

# Development of a Web-Based Online Examination System

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## Abstract

People today go through big and small tests, with tests having become a frequently faced issue. Besides, the testing system merits at being fair and open. It is also the best way to measure academic performance. However, examinations come at the cost of society, which cannot be ignored. There are so many people taking the joint examination each year in addition to the different convention tests, that if you were to add up the time consumed by these tests, it will be a considerable figure. Amending this figure will be a big help to the growth of society. As to how to amend this, the first thing that everyone thinks of is 'the internet'.

Today, there is nothing that the internet could not do. Read the news, browse e-shops, shopping, etc., followed by online ordering, online restaurants, and online bidding, all of which have awed its precedents, along with the most recent and happening online classes. In the future, neither will students be required to go to school for classes nor teachers be required to go to school to teach. Lessons will be held through online teaching and in online classrooms. Hence, the problem of examinations arises. The online examination system is the answer to the problem. In the internet age, an online examination system is a must, and online lessons and online testing shall be the direction towards which the world of education shall move. Online examination is neither limited by time nor place of the examination. The time of examination can be arranged in accordance to the progress of the lessons. At the same time, since the tests are examined by the computer, time cost of manual examination of tests is saved. Based on the virtues of internet, amendments have been made to the examination system concept by constructing a website with online testing for the students and online question setting and online management for the teachers.

**Keywords: Internet, worldwide web, online testing system, database system, browser**

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## 1. Introduction

Online examinations are convenient, and fast. Online examination has three main purposes.

- (1) To allow test-takers at different places to take the test at the same time through the online examination website.
- (2) Through careful planning and proper coding, enable tests, grading and to check results on the website.
- (3) To integrate database with the program, allowing teachers easy addition of questions and creation of tests.

However, the formulation of questions for a test is often treated with doubts and suspicions. It is also most widely discussed. Cheating through fraud is not our current concern. The formulation of questions depends on the test. The test questions are strict and set with care. Although, the test is in the multiple-choice format, the questions are chosen at random. All students have the same questions, but the order of questions is different. Since the order of the questions differs on each computer, the motive in students to cheat is reduced. Cheating at examinations is unacceptable. It is common knowledge that students are extremely prone to cheating under a network environment, which could affect the fairness of an examination. So, to technologically overcome cheating or to eliminate a student's motive to cheat is the biggest challenge to online examination. However, to teachers intending to use the internet to conduct examinations, internet is still a frightening obstacle, because not all teachers can learn on their own how to set up the kind of network technology required to conduct online examinations. With this objective, the online examination system has been set up to solve a teacher's technology problem. Teachers can work with the system to set up test questions, which would be included in a test bank through which they can share their test questions with other teachers, thus allowing resource sharing, which in turn substantiate the lessons and teaching resources. This allows the course to progress smoothly, which is also the aim towards which the system is swiftly moving.

## **2. Online Examination system construction and discussion**

The construction of an online examination system involves the following technology, and their analyses are as follows. The system is primarily based on the Windows 2000 operating system(Phillips and Harry (2001)). The object is to provide a better online operations environment, application environment and communication, and internet services(Smith, Teresa and Smith, Kelly (2001)). Besides, the above system is also stable, expandable and easy to manage. The most important being the lowering of information management expenses, in addition to easier administration operations. The three main reasons why the online examination system is not based on the UNIX operating system are as follows.

- (1) Most of the users are more familiar with the Windows environment.
- (2) Although UNIX has open source code, it is difficult for an unfamiliar user to code his programs.
- (3) Since UNIX has an open source structure, there are various channels of attack for intentional personnel. Users will be required to find ways to patch the security loopholes. For an unfamiliar UNIX user, this will be a very difficult task.

The online examination system is a high quality website and not just a website meant for browsing; and since its functions include setting questions online and students logging in to the online examination center, the website has to interact with its users. Since HTML can only provide one way information, it is unable to interact with users, or allow students to answer questions online, hence the Windows 2000 compatible dynamic webpage ASP (Active Server Pages) (Williams, Barber and Newkirk (2000)) has been selected for the purpose. Through the VB Script in ASP (Morneau, Heith and Batistick (2001)), the functions required by the online examination system can be appropriately processed.

The system uses IIS technology (Internet Information Server) (Perry, James and Schneider (2001)) of Windows 2000 to construct an ASP platform (Oxford, Kristle (2001)). Since the online examination system is based on the Windows 2000 operating system, and IIS has more functions than PWS (Personal Web Server), therefore IIS is the chosen operating platform that is to be paired with

ASP. Next, a database system must be set up, the online examination system accesses student data and the test bank through a database, therefore ODBC must be set up for database access. Furthermore, the system employs Access (Batschelet, Margaret (2001)) to appoint the database file source (Shelly, Cashman and Kosteba (2002)).

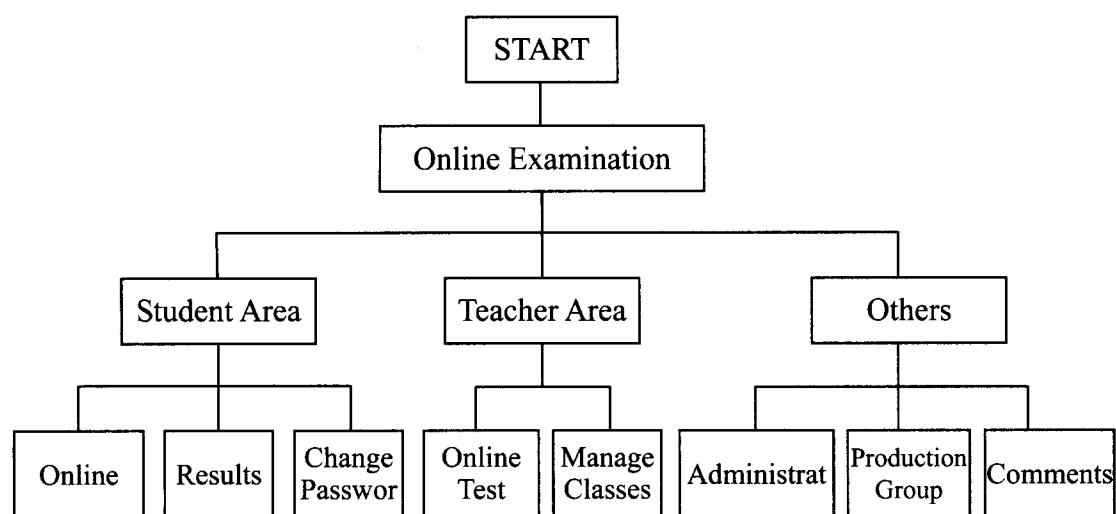
### 3. Online examination system structure

#### 3.1 System structure

The online examination system employs web-interface that people are familiar with (London, Sherry and London, Dan (2001)). It is also easy to operate so that people can easily learn to use the system (Mohler, James L.(2001)). The structure of the online examination system is as shown in Fig. 1, among which, teacher area and student area are the primary areas. These two primary areas are explained in detail in following sub-sections.

#### 3.2 System characteristics

The essential characteristics of the proposed online examination system are explained in detail below.

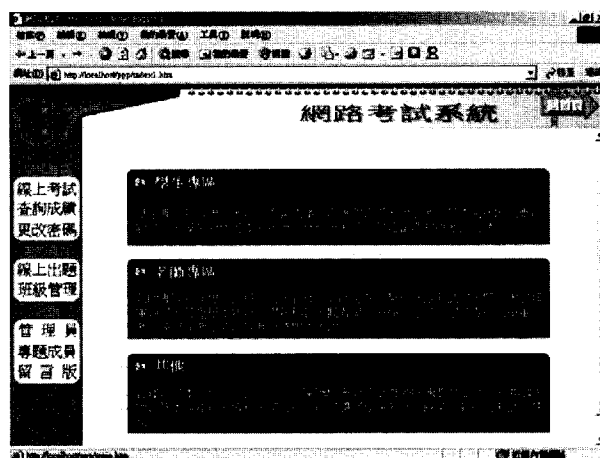


《Fig. 1》 Structure of the Online Examination

- (1) The system has simple fraud protection function; it employs random generation of the order of questions in each student's test making cheating extremely difficult.
- (2) Besides textual test questions, the questions could also be in diagram form, animations and other multimedia forms, making the test questions more diverse.
- (3) The time limit of a test is set by the teacher; hence students will not be able to login after the time is up.
- (4) Teachers can set durations for a test; the clock begins when a student login to the test; when time is up, the system automatically submits the tests.
- (5) A student cannot login again once the test has been submitted. In other words, the system prevents re-taking of tests.
- (6) Teachers while still setting questions for a test may at any time add or delete questions. They can also edit previously set tests.
- (7) Both teachers and students can check test results online through the simple interface.
- (8) All test questions are open for sharing, and they can be edited at any time.
- (9) A test can be generated automatically from the test bank by specifying the chapter and the number of questions in a test.
- (10) Statistical analysis can aim at a particular test to determine the average score scored by students on a particular test, which is used by teachers as reference material to remedy teaching.

### **3.3 Structure and analysis**

The structure of the online examination system interface consists primarily of a banner on top, dynamic buttons on the left, and then the contents. The index page holds brief descriptions of the primary areas, as shown in Fig.2. Under each of these primary areas, are their detailed structure and their sub-sections.



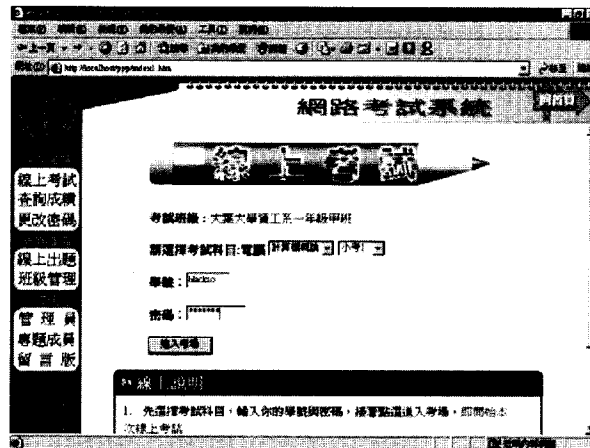
《Fig. 2》 Home Page

## 4. Online introduction of the Online Examination System

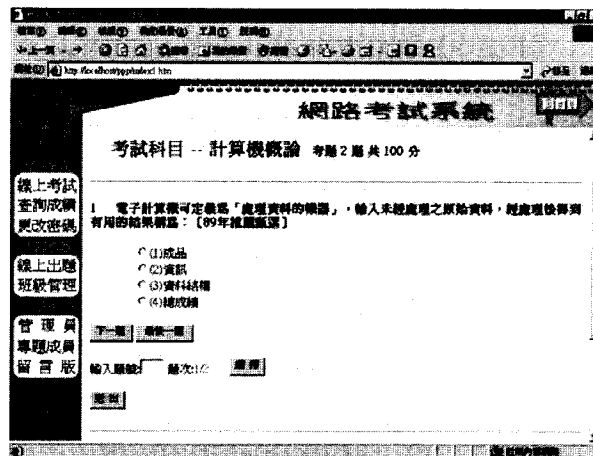
### 4.1 Instructions to online testing

Click on the top left corner of the index page to login to the online test. The online test page is as shown in Fig. 3. Before a student enters the initial page of the test, the system will ask the student to enter his class and the test topic, and then the initial page of the test will be displayed. At this time, the system will display the student's class and available test topics. Then the system will ask for the student's ID and password to perform identity check. The examination rules and instructions too will be displayed, as shown in Fig. 4.

At the end of the examination, the system grades the tests, and automatically enters the results into the system database, saving teachers' time. Besides, the system also automatically builds individual files for individual students' result, so as to allow all students to check their test results at any time.



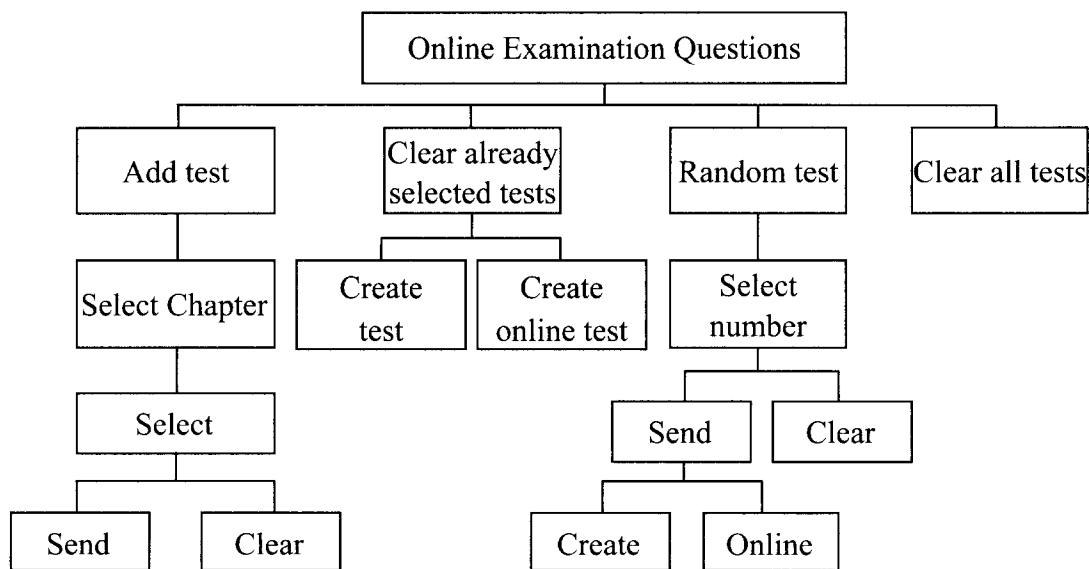
《Fig. 3》 Initial page of online test



《Fig. 4》 A test page of 'Computer concepts' of online examination

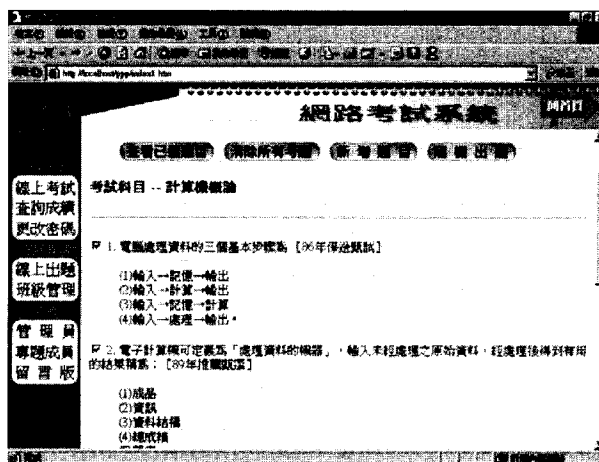
#### 4.2 Design structure and analysis of online examination question setting

The online examination question setting is the core of the online examination system, and the structure of the online examination setup is as shown in Fig. 5.



《Fig. 5》 Structure of online examination question

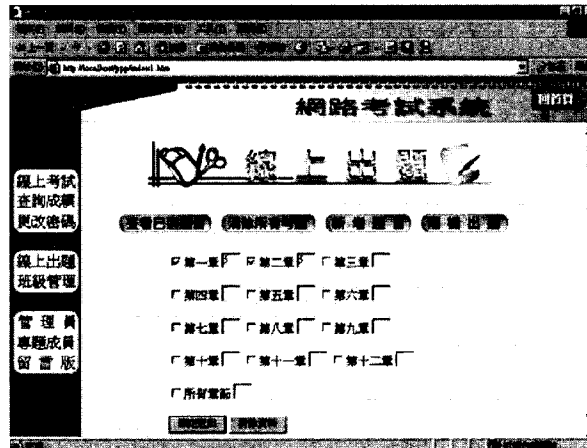
Teachers set tests through the online examination question setup. Here, teachers can set the tests as desired, and the tests are used for online examinations, as shown in Fig. 6.



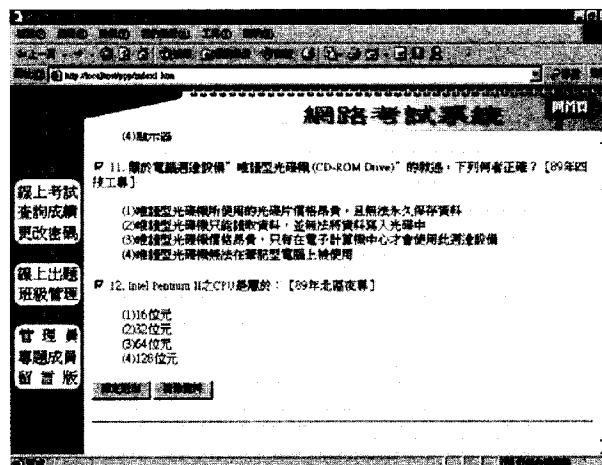
《Fig. 6》 Online test setup page

Methods of setting questions include ticking questions from the test bank and random selection of questions. In random selection of questions, the system automatically selects test questions from the test bank through random selection. Teachers may check the resulting selection, as shown in Fig. 7 and Fig. 8. Teachers may also choose to personally select the test questions; the system will automatically generate a Word file; teachers need only print the Word file out.





《Fig. 7》 Random test chapter selection page



《Fig. 8》 Random test questions selection page

### 4.3 Adding new questions to the online test

The test format can be set by the teacher or new questions can be added. If a desired question is not included in the test bank, teachers may choose to add new questions to the test bank, which is shared by all teachers. Then enter the question and options, and enter the answer, as shown in Fig. 9.

新增考題(作業系統)		考題 0 題
題目:	下列何種狀態不為作業系統中處理Process之基本狀態?	
選項 1:	Running	
選項 2:	Ready	
選項 3:	Wait	
選項 4:	Input	
選項 5:		
詳解:		
章節:	1	
解答:	4	

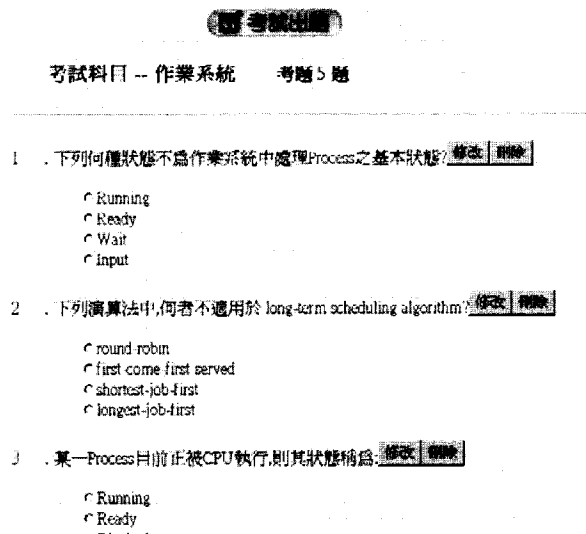
《Fig. 9》 Add new questions page

After confirming the new test questions, the system will inform the teacher that the new questions had been added, as shown in Fig. 10. The system can then automatically generate new questions.

考試科目 -- 作業系統題庫	
新增考題完成	
<input type="button" value="新增考題"/>	<input type="button" value="編輯考題"/>

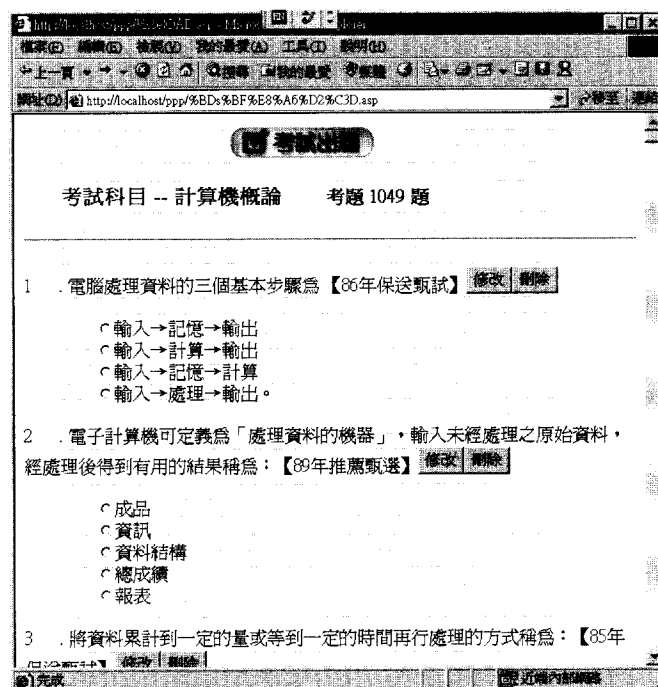
《Fig. 10》 Add new questions completed page

Selecting edit test questions in Fig. 10 will display the selected questions. If you repeat the above action and enter an additional five questions, the system will display an edit and delete button after each question, as shown in Fig. 11. This allows teachers to edit or delete questions as per requirement.



《Fig. 11》 Add new questions model page

Besides, the online examination system in order to allow teachers to save time on setting test questions, has a test bank from which teachers can select test questions, alter them and then the test is ready, saving teachers' precious time. Currently, the topic included in the test bank is computer concepts. Teachers can choose from more than one thousand questions on computer concepts from the test bank, as shown in Fig. 12.



《Fig. 12》 internally built question bank page

## 5. Conclusion

In future, the internet world will have an even closer relation with our daily lives, and online teaching and online examination are the direction towards which the academic circle will move. An online examination system does not have the limitation of time and place. Users can arrange their examination time in accordance to the progress of their lesson. At the same time, since the test is graded by computers, time which would have been required in case of manual grading is saved. Test takers can check the test solutions immediately after the test, thus letting students know their mistakes and work to correct them. We believe that online examination system is the inevitable future trend.

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