The Design and Implementation of Teaching Resource Platform for Cloud Computing Major

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ABSTRACT. *The rapid development of information technology and network technology, as well as their wide application in education, determines that the construction of teaching resources database based on them will be an important theme in curriculum construction and teaching reform of Higher Vocational schools. The platform of teaching resource bank in higher vocational colleges is the platform of teaching resource bank independently developed by the institute, which is more in line with the teaching needs of Higher Vocational colleges. It is an important means to promote active, collaborative, research-oriented and independent learning, and to form an open and efficient new teaching mode. It is also the construction and promotion of high-quality schools in Jiangsu Maritime Institute. An important platform for the achievements of teaching reform in Guangzhou University.*

KEYWORDS: Teaching Resource Platform, MySQL database, SSH, B/S structure

1. Introduction

At present, higher vocational education is in a period of rapid development, especially in China. It is the requirement of every higher vocational college to establish provincial or even national excellent demonstration schools to create a platform of teaching resources database of shared higher vocational colleges [1-2]. However, the construction of resource bank in higher vocational colleges is different from that in general undergraduate colleges. It is more reflected in the close connection between the organization and content of teaching resources and practice. The proportion of theoretical teaching resources is much smaller than that of practical teaching resources. Nowadays, campus informationization has been basically popularized in our country, the speed of campus network is also faster and faster, and the hardware configuration is also higher and higher. However, the utilization rate of network resources is generally low, resulting in a phenomenon of "big horse and cart", resulting in the dual waste of initial investment and idle

resources. As we all know, the biggest function of the network is to share resources, but the sharing of educational resources among colleges and universities in China is relatively weak, even among different departments of a school, the sharing of educational resources is also weak, resulting in extreme waste of resources. On the other hand, the current situation of educational resources on the Internet in China obviously can not meet the requirements of teachers and students'teaching activities.

This system decomposes the platform of teaching resource database of shared higher vocational colleges into several sub-platforms. The idea of sharing resource database is composed of distributed micro-service connection. On the basis of component development, parametric component technology is used to cooperate with the development environment and basic components, so as to reduce the cost of university network resource integration.

2. Requirement Analysis and Functional Design

2.1 Requirement Analysis

A use case diagram is a view that describes the functionality of a system consisting of actors, use cases, boundaries, and their relationships [3-4].

Figures 1 to 3 are system use case diagrams, describing the operation functions of various roles in the system on the platform of shared higher vocational college teaching resource database. Figure 1 depicts the operation functions of the system administrator and department secretary. The main responsibility of the system administrator is to ensure the operation of the system. The main functions are basic data maintenance, data management, including the formulation of data backup rules, view logs and other functions.
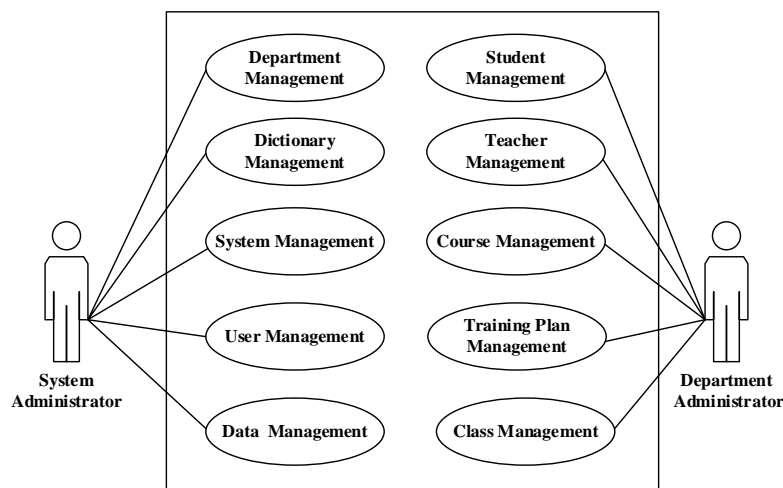

Figure. 1 The use case diagram for administrators

Figure 2 is a use case diagram fo teachers. The main functions of professional leaders are the formulation of professional training plans and the formulation of lecturers in various courses. The main function of teachers is to manage their own course resources. In addition to course standards, teaching plans, teaching plans, PPT and other basic materials, there are also teaching videos, e-books and other related resources.
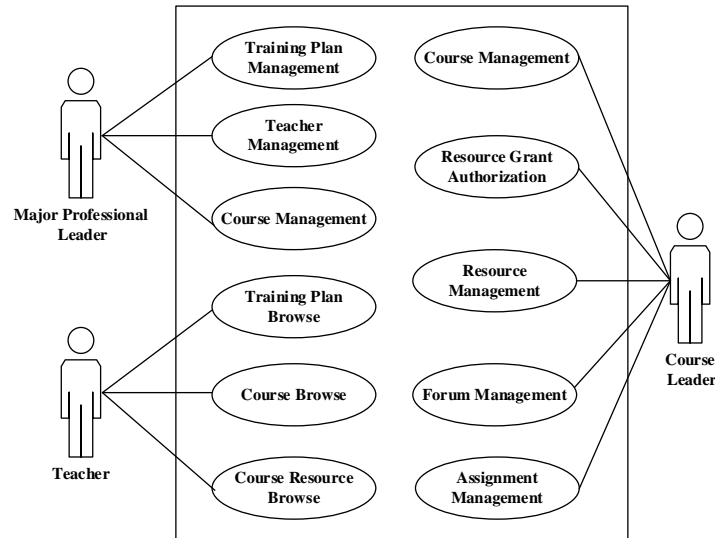

Figure. 2 The use case diagram for teachers

Figure 3 is a use case diagram for students and vistors. As a student, if authorized by the teacher of the course, he can access the resources of the course. As a general visitor, he can only visit the front page of the resource bank platform and some open course resources.
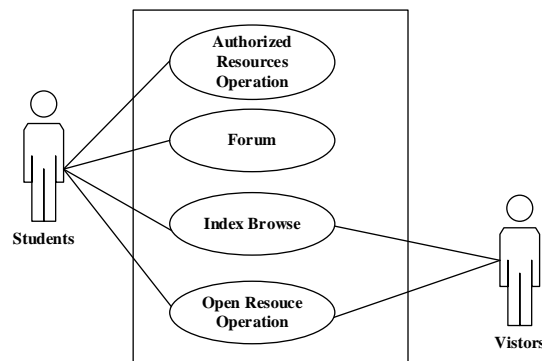

Figure. 3 The use case diagram for students

2.2 Non-functional requirements

The non-functional requirements introduced here are mainly operational requirements, such as logo, color, keyboard shortcuts. The non-functional requirements of Teaching Resource Platform are shown in Table 1.

Table 1 Non-functional requirement analysis

Requirement Name	Detailed requirements
LOGO	Unified LOGO of JMI
Tone	Embodying the characteristics of JMI
Style	similar toeducational platforms of JMI
Shortcut keys	Query buttons can be replaced by Tab or Enter
Access time	If you visit the campus intranet, you need to control the response time of the page within 5 seconds. If it is an off-campus visit, the response time of the page is controlled within 15 seconds.
Concurrent Access	Platform accesses within 100 concurrently, the platform can be accessed normally, without too long delay or error.

3. Functional Design

The overall design idea of platform development is to design and put forward a set of technically reasonable and reliable development plan to realize the sharing of teaching resources by familiarizing with the basic needs of teachers, students, managers and other users to the resource database and combining with CMMI3 waterfall development process.

(1) Platform to ensure good adaptability and scalability, so the platform must be developed, with the school's original platform can be docked, at the same time, the resource base is open, but also need to provide external interface.

(2) Easy to operate, to make users simple and easy to use, because there are many users, it is impossible to train one by one, only to use by oneself, so ease of use is one of the basic principles of platform design.

(3) To ensure the security of the platform by combining with the unified authentication platform.

Teaching resource platform consists of five modules : foreground exhibit, background managemet, service module, service interface module and information capture module. Figure 4 shows the function module diagram of foreground exhibit and figure 4 shows the shows the function module diagram of background managemet.
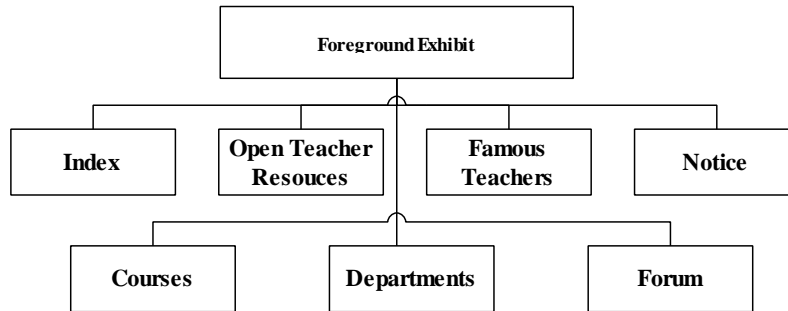
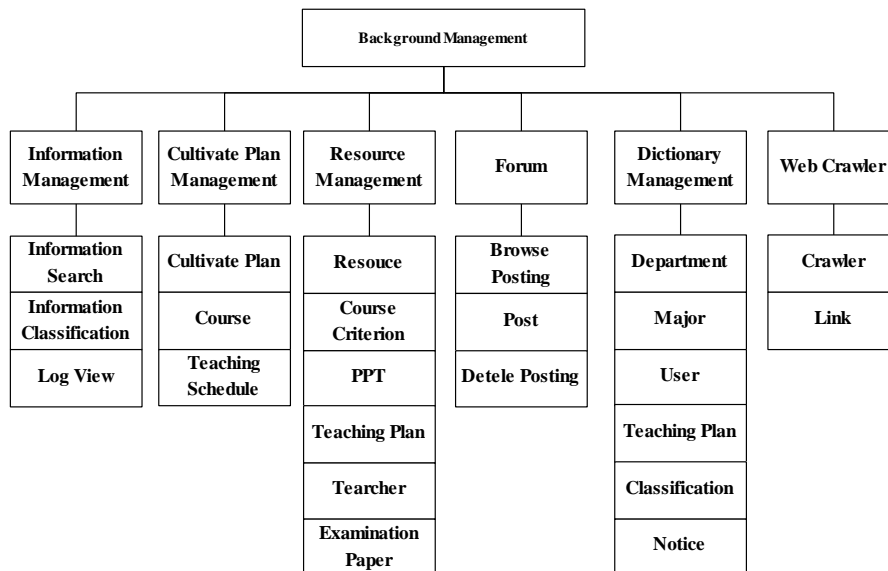*Figure. 4 The function module diagram of foreground exhibit*

Figure. 5 The function module diagram of background management

Background service module includes automatic backup of database and automatic backup of database to ensure data security. Platform status detection module, when the platform status is abnormal, immediately send short messages to the platform administrator through the way of SMS cat, to ensure the stable operation of the platform.

The service interface module provides interfaces to access platform resources through service interfaces with other platforms.

Information capture module is implemented by vertical search engine. Vertical search engine is divided into main crawler and information extraction part. Theme crawler obtains educational resources pages from campus network according to seed sites, and then collates the captured pages by information extraction sub-platform according to rules and stores structured data into index database.

4. System Implementation

SSH(Spring MVC+ Spring +Hibernate) framework takes Spring as its core function and integrates Spring MVC to complete Model-View-Control mode. Integrating Hibernate + JPA simplifies database operation[5].

4.1 Model Layer

The database operation is mainly accomplished by the persistence layer of Spring and Hibernate+JPA. Teaching Resource Platform model layer is mainly implemented by database connection pool, entity class (Bean class or entity class), Dao class (data operation object).

(1) Database Connection Pool

Using database connection pool can reduce the platform inefficiency caused by frequent database connection. The platform uses DBCP to complete the implementation of connection pool.

(2) DAO

The operation of database is realized by the integration of Spring+Hibernate [6]. This platform encapsulates the BaseDao class, which simplifies the operation. It provides the basic CRUD (create, retrive, update, delete) function. Other Daos in the platform simplify the operation of the database by inheriting and classifying. To provide most of the operations, the BaseBao provides the following methods. BaseDao is the parent class of all the classes in the Dao package of the platform, encapsulating the operation of adding, deleting, and checking. Other Dao classes have the basic function of operating database by inheriting this class.

4.2 Controller Layer

Users click on a connection, the control layer accepts the request, does not process business information, it only passes the user's information to the model, tells the model what to do, and chooses the view that meets the requirements to return to the user.

(1) Controller

The system adopts Spring MVC framework, and the control layer is composed of the core controller FilterDispatcher and the business controller written by users. The

core controller Dispatcher Servlet is the foundation of Spring MVC framework, which includes the internal control process and processing mechanism. Business Controller and Business Logic Components are implemented by users themselves. Users need to write configuration files for core controller Dispatcher Servlet while developing action and business logic components.

(2) Integererceptor

Spring privilege interceptor is used to implement the privilege checking in Web applications. The process of interceptor privilege verification is shown in Figure 6.
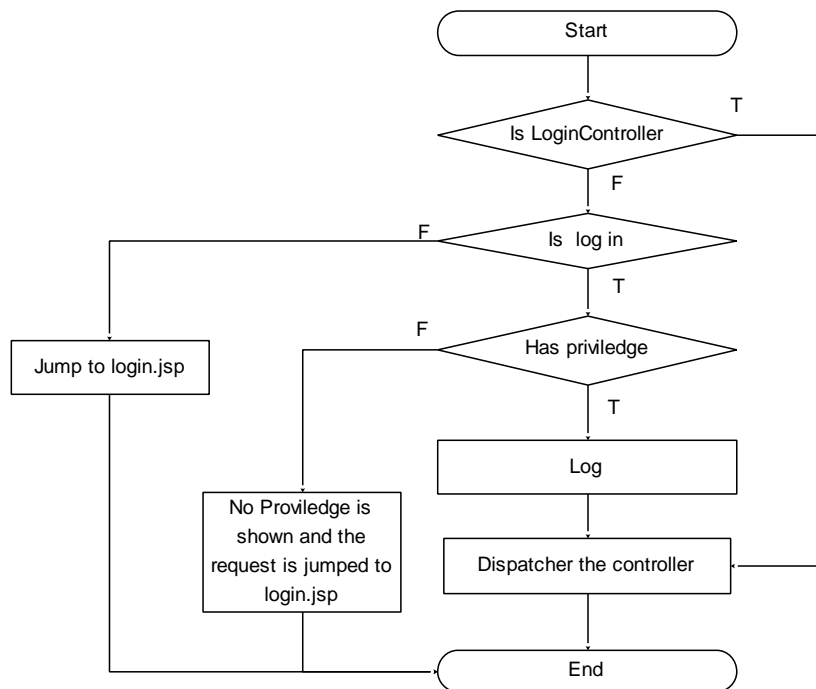

Figure. 6 The processing flow of the interceptor

4.3 View Layer

JSP is used to implement the function of platform view layer. In the generation of repository platform, every JSP page has no business logic code.

5. Conclusion

The rapid development of information technology and network technology, as well as their wide application in education, determines that the construction of teaching resources database based on them will be an important theme in curriculum

construction and teaching reform of Higher Vocational schools. Most of the members of the subject group are the teachers who teach the core courses of the software technology specialty in the Information Engineering Department of our university. During the course of teaching, we found that there are many problems in the teaching resource pool of the software technology specialty in Higher Vocational colleges, such as the lack of resources, the lack of effective teaching resources, the narrow ability and way for students to obtain resources.

The research of the subject discusses the basic process of teaching resources organization under the network environment, which has practical significance for promoting the construction and application of teaching resources database. In view of the current situation of the construction of Teaching Resource Bank of software specialty in Higher Vocational Colleges and the inefficiency of teaching support, this paper deeply considers the essential characteristics and functional attributes of teaching resource bank, and proceeds with the design and development of Teaching Resource Bank of software technology specialty to provide practical examples for the construction of teaching resource bank in Higher Vocational colleges, with a view to promoting it. Improvement of teaching quality and effective implementation of project courses.

Acknowledgements

References

[1] Liu X, Li K. Application Research of the Microlecture Teaching Model in the Higher Vocational Education and Teaching Reform [C] // International Conference on Information Technology in Medicine & Education. 2017.

[2] Yuan B. The construction of multimedia teaching resource base based on campus network [C] // Advances in Materials, Machinery, Electronics. 2017.

[3] Arora P K, Bhatia, Rajesh. Agent-Based Regression Test Case Generation using Class Diagram, Use cases and Activity Diagram [J]. Procedia Computer Science, 2018, 125: 747-753.

[4] Vachharajani V, Pareek J, Gulabani S. Effective Label Matching for Automatic Evaluation of Use -- Case Diagrams [M]. 2012.

[5] Zhang J J, Pu X H, Zhang Z H. Design and Implement of Teaching Resources Management Network Platform Based on MVC [J]. Applied Mechanics & Materials, 2014, 631-632 (2): 999-1002.

[6] Wang Y, Zi-Guo H, Luo Y G. Research and Application of Web System Development Architecture Based on Ext+Spring+Hibernate [J]. Computer & Modernization, 2009, 1 (12): 78-81.

[7] Zhang D, Wei Z, Yang Y. Research on Lightweight MVC Framework Based on Spring MVC and Mybatis [C] // Sixth International Symposium on Computational Intelligence & Design. 2014.

[8] Xu L, Chi K, Ming H. Design and implement for Internet taxpaying system based on spring MVC [C] // International Conference on Computer Science & Network Technology. 2016.