Design and Implementation of English Reading Examination System Based on WEB Platform

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Abstract—For the self-assessment and practice-based improvement of students' English reading level, this paper designed an English reading test system based on the WEB platform, which will enrich the methods for students to improve their reading ability and will advance the informatization level of English tests. The system adopts the browser / server architecture with the back-end database SQL Server as the database management system and C # and ASP.NET as the programming language to meet multiple needs of English reading examinations and achieve the informatization management of English reading examinations. The design and implementation of the English reading examination system based on the WEB platform will not only improve the efficiency of the examination management, but also drive students to actively learn English reading, with certain application value.

Keywords—Web platform, English reading, C # and ASP.NET, SQL Server, The Examination System

1   Introduction

As the most frequently used language in international finance, trade, industry, information and diplomacy, English plays an increasingly important role in international exchanges [1]. As the accelerating opening up to the outside world by China, more and more people are learning English. There are extensive ways and skills to improve the English level, of which reading is one of the most powerful weapons and also one of the only ways to learn English. Reading ability is an important indicator to determine the level of a foreign language. Therefore, rapidly improving the English reading ability, namely reading fast with good understanding, is the goal of many students [2]. Nowadays, in the era of knowledge and information explosion, the society and economy experience increasing changes and development with more and more frequent international exchanges, all towards the global integration, driving huge demands for foreign language talents and posing higher requirements for the quality of foreign language talents. In such a context, it has always been the primary task of college English teaching to cultivate and improve students' English reading ability.

English reading ability is the key to analyze knowledge and information, while the domestic college students show weak English reading ability with low reading effi-

ciency and speed. In English examinations, students mainly lose on reading, due to limited vocabularies and lack of reading exercises and targeted examinations to cultivate students' reading ability, with the latter being the main reason. The traditional English reading examinations have several drawbacks, such as fewer questions in the database, the slow test feedback, and lack of centralized trainings, hindering students' English improvement in terms of efficiency and time [3]. As the computer network information age comes, the computer hardware infrastructure has already met the design of the independent examination system. Then the system functional support from the software will realize the design of the English reading examination system, which makes up for the shortcomings of the traditional English reading examinations [4]. This paper first introduced the computer technologies related to the English reading examination system, and expounded the system architecture. On this basis, the paper analyzed the functional requirements of the English reading examination system in line with the research and experience, and explained the design flow of the system from the perspectives of the front-end accessing interface and the back-end data storage respectively. The realization of the English reading examination system has a great help to the improvement of students' English reading level.

2 Introduction to Relevant Computer Technologies and System Software Architecture

2.1 ASP.NET Technology and C # Language

ASP.NET is an important part of Microsoft's NGWS (Next Generation Windows Services), which brings a new technology and concept to the design of dynamic web sites, and performance improvement and increased productivity to web developers [5]. ASP.NET expands and enhances the functional advantages of ASP in Web development, and overcomes the limitations brought by the use of ASP in developing applications. ASP.NET is an integral part of the .NET Framework as a whole. The .NET Framework is designed to make it easier for developers to initiate web applications and Web services, featuring the provision of an environment for multi-language component development and execution [6].

ASP.NET, compared with previous web development technologies, has more powerful performance and development tools, better adaptability and recovery, higher effectiveness, superior customization and scalability, and better language support [7]. ASP.NET data operations can be realized by ADO.NET through the SQL statements. Just set the SQL statements and pass them to the database server, the data management can be achieved [8].

C # as a new type of programming language designed by Microsoft Corporation. has the following characteristics: 1. The easy-to-learn grammar; 2. Object-oriented programming [9]; 3. Close contact with and relation to the Web, and the ability of C # language to call other languages in the operating system; 4. High security and fault tolerance, namely just a small amount of codes performed can meet the corresponding functions to reduce the possibility of errors. 5. Flexibility and compatibility, namely

API and DLL functions of C # allow access to other programs with compatibility between different languages [10].

2.2 SQL Server Database

SQL database system is composed of the database and the database management system. The database is an interrelated data collection, and the database management system is a generic software system consisting of a set of computer programs. The database management system can effectively manage the database and provide a software environment that enables users to quickly and easily create, maintain, retrieve, store, access, and process information in the database [11]. This paper used the SQL database for the data management of the English reading examination system, as a distribution database [12]. Microsoft SQL Server has the following characteristics:

1. It's based on the Client / Server architecture.
2. The graphical management interface enables more intuitive and simple health care English test system.
3. It has rich programming interfaces.
4. It is compatible with other Window software, good to system expansion and integration.
5. It supports Web technology for publishing data.
6. It supports the data warehouse function, convenient for data storage.

2.3 Software Architecture of the System

The English reading examination system based on the WEB platform uses a multi-layer architecture to effectively separate the system's presentation layer, the core business logic layer, the general business logic layer, and the data layer [13]. On the one hand, it protects the system's scalability, while, on the other hand, it realized the clear division of labor in the program development work, reducing the data entry points and security risks.

From Figure 1, it can be seen that the four-tier architecture of the system goes forward on by one layer. The system's WEB UI layer provides the WEB interface for interaction with students, examiners, and teachers, while the back-end database realizes requests and interaction through WEB data to achieve data access, effectively meeting the English online test management business based on the WEB environment [14].
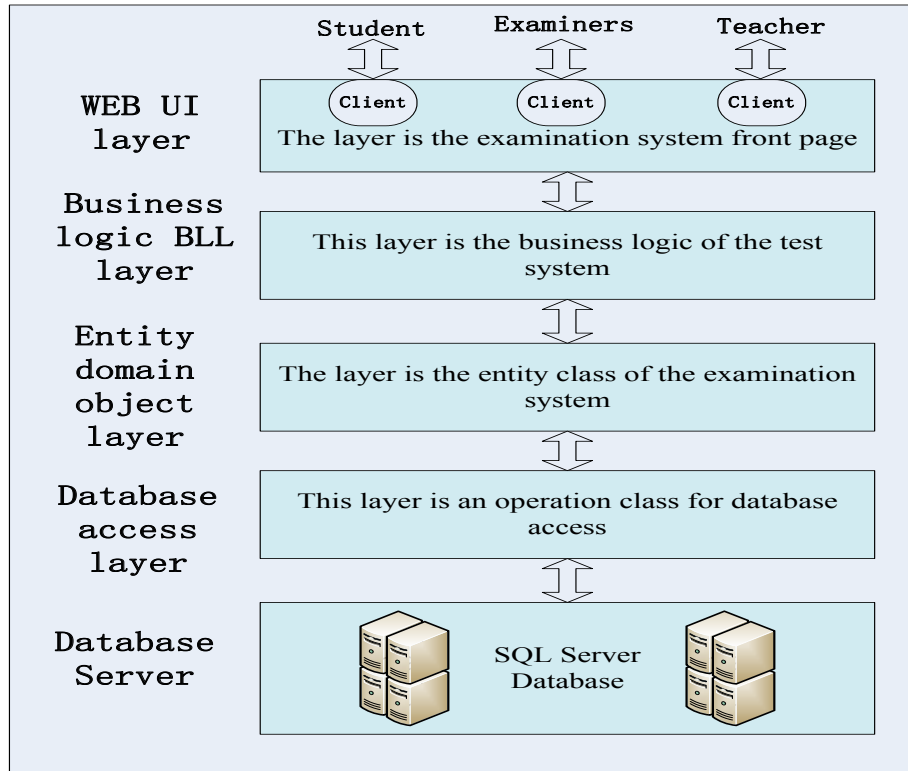
Fig. 1. The system architecture design

3 Analysis of Feasibility and Demands of English Reading Examination System

3.1 System Feasibility Analysis

At present, most of the examination management is done by manual at a low processing speed and high mistaking rate in the marking process. Thus, it is urgent to design an English reading examination system to realize the automatic exam management, marking and result announcement. In the design process, the feasibility needs to be analyzed, as shown from the following aspects.

System Economic Feasibility Analysis. As hardware and management costs involved in the system development are lower than expenses in examination organizations and scoring and exam management staff long-term labor costs, the system development is quite economical. From the long - term perspective, they system not only speeds up the English reading examination data processing efficiency, but also saves manpower and time.

System Technology Feasibility Analysis. The Web-based English reading examination system adopts the browser / server architecture with the back-end database SQL Server as the database management system and C # and ASP.NET as the programming language, all of which can be developed and operated in Window XP, Window 7, and Window10 operating systems with lower hardware requirements. From the technical view, the design of this English reading examination system is feasible.

System operational analysis. The interface of the system developed based on C # language features simple operations, friendly human-computer interface, and flexible and variable system interface. After a short period of training, examination management staff, students, and teachers can master the operations of the system. This paper uses a reasonable system architecture and personalized system interface whose operations are easy to learn, meeting the system's design requirements.

3.2 Analysis of System Overall Functional Requirements

The business process of the English reading examination system can be divided into the following parts:

1. Teachers write various types of English reading questions, import questions, and maintain the question bank.
2. Teachers generate test papers on-line, and set the examination time, the number of questions and the point of each question.
3. The system generates sample test paper for teachers to review who will remove papers they are not satisfied with.
4. The administrator manages the information of students and the administrator, and can add, delete, modify and query students. Also, administrators with differentiated authorities can be set to supervise different back-end modules.
5. Students who have been identified as examinees can take the exam and inquire about the previous examination subjects, and other students may carry out the results inquiries [15].

The business flow chart of the English read examination system is shown in Figure 2.

The English online examination system solves the problems brought by the arrangement of the examination rooms and the preservation of the test papers, and uses the database software system and the information flow management mode to meet the demands for the English reading examination system [16]. Also, the demands for the system's data flow diagram (DFD) are analyzed to model the system, including the top-level DFD, the second layer DFD, the student management process, the examination management process, etc.
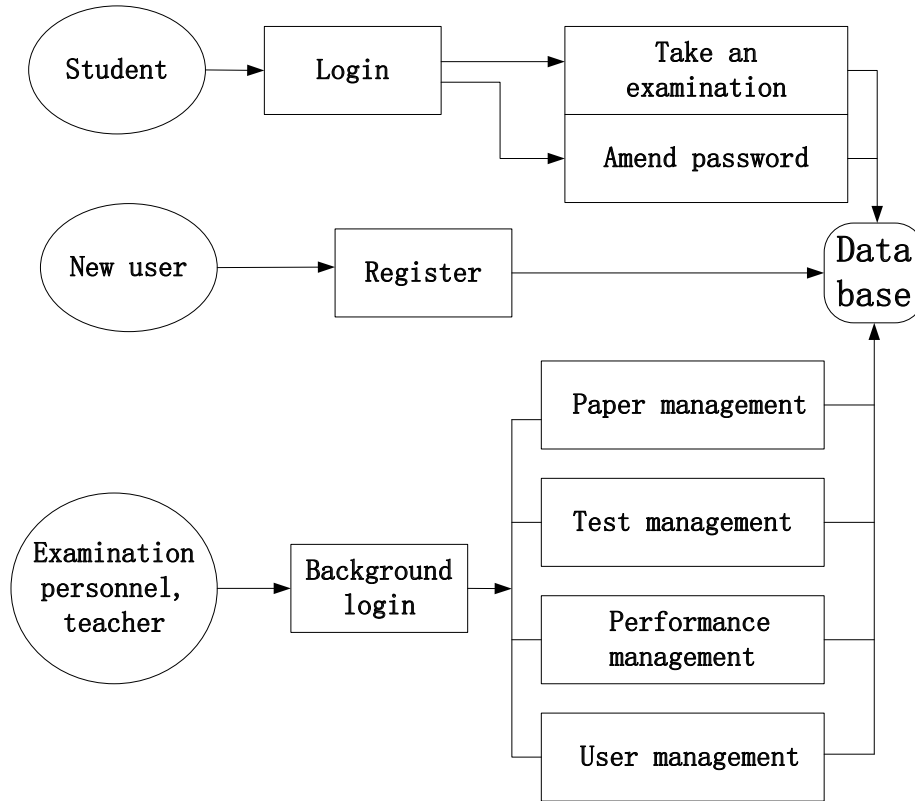
Fig. 2. English reading test system business flow chart

4 Design and Implementation of the English Reading Examination System Based on WEB Platform

The English reading examination system is designed to improve the efficiency of examination management and provide students and managers with a convenient platform to meet the demands for English reading examinations. This section starts the system design work according to the system function requirements in the previous chapter.

4.1 Design of System Back-end Management Function

Figure 3 shows the structure of the system's back-end management function. The system is divided into user management module, question bank management module, test management module, and result management module, mainly to meet the operation requirements of the administrator for the English reading examination system.
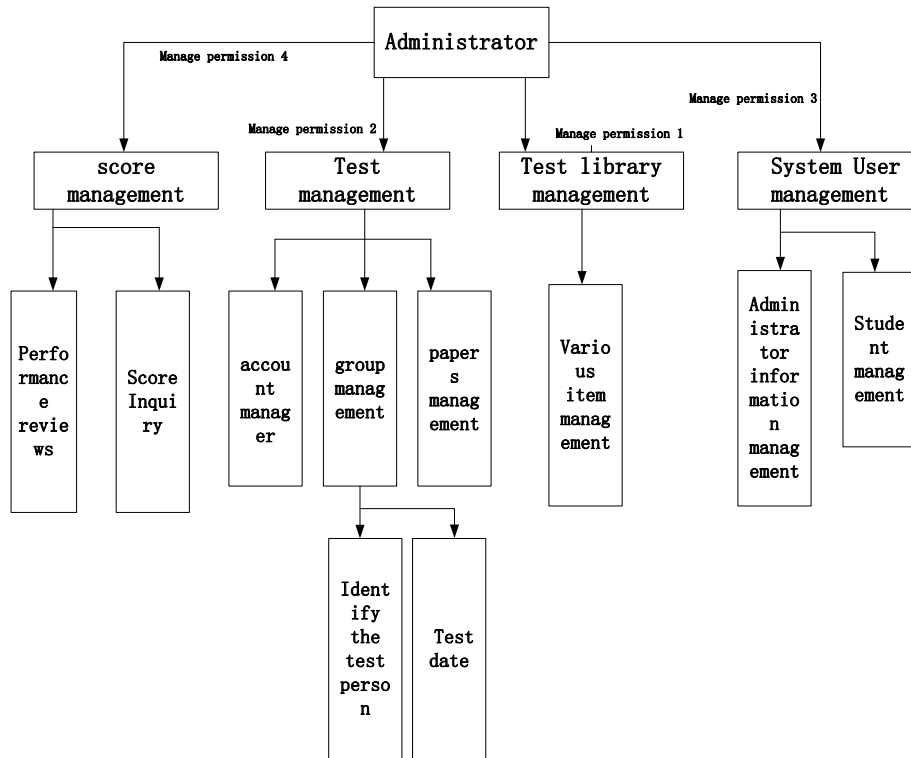
Fig. 3. The Structure of the Background Management Function of English Reading Examination System

4.2 System Function Module Design

After students register as users and set the password in front-end, they can participate in the examinations and query performance. The users' authority ensures the security of the system and the users' privacy. In line with the above analysis, the functional modules of the system designed in this paper include:

1. Test paper management module, mainly for the management of English reading test paper formulation and compiling.
2. User management module, for the administrator to manage the basic information of the students, set the system authority, examination paper information, the question bank information, the examination results, etc.
3. Result management module, offering results query for students and result modification for teachers.

The Web-based English online examination system is divided into English test scores management subsystem, English test question bank management subsystem, English test paper management subsystem and system management subsystem.

4.3 Design of the Database Structure

SQL server as the back-end database provides a comprehensive data management and analysis solution.

Design of the Database Concept Structure (E-R Diagram). For the data attribute structure, the association between the E-R entity figure and the attributes of the entity is used, including the user entity's ID, user name, password and identity, the student entity's ID, student name, test paper name and results, the test entity's ID, name, total scores and test time, and the test paper bank entity's ID, test scores, test paper name and type.

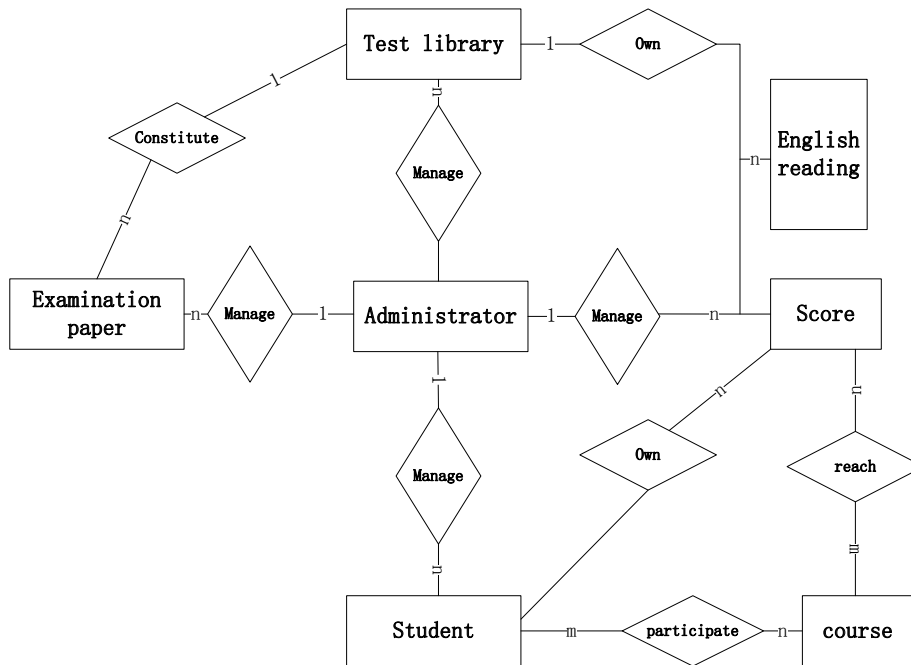Figure 4 displays the E-R diagram of the English reading examination system.

Fig. 4. System overall E-R diagram

E-R data relationship will materialize abstract data and clarify the relationship between the various entities, so that the database data storage program is simple and feasible.

Design of the Database Physical Structure. On the basis of the inter-entity relationship, the data table was used to define the physical structure of the database. Firstly, complete the table and field design for the database. The table includes the table name, the attribute name, the storage code, the field data type, the field length and notes, and the descriptive interpretation of the fields. The tables showing the physical structure of the database for the English reading system are as follows. Table 1 is the user management table.

Table 1.   User Management Table

Item	Field Name	Field description	Type	Digit	Remark
1	UserID	Identity card	varchar	20	home
2	UserName	Name	varchar	20	No empty
3	UserPwd	Password	varchar	20	No empty
4	UserType	Type	varchar	20	No empty

Table 2 is the examination management table, which records the examination time, the duration of the exam, the examinee's major and age, etc.

Table 2.   Test Management Table

Item	Field Name	Field description	Type	Digit	Remark
1	TestCode	Code	varchar	20	home
2	TestName	Name	varchar	200	No empty
3	TestDate	Date	datetime	8	No empty
4	TestTime	Time	datetime	8	No empty
5	TotalTime	Duration	int	4	No empty
6	JoinYear	Year	varchar	4	No empty
7	Grade	Grade	varchar	20	No empty
8	Term	Term	varchar	20	No empty
9	Major	Major	varchar	50	No empty

The physical structure tables also include the curriculum management table, the student information table, the test paper management table, the result management table, and the question bank management table. Different data shall be stored in different types as required, to provide back-end database support for English reading.

4.4   Realization and Testing of the English Reading Examination System

Realization of the English Reading Examination System. Under the B / S architecture in the WEB environment, users visit the English reading examination system through the browser. After verifying users' legitimacy identity, they can enter the system to carry on the corresponding operations. Fig. 5 shows the main interface of the English reading examination system.

As shown in figure 5, after login, users will enter the welcome interface, where the administrator and the examinee can select the appropriate option in the right menu to operate.

And examinees, after registration, can select the appropriate examination subjects and enter the test system, leading to the examination interface as shown in Figure 6.

In figure 6, the examinee "LMM" chose the past CET-6 test paper as an exercise. After reading through the article, LMM could choose the answer according to the understanding of the article, which would be recorded by the system. LMM would submit the examination paper after completing all the questions, and look up the scores in the "my scores" module.

At the same time, the system also has the question bank management module, the result management module, and the examination management module. All of them

have individualized system interface, which will not be introduced in details one by one.

Testing of the English Reading Examination System. After the design of the system, the white box test and black box test were respectively used to verify whether the various functional modules of the system can meet the functional requirements.

In the operating environment of i3 computer processor, 2GB system memory, 1T hard disk, and Window 7 operating system, the following test output are all qualified: user registration login, result information query and add, test bank management, and automatically scoring by the system, indicating that the system already has been qualified as an English reading examination system.
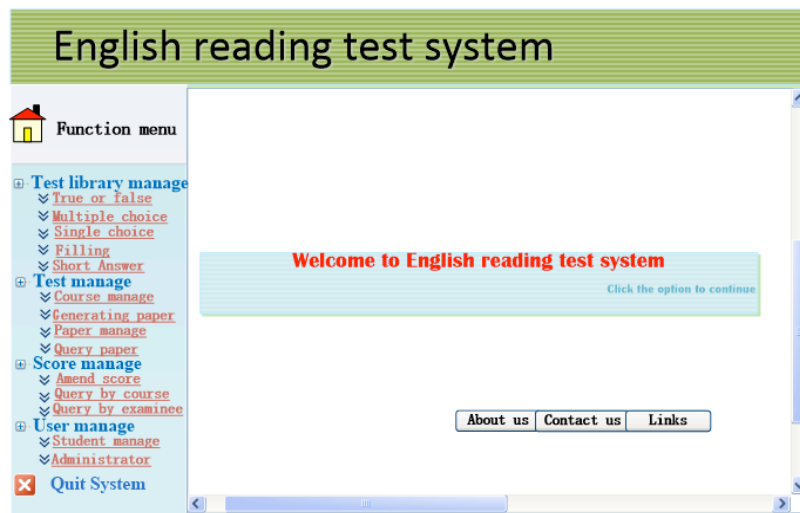
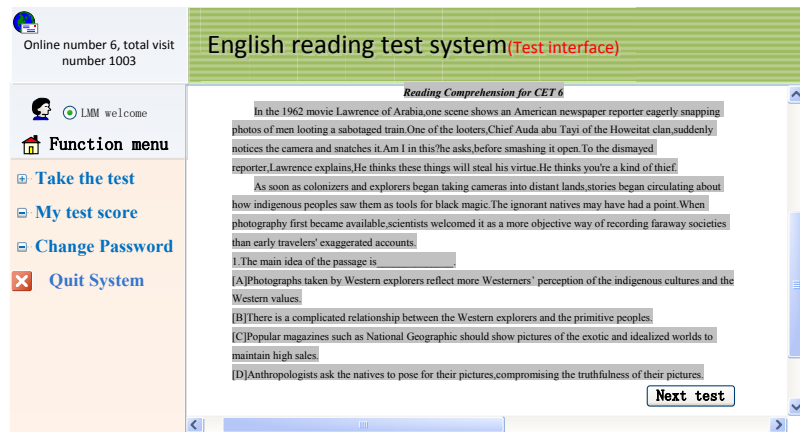**Fig. 5.** The System main interface function module diagram

Fig. 6. Student examination interface

5   Conclusion

The level of English reading is the main indicator of the level of English students. Based on the WEB platform, this paper designed and implemented the English reading examination system to realize the informationization, modernization and high-efficiency of English tests. Specifically, this paper, by analyzing the system's functional demands, started from the introduction of basic computer technology, and then interpreted in details the design concept and process of the English reading examination system, which has the following meaning:

1. The WEB-based English reading examination system benefits the English reading teaching and learning with a stable system, simple interface, and secure functions.
2. The system boasts various functions such as the English reading examination, independent question selection, automatically scoring by the system, the examiner involvement in the management, and the question bank expansion.
3. The system will on the one hand improve students' initiative to learn, but also effectively assist the English reading teaching faculty.

6   Acknowledgement

7   References

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