

Design and Implementation of the Network Examination System Based on B/S

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Abstract. Today the changes of the test mode are common. Many exams have adopted computer test, so the reform of text mode will be a trend in universities. Based on the working practice, the paper showed a project about the reform. It improves the work's efficiency greatly.

Introduction

The school will make a final written at the end of each semester. The whole process of examination involves a lot of things. Such as test paper printing, examination room arrangement, papers review, analysis of test paper and so on. So it is a very complicated job and easy to make mistake. The traditional mode of examination makes the whole process too hard and wastes too many resources. The working efficiency is very low. With the development of computer and network, the computers have been used in teaching. So the network examination is possible. In order to improve the quality of teaching, realize public and fairness of the examination, reduce the teachers' burden, it is imperative to use a new kind of high efficient and fast network examination.

Network examination system is divided into two categories: one is based on the C/S network, the other is based on the B/S network. C/S network exam system is usually used to make a single subject's test and must install the client first. But the B/S network examination system is very flexible. It can organize the examination according to the requirements. As long as the student has a browser, he can join the exam by network. The paper discussed the network examination system. By using this system the teachers can organize the examination and manage test scores by the computer.

Realization of exam system

The module of exam system has great significance. A good system has a clear structure and is easy to use. The links between two modules should be lesser as far as possible, but the more closely contact in one module the better. According to the independence principle of module division, it is better to less the coupling and increase cohesion. It must improve the reuse of module code and reasonably plot the size of the module. In the light of requirement analysis the system is composed of six main parts. The system structure is shown in figure1.

User rights management: This module mainly distinguishes the role among different users. Different users have different rights. The users in the system fall into two kinds, the teacher is mainly responsible for the students' information management, item pool management, score management. Students can only take part in extracting examination paper and carry out the exam.

Students' information management: This module is used to manage the information of students, such as ID, name and so on.

Item pool and test paper management: This part is the root of the network exam system. The key problem is how to make sure of the rationality of test questions, scientificity of the structure. It is important to fit test questions together automatically:

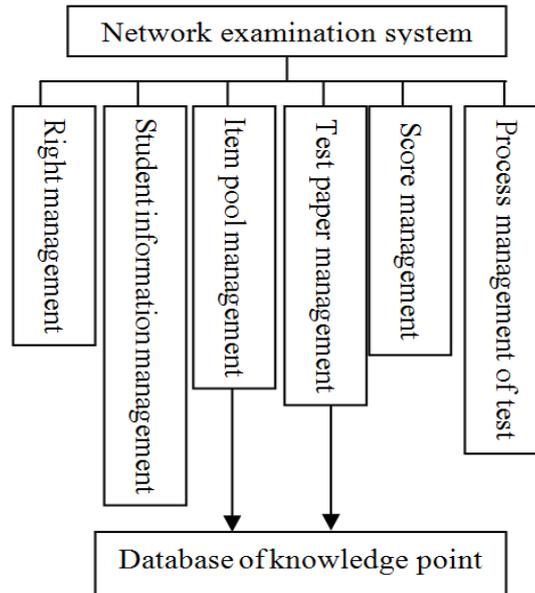


Fig.1 system structure

The item pool subsystem includes database of item pool, database of test paper and the knowledge point. The module structure is shown in Fig.2 and Fig.3.

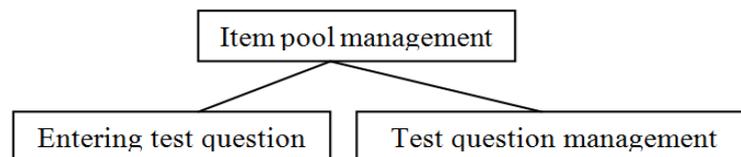


Fig.2 module of item pool

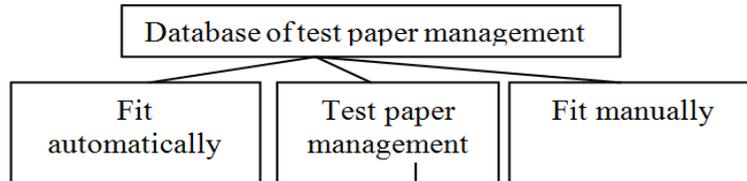


Fig.3 module of test paper management

The database of test paper saves all information about paper as Word document. The function is: 1. making a backup for checking or printing. 2. making a review or test for students.

Database of knowledge point includes all knowledge points in each chapter. In the process of setting chapter's structure, the teacher must set the structure of each section then increase the corresponding knowledge. The system can well fit the knowledge points together and compose a test paper.

Each test question must relate to its knowledge point and the value when it is entered the computer. When teachers enter the questions, the system must distinguish the same questions. Only identifying the same questions we can make a good database of test paper. Fitting the questions together can be completed automatically or manually.

Manual fitting is similar to traditional way. Teachers can inquire the database of questions to fit. When teachers fit the test questions together, they are used to refereeing to the catalogue of teaching book. Thus they can clearly understand the distribution of knowledge. The system composes the test paper according the hiberarchy of chapter-section-knowledge point. Teachers first make a structure of chapter and section. Then contact it with knowledge points. Teachers add chapters according to the structure of the course and insert the knowledge point behind every chapter. In item pool test questions correspond with knowledge and value. Thus item pool, chapter and value of every test question are combined. Teachers can control the structure of test paper and the question value in the process of generating the paper.

When the system fits the questions together, the program provides chapter, section and knowledge points to choose for teacher. If there are few test questions, the system lists all of them at once. When

there are lots of questions, it displays the hierarchy. That is, when the teacher chooses a knowledge point, the system will list all questions about the point. If the question involves many points, it will be displayed under the condition that the teacher chooses the point with the biggest weight. So we must make a switch for this. When the switch is open, the system can avoid the same question with different knowledge point. So it is better to set the switch “on”. After fitting, the paper is saved in the item pool as Word document.

The part of automatic fitting, some restriction conditions which can appraise the paper is good or not are defined in advanced. When the system fits the questions together, teachers set those conditions according to requirement. The module of fitting will choose questions from item pool to compose a test paper with the requirement. The fitting must realize that the paper can cover aspects of the course as many as possible. The types of question are reasonable. The paper is well-suited in difficulty and the test time is moderate and so on.

The essence of fitting is to choose a subset from item pool according to the restrictions. It can be completed in two ways: the one is accurate search and the other is fuzzy search. The accurate one is that all conditions must precisely equal the restrictions mentioned above. It is very difficult to realize. The fuzzy way is to choose a subset which has little difference compared the expectation. It can give the teacher a test paper which he wants best.

Student score management: The grading system is divided into two kinds: automatic and manual. Automatic grading system is used on multiple choice questions and judgment question. The system can show the answers to student when they finish the test. The subjective question must use manual grading system. It will show both the answer from student and the right answer. The module is shown in Fig. 4.

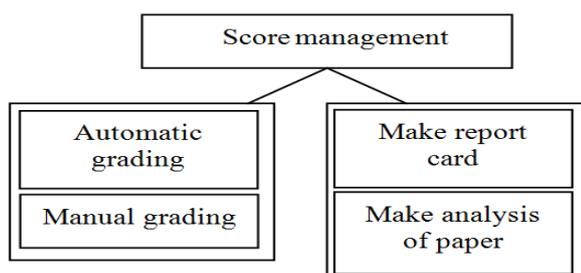


Fig. 4 module of performance management

At last the grading system gives out the scores and analysis of test. In our school teachers have too many work on checking test paper, making report card and analyzing of paper. So if this system can generate the performance report and the analysis of paper according to the existing results, it will make the whole process of test to be easy and efficient.

Examination control module: The test will begin if students log in the system. The timers start to work. When the time is used up the paper is submitted automatically. In order to prevent students from cheating, the order of options of every paper is different. The system randomly controls the order. During the exam, the system will prompt the students with the type, count of questions which the students are dealing with. The students can keep abreast of the exam. The students can modify the answer which they had made. The paper is submitted automatically when the exam is over or by students ahead. The module of control process is shown in Fig. 5.

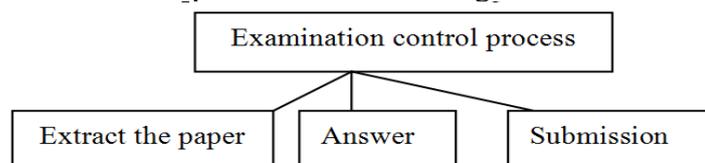


Fig. 5 module structure of control process

Design mode of network examination system

The exam system is based on B/S model and adopts three-level structure which is composed of show layer, control layer and data service layer. The show layer is responsible for the students' login. It is connected to the server and can receive papers for the students to answer. After the student submits the paper, it submits the answers to the control layer. The control layer completes all

functions to support network examination system. The data service layer provides the storage function. The structure is shown in Fig.6.

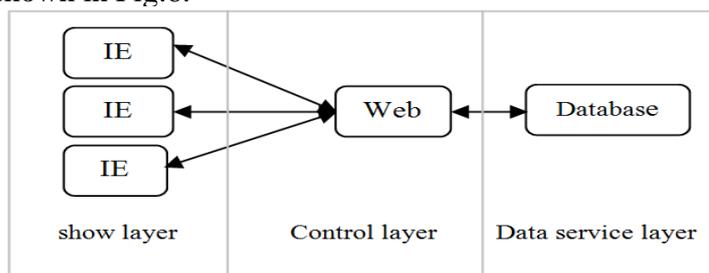


Fig. 6 three-level structure module based on B/S

Research on security

All kinds of insecurity facts must be considered during the concrete design. So it must take effective measures to avoid the bad effects, such as cheat, oversight and so on. Some security questions are shown as follow.

Data security of system: The security of item pool saved on the server is more severe with the web incursion. Except for security mechanism of database, it must adopt encryption techniques on database to avoid unlawful incursion.

The solution is to isolate physical database from logical database. The server which saves the item pool is placed at machine room. Database doesn't connect the Internet. User accesses database by web sever. At the same time, back up all data periodically and save the copy at insecurity site. It can protect physical exercise database.

Technology of access control: Make sure of the effective of examinee, it must control the access to system, including the computer and the authentication of examinee. Make use of the logicity of program to protect the validity of access time and privilege.

Prevent cheating: In order to prevent cheating, such as transmitting the test questions to others by web, divulging confidential information about paper and so on, the system takes the technology of page control. That is, it doesn't allow students to refresh the page or do something else which is unrelated to the exam. Additionally, disarrange the order of questions and the answers of multiple choice questions in one exam.

Conclusion

In short, with the social development, low-carbon and high-efficiency test will replace the traditional paper test. The network examination system not only saves human, material and financial resources, also can promote the teaching quality and teaching level, promote the education reformation.

References

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