The construction of engineering training information education platform based on UML modeling.

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Abstract. In order to construct the information engineering training practice education platform under the background of Internet + in Jilin University, this paper introduces UML modeling, carries out object-oriented analysis and design, simplifies the complexity of the experimental teaching information management cloud platform system, innovates the system development process, realizes the information technology upgrading of engineering training, and leads the scientific and technological change in the field of engineering training center construction.

Keywords: Information education; Engineering training; System development; UML modeling analysis.

1 Introduction

In recent years, with the wave of a new round of scientific and technological revolution and industrial revolution coming, China is vigorously promoting the innovation-driven development of education [1]. This provides new ideas and new requirements for the optimization and reform of engineering training practice education in colleges and universities. At present, the management mode of the traditional engineering training center is still mainly manual. At the same time, there is also a lag and deviation in the transmission of information [2,3].

Therefore, the construction of the information education platform of the engineering training center can not only deepen the teaching reform of higher education, improve the quality and efficiency of the industry-university-research collaborative education model, but also promote the construction of the modern engineering training center in the new era.

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2 The architecture design of information engineering training education platform

Taking the engineering training center of Jilin University as an example, the architecture design of engineering training information education platform is mainly composed of two parts: software system and hardware system [4].

2.1 Software system

The software part of the information education platform of the Engineering Training Center of Jilin University is mainly composed of the following four subsystems: laboratory management system, safety education system, teaching system and service system. As shown in fig.1.

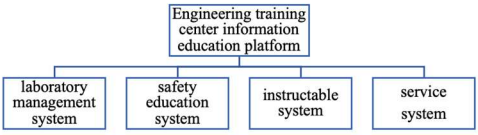

Fig. 1. Software part subsystem composition

2.2 Hardware system

The hardware system of the information education platform of the Engineering Training Center of Jilin U The hardware system mainly realizes intelligent control through the Internet of Things [5]. At the same time, it uses computer control as the core, equipped with mobile phone clients, and creates a visual platform. As shown in fig 2.

Fig. 2. Information platform IoT architecture

3 The construction scheme of information engineering training education platform

3.1 System Development Environment

The specific configuration of the laboratory management system is as follows: Intel (R) Core (TM) i5-2400 CPU @ 3.10 GHz processor, memory of 3.96 GB, hard disk space of 500 GB, hp DVD DH16D5S optical drive and AMD Radeon HD 6570 graphics card. This configuration can meet the requirements of system throughput and stability, and the later maintenance of the configuration is more convenient, which greatly improves the service life of the system.

3.2 UML modeling analysis

3.2.1. Use case analysis.

UML (Unified Modeling Language) is a common programming language. For UML modeling of the laboratory management system, the first step is to complete the use case analysis. Taking the laboratory management system as an example, the use case diagram should include system, user, use case and the relationship between use case. Among them, the user includes students, teachers, and administrators [6-8].

In the face of users with different identities, the system 's open permissions are also different. When the user is a student, the system needs to open laboratory information management, resource management and appointment management functions. The use case diagram is shown in fig.3.

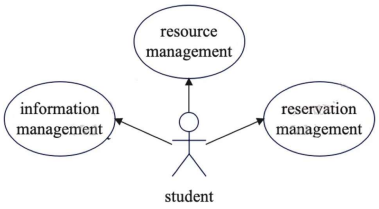

Fig. 3. Student role permissions use case diagram

When the user is a teacher, the system needs to open laboratory information management, resource management, reservation management, project management and equipment management and other permissions. The use case diagram is shown in fig.4.

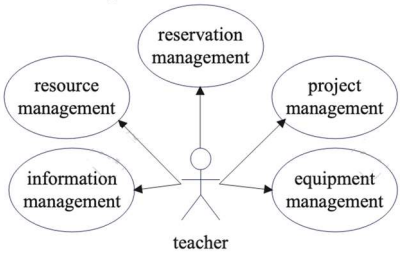

Fig. 4. Teacher role permissions use case diagram

When the user is an administrator, the system needs to open all permissions to it. Based on the teacher 's authority, the system personnel management function is added. At the same time, the system must perform user management and data maintenance. The use case diagram is shown in fig.5.

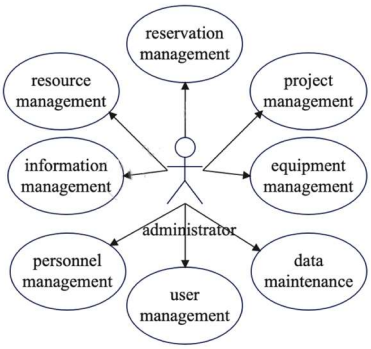

Fig. 5. Administrator role permissions use case diagram

According to the use case analysis, the UML model is obtained, and the time sequence of messages transmitted between objects is expressed by the time sequence diagram. Taking the administrator with the most complex functions as an example, the fig.6 shows the administrator function sequence diagram.

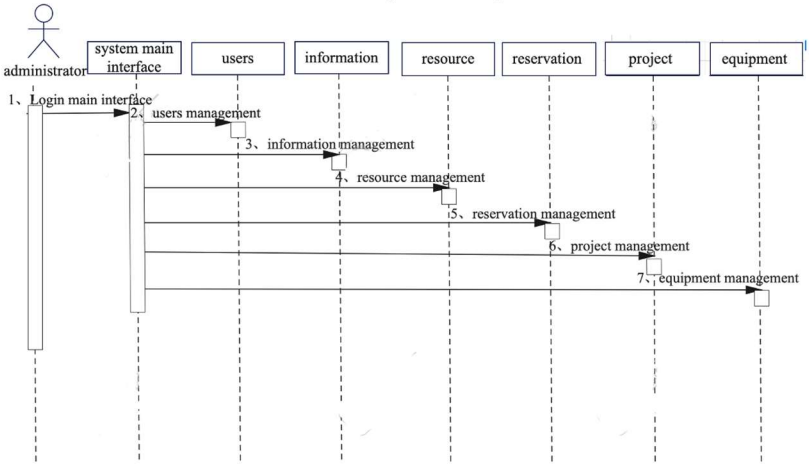

Fig. 6. Sequence diagram of function module of administrator

3.2.2. Domain class analysis.

After completing the use case analysis, we will analyze the database of the laboratory management system and use UML modeling domain class analysis to transform the events and actions in the system into the relationship between domain classes. The domain classes involved in the laboratory management system mainly include user (User), laboratory information (LabInfor), experimental resources, experimental projects

(LabPro) and laboratory reservation (LabAppo). When modeling, the domain classes involved and the relationship between them are represented by the domain class diagram, as shown in fig.7.

3.3 Database design

The database design of the laboratory management system is to construct the optimal database model under the specified application environment, to realize the storage data to meet the needs of different users. Database design is mainly divided into creating database and creating database tables and fields [9,10]. Login Microsoft SQL Server Management Studio, connect to the server side, you can create a database. The database table is the basic unit for storing data. It is a database object that contains all the data in the database. Taking the user system database design as an example, according to the design requirements and actual needs, the design of the user system database table and field is completed, as shown in Table 1.

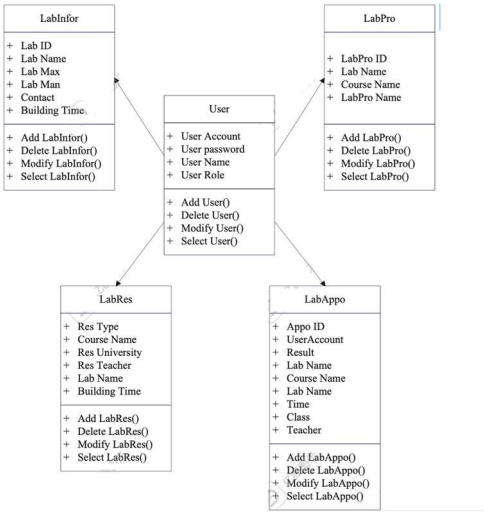

Fig. 7. Domain class diagram of laboratory management system

Table 1. User system database tables and fields

No.	Field name	Data structure	Description
1	Account	Varchar (10)	Account
2	Password	Varchar (20)	Password
3	Name	Varchar (10)	Name
4	Role	Varchar (10)	Role

3.4 Feasibility validation

The feasibility of the system is based on the function and the realization of its supporting conditions and other factors, to determine whether the system can be realized. Feasibility verification includes technical feasibility, operational feasibility, and economic

feasibility. Using C / S architecture for development, C # programming, database management using SQL Server 2005, the server using Windows Server 2003 operating system is technically feasible. After analysis, users only need to install the software of the system and log in their own accounts to realize the operation. The process is simple and convenient and has the feasibility of operation. The informatization engineering training education platform will fully realize the informatization, digitization, intelligence, and modernization management of the engineering training center. The benefits realized by the platform are considerable and economically feasible [11].

4 The application effect of information education platform

Through UML modeling analysis and database design, an information-based engineering training and education platform is constructed, which realizes the digital control of intelligent equipment in the engineering training center and improves the resource utilization of training equipment. At the same time, more than 3700 students from 6 colleges who participate in engineering practice every year also benefit from the education platform, which realizes the whole process management of practice and teaching, as shown in Fig 8.

Fig. 8. Engineering training information management platform interface

5 Conclusion

Through UML modeling analysis and database design, an information-based engineering training and education platform is constructed, which realizes the digital control of intelligent equipment in the engineering training center and improves the resource utilization of training equipment. The emergence of UML modeling method provides a powerful help for the construction and design of information system. This method innovates the development and function realization of information education system and helps the construction and application of information engineering training and education platform of Jilin University. It is the cross integration of communication technology, network technology and manufacturing technology in today 's era, and realizes the

informationization, digitization and intelligent management of engineering education system.

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