The Establishment of Network Teaching Platform Model based on UML

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Abstract. As a visual modelling language, UML relieves many problems of software development, and it improves the software developing process by object-oriented analysis and design method. In the background of network teaching, this paper establishes a model of network teaching platform based on UML. Combined with the fact of colleges and universities, this paper investigates and analyses the network teaching's current situation and developing tendency deeply. At the same time, it builds a model of network teaching platform, and describes the use-case diagram, class diagram, sequence diagram of relevant scene in detail.

Keywords: network teaching platform, model, UML.

1. Introduction of Network Teaching

With the popularization of computers and networks, digital technology is changing the social environment on which human beings depend, making the living and working environment of human beings possess more digital characteristics, and bringing about tremendous changes in the way of human life and work.

On this basis, the concept of digital campus was born. "Digital Campus" is a new digital working, learning and living environment which integrates teaching, management and entertainment under the background of campus network [1]. It uses computer technology and network communication technology to digitalize all aspects of information resources in school, such as teaching, scientific research, management and life service, and integrates these information resources scientifically and normatively, to form a unified user management, unified resource management and unified authority control. And through organization and business process reengineering, it promotes school system [2].

In 1990, the Campus Computing Project, a large-scale scientific research project initiated and sponsored by Kenneth Green, a professor of Claremont University in the United States, was the earliest appearance of the concept of digital campus. Over the past decades, digital campus has developed rapidly in the world. At present, many universities and colleges have established wireless networks. The services offered to students on the Internet include online courses, online course registration, online magazines and reference materials, etc. They have basically completed the transformation from traditional education to digital platform education. In recent years, the construction of campus digitalization in China has also developed rapidly. The construction of campus network in famous universities such as Tsinghua University and Peking University began in the early 1990s. After nearly three decades of construction, a high-speed campus network has been basically built, which includes academic research, network teaching, information resources, community service and office management, and distance education.

2. Current Situation of Network Teaching

The network teaching management platform is the support platform of modern distance education based on Internet. It provides support tools of teaching process such as teaching, learning, answering questions, discussing and homework processing for learners and educators.

At present, most products on the market can provide relatively complete solutions, such as Web Course Tools developed by the Department of Computer Science of the University of British Columbia, Virtual-U developed by Simon Fraser University of Canada, Learning Space of Lotus Company, Smart Force, Digital Think, IACKBOARD, SYBA and so on. Domestic network teaching management platform is mainly based on the company's participation in development. It is widely used in the sky classroom network teaching management platform, Tsinghua network teaching

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management platform, Beijing remote prosperity platform, etc. These products support autonomous learning and real-time learning[3]. Most of them have the ability of curriculum publishing, tracking and management. Some products also have integrated curriculum content and creation tools, which enable teachers to focus on integrating teaching content and provide users with flexible and rich learning experience. At the same time, these network teaching management platforms also have the following problems more or less. Firstly, the dynamic interaction function of teaching environment is not strong. Sencondly, it's lack of support for multi-disciplinary system. Thirdly, it's lack of online testing system. Fourthly, it's low intelligence or insufficient support for network collaboration and so on.

In view of the above analysis, we can see that the development of network teaching management platform has not yet formed a recognized model system. Therefore, the study and attempt to establish a model system suitable for the network teaching management platform are significant, which can practically promote education informatization.

3. Analysis and Design of Network Teaching Management Model

This paper mainly studies and tries to establish a model system suitable for the network teaching platform of colleges and universities.

In the specific research process, the UML modeling mechanism is adopted, the object-oriented analysis and design method is applied to the development of the network teaching platform, and the UML modeling of the platform is completed by using Rational Rose tool.

UML(Unified Modeling Language) is a well-defined, easy-to-express, powerful and universally applicable modeling language. It integrates new ideas, methods and technologies in the field of software engineering. Its scope is not only to support object-oriented analysis and design, but also to support the whole process of software development starting from requirement analysis [4].

This paper mainly elaborates how to use UML modeling mechanism, starting from the demand analysis of network teaching management platform, and gradually establish its use-case model, static model and dynamic model. In the static modeling stage, we focus on how to identify the things involved in the network teaching management platform and their relationships. In the dynamic modeling stage, the interaction aspect focuses on how to identify the objects and messages involved in the network teaching management platform; in the behavior aspect, it focuses on how to identify the state sequence, the events causing the state transition, and the actions accompanied by the state transition.

4. General Solution

4.1 Requirement Analysis

Starting with the requirements of the network management platform, the participants, use-cases, the relationship between participants, the relationship between participants and use-cases, and the relationship between use-cases involved in the system are obtained, and the use-case diagrams are established with the help of Rational Rose tool.

4.1.1 System Design

Based on the use-case model established in the analysis stage, the class, interface, relationship between classes and interfaces involved in the network teaching management platform are acquired, and the class diagram is established with the help of Rational Rose tool. Then the object, message and other elements involved in the network teaching management platform are acquired, and the sequence diagram or collaboration diagram is established with the help of Rational Rose tool too.

4.2 Establishment of UML Model

4.2.1 Use-case Model

The use-case model is mainly composed of multiple use-case diagrams. To create a use-case diagram, it's needed to identify the participants [5]. In the network teaching management platform, participants include students, teachers and administrators. Students use the platform to browse and query, such as browsing course information, teaching plan, learning methods, etc. At the same time, they can also make relevant queries according to keywords. In addition, students can download teaching courseware from the platform. Teachers, as the leading role in teaching, can use this platform to publish teaching focus, learning guidance, uploading the teaching courseware, and other teaching-related contents. As we know, almost all websites need a dedicated administrator for daily maintenance and management, so the system administrator is also a participant of the platform.

In summary, all participants in the platform and their associated use-cases can be described in Figures 1 and Figures 2.

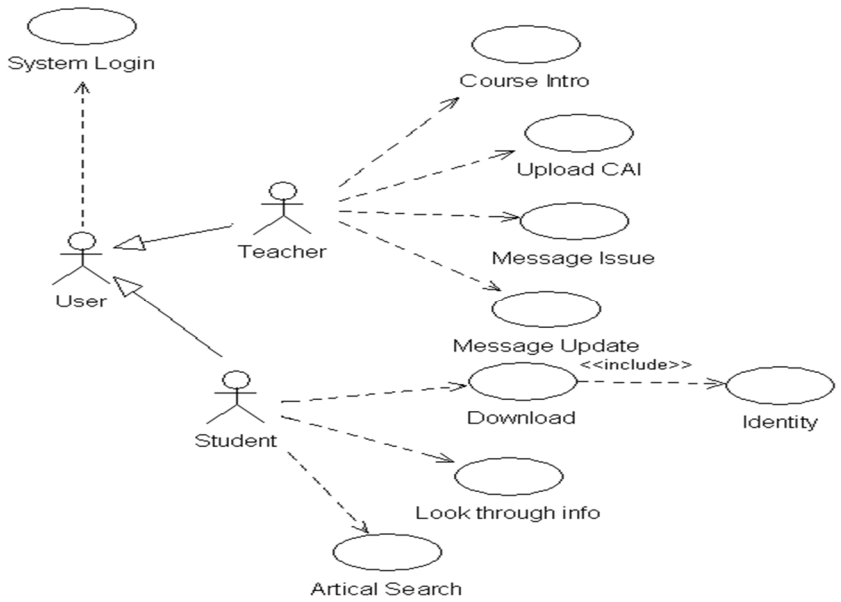

Fig.1 use-case diagram of teacher and student

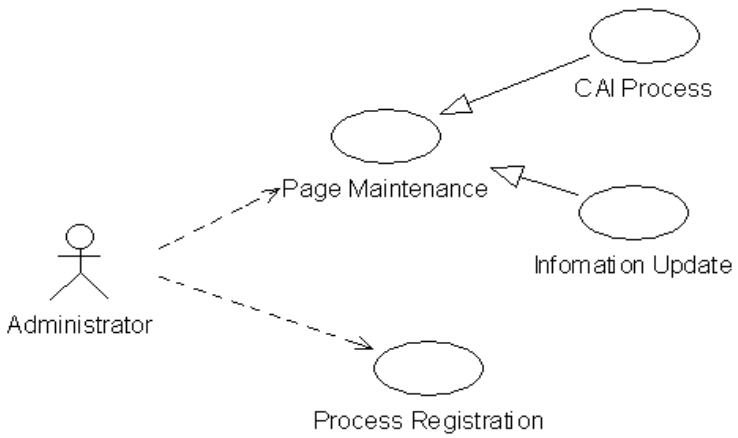

Fig.2 use-case diagram of system administrator

4.2.2 Static Model

Static models are mainly described with class diagrams. Classes often do not appear alone, and there are usually some connections among different classes. For example, there are inevitable links

between teachers and courses, students and courses. Therefore, the static models of the network teaching management platform are described with the class diagrams in Figures 3 and Figures 4.

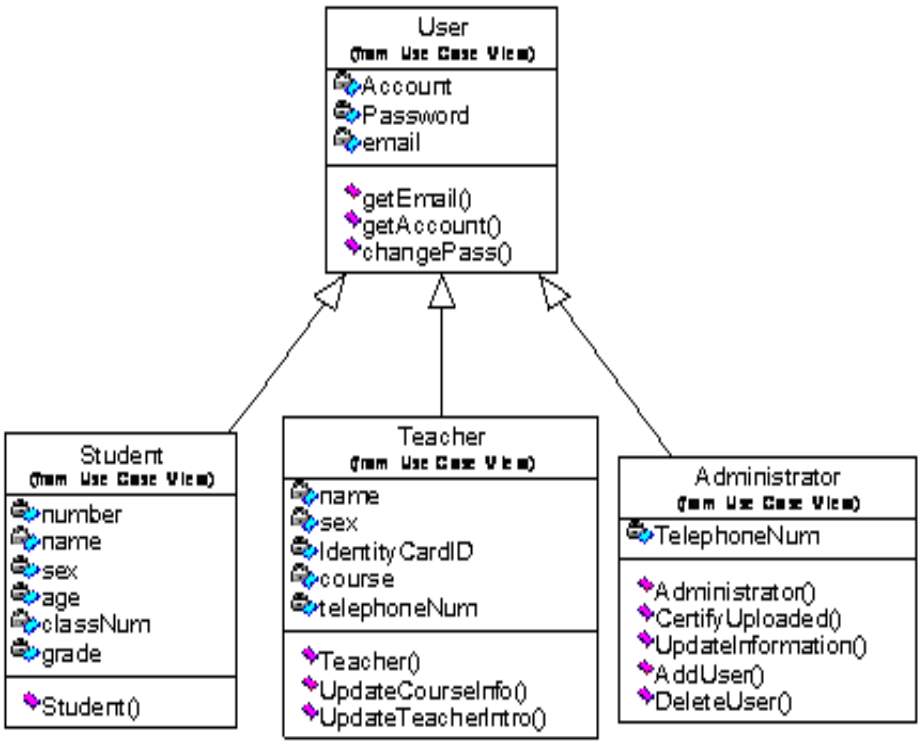

Fig.3 classes abstracted from actors

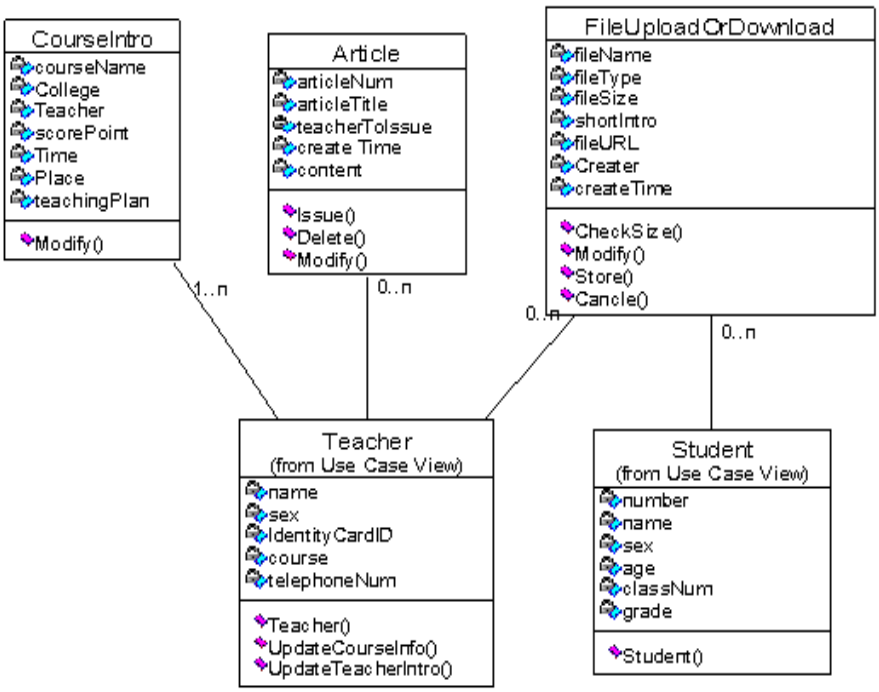

Fig.4 the relationship between classes

4.2.3 Dynamic Model

The interaction of the dynamic model is mainly embodied in the form of sequence diagram. But it is not necessary to build sequence diagram one by one for each scene in the network teaching management platform. So only the main scenes, such as students download files, is selected to describe the sequence diagram.

When students download files, they first need to input the information of download resources in the download interface, and then the information is transmitted to the server. Then the server and the database interact in order to obtain the identity authentication of students. After the authentication, the files can be downloaded. The sequence diagram is shown in Figure 5.

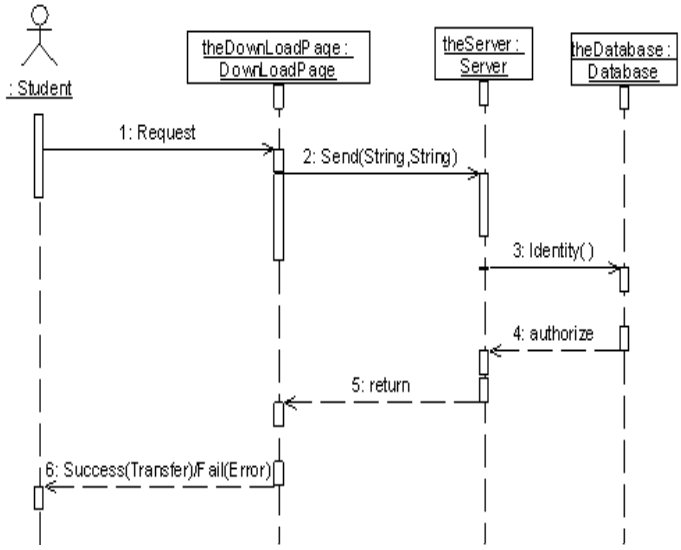

Fig.5 sequence diagram of download files

5. Summary and Prospect

UML technology and method are used in the whole process of planning and development of network teaching management platform. In the implementation of iterative asymptotic process, UML itself implies an iterative and progressive process. Because UML is driven by use-cases, the execution cycle of software system can be planned according to use-cases. For example, the more difficult use-cases can be completed in the earlier execution cycle, so that the main structure of software system can be designed as soon as possible.

This paper builds a model of network teaching management platform, and the next step is to discuss the application of the model in the actual development process. It can be seen that this is a very close work combining theory with practice, which still needs in-depth analysis and research.

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