

# The Design and Implementation of Integrated Network Teaching Platform Based on Java

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**Abstract**—With the rise of the Internet in China and the penetration of mobile phone ports and computer ports to Chinese users, this system has the premise and foundation. In order to solve the current problems of the epidemic, so that students can learn the knowledge normally and even exceed the quality of teaching under the normal mode, this comprehensive online teaching platform is hereby established. The design of the B/S structure makes the platform run perfectly, the application of JSP technology solves the problem of dynamic pages, and the background is the commonly used and mature MYSQL database technology. Breaking the traditional teaching model allows students to learn knowledge at any suitable time and place, and master high-quality resources from the Internet. Students registered on the platform of this system can purchase courses online and view their studies in My Center, and the administrator will perform background management of the member students.

**Keywords**—Teaching platform, SSM frame, Java language, JSP technology

## I. INTRODUCTION

The sudden epidemic in 2020 had a major impact on the production and life of our country. The economy was severely damaged, and various industrial and structural chains were broken. Based on the general background of this general environment, Along with the innovation of Internet technology, various "Internet +" models have emerged, such as "Internet + medicine", "Internet + education", and various systems are in full swing, in view of the current teaching problems of the epidemic, In addition to the school's "No class suspension" related policies, making teachers network office, network teaching, as the first large-scale online teaching activities, because many students can not keep up with the teaching progress and can not adapt to the teaching environment, the result is that the academic achievement and the accumulation of knowledge can not meet the requirements of the semester, which also leads to a certain degree of impact on college students. It can be said that the epidemic has had a profound impact on the entire educational ecology. In recent years, the Internet of things, cloud computing, big data, artificial intelligence and other industries have developed rapidly, new technology has infiltrated all aspects of education, the epidemic has undoubtedly accelerated the process of educational intellectualization<sup>[1]</sup>.

In view of this, the first is to solve the problem of the decline of students' learning, improve the quality of students' learning and facilitate the management of the corresponding managers. To the actual network teaching, the teacher's position is not clear, only carries on the teaching by the pure live broadcast way, the study quality can not obtain the proper

guarantee, the after-class study does not have the sufficient resources conformity platform, therefore, it is very important to develop a comprehensive network teaching platform<sup>[2]</sup>. Secondly, the gap between urban and rural areas is getting bigger and bigger in the new era, and the teaching level is high in big cities. For rural areas, the undeveloped network, the uneven teaching level and teaching conditions have created the present situation, developing integrated network teaching platform and integrating resource information can help students understand and learn rich resource content through computer port and mobile phone port.

With the rise of the Internet in China and the expansion of mobile phone and computer ports, as well as being affected by the epidemic, relevant schools in our country have also started to prepare for the development of teaching websites, along with our country taking the road of modernization policy, there are many systems to help teachers manage students, With the rise of the Internet in China and the expansion of mobile phone and computer ports, as well as being affected by the epidemic, relevant schools in our country have also started to prepare for the development of teaching websites, along with our country taking the road of modernization policy, there are many systems to help teachers manage students, For example: "The network corrects the examination paper system", "The network answer paper system" and so on, these software and hardware development help our country network teaching to advance unceasingly, shortens the disparity with the developed country.

At the moment of the epidemic, most students are learning through online courses. This project can help students to collect resources for use. Secondly, it is the general trend of modern society to develop online teaching, various platforms in full swing, the development and use of these software that our country must take the road of modern teaching<sup>[3-4]</sup>. The use of this project not only for institutional management, but also to achieve modern teaching, convenient time management, student time.

## II. INTRODUCTION OF DEVELOPMENT LANGUAGE AND TOOLS

### A. Introduction to Java

Compared with C++, Java abandons the pointer and multiple inheritance and other complex concepts, and draws on almost all the advantages of C++. Java development language is powerful, and Java is one of the most influential languages for enterprise network and Internet environment, Java's entry into the Internet was supported and promoted by Sun Microsystems. For an object-oriented language, writing desktop programs, Web programs and embedded system can be perfectly adapted to developers' thinking,

maintainability and extensibility make it easy to view and modify code. It is the JDK development environment that comes into play. Unlike the JRE runtime environment, the JDK itself exists in Java programs as the core function

As an ISO standard, Java has four features. Encapsulation is embodied by classes, which contain behavior and attributes. Abstract is the feature of a class abstract out, its attributes can not fully describe the object, so the abstract class can not be instantiated. Classes can inherit from other classes, enabling code reuse through inheritance. Polymorphism is achieved by passing each other, and extensibility is achieved by polymorphism. The official release of Java 8 has established its pivotal role in the programming language.

#### B. JSP Technology

JSP adds Java programs to traditional web page HTML files. For Web applications, Java development is cross-platform operation<sup>[5]</sup>, which greatly facilitates the use of Web developers, for special JSP tags can write data information to the database, so you can add dynamic content. The scripting language is Java, therefore has the Java superiority and the characteristic, the merit one is the cross-platform operation<sup>[6]</sup>.

#### C. B/S Structure

B/S is a browser/server structure, the user requests the web browser through the native browser, where the server is to complete the connection with the database and the execution of the program. The interface is realized by WWW browser technology, which can not be simply understood as C/S architecture, and its powerful functions enable it to accomplish the distributed processing of information<sup>[7]</sup>, users can use it after installing the native browser, without additional clients, and it can be upgraded automatically when used. B/S structure is the biggest advantage of the load ratio, the structure installed in the server-side, after the completion of server-side updates only need to complete the maintenance of hardware.

#### D. SSM Framework

Spring MVC is based on the MVC pattern, has good extensibility and flexibility, with detailed MVC annotations, Spring's full-featured modules for Web applications<sup>[8]</sup>

#### E. The MyEclipse environment

MyEclipse is widely used in web development. The latest version is 2017 stable 2.0, while the 8.5 version of MyEclipse is the most Stable, using the Eclipse IDE-based MyEclipse is a huge increase in operational capability, and the power of it is another plus. It has coding, testing, debugging, and runtime capabilities, as well as support for the CSS language<sup>[9]</sup>.

#### F. MySQL database

MySQL as a common database, in the new era of developers welcome, for the source code, developers can constantly update and modify MySQL itself from the creation of a series of root causes, MySQL was released in 2000 as a product based on a dual-license model, which laid the foundation for later development. MySQL for personal use and small business use can be said to reduce the cost requirements, its own design requirements to ensure the stability of its source code and portability. For the programming language Java and C or C++, MySQL provides API interface, can help developers understand the internal working mechanism<sup>[10]</sup>, constantly optimize SQL query algorithm, improve the speed, convenient for

developers to develop and use. Multi-source replication and 3x faster performance were added in version 5.7. Multi-threaded MySQL can handle a large amount of data at the same time, which is not comparable to other databases<sup>[11]</sup>, for its installation and use is also relatively simple, just install the software, complete the configuration wizard, select the type of server, and do simple things.

#### G. Navicat for MySQL

Navicat for MySQL can support a single program, as a front-end software, it can provide developers with intuitive good graphical user interface, reducing the complexity of database management<sup>[12]</sup>, improve software efficiency and developer efficiency.

#### H. Tomcat

Tomcat runs as a separate process in Myeclipse8.5<sup>[13]</sup>, sending requests to servlets that return data to the user, making it accessible to any user.

### III. REQUIREMENTS ANALYSIS

#### A. Functional requirements for system permissions

Students can only log in through the student port operation, background login must have a special account and password, the administrator has the largest administrative authority, this authority can be a good protection of student members of the information, for uploading some resources and course annexes, the administrator has the right to delete, update, for student user account personal information administrator also has the right to seal, unseal, for the home page display announcement information, answer questions can be deleted, updated operation, the manager has the right to "Add, delete, modify" the data. Students without rights can not see other members' information and can not make relevant changes.

#### B. System Functional Framework

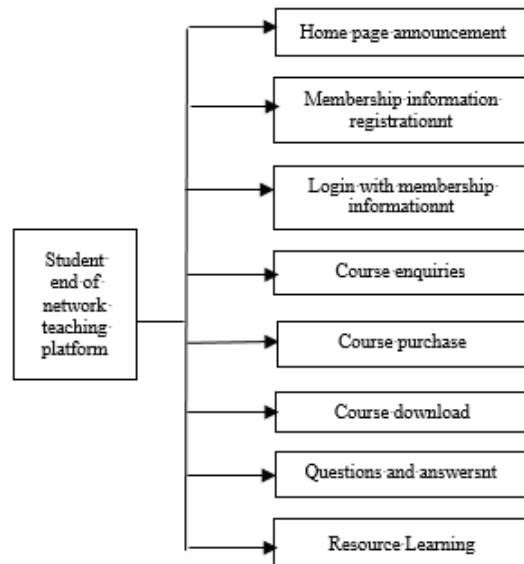


Fig. 1. Student port function framework

As shown in Fig. 1, students first go to the registration section of the page, through the binding of mobile phone number and mailbox so that the relevant information is stored

in the database, after becoming a member, students can modify and update their information in the personal center. After registering, they can search for the required courses and video resources to purchase according to the navigation bar, after the purchase can be in the personal center to view information and study, video viewing will show the progress of the background, members in the existence of relevant questions to the administrator, administrators will also view through the background and reply to individuals, individuals can also be in the home page of the announcement to view the content of information.

### C. System performance requirement analysis

System performance requirements are the basic functions of the system to further improve the operation, the next will be through two aspects of analysis. The system is not invariable, as the system is running in the process of the platform must be updated, not only in the update of resources, but also for the maintenance and expansion of the entire system updates. Therefore, the system should be extensible. When a problem occurs in a system, the learning environment of student members can not be guaranteed, which will cause loss and confusion to the whole platform, it will certainly result in a lower user experience, for the development of the entire system has a certain impact, so the system to run steadily is essential.

## IV. OVERALL DESIGN

### A. Business Flow Chart

As shown in Fig. 2, students can purchase relevant course resources after they register as a member, and the individual member center will exist for course purchase and courseware attachment download. Student members can also view bulletins and ask managers for answers to difficult questions of their own. The administrator manages the member's information, which only stores the database information of the valid member, and for illegal members will be banned, after purchasing the required courses, the students will display the corresponding order information on the background page for the manager to view. The manager has the highest administrative authority for the announcements

and courseware that the members view and download, can be deleted, replacement notices and attachments. Database E-R diagram

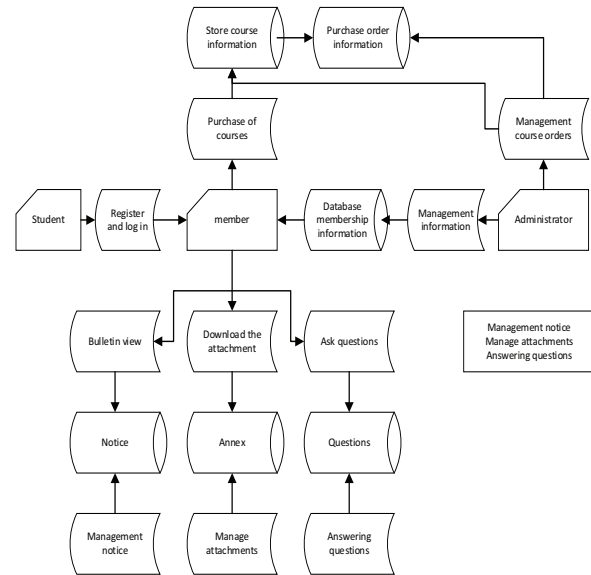


Fig.2. Business Flow Chart

The design of the database is from the main function, continue to expand to the secondary function to achieve the overall structure of the perfect. For the whole frame design, it is very important to give priority to the top-down method. After the whole frame is built, every module is processed in detail.

For the E-R graph of this platform, it is composed of three parts: entity, Attribute and association. This structure can express the association relation clearly, and it is convenient for the manager to view and modify the database, the E-R diagram is based on the 3NF paradigm. The use of the database meets the above criteria. The entity and contact model is shown in Fig. 3,

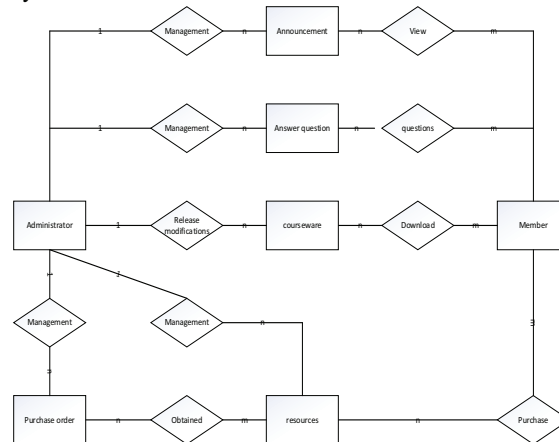


Fig.3. E-R diagram

### B. Design of database physical structure

As shown in TABLE I, here's how to design the form from

the login page:

TABLE I. DETAILED DESIGN TABLE

Name	Data type	Length	If it's empty	primary key	Notes
home announcement information					
id	int	11	No	Yes	Number
tiitle	varchar	255	No	No	Title
contents	varchar	255	No	No	Content
ntime	datetime	--	No	No	Time
course type information					
id	int	11	No	Yes	Number
tname	varchar	255	Yes	No	Name
course information					
id	int	11	No	Yes	Number
cname	varchar	255	Yes	No	Course
tid	int	11	Yes	No	Type number
summary	varchar	255	Yes	No	Course description
tename	varchar	50	Yes	No	Course teacher number
docx	varchar	255	Yes	No	Resources
ctime	datetime	--	Yes	No	Time
course order information					
id	int	11	No	Yes	Number
cid	int	11	Yes	No	Course
ostatus	varchar	20	Yes	No	Whether or not to buy
schedule	varchar	50	Yes	No	Learning
otime	Datetime	--	Yes	外	Buying time
uid	int	11	Yes	No	User membership
course annex information					
id	int	11	No	Yes	Number
wname	int	11	Yes	NO	Course description
wcontents	varchar	255	Yes	No	Course annexes
cid	int	11	Yes	No	Course number
online answer information					
id	int	11	No	Yes	Number
contents	varchar	255	Yes	No	Content
uid	int	50	Yes	No	Users
cotime	datetime	--	Yes	No	Question Time
rcontents	varchar	255	Yes	No	Reasons
rtime	datetime	--	Yes	No	Time
Personal information modification					
id	int	11	No	Yes	Number
username	varchar	255	Yes	No	Account number
password	varchar	255	Yes	No	Password
name	varchar	50	Yes	No	Name
sex	varchar	4	Yes	No	Gender
age	int	11	Yes	No	Age
phone	int	11	Yes	No	Mobile phone number
mail	varchar	255	Yes	No	Mailbox
ustatus	varchar	255	Yes	No	Forbidden status
role	varchar	255	Yes	No	Permission description

## V. DETAILED DESIGN

### A. Registration and login page

Students who want to purchase video resources to improve their academic performance, or have to register when they first log in, will be directed to the registration page, students fill in the name, age, account number, password, second confirmation password, gender, mobile phone number and mailbox after the system to determine, after using JS script, judge whether the information input is comprehensive and accurate and saved to the database, users can not complete the registration only through visitors to view the home page information, can not purchase courses and own a personal center. The second password must be the same as the first password, or registration will fail.

After the member enters the account number and the password, clicks the login button, the system will match with the background database automatically, after verifying

successfully can display the next page, because other reasons can not match, will pop-up window to show "User name or password error!" Show login failure, members must check whether the account password is correct or whether it is blocked and then proceed to the next step.

### B. The realization of course display and purchase

Student members can go to the course display page by searching for the course online or clicking on the course link in the navigation bar, members can check the course name, video summary, type, lecture lecturer, and clickable course purchase button. After members select the course that suits them and purchase it, the course will be automatically stored in the personal center, members can go to the personal center to view and learn, implementation of courseware attachment download. After the purchase into the personal center to view my order, after the purchase operation does not show to my order, can ask questions to the administrator, the administrator will be the first time to contact the member



himself, the course purchase page shows more progress than the course purchase page, in which the member after the completion of the course, the learning progress will be updated to show "Completed", if you do not study after purchase or if you do not complete all of your studies, you will be shown as "Incomplete". Click on the learning link to jump to the appropriate window to play video, video playback depends on the media player, the player can adjust the video progress and sound size, after completing the learning video, members can click the finish learning button to update the "Completed" display in the learning progress.

Learning video can be viewed repeatedly, no time limit. However, for the video download to the local need to contact the administrator for inquiry, video learning process instructors explain the courseware will be displayed in this window for members to download and use, courseware attachment download is stored in the form of Word documents, when downloading, click on the corresponding course courseware can be downloaded with the help of the browser downloader, the browser used in this article is Sogou browser, that is, with the help of SoGou web downloader to operate.

### C. The realization of answering questions

Members in the registration, Login, purchase and a series of links encountered or problems, can be asked in this window, the question will be displayed to the back-office administrator, the administrator will check and handle the reply at the first time. The questions will be answered to the individual and displayed on the answer page to facilitate other members to provide answers if they have corresponding questions, the page consists of comments, replies and comments, reply time, in the display below the question other members input questions after clicking submit can be displayed at the top of the question.

## VI. TESTING AND MAINTENANCE

Test and maintenance in the promotion of user experience, to ensure smooth operation of the system to provide an important support to ensure that quality is an important carrier to attract users<sup>[14]</sup>. The following is divided into system platform testing and maintenance.

### A. System testing

For the accuracy of the data, the first test is whether there is a technical error in the programming code, and then test the function of the relevant modules, for the code throughout the design of the whole program, more difficult, the most common testing methods are black box testing and white box testing<sup>[15]</sup>. Black box testing, as its name implies, compares a system to a black box without changing its internal structure, the stability and fluency of the testing system for randomly extracted or input data information, if there is more randomly extracted data and the system function can run completely, the system test passes the run, if the input information is wrong, the system will also connect to the database in a timely manner to report errors, and the response will prove the smoothness of the system. White-box testing refers to combing through the structure of a program and running it to see if the console output is correct every time you write an output statement, if the console output is unsatisfactory, the output statement is checked, and the test is corrected and continued<sup>[16]</sup>.

### B. System maintenance

After testing the function of the system, it is necessary to ensure the user's experience in the use of the process, which requires the administrator to maintain and update constantly, so as to avoid the increase in the number of users due to time and system errors, for the improvement of performance, in the process of maintenance, according to the experience of user members, comments to constantly update the efficiency of the trial run, to find a part of the population to put into use, according to the feedback information improvement, for this system platform, mainly divided into three aspects. Technology: a large number of users at the same time online learning system running error-free, to meet the needs of users. Function: the current system functions to meet the daily learning needs of users, for some innovative modules can enhance the user's convenience. Economy: the Integrated Network teaching platform is put into use, through a series of functional interface can save time and effort for members and managers, with high economic benefits.

## VII. CONCLUSION

Through unceasing system debugging and trial running, the system platform has realized a series of basic functions, such as member registration and learning, to meet the basic requirements. The purpose of this system is to meet the needs of students in the epidemic situation, and to improve the performance of students in primary, junior, senior and university. This platform not only solves the current problems brought about by the epidemic, but also enables students' learning ability to surpass the cultivation of students' abilities by ordinary teaching through this platform. The target audience of this platform is only students and administrators, this design to the greatest extent for students to create a stable learning environment, with a strong value.

Of course, the system in the proof-of-concept design phase and in the production phase there are many problems to deal with, for the MYSQL database understanding is crucial, myeclipse 8.5 software installation is the foundation guarantee, the source code written in Java has gone from verbose and complex to simplified, which has enhanced the understanding of the programming language. However, due to his own lack of experience in developing systems, for the platform of the database automatically generate orders, background pages of the increase and deletion of the management mode of information encountered a big problem, in the active communication with the teacher to solve the problem.

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