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Design and Realization of Network Examination System

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ABSTRACT:

The previous exams required the organizers to invest a lot of time and energy. It was necessary to screen the exam questions and review the later exam papers. So many steps affected the efficiency of the entire exam. Therefore, this paper proposes a network examination system.
The network examination system described in this paper mainly uses the browser as the interface and uses the B/S mode, that is, the user can use the browser to directly access this site. The main technology used is to use JavaWeb technology and MySql database to design various functions. The system mainly has functions such as user management, function management, role authority management, student network examination, test question management, wrong question management, and automatic test grouping.
The network examination system can basically meet some simple examinations, runs well, and can basically meet the design requirements.

Keywords: Exam system, Java Web, Network, Databank

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I. INTRODUCTION

In our previous exam experience, each exam requires the process of issuing the test paper, printing the test paper, issuing the paper, preparing the paper, collecting the paper, grading the paper, and statistics. These processes have a strong sequence and cannot be reversed. Among these processes, the most complicated ones are producing papers, grading papers and statistics. When a large number of people are involved in an exam, the teacher needs to mark a lot of papers, which wastes a lot of time. In addition, not only is the efficiency low, but also a lot of Teachers are also overwhelmed by the grading work, which eventually leads to a decrease in the accuracy of the grading. Even after the grading is completed, the work is not over yet. It is necessary to register the scores, count the scores, and count the error rate of each question. These tasks consume a lot of time, so the efficiency is also very low. In addition, from the student's point of view, it is troublesome and does not meet the requirements of environmental protection to prepare pens and scratch paper every time a paper is prepared. From the teacher's point of view, if the time for producing the paper, grading and statistics can be reduced, then more time can be freed up. Spend more time elsewhere.
The network examination system developed in this paper is mainly to solve the problem that teachers spend too much time in producing papers, marking papers and statistics. Developing a system needs to consider many aspects, such as timeliness and efficiency. These are the two most common factors, because timeliness is related to whether your system can really solve these existing problems when it is put into use. The problem is that although the online examination system has begun to take shape in China, and some schools are also using this method for examinations, I think there are still some unsolved problems in the current examination system, which need to be further improved. At the same time, efficiency is also a very important factor. If your system is not as good as it is after use, then your system must be an unsuccessful product. This is also an important issue that we need to consider in our development. At present, this system can only test the objective questions of one subject. Basically, it is not a particularly mature system. I also need to consider how to conduct the subjective and objective test of multiple subjects. This is the direction of my future research. Therefore, the development of this system has very important practical significance. It can provide appropriate help for students and teachers under the current development status, and also provide a certain foundation for the development of such software in the future.
The research purpose of this system is to realize the network examination system, and the work to be completed in the realization of the system includes the following aspects:

(1) Understand the development process and current situation of the global network examination system. In-depth analysis of its workflow.
(2) Design its overall structure according to the work flow of the system, and draw its structure diagram.
(3) Design the functional modules of the system, such as: background system operation and maintenance modules. Including the entry, screening, deletion, random generation, submission, scoring and other functions of test questions. The front-end exam module, including the distribution of questions, the recording of time and other functions. The teacher group question module has the ability to generate, select, and evaluate the test questions. Design and implement the function module of group questions for teachers to set questions before examination. Including the type of questions, the number of questions, the setting of the test score for each question, etc.
(4) Proficiently use and master JavaWeb technology and MySql database programming, and carry out program code writing, debugging operation and functional testing of the examination system.
(5) Understand the operation problems and principles of computer servers; the storage of large databases; and the mutual communication between large databases and programs.

II. OVERALL SYSTEM DESIGN

The network examination system developed by this system is mainly divided into three main functions: system function, examination function and student function. Each function includes several sub-functions. The sub-functions mainly include: management of system functions, roles management, user management, management of test questions, management of test papers, students answering questions, summarizing the wrong question bank and scoring. The general function diagram of the system is shown in Figure 1:

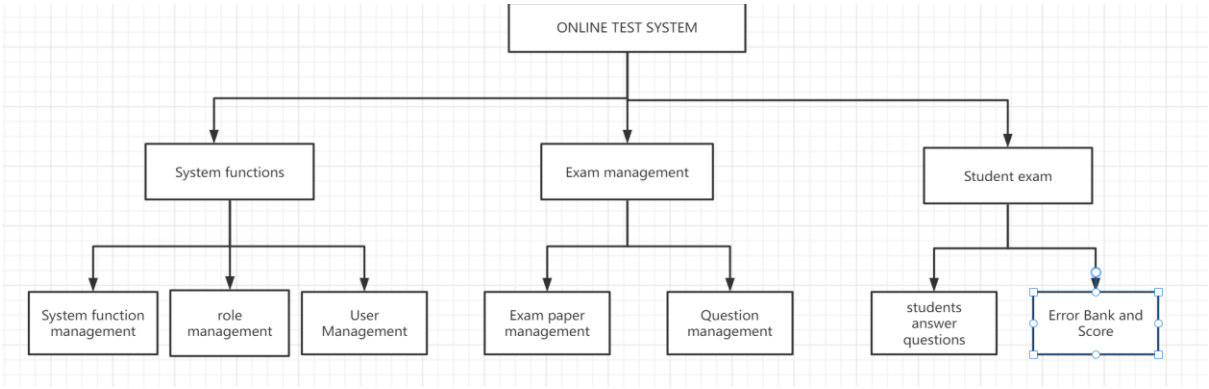

Figure 1 System outline function diagram

2.2 Basic functions of the system

The division of system functions can be divided into many types. The front is divided according to functional modules, and the system is divided into three modules. According to the different system roles of the network examination system, it can be divided into user end and administrator end. The client terminal includes: login function, students answering questions, answering questions, and analysis of wrong questions after the test. The administrator side includes: login function, system function management, user management, role management, question management, and test paper management. The following section mainly introduces each basic function.
(1) Login function
The login function is an important part of a system and an important portal function of the system. The login function mainly realizes the user's login to the system. In the system designed in this paper, the login is mainly divided into two identities: student user and management member. Logging in with two identities can subdivide the functional modules of the system to achieve more convenient operation and management.
(2) System answer
The system answering module is an important function of this system, which can realize the answering operation of users. The system answering function is mainly operated after the student user logs in. The student user can start the system answering after inputting the correct user's name and password. The questions answered by the system are all from the database.
(3) answer score
The answer score function enables student users to view their own scores after answering the questions. This function enables students who log in to the system to view their own scores by clicking submit after completing

their test papers. Therefore, this function is A functional aid of a show nature.

(4) Error analysis

The wrong question analysis function is an auxiliary or optimized function of the system answering function. Only the student user can operate this function with the teacher's permission after logging in to the system to complete the answer. View becomes a sub-function of the exam system. Therefore, the error analysis function designed in this paper can enable students to quickly find the correct or wrong questions and the analysis process. This facilitates self-learning and improvement. Student function structure diagram, as shown in Figure 2:

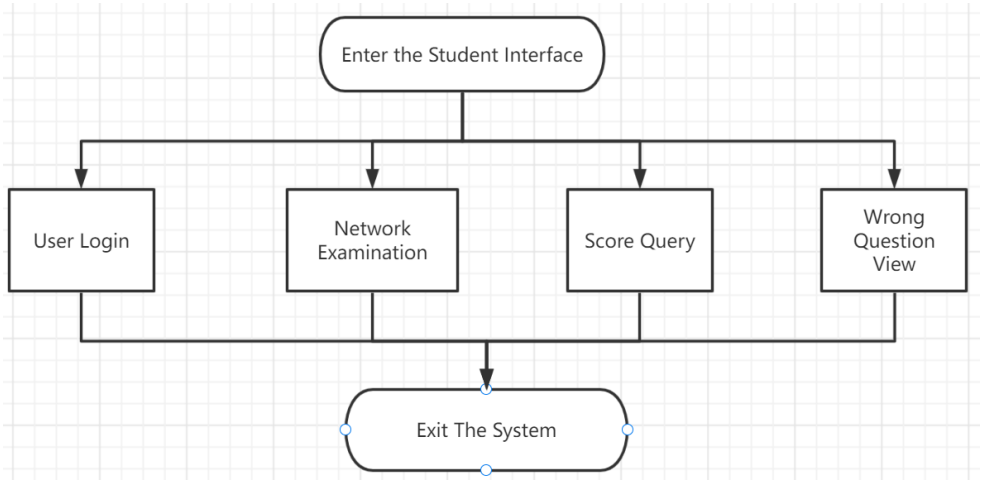

Figure 2 Student system structure diagram

(5) System function management

System function management mainly realizes the management of other functions of the system, including the addition and editing of new functions, the addition and modification of existing functions, and the editing and modification of sub-functions of existing functions. The functions can be viewed in the system.

(6) User Management

User management is one of the important functions of a system. The management of users can realize the understanding and view of users of the system, and make users more convenient to use the system. There are many types of users. This article is mainly reflected in the on both the student user and the manager, the user's information can be added and modified.

(7) role management

Role management is mainly designed for users, and different users have different powers. In other words, the permissions for operations are different. Student accounts can only perform actions such as answering questions, but cannot perform background administrator operations. Administrator accounts also have different rights. These powers are reflected in the operation of accounts, the management of test papers and questions, so the management of permissions can well control the behavior of system users, which is beneficial to the more stable operation of the system.

(8) topic management

Question management is mainly for administrators. This function is oriented to the question bank used by the test papers in the system. In this system, administrators can manage questions by adding and modifying questions, and can view existing questions and at the same time. New questions can also be added to provide more options for the generation of test papers.

(9) Exam paper management

Test paper management is the core function of this system. It mainly realizes the management of test papers for students who answer the test. The test paper is automatically generated by the randomly selected questions of the system and the test paper can be stored in the database for students to choose during the test. The administrator function structure diagram, as shown in Figure 4-3:

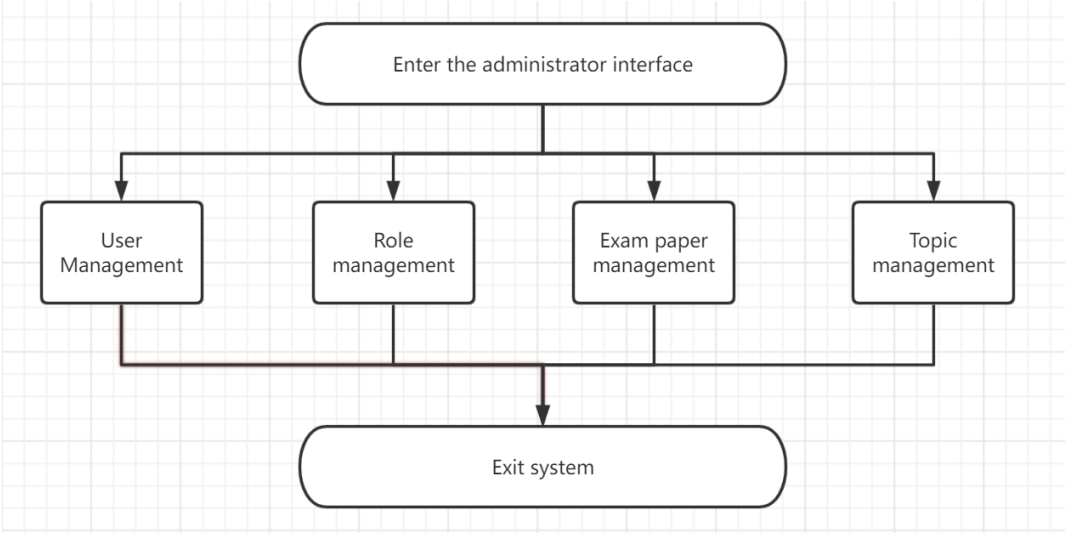

Figure 3 Administrator function structure diagram

2.3 Database Design

The design of the database is very important. The following will introduce the data tables used in this article one by one.

1. User table and ER diagram

Table 1 User table

field name	type of data	length	Field meaning	primary key	foreign key
userid	INTEGER	11	User ID	Yes	
roleid	INTEGER	11	character id		Yes
username	VARCHAR	20	User accound		
userpwd	VARCHAR	20	user password		
usertruename	VARCHAR	30	actual name		

User table ER diagram, as shown in Figure 4:

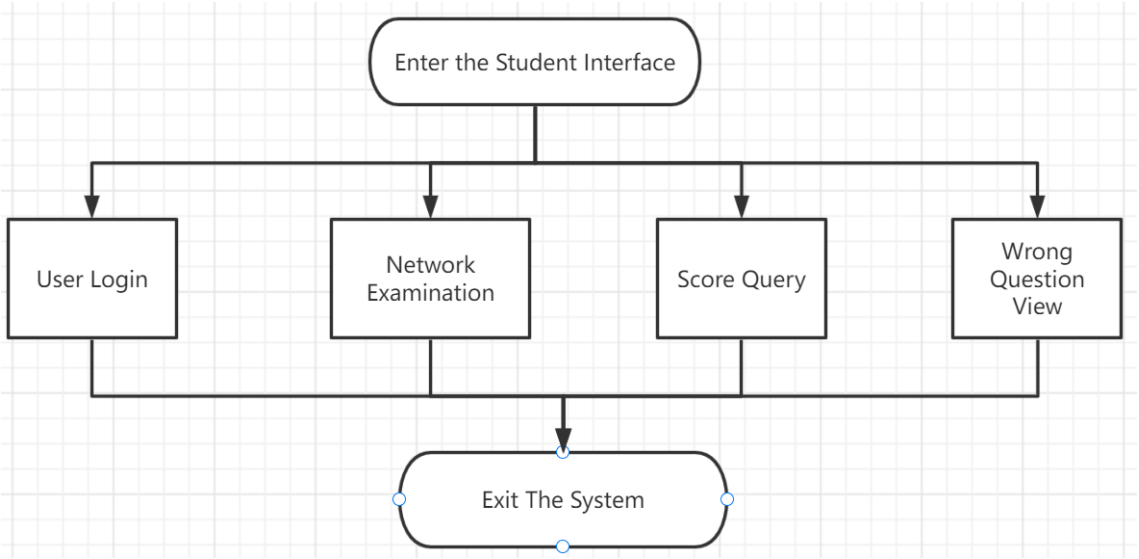

Figure 4 User table ER diagram

User id: Each logged in user has a unique number;

Role id: student, super administrator, question administrator, each of the three roles corresponds to a number;

Account: needed to log in;
Password: The password corresponds to the corresponding account;
Name: the real name of the user;
Status: 1 is normal, 0 is disabled.

2. Role sheet

Table 2 Role table

field name	type of data	length	**Field meaning**	primary key	foreign key
roleid	INTEGER	11	character id	Yes	
rolename	VARCHAR	20	character name		
rolestate	INTEGER	11	role status		

Role id: student, super administrator, question administrator, each of the three roles corresponds to a number;
Role name: student, super administrator, question administrator;
Character status: 1 is normal, 0 is disabled.

3. Function table ER diagram
table function table

field name	type of data	length	Field meaning	primary key	foreign key
funid	INTEGER	11	Feature ID	Yes	
funname	VARCAR	20	function name		
funurl	VARCHAR	200	function address		
funpid	INTEGER	11	Top level function ID		
funstate	INTEGER	11	functional status		

4. Permission table ER diagram

Table 3 Permission table

field name	type of data	length	Field meaning	primary key	foreign key
rrid	INTEGER	11	Role permission ID	Yes	
funid	INTEGER	11	Feature ID		Yes

ER diagram of the permission table, as shown in Figure5:

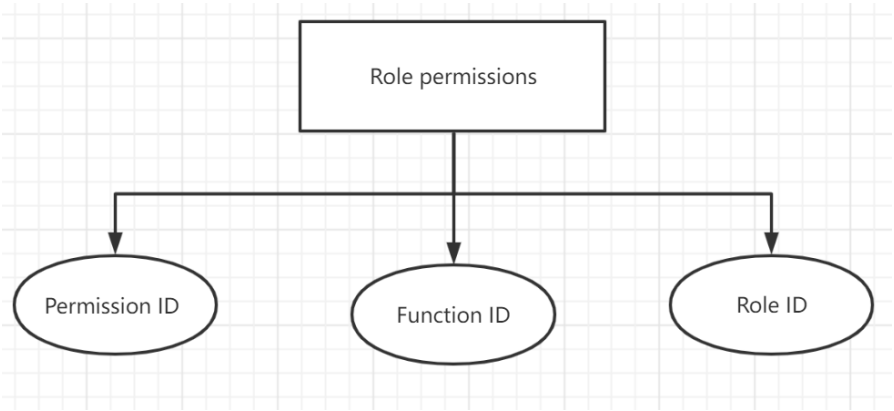

Figure 5 Permission table ER diagram

Role permission id : the number corresponding to the permission possessed by each role;
Function id : the number corresponding to each function;
5. ER diagram of the test question table

Table 4 Exam Questions

field name	type of data	length	Field meaning	primary key	foreign key
sid	INTEGER	11	Question ID	Yes	
scontent	VARCHAR	150	stem		
sa	VARCHAR	100	A option		
sb	VARCHAR	100	B option		
sc	VARCHAR	100	option C		
sd	VARCHAR	100	D option		

Question id: the number corresponding to each question;
Topic stem: the content of the topic;
2.3 DETAILED SYSTEM DESIGN AND IMPLEMENTATION
This chapter mainly introduces the detailed design of the network examination system, and introduces the implementation of each functional module and the screenshots of its operation from the user side and the administrator side. The following describes the user side first, and then the administrator side.

III. STUDENT CLIENT

In this system, users are mainly divided into administrators and students. Here I will first introduce the operation of the student user system. The following is the entire running process of student users from login to error resolution, which will be shown in the following paper.
3.1 Student User Login
To log in as a student user, go to this interface first. As shown in Figure 6:

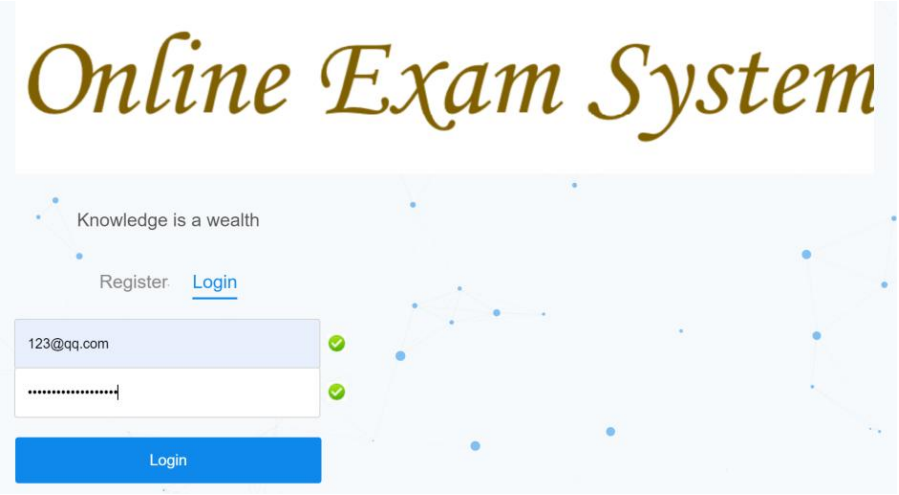

Figure 6 User login and running interface

After entering the login interface, select Student Login, and then enter the correct user name and correct password to log in. As shown in Figure 7:

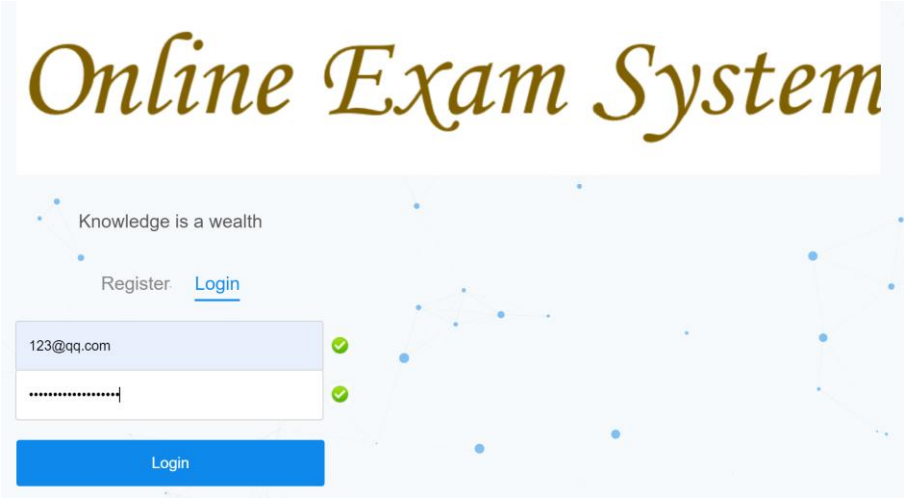

Figure 7 User login input interface

After the user completes the login input correctly, the system will compare the data stored in the database through the function code according to the information entered by the user, so as to determine whether the login user is legal. Log in to the system and enter the main interface of the system.

3.2 Main interface

After the student user logs in to the system correctly, it will jump to the interface of the student client. The main interface is shown in Figure 5-3:

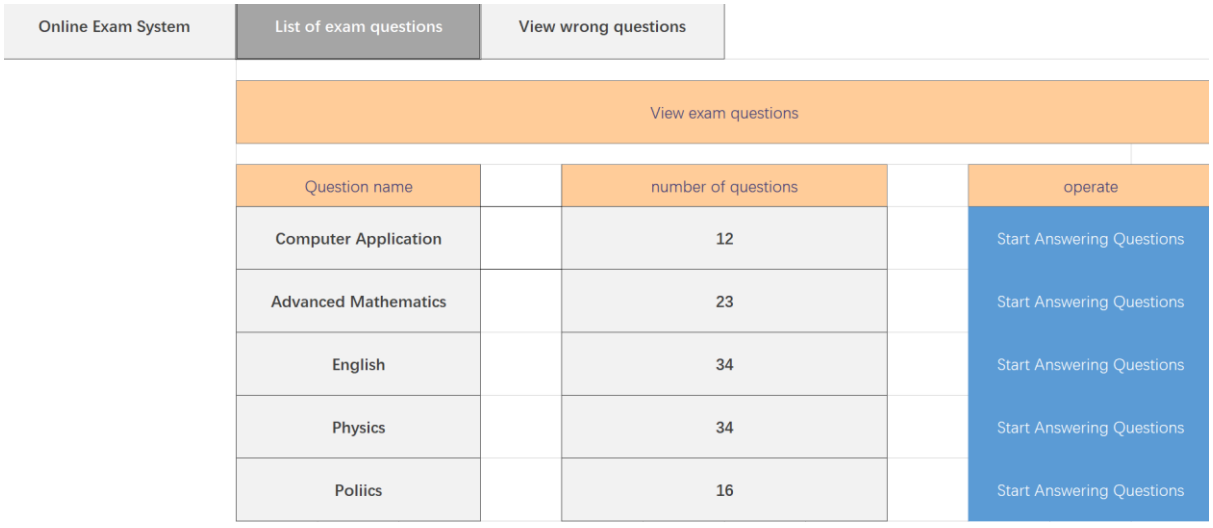

Figure 8 Student user main interface

The main interface of the student user mainly includes two functions: test paper list and viewing wrong questions. The test paper list lists all the test papers of the exam. Students can choose the corresponding test paper to take the test according to the requirements of the teacher. After the test, they can also make wrong questions Check out the features.

Students need to complete all the questions on the test paper within a certain period of time, and then submit them. The system will give prompts about the progress and time limit of answering questions.

Students can research and study according to the normal answers given in the database and compare their wrong options, so as to achieve the effect of improving their ability in the exam.

3.3 Data Management

Data management plays a role in the connection and interaction between the code and the database. The code implemented by the database interaction is:

```
Connection conn = null;
        try {

                DbUtils.loadDriver("com.mysql.jdbc.Driver");
                conn = DriverManager.getConnection(
                        "jdbc:mysql://localhost:3306/exam", "root", "zhs2668281");

        } catch (SQLException e) {
                e.printStackTrace();
        }
        return conn;
}
```

Complete the database connection and perform some simple database operations, including additions, deletions, changes, and searches. The main code is:

The code for paging lookup is:

```
/**
         * Query with pagination
* @param sql SQL statement
* @param map SQL parameters
* @param pc paging control object, need to pass parameters: the current page ( currentindex ) , how many lines are displayed on each page: (pagesize)
* The pagination control shows how many also: showpcount
* @return
*/
public static <T> Pager<T> execlist(String sql,PageControl pc,Class cls,String pk,Object...object)
```

IV. SYSTEM TEST AND RESULTS

One of the main tasks of system testing is to check some deficiencies and areas that need improvement in the system, so as to improve the reliability of the entire system. And a more main purpose of system construction is to detect "how well" the whole system performs. This can be divided into three steps, namely, module testing, assembly testing, and verification testing. The module test is to test the correctness of the whole program, the installation test is to test whether the interface of the program is correct or not, and the final verification test is the key to whether the user can satisfy the function and performance of the entire system software.

4.1 Methods of testing

There are basically two common methods of software testing: static testing and dynamic testing.

(1) Static testing mainly refers to finding logic errors and code errors in the software by manually reviewing the program source code and program-related documentation and other various materials without running the program. have certain limitations;

(2) Dynamic testing, as the name suggests, is to run the test program, check the difference between the running result and the expected result, and analyze the attributes such as running efficiency and robustness. The key to dynamic testing is the construction of test cases. At present, the testing methods of most companies are mainly dynamic testing, and the methods of designing test cases in dynamic testing are white-box method and black-box method;

White-box testing: Also called structural testing, it treats the software as a transparent white box, selects test cases according to the internal structure and processing logic of the program, tests the logical path and process of the software, and checks it Is it consistent with the design.

Black-box testing: Also known as functional testing, data-driven testing, or specification-based testing, is testing rigorously by using the entire software or a certain software function without examining the program's source code or having a clear understanding of the software The source code of the program is specifically designed. Testers learn how the software works by entering their data and seeing the output.

4.2 Functional testing

In order to ensure the normal operation of the program In order to ensure that each function can achieve the established task, the entire system should be functionally tested at the end of the program development. As we know, functional testing is to verify each function of the product we develop one by one to ensure that only the functions we designed can be completed. In the process of functional testing, we need to use some test cases to test each function enough to check whether the system we designed can achieve all the functions we expected at that time. Functional testing can also be called black-box testing or data-driven testing from another aspect, because in black-box testing and data-driven testing, we only need to consider each individual function and do not need to consider the function of the entire code. . Generally speaking, we can start testing from every small function of the system. For example, in this article, the login function and the comment function are embodied. By testing these two small functions, we can conclude whether our system satisfies us. desired functional requirements.

The functional tests are shown in Table 5.

Table 5 Functional Test Table

What the test needs to achieve	After testing, you need to complete the following goals: First of all, we first check whether the software meets the requirements set out before. These requirements include whether each functional module has been implemented. The business process is not correct. Whether the operation of the system is relatively stable, and whether the performance of the system is within an acceptable range.
The scope of the test	Determine the given functional module in the time to figure out what the user wants to ask
technology	Come up with test cases first, then use black box testing to test each use case
start standard	The user is put into use and can operate normally
Completion standard	The realization of the function and the operation space meet the previous design criteria
Test focus	Test focus: software compatibility
Things to Consider	Is the interface suitable for different sizes and different resolutions?

Some of the tests are shown in Table 6.

Table 6 Software test case table

use case number	501	
use case name	Start software use case testing.	
Use Case Brief	Users can enter the software interface by clicking the icon.	
participant	user.	
precondition	The user has successfully launched the software successfully.	
postcondition	The experiencer can smoothly start an operation by clicking the button.	
conditions for success	The experiencer can operate normally by touching the button, and the function can be used normally.	
basic event flow	step	Activity
	1	The experiencer normally starts the program according to the process, enters the login interface of the software, and finally enters the main interface of the program.
	2	Click the Select button.
	3	Jump between interfaces.

Rules and Constraints	The user operates correctly according to the operating instructions

4.3 Compatibility Test

Compatibility testing is the key to whether a system can run normally under various circumstances. The testing environment is mainly carried out on various operating systems and various browsers. Compatibility testing in software testing is very important. If we say a B/S system It is not very compatible with most major browsers, so this system will not work stably in the market. In this design, although the system we propose does not need to consider too many commercial factors, it must also take into account the compatibility test, so that the system can run more stably in future use. Therefore, a compatibility test on the system is a useful detection method.

V. CONCLUSION

The paper mainly focuses on a network examination system, which has completed the following points:

(1) Design the overall structure of the system according to the workflow of the examination system, and draw the structure diagram;

(2) The functional modules of the design system, such as: the background system maintenance module, which includes functions such as input, sorting, and deletion of test questions; the front-end test module, which includes functions such as the extraction of test questions and the countdown of the test time; teachers group questions Module, including the generation of test questions, the choice of question form, the setting of the score of each question, etc.; design and complete the function module that the teacher organizes the questions before the test, including the type of questions, the number of questions, the setting of the score of each question, etc. ;

(3) Use JavaWeb technology and MySql database programming to write the program code, debug and run the test system and functional test;

(5) Complete the deployment of the server, the storage of the database, and the interaction between the database and the program.

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