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Analysis and Design of University Teaching Equipment Management Information System

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Abstract: Teaching equipment management is an important factor for colleges and universities to improve their teaching level, and its management level directly affects the service life and efficiency of teaching equipment. But in recent years, our university recruitment of students scale is increasing year by year, the size of the corresponding teaching equipment is also growing, therefore to develop a teaching equipment management information system is necessary, not only can help universities to effective use of the existing teaching resources, also can update scrap equipment, related equipment maintenance, and build a good learning environment to students and to the improvement of the teaching quality of colleges and universities play a reliable safeguard role. This paper first introduces some common development tools, and then analyzes the user functional requirements and data requirements of the system, and analyzes the feasibility of the system development from many aspects, finally based on B/S mode, using Java language, JSP technology and MySQL database design and implementation of a teaching equipment management information system. The main functional modules of the system include equipment basic information management, equipment loan and return information management, equipment maintenance information management, equipment scrap information management, the interface of each functional module is shown in the paper.

Keywords: Information systems; teaching equipment management; system analysis

1 Introduction

Teaching equipment management information system as an important tool to improve the quality of teaching and scientific research in colleges and universities, it is very important for both schools and students [1]. But the present teaching equipment management demand is the traditional manual management cannot meet. Therefore, the development and use of teaching equipment management information system is urgently needed at this stage [2–5].

In recent years, our country has attached great importance to the development of education. In order to meet the overall deepening of reform and cultivate more types of talents, many colleges and universities are increasing their investment in education every year. In order to improve the teaching level, colleges and universities have gradually increased their investment in teaching equipment, both in terms of the type of teaching equipment and the number of teaching equipment. Therefore, the task of teaching

equipment management is more difficult to carry out. Therefore, the development and use of teaching equipment management information system is also a key step to improve the level of teaching equipment management [6–8].

At the present stage, the development of teaching equipment management system in colleges and universities has gradually become more information-based [9]. In terms of technology, with the development of science and technology, China's computer technology has developed gradually in most fields. The design of the system, in the development of the system selection tools, is also the choice of tools for the repeated thinking and expectations. The B/S system architecture has become the first choice for the development of this system, mainly because the technology has been used everywhere for a long time compared to other development models. Over such a long period of time, the process of use has grown very mature. Another advantage is the use of B/S-based Web applications on the Internet, which can greatly access network data resources, and can be developed quickly and easy to maintain in the future. It has certain operational security and is currently welcomed by system developers [10].

Through the analysis of the domestic situation, it is found that many college students have high scientific research ability, and some outstanding universities have also developed the related teaching equipment management system. In the process of development, the related problems are put forward and the system is explored repeatedly. These explorations and researches provide great inspiration for the design and development of this system.

With the development of The Times, the management information system tends to be more and more intelligent. Using the teaching equipment management system in colleges and universities to manage teaching equipment can effectively achieve comprehensive, systematic and scientific management. The development of the teaching equipment management system in colleges and universities is also aimed at transferring the management of teaching equipment online. Such online management mode not only simplifies the work of administrators, but also facilitates students and teachers in colleges and universities. Therefore, it is of great significance to develop an efficient, convenient, simple and practical university teaching equipment management system [11–15].

2 Related Work

2.1 Introduction of Related Technologies

The greatest feature of the Java language is object orientation. The so-called object-oriented, understandable for all the things can be abstracted as an object, the characteristics of this thing can abstract into this object's properties, and the object have functionality or need this object can have what effect, can be abstracted as a method, in this case, the operation of the object is actually similar to operate this thing. Another feature of the Java language is that it is so easy to use that the user does not need to know how the underlying Java language works at all, but only needs to develop using the tools provided. The Java language is not only convenient, but also secure and reliable to use. Moreover, it has no relation with the system installed by the client, which is mainly realized through Java virtual machine and has strong portability [16–17].

JSP, whose full name is Java Server Pages, is also fully object-oriented. JSPS form JSP files by inserting Java statements into normal web page files. This is a dynamic web page making technology based on Java language [18]. During the development of the system, JSP focuses on the use of Java language, so JSP has many advantages of Java, and has a wide range of applications. The generated JSP files and Java are very portable and can be used across platforms. Both its execution efficiency and its security are very high.

As a relational database management system, MySQL stores the data information of different objects in different data tables. For developers, the data characteristics in the form of tables are very clear and easy to understand, even for different developers. Knowing the specific results of the table and relevant information can greatly improve your work efficiency [19]. The objects and results of its operations are relationships, and each table is a primary key used to uniquely distinguish data between columns.

Compared with other larger systems, MySQL database has a lower degree of complexity. SQL language is the most commonly used standardized language for accessing databases on the market [20]. It is easy to understand and easy to use. Easy to operate, it is very suitable for beginners to learn and use.

SQLyog is a graphical management tool designed for MySQL databases. By using SQLyog, you can intuitively observe the data in the background of MySQL. And it is easy to operate, beginners can quickly learn to use. SQLyog mainly edits the data table by establishing the form of table, so users can operate and manage the database content conveniently and quickly.

2.2 Feasibility Analysis

It is necessary to analyze the feasibility of the system before it is developed. Through feasibility analysis, resources can be reasonably applied to avoid the waste of resources. After a lot of investigation and analysis, the design scheme of the system has the following three feasibilities.

Under the background of knowledge economy and information age, information management means of teaching equipment are becoming increasingly mature. From the perspective of long-term interests, school leaders and management personnel will strongly support the development of the project [19].

This system uses Eclipse development tools, uses MYSQL database to store data, and the software technology is relatively mature. This system replaces the original manual management work and reduces labor costs. The software used in this technology is all open source, saving the purchase cost.

2.3 Functional Requirement and Data Demand Analysis

The functional requirements of the system refer to the specific functions and services that users expect the system to achieve or the system can provide in advance [19]. To develop a teaching equipment management information system, we must first determine what functions the management of teaching equipment needs to achieve. For teaching equipment, such as printers, cameras, projectors, etc., First of all, it is necessary to grasp some basic information of these equipment, such as the number of these equipment, record the number, convenient storage. Teaching equipment in colleges and universities is often borrowed by teachers or students for teaching, so it needs to be borrowed and managed. Due to a long purchase time, equipment aging or equipment damage in the process of use is common, so it is necessary to manage the equipment that needs maintenance. For the equipment that cannot be maintained, it is also necessary to carry out scrap registration, re-apply for new equipment and other scrap management. Through the previous analysis, the system should be able to achieve the basic equipment information management, equipment borrowing and return management, equipment maintenance management, equipment scrap management and other basic functions. By constructing these functions, the work efficiency of management departments can be effectively improved and the information management of teaching equipment in colleges and universities can be realized [19].

The data involved in the information management system of teaching equipment in colleges and universities is relatively complex, so the target is set for the data demand of the system to ensure the establishment of a simple and practical small teaching equipment management system. The basic information of the teaching equipment in this system shall be obtained, including the number, name, model, purchase price, purchase time, manufacturer and other attributes of the storage teaching equipment. The system needs to obtain the loan and return information of the teaching equipment, which includes the serial number of the teaching equipment, the serial number of the teaching equipment in the borrowed equipment, the department where the lender is, the time when the equipment is borrowed and returned, the loan and return state and other attributes. The system needs to obtain the maintenance information of the teaching equipment, including the serial number of the teaching equipment to be maintained, the serial number of the teaching equipment, the time when the teaching equipment is taken for maintenance, the time when the teaching equipment is returned to the warehouse after the maintenance, the contact number of the repair, the maintenance state and other attributes. Scrap information of teaching equipment should be obtained in the system [19]. Scrap information includes the serial number of teaching equipment, serial

number of teaching equipment, reasons for scrapping, time of scrapping, scrap state and other attributes. In this system, the user entity, basic information of teaching equipment, borrowing and returning of teaching equipment, maintenance of teaching equipment and scrapping of teaching equipment are defined. There are many-to-many relationships between user entities and basic information of teaching equipment, between user entities and borrowing and returning of teaching equipment, between user entities and maintenance of teaching equipment, and between user entities and scrapping of teaching equipment.

3 Design

3.1 System Function Module Design

The analysis method of function module design of this system is "from top to bottom, step by step refinement". After understanding the specific needs of teaching equipment management in colleges and universities, the overall functional module composition of teaching equipment management system is further determined. The system mainly consists of four sub-function modules: basic information management of equipment, borrowing and returning information management of equipment, maintenance information management of equipment and scrapping information management of equipment. Each module completes different business functions independently and is connected with each other through common modules. The function module diagram of the system is shown in Fig. 1.
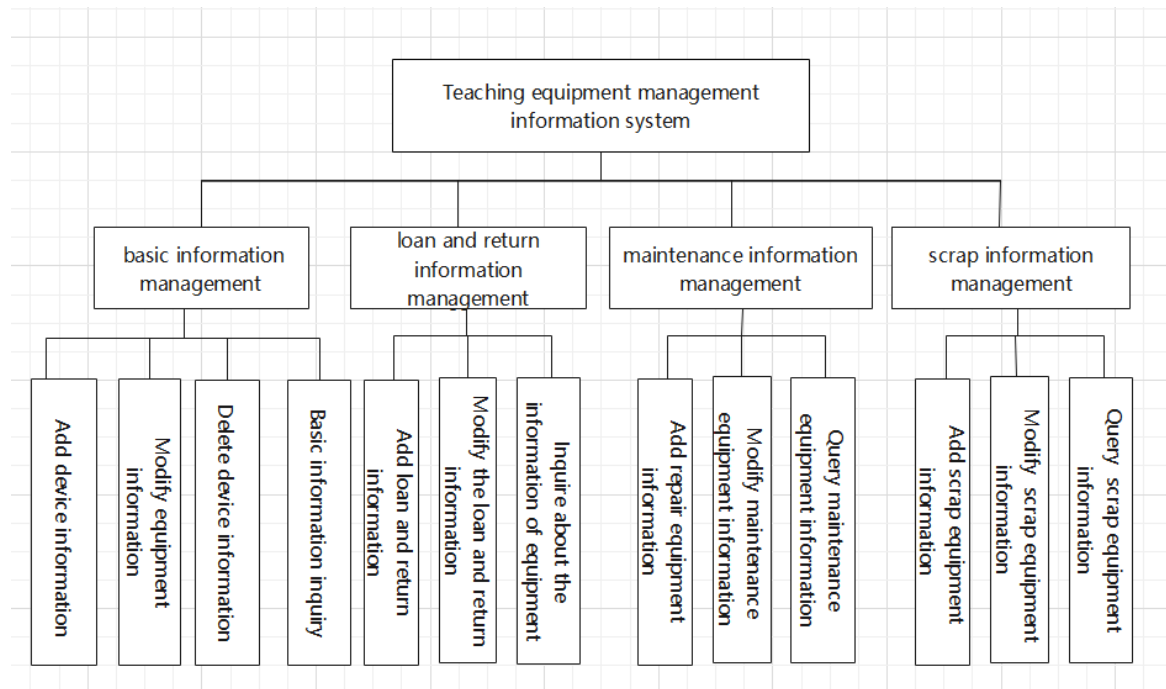

Figure 1: Teaching equipment management system function module

3.2 Conceptual Model Design

There are many-to-many relationships between user entities and basic information of teaching equipment [9], between user entities and borrowing and returning of teaching equipment, between user entities and maintenance of teaching equipment, and between user entities and scrapping of teaching equipment. A user can manage the basic information of multiple teaching equipment, borrowing and returning of teaching equipment, maintenance of teaching equipment, scrapping of teaching equipment; Accordingly, the basic information, borrowing and returning, maintenance and scrapping of a teaching equipment can be managed by multiple users.

The database contains five data tables. The deviceId(Integer) field is created in the equipment basic information data table, equipment loan and return data table, equipment maintenance data table and equipment scrap data table.

Check the serial number of the device borrowing and returning status through deviceId; the equipment maintenance table can check the maintenance status serial number through deviceId; the equipment maintenance table can check the serial number of scrap status through deviceId. The deviceId field is set in the three tables, and the complete information of the teaching equipment is displayed in the basic information table by inquiring the status of the teaching equipment.

4 Implementation

According to the design and function of the system, this chapter will realize the main functions of the teaching equipment management system. The following will show various interfaces, including the home page, the basic information management page of equipment, the information management interface of equipment borrowing and returning, the information management interface of equipment maintenance and the information management interface of equipment scrapping.

The login section of the login page is three Inputtext boxes for entering the username, password, and authentication. The login and reset buttons are set below. The login page is shown in Fig. 2.
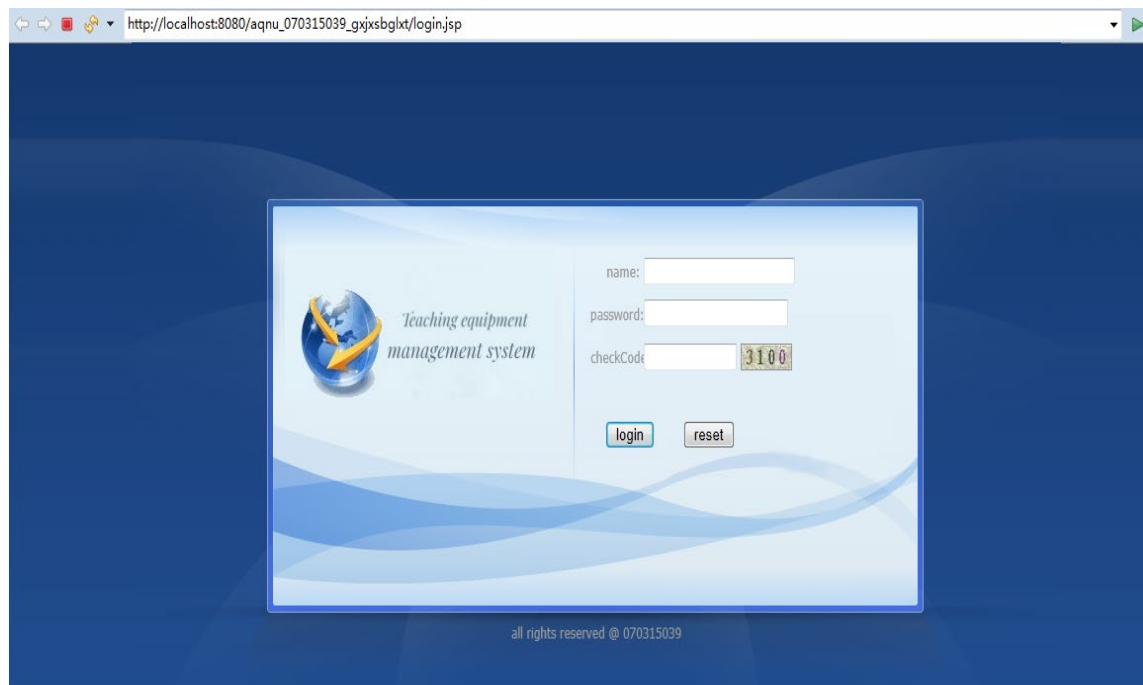

Figure 2: Login page

The main page is divided into two parts, the upper part mainly displays the system name and the current user's user name. The lower left part shows the navigation menu bar, the right part shows the home page. The menu navigation bar adopts the tree menu. The main page is shown in Fig. 3.
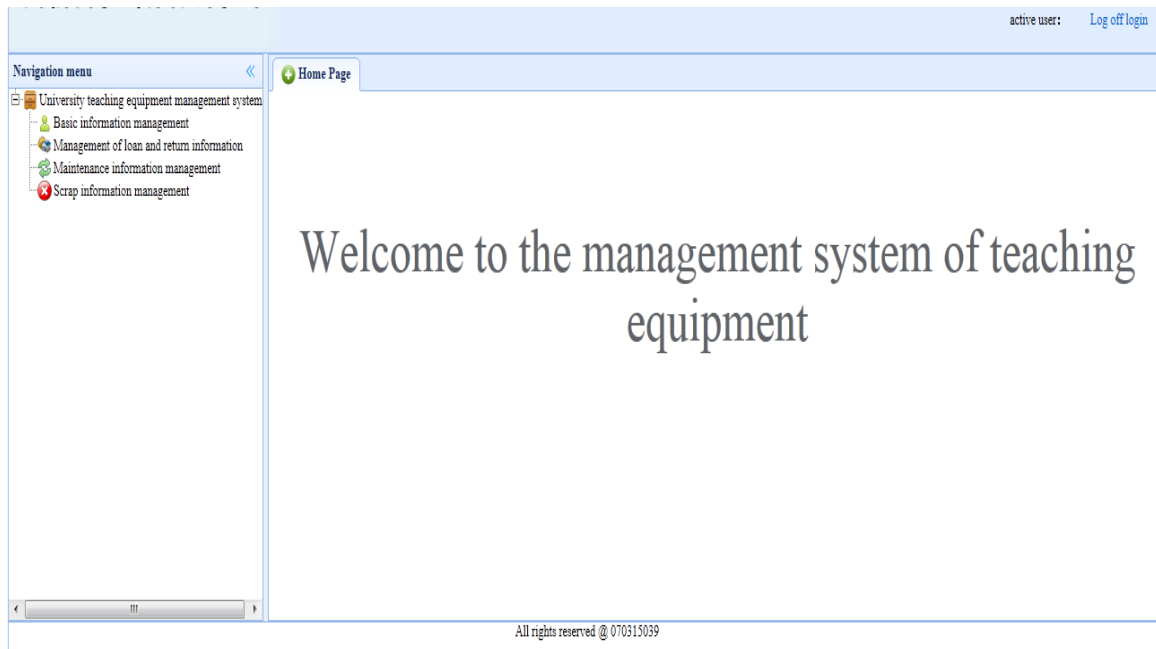
Figure 3: The main page

The basic information management page of equipment is mainly used for adding, modifying, deleting and inquiring functions of teaching equipment. The basic information management page is shown in Fig. 4.

Figure 4: Device basic information management page

The equipment borrowing and returning information management page mainly performs the functions of renting, returning and inquiring. During the return process, it is necessary to determine whether the teaching equipment has been returned. If the equipment has been returned, it will be

prompted that the return fails. The equipment borrowing and returning information management page is shown in Fig. 5.
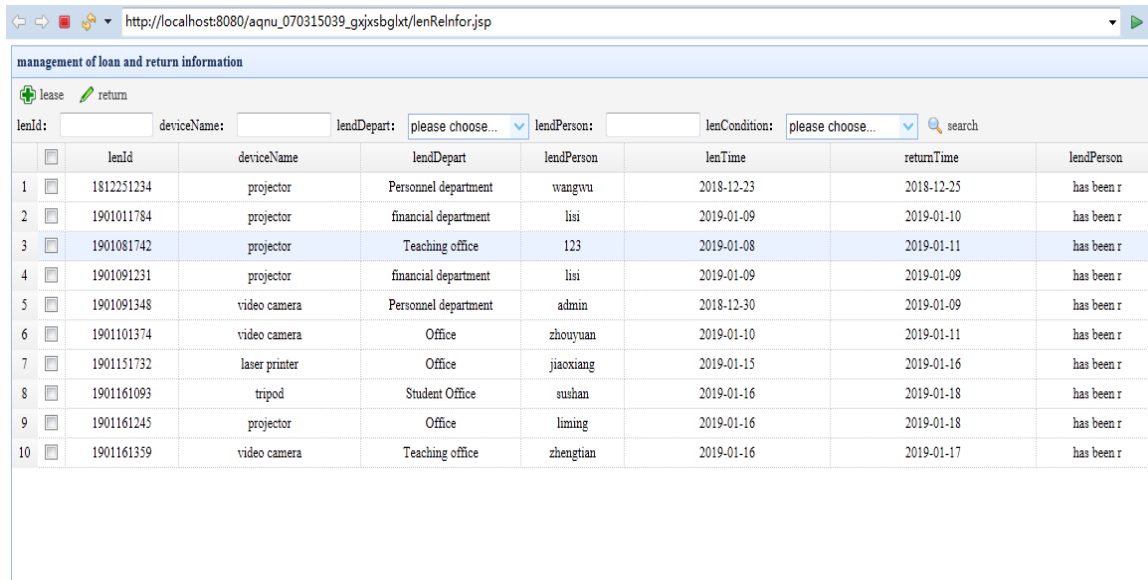

Figure 5: Device return information management page

Equipment maintenance information management page mainly for repair, repair and query functions. It is also necessary to determine whether the teaching equipment has been repaired. If the equipment has been repaired, it will be suggested that the repair fails. Equipment maintenance information management page is shown in Fig. 6.
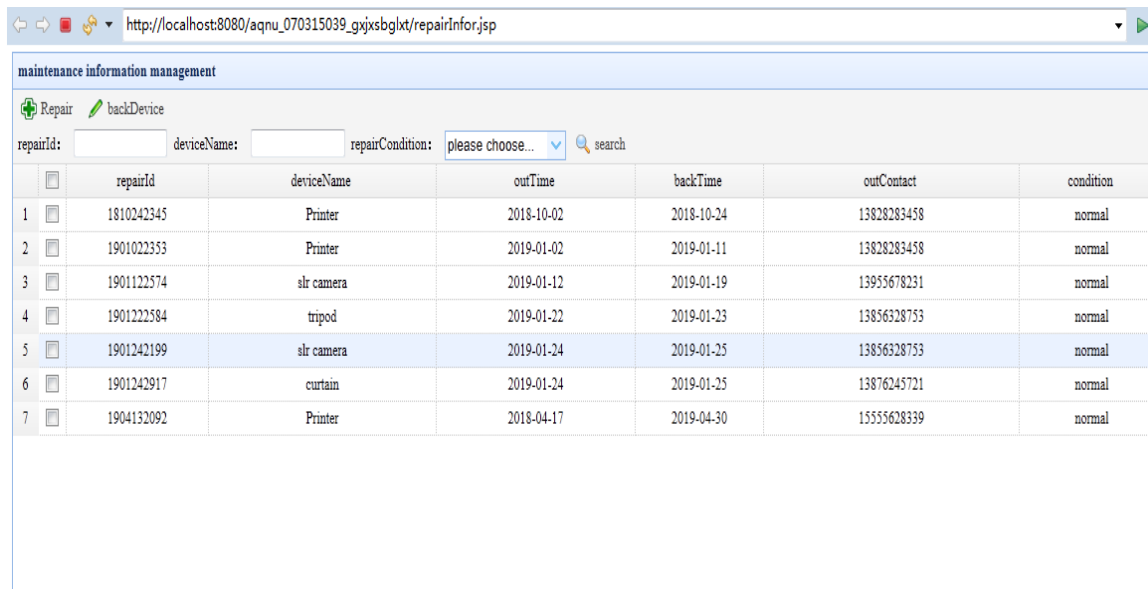

Figure 6: Equipment maintenance information management page

The equipment scrap information management page is mainly for adding, modifying and inquiring functions. When adding the information of scrapped equipment, it is necessary to input the serial number,

scrapping time and scrapping reason of the equipment. The equipment scrap information management page is shown in Fig. 7.

Figure 7: The equipment scrap information management page

5 Conclusion

Tomcat server is used in this paper, B/S three-tier structure, combined with MySQL database and JSP technology to develop the system. Based on the analysis of the various requirements of the system, the design of the teaching equipment management system in universities is carried out. System development is a process of continuous improvement, in addition to the improvement of the current system problems, there are still some imperfections. The advantages and disadvantages of the system are described below.

The realization of this system effectively improves the efficiency of teaching equipment management in colleges and universities, realizes the standardized and scientific management, and reduces the work cost of basic management of teaching equipment. With the help of the related technologies introduced in this paper, the developed system provides more advanced management technologies and efficient and convenient services for students and administrators in colleges and universities. At the same time, in the four functional modules of information management of teaching equipment, all support to inquire the status of teaching equipment, which can clearly see the current status of teaching equipment, and effectively improve the efficiency of management work. But at the same time, due to the limited development time of the system, in the face of the actual management work, the function of the system is not perfect. For example, in the actual management process, after the scrapping of equipment is registered, it is necessary to generate a report and apply for scrapping. After the application is approved, it will be classified as scrapped equipment. This system does not consider the report generation function. At the same time, it is also necessary to output the information of teaching equipment, and this system lacks the report form output management function of basic information, borrowing and returning information, maintenance information and scrap information. In the future, we will solve these problems and gradually improve the system.

Conflicts of Interest: The authors declare that they have no conflicts of interest to report regarding the present study.

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