Design and Implementation of Internet of Things Big Data in Computer Application Basic Course Examination System

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ABSTRACT

With the development of computer technology and network technology, the application of computer in the field of education is more and more widely. In modern teaching, many subjects are gradually using computer as a tool for examination, that is, paperless examination. So as to save human and material resources, but also improve the efficiency of the examination. The automatic examination system of computer basic course is a CAI software developed by using object-oriented programming technology under Windows environment. The purpose of this paper is to combine the needs of the author's work, based on the current situation of the examination, combined with the characteristics of the course, develop an examination management system with moderate scale, moderate difficulty, strong operability, good portability, full coverage of knowledge points, and good security, so as to solve the paperless examination problem of basic computer application course.

Keywords: Computer application; Examination system; system design

1   INTRODUCTION

With the development of computer technology and network technology, the application of computer in the field of education is more and more widely. In the process of modern teaching, many subjects gradually use computer as a tool for examination, that is, paperless examination. So as to save human and material resources, but also improve the efficiency of the examination. But my college "computer application foundation" course examination still uses the teacher to make the question, the student answers the way in writing, cannot very good appraisal student to the office software operation ability, cannot comprehensive, fair, objective to examine the student to the curriculum grasp the situation. Therefore, the purpose of this project is to develop an examination management system with moderate scale, moderate difficulty, strong operability, good portability, complete knowledge coverage and good security, based on the current examination situation and the characteristics of the course, so as to solve the paperless examination problem of the course of computer application basis[1].

According to the instruction of the Ministry of education of the people's Republic of China to improve students' computer application level in Colleges and universities, it is urgent to reform students' computer education and teaching methods. "Computer application foundation" course is a public computer basic course for all professional students, and it is an important compulsory course. Especially for non computer majors, it is particularly important to improve their comprehensive ability of computer application. On the other hand, the continuous development of computer network technology provides a new platform and technical support for the computer examination[2]. With the advanced technology platform and the advanced education and teaching concept of "people-oriented, student-centered and teacher led", the traditional open education mode is adopted, which makes the computer examination system be popularized and applied in Colleges and universities, Further improve the quality and ability of students. Figure 1 below shows the computer application technology in the open education mode.
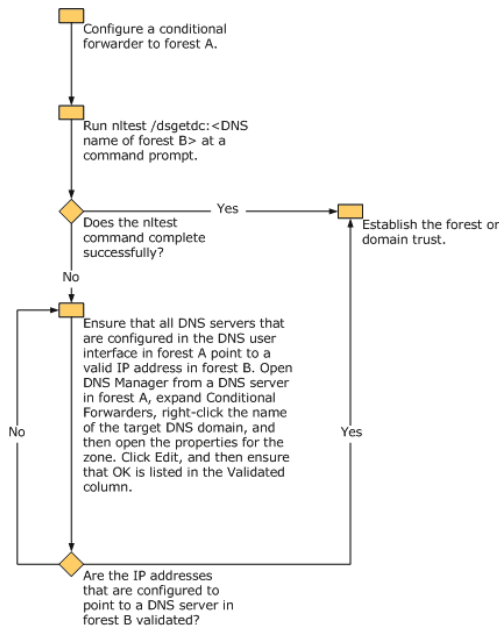
Fig. 1. Computer application technology in open education mode

2 RELATED WORK

2.1 Research on big data computer application basic course examination system

At present, the more perfect and comprehensive computer application basic examination system is the national computer level examination. The national and provincial computer level examinations are based on the examination system of answering questions in the local area network. In the preparation process of the examination, relevant examination site materials and candidate registration information have been submitted to the examination center through the Internet, and then the special teacher will install the question bank into the operating system specified by the examination center within the specified time through the specified software. In order to enable candidates to adapt to the examination environment, a test version of the examination system is also provided to facilitate candidates' understanding of the examination process. Before the national computer examination, the question bank shall be installed on the server provided by the examination center. In order to deal with emergencies during the examination, such as power failure, local area network being attacked by ARP virus, there shall also be a standby question bank server and a standby computer room to ensure the smooth progress of the computer examination[3].

With the continuous development of computer application technology, computer has become an indispensable and important part of people's work and study. Computer application technology also involves all fields of human society. It is no exaggeration to say that the development speed of computer technology has been linked with the progress speed of human society. Relatively, people's ability to master computers is also improving, so improving students' comprehensive computer ability has become the basic requirement of colleges and universities. According to the instructions of the Ministry of education on improving students' computer application level in Colleges and universities, it is urgent to reform students' computer education and teaching methods. The course "Fundamentals of computer application" is a public basic computer course for all professional students and an important compulsory course. Especially for non computer majors, it is particularly important to improve the comprehensive computer application ability of non computer majors. On the other hand, the continuous development of computer network technology provides a new platform and technical support for computer examination[4]. With the advanced technical platform and the advanced education and teaching concept of "people-oriented, student-centered and teacher led", the traditional open education mode is adopted, so that the computer examination system can be popularized and applied in Colleges and universities, Further improve the quality and ability of students.

2.2 System performance requirements

From the development of the system to the implementation of the system, there are several main requirements for the performance of the system itself
1. Accuracy of the system
This is an important indicator of the success of the test system. In the process of examination, it is the most basic requirement for the examination system to ensure accuracy in all aspects and to be objective and fair.
2. Fault tolerance of the system
The system itself has a certain error correction ability. When the examinee in the examination process of operation error rather than man-made error, the examination system will carry out the corresponding operation processing, through the form of prompt box to inform the examinee related matters, can save human resources to a certain extent.
3. Ease of use of the system
On the one hand, the purpose of developing the system is to save manpower and material resources, on the other hand, it is to be convenient to use. It should be convenient for the examination center to install, debug, test

and maintain the system; It is also convenient for examinees to use the examination system in the examination process.

In the learning stage of the training network, there are N training samples:

$$net_t^p = \sum_{j=1}^{M} w_{ij}o_j^p - \theta_i = \sum w_{ij}x_j^p - \theta_i, \quad (i = 1,2,\ldots,q)$$

(1)

$$y(k) = \frac{\alpha(k)y(k-1)}{1 + y^2(k-1)} + u(k-1)$$

(2)

$$X_j = \frac{X_i - X_{\min}}{X_{\max} - X_{\min}}$$

(3)

$$s = \sqrt{\frac{\sum_{i=1}^{n}(X_i - X)}{n-1}}$$

(4)

4. Scalability of the system

The development of the system is constantly improving, so the system should be more and more easy to use, rather than more and more difficult to use. This requires that the system should have the ability to upgrade and merge modules. The demand for the system will not be invariable. When the corresponding problems appear, the system should also have its own improvement ability and upgrade ability.

5. System supportability

In the process of examination, it is inevitable that there will be unexpected crash, network failure, power failure and other problems. In order to solve the above problems, the system is required to back up and record the examinee's examination information in time, so as to avoid losing the examinee's examination data when the above problems occur.

2.3   Functional requirements of the system

The users of the examination system are some different specific users, so they have to pass the authentication to enter the system every time. Only after the authentication is passed, can you enter the system and use the system normally. Moreover, if we want to reuse the examination system, we should also modify the relevant authentication, database path and login password of the examination system. Combined with the computer examination system, in the examination process, the distance of the computer is relatively close, so there are certain requirements in the randomness, for example, according to the computer machine number as a parameter of random selection[5], so as to avoid candidates adjacent to the seat to draw the same question. In

the process of examination, the system should also control the examination time intelligently, and remind the examinee to hand in the paper in the form of prompt box. After the examinee submits the answer paper successfully, the computer will judge the paper automatically, get the result and display it. Through the comparative analysis of the relevant examination system, the examination system divides the user functional requirements into three types: system administrator, examinee, and teacher. The administrator is responsible for the setup and maintenance of the system; Examinees are those who take part in the examination and inquire about their scores; Teachers are the organizers and implementers of examinations. As shown in Figure 2, the computer examination system.
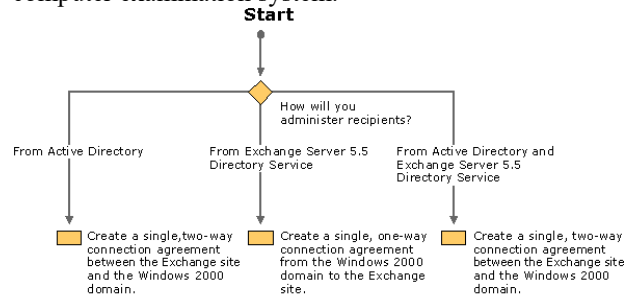

Fig. 2. Computer examination system

3   DATA ANALYSIS

The working process of the automatic examination system for computer basic courses is divided into three steps: establishing the examination question bank of a course through the question bank management module; Then in each use, through the setting of the test paper generation environment, the test paper generation module randomly selects test questions to generate different test papers, which provides an easy-to-use graphical user interface test environment; The paper reading subsystem can only be used by the privileged teachers, and the scores of each test paper can be stored in the examinee's score database. The file service function of the system provides the operation of directory and file management for the generated test papers, and uses the directory operation and file operation function of Net ware operating system to carefully set the directory and file attributes of test questions, standard answers and candidates' answers, so as to make the whole system safe[6]. The structure and connection of the automatic examination system are shown in Figure 3.
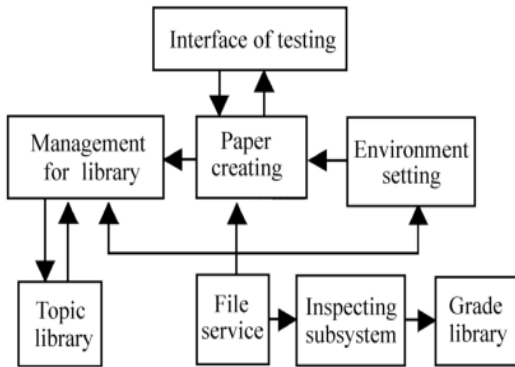
Fig. 3. Schematic diagram of automatic examination system structure

The development environment of this system is the Chinese Windows 98 operating system, which adopts the object-oriented programming tools Visual Basic and OLE programming technology. The main contents of the system development are the design and implementation of the item bank management function, the test paper automatic generation function, the automatic reading subsystem and so on.

The conceptual design of the examination system starts from the overall design of the database. In the process of the overall design of the database, a clear idea is to first consider the application environment of the examination system, and in the application environment, through system analysis, construct the optimal database model of the examination system, so that it can run effectively and store data safely, to meet the application requirements of various users. The test system model should avoid the concrete and objective embodiment of the test database in the test system as far as possible, but show it in some subjective and abstract ways[7]. The process of safely storing data is shown in Figure 4 below.
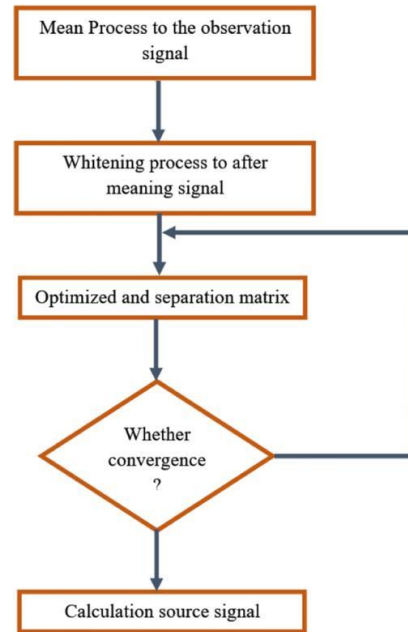

Fig. 4. Secure data storage process

Each corresponding conceptual model should objectively reflect the data structure composition, data module type, information flow, the relationship between data, and the requirements of each module body for the preservation, association and query of the module information. In the process of establishing the examination system, we should also adopt the method of modeling from the part to the whole, first clarify the composition of each sub module, and then establish a global view, which is convenient for programmers to organize and modify.

4 COMPUTER BASIC COURSE AUTOMATIC EXAMINATION SYSTEM

4.1 Item bank management module

Visual basic uses Microsoft Jet data core, data control and Dao 4 tools to operate and manage the database. In the item bank management module, the basic operation of the item bank is easily realized by using Visual Basic programming, such as creating a database, adding or deleting records, browsing and printing data, etc. But for the establishment of the question bank, in order to generate the test paper to select the question conveniently, we must provide a certain structure for the question bank. By analyzing the test questions of most courses, we can know that any question can be divided into two parts: the text and the picture. We can establish a fixed

question bank structure to adapt to various types of questions. However, this will waste a lot of storage space and reduce the speed of the system, especially for the blank questions, multiple-choice questions and other questions without a picture. Therefore, this system uses a kind of dynamic question bank structure to establish test question banks for various types of questions. The system can use the corresponding field structure when establishing the test database. For example, the field structure of a certain type of question is shown in Table 1. The title field can be selected from two data types: t ext and memo.

Table 1. The field structure of a question type

Fi el d	N o.	Ti- tle	Gra ph ic	Ans w er	Ch apt er	Dif- ficul- ty	Ti me	Sig n
T yp e	Lo ng	Te xt	Bi- nary	M emo	In- teg er	Byte	Int ege r	By te
	(4)	(2 55)	(1.2 M)	(1. 2M)	(2)	（1 ）	（ 2 ）	（ 1 ）

Under normal circumstances, each test questions to avoid repetition as far as possible. The data stored in the sign field reflects the selected status of the question in the history and at present. It is represented by an integer code, which can be used in the generation of test paper to avoid repeated topic selection. Each question is given a difficulty coefficient when it is entered[8]. The difficulty coefficient is checked by the teachers of the teaching and research department one by one. It is a short integer data. The time field records the basic time when doing this question, which is used to analyze the amount of examination when composing the test paper.

4.2 Paper reading subsystem

The purpose of the paper reading subsystem is to evaluate the students' mastery of all kinds of knowledge based on the results of the candidates' answers, and record them in the examinee's score database in the form of percentile system. As shown in Figure 5 below, the candidates' scores are stored in the database.
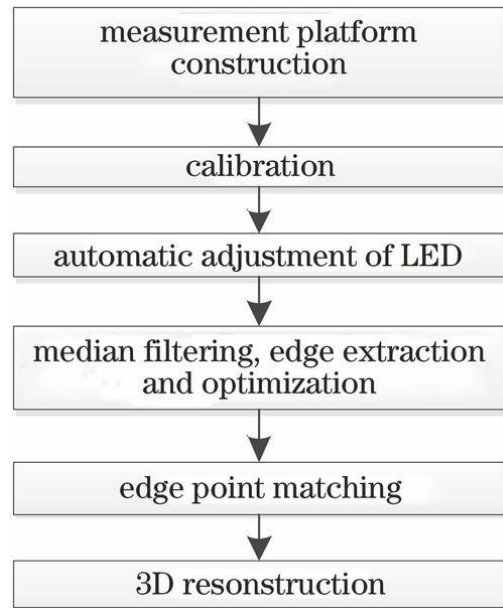
Fig. 4. Secure data storage process

In order to achieve the objectivity and accuracy of marking, the system provides a variety of marking forms. For multiple-choice questions, the process of comparing examinee's answers with standard answers is completely realized by computer. For filling in the blanks, there are two forms: automatic marking and manual marking. In the way of automatic marking, fuzzy matching is adopted, which ignores the blank space and punctuation that examinees input in the process of answering questions. However, due to the complexity and diversity of Chinese characters, even if fuzzy matching method is used, it is sometimes difficult to objectively and scientifically evaluate the candidates' mastery of knowledge[9]. Therefore, the system also provides a manual marking method, which provides an interface for marking teachers, showing the questions, candidates' answers and standard answers (all read-only), The teacher can evaluate the examinees' answers subjectively according to the information.

For the subjective questions of examinee's operation ability, the system provides the corresponding interface, which is convenient for the teacher to read all kinds of operation questions[10].

Finally, the system records the scores and total scores of all kinds of examination questions in the examinee's score database, which is convenient for future query, and provides the input data for score analysis and printing for the computer examination information management system.

In addition to Linux and windows, IOS developers also have strong cloud needs. The MAC node launched by AWS enables Los developers to focus only on iosapp innovation without building their own development and test environment or maintenance.

In the AWS computing instance, users can choose either AMD or graviton of AWS self-taught processor according to their own business.

5   CONCLUSION

This paper mainly studies and discusses the design and implementation of computer application foundation examination system. This paper mainly from the "computer application foundation" course characteristics, after in-depth research, comparison and analysis, the design of each module, to achieve a strong usability, high security examination system. The paper editing environment with both pictures and texts, the flexible way of paper generation and editing function make the examination questions varied and meet the needs of different examination objects. It is more objective and scientific to use the index constraint matrix to generate test paper. The paper reading subsystem provides the teachers with various ways to score the test papers objectively and fairly.

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