Design and Implementation of College Online Examination Platform Based on SQL Server Database

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Abstract: At present, many similar web online examination management systems have been developed in China, and put into system testing and operation. This system combines the actual situation of our school and fully considers the characteristics of other colleges and universities, and develops an online examination system suitable for general colleges and universities, which can realize flexible problem making strategies.

1. Current Status of Research

1.1. Status of Foreign Examination Systems

The use of computer to develop the student examination system has been recognized by the world for its security, convenience, simplicity and rapid characteristics, is the development trend of the future world, has been widely used abroad at present, many international certification examinations have also used the online examination system to test, for example: Microsoft certification examination in the industry is very influential, its certificate is also a high-end certificate with high gold content and practicability, mainly to train system network management and application development talent certification examination. CCIE certification examination is an expert level certification examination developed and designed by Cisco company. It is recognized by the industry as the most authoritative certification examination, but also one of the highest gold content certificate. Besides, Cisco company also develops and designs other certification examinations related to the Internet industry [1]. A large number of candidates around the world have taken online certification examinations organized by Cisco. The United States Educational Examinations Service Centre (ETS) has also changed the analytical writing examination for GRE into a computerized examination in China since 15 October 1999.

1.2. Status of the National Examination System

In China, more and more national examinations also take into account the advantages of high security, convenience and rapidity, and technical maturity of the online examination system, and many industry vocational qualification examinations have begun to consider and put into use the online examination system. For example, in 2012, the Ministry of Finance and the China Association of Certified Public Accountants, drawing on the successful experience of other foreign professional qualification examinations, designed and developed the online examination system for certified public accountants and started the online examination for certified public accountants qualification examinations. In addition, other industry qualification examination such as accounting qualification certificate, securities qualification certificate are currently using online examination, the effect is also very good. The Tsinghua Taihao examination system was developed by some famous primary and secondary school teachers in Beijing. The system can be applied to various network platforms, and the examination question bank can be added. Driving licence examination subject 1 and subject 4 to implement online examination, in the examination process candidates can know their real-time wrong questions, after the examination submitted immediately have results. The examination system is convenient, quick and fair, and practical [2].

Figure 1 Online examinations

2. System Analysis

2.1. Functional Modules of the System

The users of online examination system mainly have three roles: administrator, teacher and examinee. According to different roles, the whole system can be divided into three modules. The administrator has the highest authority to manage the basic information of the teacher examinee, the information of the question bank, the basic information of the test paper and the information of the test question. The teacher module can manage the examination papers, test questions and modify their basic information. Students can take the examination through the examination module, check the results of reference subjects and modify personal information and other functions.

2.2. Main Functional Description

(1) Management function of online examination system. System administrator input account password login background management interface, administrator can face each module in this interface to operate, such as create roles, assign permissions, examinee information import, etc., administrator click add test button, the page jump to add page, administrator input relevant test questions or use the specified template file import information can be saved. (2) User personal modification. After each type of user logs in to the system interface, the hidden area pops up after clicking on the upper right corner of the system, and the user's password modification button in this area can jump to the password modification interface, and the user can submit the password modification operation after entering the new password in this interface. (3) The function of teacher's composition. After the teacher logs in to the system, after choosing to create the test paper in the left navigation bar, he can set up the test paper subject, the name of the test paper, there are two kinds of paper composition, one is manual paper composition: the teacher can select different questions from the corresponding question bank, set each question score, the test paper generated by the system is a fixed question set by the teacher, all the students take the examination questions are consistent; the other is the system randomly draw questions from the question bank: the teacher sets each chapter of the test paper and each chapter of the question quantity, question type, each question score and other test paper content information, after confirming that the stored information is correct, click submit. According to the test paper parameters set by the teacher, the system automatically generates the test paper by selecting the questions which satisfy the conditions from the question bank by using the random problem making algorithm. (4) Student answer function. After students log on to the system, they view the test paper information through the left navigation menu, and display the list of test papers in the allowed examination period in the right window. After students select one of the test papers and click to take the examination, the system takes out the corresponding question information from the database to generate the answer page.

Figure 2 Online examinations

2.3. Core Functions of the System

The display layer mainly refers to the front-end interface of the system, receives the user's operation and input, submits the request to the controller for forwarding, and receives and displays the processing results.

The control layer consists mainly of Action class, ActionServlet class and struts-config.xml configuration file. the system submits the request to a unified processing object according to the configuration in the struts-configure.xml RequestProcess,RequestProcess the object will receive the request data encapsulated into a ActionForm object, then calls the appropriate Action object processing, and finally returns the processing result generated object to the front-end page display.

The system model layer is implemented by the ActionFormBean in the struts framework to realize the transfer of form information and business data between the view and the controller. each request will have a unique Bean object responsible for its processing. the data fields passed in the request and the properties in the Action FormBean should satisfy the one-to-one correspondence. Verify the validity and legitimacy of form data by ActionForm validate method.

Figure 3 Online examinations

3. System Implementation

3.1. Examination Pages

The examination page mainly involves two tables, the first is the test list. In the system test page need to use the table questions, test scores, test content and other fields, the test page will read these valid information to the examinee. The examinee's personal information is kept in the examinee's information table, the examination paper information is mainly the examination paper name, the examination time, the current state and so on field, the purpose is to control the examination opening and the examination paper submission state.

In the multiple choice questions of the test paper, the random algorithm of the selected topic should be emphasized. The algorithm according to the teacher set in the test paper title information

table in the question type, knowledge points in the chapter, the number of questions in each chapter, difficulty and other parameters, in the whole test table through random generation of numbers to correspond to the corresponding test number, to generate a vector table of questions we need, with the above question array, then to do is to read the test questions, displayed on the page.

3.2. Correction Page

The examination paper correction page mainly involves the examinee answer table and the question answer table two tables, the page display way still uses the page display which is similar to the examinee answer question, on this basis displays the examinee answer question information and the standard answer in the answer table after the question, facilitates the teacher to mark the paper to check the answer. Question answer table mainly has the question number, the question type, the question question answer and so on field, the examinee answer table mainly has the examinee number, the question number and so on field. save the automatic scoring results to the examination results registration form, and change the status of the examinee to the submitted status.

The core table is the answer sheet, in which the main fields are the number of candidates, the number of test questions, the answers of the candidates, and so on. The number of test questions, the number of test questions and the answer table of the test questions are related to the query. If correct, add up the score of the correct topic and write the total score to the examinee's score sheet.

4. Development Difficulties and Solutions

4.1. Algorithm for Random Selection

Automatic random problem algorithm, using the teacher set the parameters to obtain the number of test questions, and then a matrix of the total number of 1~ test questions, regenerated into a random number, the matrix will be disrupted, and finally according to the number of questions and questions from the matrix out of the problem, the idea of the algorithm is similar to the principle of shuffling.

4.2. Real-time Answers

system is AJAX technology, when the examinee every time click or fill in the answer, trigger the corresponding event, submit the answer made by the examinee to the background database in real time, that is, save the examinee's answer, but also ensure that in the case of broken line or computer accidentally shut down, the examinee login system can read out the content of the answer questions, to provide candidates with the opportunity to continue the examination.

5. System Function Module Design

The online examination system mainly includes three subsystems: examination management subsystem, score management subsystem and student examination subsystem. The three subsystems are independent of each other and have certain connections and constraints. For example, the examination management in the examination management subsystem can set the examination time and student object of the examinee examination subsystem. Student examination subsystem is mainly used for students to log in, extract test questions, submit answers, in addition to automatic preservation and data recovery, forced collection, countdown and other functions. The examination management subsystem mainly includes four modules: user management, question bank management, group paper management, examination management, which are the most core and complex parts of the online examination system. The results management subsystem can not only provide simple results query, but also provide statistical analysis functions such as student score distribution, test value, examination scope, question type distribution, etc. It can also be statistically analyzed according to specialty, student origin, course, chapter, question type and knowledge point. According to the results of statistical analysis, we can understand the students' mastery of knowledge, help teachers to analyze test papers, and provide reference for improving teaching quality at the same time.

6. Conclusion

The online examination system is an important part of the teaching system in colleges and universities, which can liberate teachers from the tedious and repeated questions, and put the main energy on the establishment of the question bank, and provide students with a fair and flexible examination environment. The online examination system is actually used after testing to achieve the desired goal and can be used for hundreds of people to test online at the same time.

Acknowledgements

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