Design and implementation of general education courses system based on curriculum network

Zhenyu Zhang

The School of Maxism, Hohai University, Changzhou, China

zhzhyu168@163.com

Abstract. Through the understanding of the current situation of the development of curriculum network teaching in China, it can be seen that the construction of a perfect network curriculum system for general education courses is the main content of practical education innovation. Therefore, this article on the basis of clarifying course network development trend, through the analysis of UML modeling technology, is put forward based on B/S network teaching platform, and clearly the actual general education courses content and form, reasonable use of SQL data storage technology, the.net framework, and B/S structure of comprehensive support all aspects of network classroom teaching, It provides an effective platform for teachers and students to share resources and interact with each other. The final results show that the design of general education courses system based on curriculum network can not only improve the quality of practical teaching, but also show a strong application value.

Keywords: Course networking; general education courses system; SQL data storage technology; The.net framework.

1   Introduction

The concept of "general education" was first used by Professor Packard in the North American Review, who believed that general education is a comprehensive education that combines classical, literary, and scientific elements to prepare for professional learning.[1] General education is of great significance for the development of universities and talent cultivation. Burton Clark once examined top universities in Germany, the United Kingdom, and the United States, pointing out that universities in these countries are all built on the foundation of general education.[2] Concept in the development of computer technology and information technology in the field of education for the comprehensive utilization, network teaching model become the important ways to promote the general education, the practice teaching mode with students as the theme, teachers as the leading factor in the process of gradually realize the resources interactive teaching idea, not only effectively integrate the general education teaching resources; It also further strengthens students' enthusiasm for learning and innovative ideas. At present, traditional teaching concepts and modes are difficult to meet the practical needs, which urges colleges and universities to pay more attention

to the course network innovation and begin to design the system according to the teaching characteristics of each discipline. In essence, course networking is to present the whole teaching knowledge and activities of a certain discipline by using network technology, which is also an effective embodiment of the rational use of modern information technology in the field of education, and the best way to ensure the shared use of practical teaching resources. [3] To construct the curriculum network for general education courses in colleges and universities, it is necessary for leaders, teachers and students to scientifically adjust the teaching concept and teaching mode according to the needs of The Times, and pay attention to the comprehensive innovation by using modern educational technology. Since 2008, when the education department promoted the education quality and teaching reform project of colleges and universities, colleges and universities across China have carried out the reform construction of all courses of various majors in a phased and systematic way, while building the network of high-quality courses.[4] Through practical exploration in recent years, it is found that the network system skills based on general education courses can improve the quality of practical teaching and strengthen the comprehensive quality of students. Therefore, local colleges and universities should strengthen the construction of curriculum network, at the same time, according to the content and form of general education courses in colleges and universities to build a corresponding system.[4]

2   Method

2.1   UML Modeling Technology

As the standardized content of system blueprint, UML can guarantee the visualization of large and complex system, and define the overall model and various files of the built system.[5] It is a modeling language with strong function, easy expression and well definition. UML supports the whole process of software development from the beginning of requirements. Three types of graphics are used to build system models. The second is the static structure diagram; Finally, it refers to the dynamic behavior diagram, which will complete the visual design analysis of the system from different abstract perspectives. UML will use a set of mature and perfect modeling technology, the actual model construction can help more fields and developers to master the business process, build a perfect and effective system model, reduce the difference in the sense of language. Therefore, it is very important to choose UML to design modeling analysis of general education courses system in colleges and universities.

2.2   Requirement Analysis

Based on the analysis of the implementation of general courses in colleges and universities, it is found that the construction of the actual course network system should be considered from the following three aspects: teachers, students and ordinary users:

First analyze the teacher's use case diagram. Teachers have the authority of administrators in the system. After completing the identity authentication, they can conduct

online teaching, data management, homework publishing and other operations. The specific structure is shown as Figure 1 follows:

Fig. 1. Demand analysis of teachers

Secondly, analyze the student's use case diagram. After registering and logging in to the system platform, students can enter the online class and independently conduct learning, uploading homework, online communication and other operations, as shown in the figure 2 below:
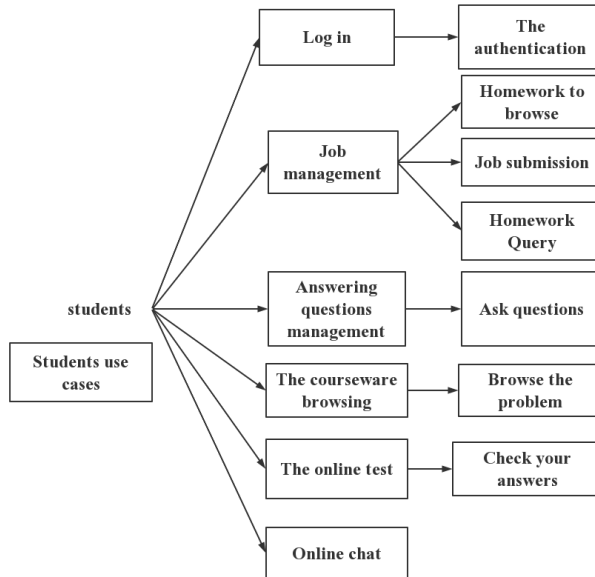
Fig. 2. Analysis of students' needs

Finally, analyze the use case diagrams for ordinary users. After registering and logging in to the platform, ordinary users can browse the teaching website and search for the teaching resources they need, but they cannot operate the areas such as homework. The specific content is shown in the figure 3 below:
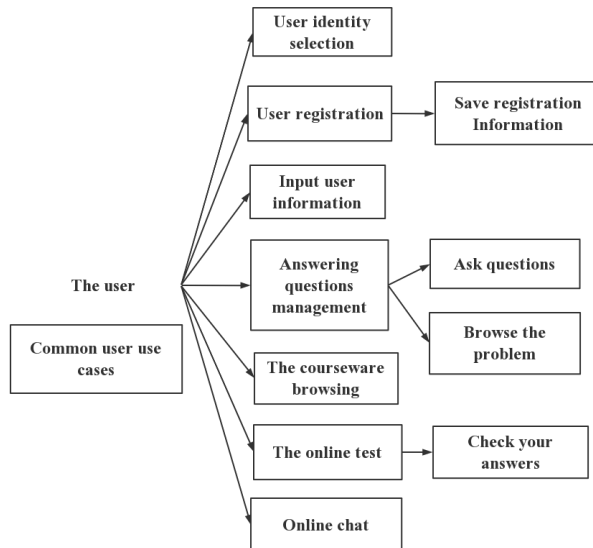

Fig. 3. Demand analysis of ordinary users

2.3   System Design

In this paper, B/S three-tier architecture is selected for the networked platform design of general education courses, as shown in the figure 4 below. Among them, the bottom of this platform is the browser, belongs to the interface of the whole system, can support the user to carry out various operations during web browsing, and submitted to the web server; The middle layer refers to the web server, mainly used to process access requests and information exchange; The top layer is the database server, mainly used to process the operations in the database. Because web server and data server can not be directly connected, so use middleware technology to coordinate work. Net, ADO.NET technology, can modify the database, add, delete and other basic operations.
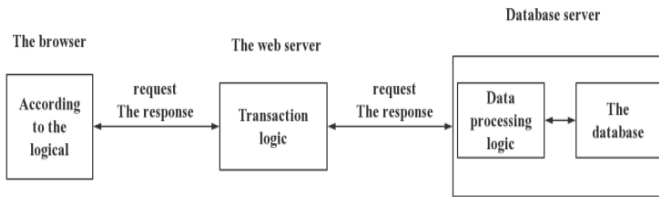
Fig. 4. B/S three-layer structure diagram

2.4   Process Analysis

Combined with the analysis of the global activity diagram of the system as shown Figure 5 below, and based on the analysis of the implementation content and requirements of general education courses of a college, it can be seen that the network platform constructed includes teachers and students and ordinary users, each of which has unique application permissions, and the services that the system can provide are also greatly different.
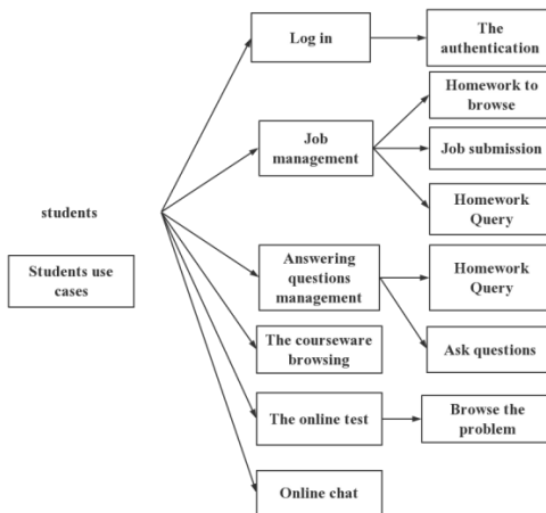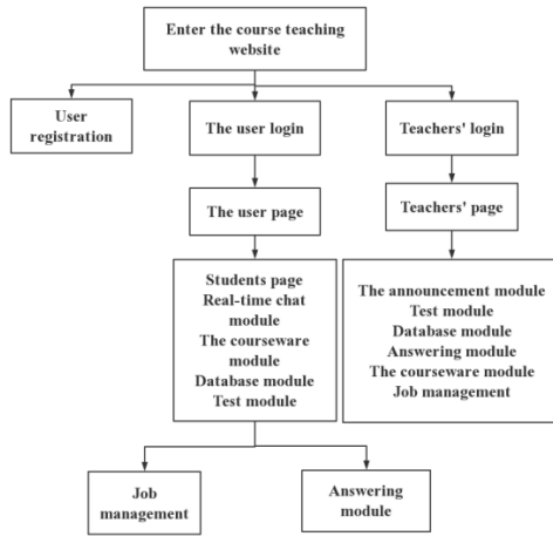
Fig. 5. System activity diagram

2.5   Architecture

Based on the analysis of the implementation of general education courses in colleges and universities, various users participating in the platform operation have different requirements. Based on their requirements, the architecture design can obtain the structure diagram as shown in the following figure 6:
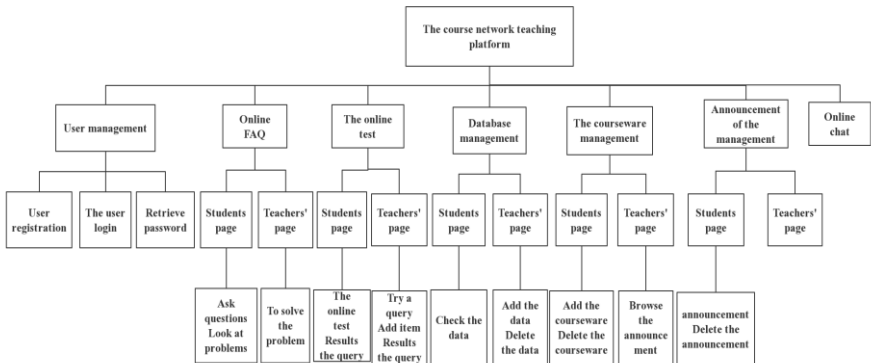

Fig. 6. Architecture diagram

2.6   Database Design

When you build a database, you must first define the corresponding logical model.[6] The general education courses system studied in this paper involves the following contents: First, the user table is mainly used to record the relevant information of

users; Second, the teacher table mainly records and teacher related information; Third, the resource table will record the information obtained by users during the upload and download; Fourth, the chapter table will record the name, major, type and other basic information of general courses; Fifth, the major table will record the relevant major serial number and name; Sixth, the topic table will record information about the test questions, such as answers, content, type, etc. Seventh, the test score table will record all the scores of students during general teaching; Eighth, the announcement table will record all the announcement information published by the user; Ninth, the homework sheet will record students' homework information during the teaching period. Other data forms will be orderly, expanded and innovated on this basis according to functional requirements.

3   Result Analysis

3.1   System Implementation

In this paper, Visual Stud IO2008 is selected as the actual development and construction platform, C language is chosen as the programming basis, and ADO.NET technology is used to call the defined storage process to access the information resources in SQL Sever 2000 database server, which is combined with B/S mode for development design. Finally, a fully functional and comprehensive general education courses system in colleges and universities is achieved.

3.2   Case Analysis

To conduct empirical research on the operation of question bank module in general education courses system, it is necessary to ensure that its key functions are realized one by one, which is embodied in two aspects:

One is the login function. In order to make general education courses system run effectively, it is necessary to study the security of system design structure, pay attention to the accurate verification of user's personal information and operation authority in the login module, and design the corresponding functional module combining with the division of authority level.[7] For example, ordinary users can not operate on homework questions and other resources, only a simple reference; general teachers can not only upload and download relevant teaching materials, but also adjust the overall teaching content.

On the other hand, it refers to the management function of the volume group scheme. As the core function of the question bank module, this content will automatically constitute examination papers according to the teaching needs of different stages. Among them, the difficulty of paper group scheme belongs to the heavy and difficult point of system function design. Generally speaking, paper group scheme management involves two functions, one is to follow the group of papers, the other is to group papers according to the difficulty of the paper.[8] The empirical analysis with the above system shows that in the random unit test paper, the system will choose the relevant test parameters, such as difficulty, question type, knowledge point, etc., ac-

cording to the teacher's pre-set test paper forming strategy, and select the test questions that meet the requirements from the test database combined with the teacher's set conditions and constitute the test paper. Affected by the randomness and automaticity of the system, this process is more free and flexible in setting questions for general education courses. The specific implementation process is shown in the figure 7 below:
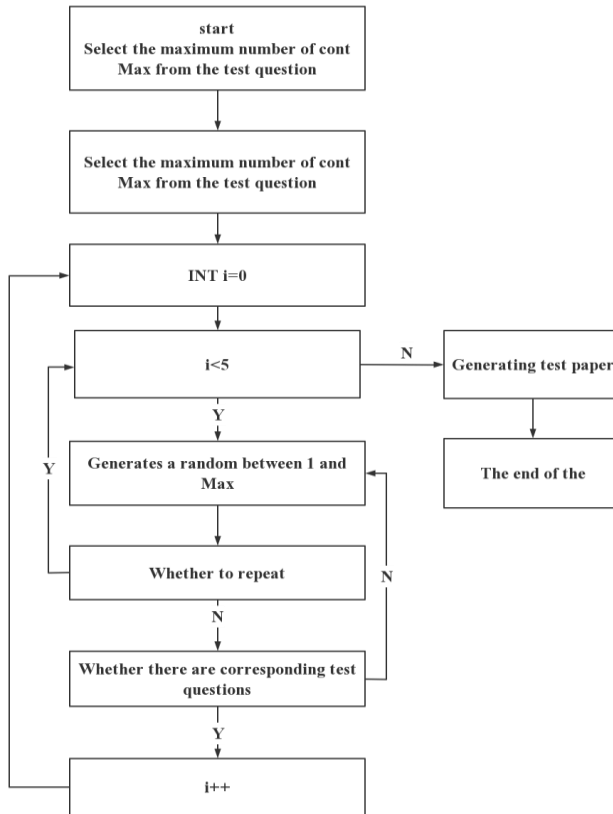

Fig. 7. flow chart of random volume

The paper is composed by combining difficulty, which requires students to choose the difficulty of the test questions according to their own learning level and characteristics, and the system will randomly select the questions in the question bank according to the input conditions of students to form the corresponding difficulty papers. In this process, two programs need to be designed to complete the operation, one is the difficulty control program, the other is the difficulty generation test paper program. The specific implementation code is as follows:

```
If   icount mod 2=0 then //Even numbers, first extract the middle
two highest priority
Begin
Arrjia[1]:=trunc(icount/2)
Arrjia[2]:arrjia[1]+1
P:3;
For i:=1 to arrjia[1]-1 do//The number of cycles is the first value,
-1, going left and right
Begin
Arrjia[p]:=arrjia[1]-i;
P:=p+1
Arrjia[p]:=arrjia[2]+i;
P:=p+1;
End;
```

According to the performance test analysis of the system operation, the main re-search is whether the actual response time and concurrency amount meet the require-ments of multiple users in multiple areas using this system to group papers. As the level of course network construction varies greatly in different regions, the empirical test scheme designed in this paper chooses 10Mbps and 10lMbps to study the maxi-mum number of concurrent users in the system between 0 and 5 seconds, thus pre-senting the multi-node operation level of the system. The actual results are shown in the figure 8 and 9 below:
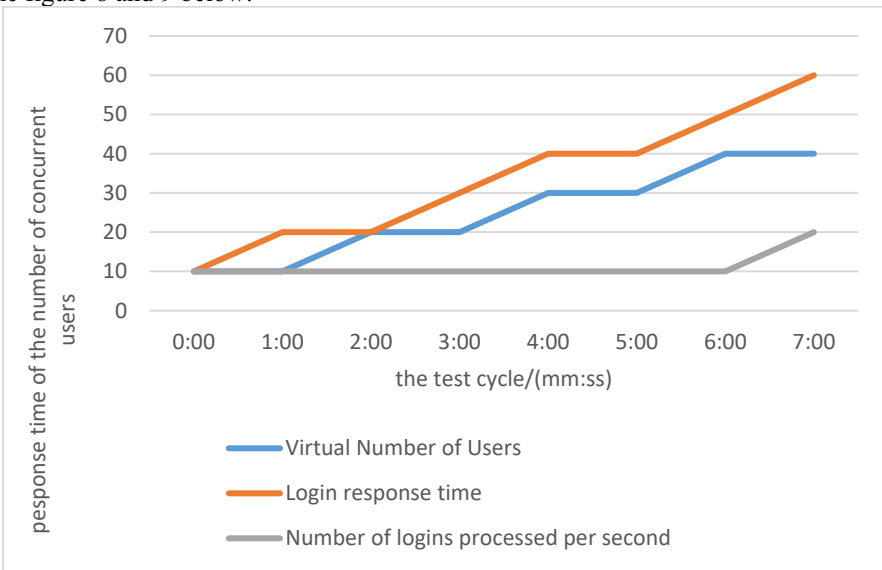

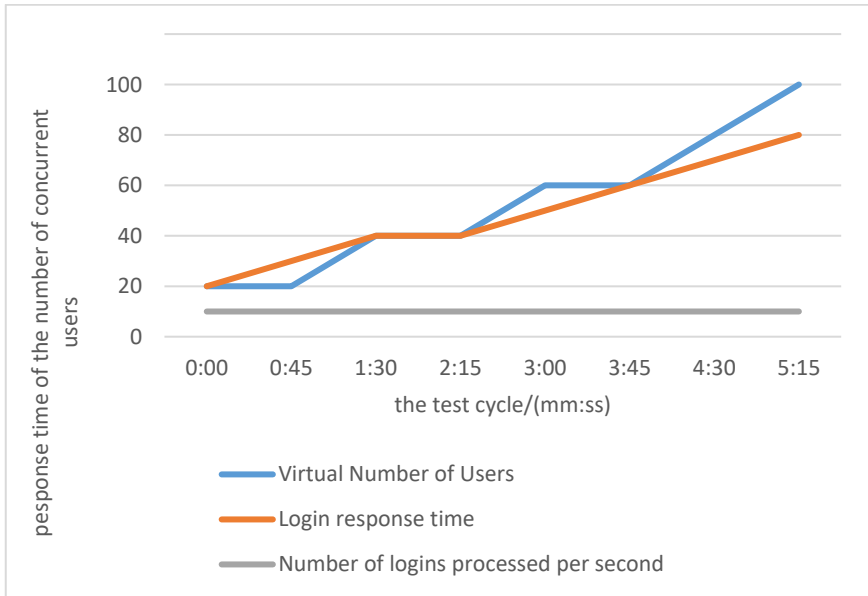**Fig. 8.** Test results at 10Mbps bandwidth

Fig. 9. Test results at 100Mbps bandwidth

Combined with the above analysis, it is found that under the condition of 10Mbps, when the response time of the system outlined in this paper is 5 seconds, the maximum number of concurrent users can reach 50; Under the condition of 100Mbps, the maximum number of concurrent users can reach 60. In other words, the research system of this paper is suitable for at least 50 nodes of users to compose papers and set questions at the same time, which is in line with the network development needs of general education courses at the present stage. Therefore, in the context of course network construction, colleges and universities should strengthen the construction of related systems according to the content and characteristics of general education courses, and pay attention to the realization of educational resources sharing, online self-testing, operation management and other comprehensive service functions, so as to lay a foundation for cultivating excellent high-quality talents.[9]

4   Conclusion

To sum up, in the development and construction course network into the core of general education courses system, to strictly abide by the principle of software engineering, UML model as the driver of actual system operation, according to the presentation layer, business logic layer, data access layer, the three aspects of function model divides the organization to ensure system software structure design more reasonable and effective, The whole operation has security and stability. This design method not only meets the needs of modern education innovation and development, but also ensures the quality and efficiency of software and hardware design and development. It

should be noted that during the operation of the system, traditional general education courses information should be effectively integrated, and comprehensive management countermeasures should be put forward based on advanced technological concepts, so as to guide China's general education courses to develop steadily towards the direction of informatization, network and science and technology. At the same time, according to the technical research needs to do a good job in the training of professional personnel, actively learn from the excellent system design experience at home and abroad, give priority to the introduction of technological equipment of epoch-making significance, and build a network course platform with comprehensive service functions.[10]

References

1. Packard A S. (1829)The substance of two reports of the faculty of amherst college to board of trustees,with the doings of the board thereon. North American Review,28:300.
2. Burton Clark.(2001)The Place of Exploration: Research and Graduate Education in Modern Universities.Wang Chengxu, translated. Hangzhou: Zhejiang Education Press, 2001:1.
3. Suiming Guo.(2021)Thinking and course design of General Education course of network space security.Technology and application of network security,2:97-100.
4. Yanshun Zhen.(2020)Construction and exploration of network general education learning system in application-oriented universities. Education and teaching forum,6:365-367.
5. Li Dai.(2011)On the construction of network teaching resources database of general education elective courses. Out-of-school education in China,8:114+121.
6. Zhenman Li.(2014)Design and development of a general education network teaching system.Fujian compute,3:68-69+76.
7. Jianghao Yu,(2014)Design and development of network teaching system for general education course in colleges and universities[J].Computer Knowledge and technology.6:40-42.
8. Hong Dai, (2014)Teaching optimization of General Education curriculum based on network classroom.Audio-visual education in China,7:88-93+104.
9. Haitao Hu. (2015)Principles and processes for selecting courses in online general education.Journal of Jilin Radio and Television University,1:68-70.
10. Junfeng Ye. (2015)Research on the Development Model of Online General Education Curriculum, Modern vocational education,12:102-103.