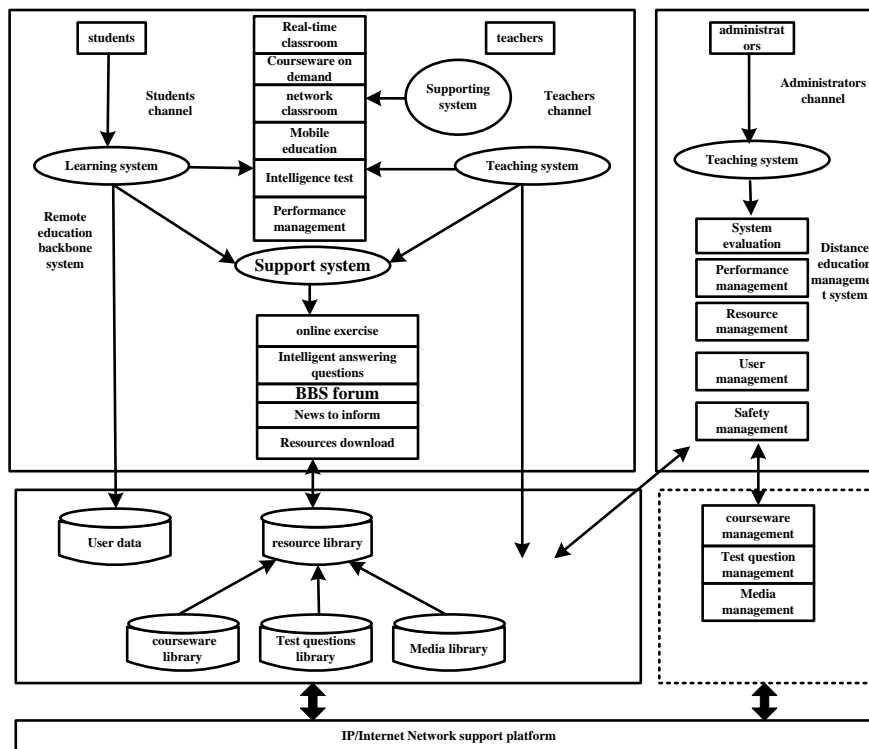

FIGURE 5 System function module chart

4.2 USER LOGIN MODULE DESIGN

The main function of the user login module is to distinguish the user identity permissions and validate whether user login password is correct or not. Therefore, this design provides three login channels for teachers, students and administrators, as shown in Figure 6. Teachers are the organizers and managers of teaching activities and teaching process of the whole teaching

system with their main task to host teaching activities. Teachers' authority is based on curriculum. They do not have any rights on the courses beyond their permissions. Students as legitimate users of the teaching system, before login must be registered in the remote management system, finish course selection and pay cost. Students have right to comprehensive learning and join a variety of online teaching activities on selected courses. Administrators'

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responsibility is to perform management and maintenance of the teaching content in the whole teaching system.

In order to strengthen the security performance of the system, prevent the illegal user's logging in by usurpation of legitimate user account through history information on the computer; the system design adds a random authentication code. Only when all of the three of user login name (or ID, including teachers and student ID number), password and random authentication code are right can the user be authenticated and operations that match with the user permission be performed. The user password and random authentication code all use MD5 encryption and then be transferred from the client to the server [10], which further ensures the safety and reliability of the system.
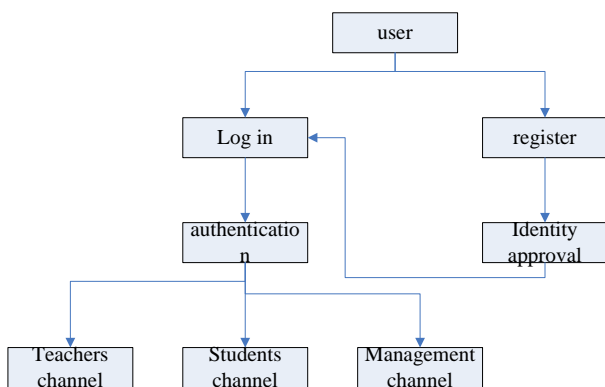

FIGURE 6 Landing module flow chart

Login authentication is the certification that all website users must go through. First, the user is required to fill in the user name and password on the page, for non-registered users, they need to register first. Then call database to search if there is a corresponding user. Code snippet is as follows:

```
mysql_conn();
Get Login Message ();
$today=date ("Y-m-d H:i:s");
$query="select id from user tbl /*
Where name=$name and password=$password
$result=my sql_query($query);
$numrows=mysql_num_rows($result);
If ($numrows==0)
Lonin Redirect (login Res ID)
Else {
$row=mysql_fetch_array($result);
$id=$row [0];
$query=" update usertbl set lastlogin=$today where id=$id";
$result=mysql_query($query);
```

```
Create ID Sesssion()
Lonin Redirect (login ResID)
}
```

4.3 ONLINE LEARNING MODULE DESIGN

When users make resources query according to their own needs, they first need to input the relevant CD information, and system will perform query information as requested. The main design code is shown below:

```
Protected void btn Search_Click(object sender, Event Args e)
{
String str =
Configuration Manager. Connection Strings ["guangpansystemConnectionString1"]. To String ();
Sql Connection con = new Sql Connection (str);
con.Open();
String book = this.txt Book name. Text. Trim ().To String ();
Sql Data Adapter sda = new Sql Data Adapter ("select * from guangpan where name like '%" + guangpan + "%'", con);
Data Set set = new Data Set ();
sda. Fill(set);
This.GridView1.Data Source = set;
This.GridView1.Data Bind ();
}
```

4.4 PERFORMANCE MANAGEMENT MODULE DESIGN

The performance needs to be managed mainly comes from test performance, task performance and course grade three aspects. Test performance will be automatically typed in by the system when students complete the test according to the test results. Task performance will be typed in by teachers when reviewing the students' work. Course grade is typed in by the teacher according to a comprehensive evaluation of test performance, homework completion as well as the usual classroom performance of the students. Therefore, written examination results of traditional teaching can also be input and managed in this module. Score type-in work is done by the administrator while the teachers and students only have the permission of query results, as shown in Figure 7. After the administrator logs in the performance management module, he can input the scores based on class information and course information. Also, operations such as modify and delete can be performed on the already type in grades and results output statements and reports can be produced.
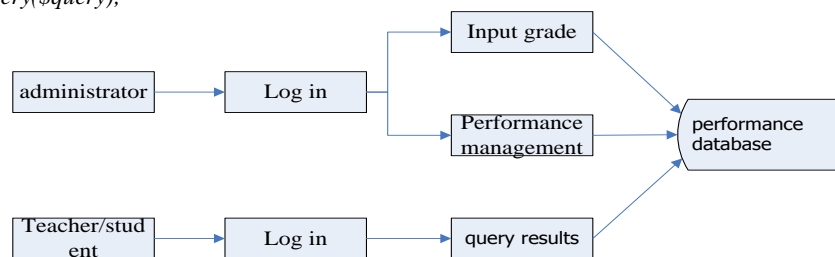

FIGURE 7 Performance management module structure chart

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5 Conclusion

With the development of network technology and the popularization of network application, online teaching has become a focus of the current education. As people begin to call for lifelong education and the quality of life is improved. Higher requirements are put forward on the space, time and form of knowledge acquisition, which will bound to promote the further development of distance education. Modern distance education is a wonderful combination of traditional education and modern communication technology, and it will become the hot spot of education development in the 21st century.

In this paper, the advantages and disadvantages of distance education are discussed. A remote education software and hardware system based on B/S (Browser/Server) structure and the frame structure of relevant auxiliary teaching system are proposed and implemented. This paper applied the modular design method and divided the whole system platform into support system and supporting system, which plays a supplementary role in teaching according to different function of each module. In the design of support system in the remote education platform, it realized five main teaching functions of network classroom, live classroom, and courseware on demand, intelligent test and performance management. A real-time interactive teaching mode with an organic combination of live classroom and text interaction is put forward. For the support system, it realized remote education auxiliary functions of online homework, BBS message, resources download, etc., and online homework help is put forward which makes it possible for students to finish the homework online and teachers assign and mark homework online. This design realized the main function modules of the remote education information system.

Acknowledgment

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