



# Design and Application of Distance Art Education Platform Based on J2EE and XML

Qi Chen<sup>1,2</sup>(✉)

<sup>1</sup> Nanchang Institute of Technology, Nanchang, Jiangxi, China  
416202627@qq.com

<sup>2</sup> Philippine Christian University Center for International Education, Manila, Philippines

**Abstract.** The development of network information technology has brought education informatization and promoted the reform of contemporary education supply mode and teaching mode. Distance education is based on the application of computer and network communication technology in the field of teaching. This paper, based on J2EE and MVC system architecture, is optimized and improved on the basis of cloud computing technology to meet the needs of personalized, standardized, scientific and informationized teaching of art majors. Platform system uses open source SSH as the basic framework, SQL Server database security and operability is excellent. Struts architecture design based on MVC model can enhance the data processing ability and good maintainability of the platform system, and provide reference for the design of distance art education supporting platform in colleges and universities, which is easy to use, safe and efficient and can simultaneously meet the needs of online teaching, q&A, discussion, examination, work display and educational administration.

**Keywords:** Resource sharing · Architecture design · J2EE · MVC · Art education platform

## 1 Introduction

With the popularization of the Internet and the development of information technology, the Ministry of Education of China has launched the Construction of “Undergraduate Teaching Quality and Teaching Reform Project” since the 12th Five-Year Plan. The cross-border integration of “Internet+ education” has brought educational innovation. Online distance education breaks the framework of traditional education, reduces the regional education gap, breaks through the time and space of education, and optimizes the allocation of educational resources. As COVID-19 broke out worldwide at the end of 2019, people’s social space and environment were limited, and their demand for online education platforms and online teaching course resources showed explosive growth. Many online teaching systems simply cannot meet the huge increase in online course data transmission demand, the traditional offline college education field is facing great opportunities and challenges, traditional college art education should also adapt to the development of The Times, explore the Internet time online art education innovation road.

© The Author(s) 2023

Z. Zhan et al. (Eds.): ICBDIE 2022, AHCS 5, pp. 683–691, 2023.

[https://doi.org/10.2991/978-94-6463-034-3\\_70](https://doi.org/10.2991/978-94-6463-034-3_70)

In recent years, the computer supported collaborative mode (CSCW) has developed rapidly. It uses computer technology and network communication technology to organically combine multiple collaborative members and their interactions in a shared environment. The network gives CSCW two advantages: information acquisition and human-computer interaction. Put the CSCW technology model is applied to network teaching, on the one hand can realize remote interactive lectures and discussion, you can also use the collaborative teaching, teachers and students can be put in the same interaction environment, teaching to make use of the computer system management and control, the visible CSCW technology for network collaborative teaching model provides favorable technical support. The new CSCW personalized network learning model established in the new environment of network teaching brings a new development opportunity and efficient reform for hybrid learning.

## 2 The Construction and Design Value of Distanion Platform

The remote online teaching platform is an application system that can provide communication services for education and teaching resources with the help of Internet technology and provide teaching services for the purpose of distance teaching. In terms of the current development trend of education, the surging social demand for online education, traditional offline art education and ordinary online education system model cannot fully meet the relevant needs. The education platform for distance art majors needs to be stable, safe and open to meet the individual needs of art majors. A set of solutions based on J2EE and XML standards and the realization of an open platform is the key to the success of the whole system.

In this paper, based on XML and J2EE to build a distance art education teaching platform as the research object, the more popular J2EE technology and XML language as the tool of information description and data exchange on the art education online teaching system platform design and implementation. The multi-tier architecture enables the platform to support Load Balancing and fail-over at the application level, even when user Clustering is booming, which can be met through Server Clustering.

## 3 Technical Support for Cloud Computing

With the popularization of network and the development of information technology, cloud computing technology has evolved into a cloud service, which is a kind of computer and network technology that is integrated and improved by a variety of advanced computer technologies in a cross-field. Cloud computing has the following four characteristics:

- A. Cloud computing compatibility can be built on a variety of basic platforms. Adapt to a variety of different types of hardware and software operating systems and databases.
- B. Cloud computing can realize the free operation of various business types at the same time. Heterogeneous support of multi-business system is the main difference between cloud computing and traditional grid computing.

- C. Cloud computing supports dynamic expandability of resources. It can realize dynamic flow and scheduling of resources, centralize high-quality resources, distinguish idle resources, reduce platform operating costs, improve energy consumption ratio, and better realize on-demand, quantity allocation and billing.
- D. While cloud computing provides services for a large number of customers, the service business of a large number of customers also provides a large amount of visual data for cloud computing, forming a massive amount of interactive information.

Cloud computing technology can solve the deficiency of big data processing in offline teaching and traditional online education system, and solve the problem that traditional online teaching system cannot meet the increasing processing of massive online teaching data. With its advantages of high cost performance, scalability and flexibility, cloud computing technology has been widely used in various fields. The support of cloud computing technology for the online teaching platform system can provide better user experience and more professional optimized data for the system. With the support of cloud computing technology, load balancing algorithm is optimized to improve the service capability of online teaching platform based on J2EE technology.

## 4 Art Education Learning Platform System Development

This research is based on the design of art education platform. It is an open architecture based on Web, with high capacity, high stability, high performance and strong scalability, and supports a variety of operating systems and application server platforms.

### 4.1 System Development and Technology

#### 4.1.1 Client Browser and Network Server Framework (B/S Framework for Short)

Under the framework of the client browser and the network server, the user sends a request to the Web server through the client. The Web server sends corresponding information to the client according to the received request. B/S framework greatly simplifies the client operation, convenient for users to use operation.

The program developer coding system source program files are placed in the network server, through the Web services provided by the server to operate, the users of the program only need to use the services provided by the server to complete all kinds of system or database operations.

Web-based application model is a simplified multi-layer model, which is very suitable for simple and easy to operate distance education application system (Figs. 1 and 2).

#### 4.1.2 J2EE Distance Education System

J2EE as a programmer or IT professionals familiar with high efficiency, open source, cross-platform application development language, consisting of three layer structure, because its can be run on multiple operating systems, using advanced architecture, possesses the advantages of good cross-platform and flexibility level has been widely used in various applications, Web services and mobile terminal APP.

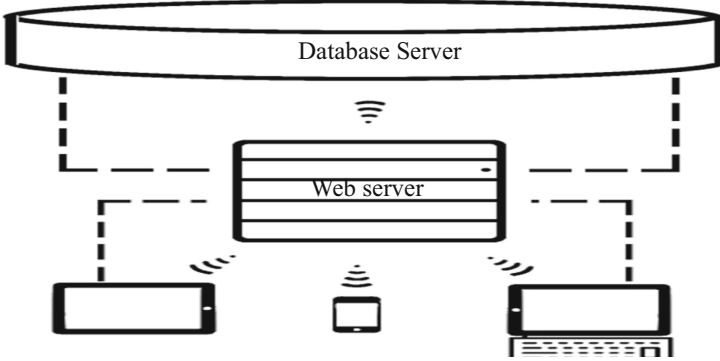


Fig. 1. Framework operation Principle

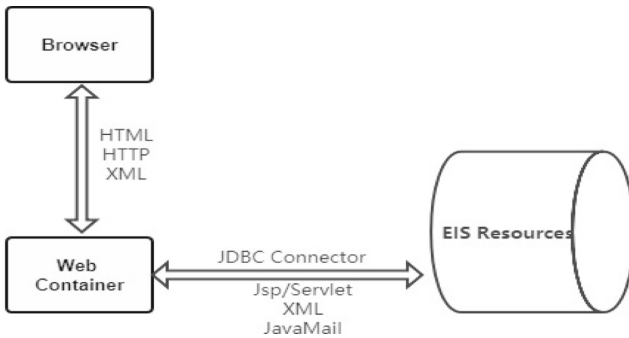


Fig. 2. Three layer structure application model

### 4.1.3 Resource Sharing Model Design Supported by ML Language

Using J2EE technology to realize the distributed multi-layer structure to build the education platform, and using XML language as a tool of data exchange and information description to realize the distance education resource sharing model, the model can be shown in Fig. 3, mainly including: ①. User layer: various forms of users, Including browsers, Java applications, and wireless devices such as mobile terminals). ②. The presentation layer consists of one or more Web servers, which process user requests and data transmission and control access to business services. ③. The business layer contains the application component technology under the server. The business layer implements the processing of specific data primarily in Java. ④. The data layer collects permanent information of various database systems and file systems as well as distance education platforms.

### 4.1.4 MVC Design Pattern

The framework based on MVC design pattern (as shown in Fig. 4) is mainly completed in the business logic in the Action class, receiving information to execute the corresponding business logic and access the database. The existing framework will get twice the result

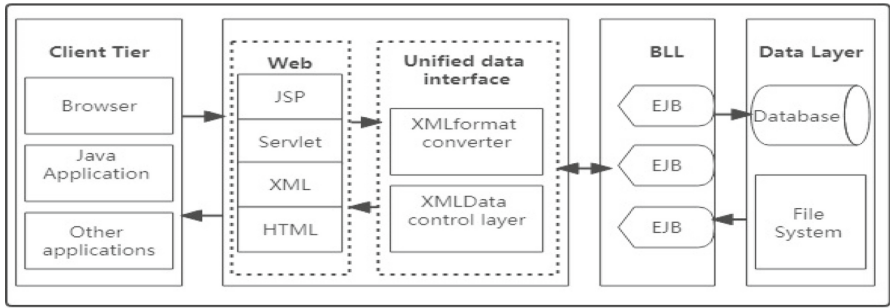


Fig. 3. The model here

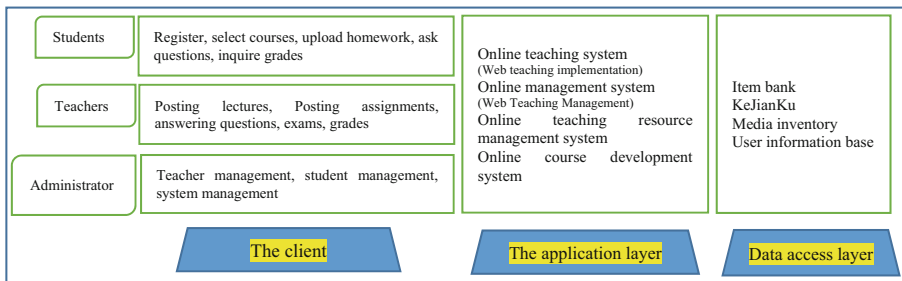


Fig. 4. Cooperative work model

with half the effort when MVC is used to implement Web applications. Struts framework itself is a good MVC application framework, can improve efficiency.

## 4.2 System Structural Module Design

J2EE distance education platform consists of four parts: online teaching system, online teaching management system, online teaching resource management system and online course development system.

Online teaching system consists of three modules: teaching module, learning module and teacher teaching management.

### 4.2.1 Teaching Module

It can also upload courseware, publish teaching announcements, mark papers, score scores, and synchronously check online students' learning status, etc. It can also restrict students' browsing of course content according to specific teaching conditions and progress changes. With the support of cloud computing, cloud data can also complete automatic grading and score calculation, supervise students' learning progress and homework completion, etc. It can also cooperate with teachers to complete teaching management tasks and provide online information exchange with students (Fig. 5).

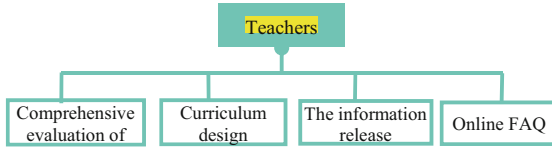


Fig. 5. Teacher use case diagram

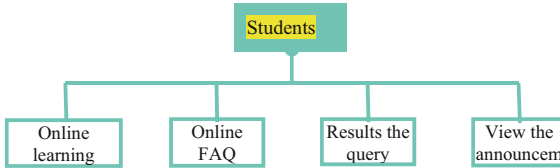


Fig. 6. Student use case diagram

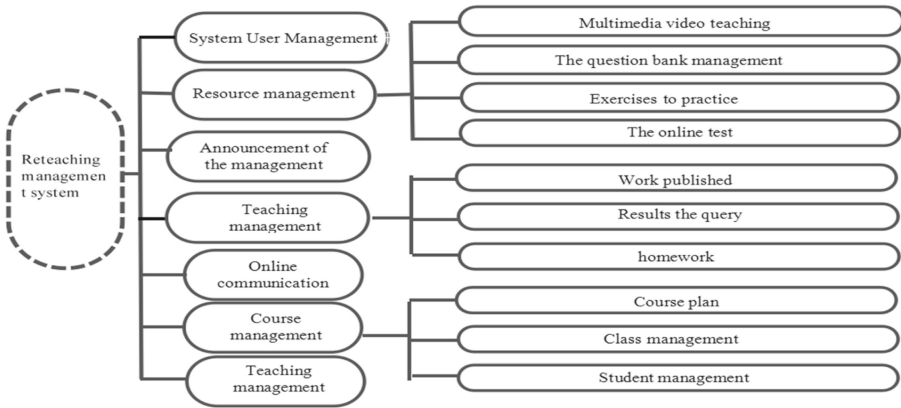


Fig. 7. Network teaching management module

### 4.2.2 Learning Module

Students can also participate in group discussions, online tests, and record their learning while choosing courses (Fig. 6).

### 4.2.3 Network Teaching Management Module

This module is the overall teaching process of teachers, including teachers’ teaching links, students’ learning progress, effect tracking record. Teachers can realize personalized teaching according to data changes. Administrators can realize teacher management, course management (course online, course offline, course selection, course evaluation), student management (enrollment, admission, tuition, student status, credit, scores) and so on (Fig. 7).

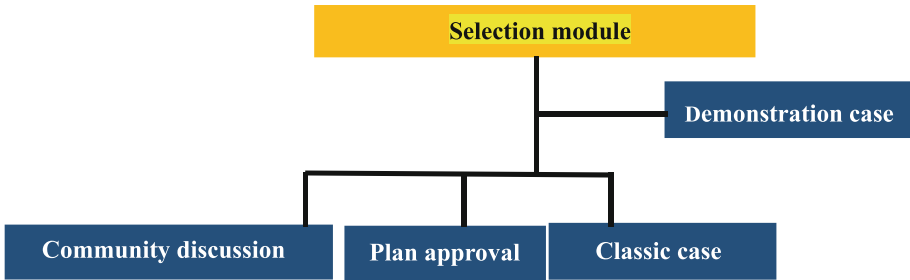


Fig. 8. Create topic selection module structure

### 4.3 The Special Structure of Art Education Platform

Combining the characteristics of art education with the practical problems encountered in online education. Practical problems encountered in online education. The importance of face to face teaching of music and art including broadcasting and hosting teachers in traditional teaching methods. The unified module design of the general teaching platform cannot meet the special needs of art students. In the design of the teaching system, it must be improved to adapt to the multi-dimensional learning needs of art students and reduce the teaching pressure of teachers.

Such as art and design of network teaching platform system function, in addition to the mentioned in the design of system structure module module, you should also join art library management, teamwork, case display and evaluation subsystem, such as function modules can also join the art field trips, classic case, case demonstration, creation subject, project examination and approval, community discussions, display module, etc., And the functional modules can be connected in series according to the needs of the course.

For example, in the creation of topic selection module, classic cases, demonstration cases, project approval, and community discussion should be linked together to strengthen the relevance between courses on the basis of improving students' interest in learning (Fig. 8).

## 5 Feasibility Analysis of Distance Art Education Platform

In order to combine XML and J2EE technology, introduce J2EE technology into XML application to realize the smooth design and implementation of distance art education teaching system, and put into use satisfaction, analyze the feasibility of the study, reduce invalid input.

### 5.1 Economic Feasibility Analysis

In order to introduce J2EE technology into XML application to achieve smooth design and implementation of distance art education teaching system, and put into use satisfaction, analyze the feasibility of the study, reduce invalid input.

## 5.2 Technical Feasibility Analysis

J2EE has high programming efficiency, wide penetration rate and mature technology. Although XML is relatively small in the application and development of distance education in China, it is not technically difficult.

## 5.3 Operation Feasibility Analysis

Affected by the global epidemic, college teachers and students are generally familiar with the online teaching system. As long as users' habits are fully taken into account in the design of the system interface, the simplicity of the operation interface and the convenience of functions are guaranteed, the operation is also feasible.

## 5.4 Social Feasibility Analysis

Since the end of 2019, the global spread and persistence of COVID-19 has increased the global demand for online distance learning, which is of great significance from the perspective of social significance.

## 6 Conclusion

The progress of science and technology, the reform of teaching methods, traditional art education and teaching methods are also changing. The construction of Internet platform, the support of multimedia information technology and the addition of modern teaching means can provide more possibilities for contemporary art education and teaching. This paper starts with the particularity of art education and constructs a distance art education platform combining XML and J2EE. However, this design research is only aimed at exploring the art education platform students in colleges and universities. In the practical design, the particularity of each major and the module design should also be concretized, which also needs the test of teaching practice.

## Bibliography

1. Ke, C. (2020). Research on Web Application based on J2EE and MVC pattern [J]. *Software*, 9 (3): 165-16
2. Peimani, N, K. H. (2021). Online Education and the COVID-19Outbreak: A Case Study of Online Teaching during Lockdown [J]. *Education Sciences*, 11
3. Wu, Y. (2018). Research on design and application of online teaching system based on smart campus [J]. *China management informatization*, 21(04): 133-134
4. Zeng, Z. M. (2008). Research on the Development of Online Teaching Platform of Art Design [J]. *Education Guide*, (8): 35
5. Zhu, F. (2006). Research and Application of MVC Enhancement Technology based on J2EE Platform [D]. Nanjing University of Aeronautics and Astronautics 45



**Open Access** This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

