Design of University Graduation Project Management System Based on Micro Service Architecture

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ABSTRACT

Based on the concept of microservice, the study integrates MyBatis+Spring Boot framework, and uses Ajax technology and MySql database technology to develop the graduation design (thesis) management system. It has realized the information management of 14 core links, such as project declaration, topic selection, assignment, opening report, mid-term inspection, paper submission, paper review, defense and material filing. Through application demonstration, the result is nice, and the system has high scalability and wide applicability.

Keywords: Microservice architecture, Colleges and universities, Graduation design, Management system, Business process, MyBatis.

1. INTRODUCTION

Graduation thesis (design) is an important part of undergraduate talent cultivation and teaching and education, and also an important embodiment of students' comprehensive application of knowledge learned to solve practical problems and training of innovative thinking [1]. It also reflects the school-running thought, comprehensive scientific research ability and school-running level of colleges and universities from the side. At present, graduation thesis (design) in most colleges and universities still follows the traditional management thinking and concept. Generally, teachers are informed by relevant schools and other departments to give reference topics first, and then head teachers are notified to organize centralized topic selection for students. Since graduates are relatively dispersed because of internship, work or other reasons, it is easy to cause the lack of effective communication between graduates and supervisors, the conflict of students' topics, and the nonstandard process of graduation thesis (design) [1-2]. In addition, the subsequent forms and reports are manually issued and submitted in paper documents, which causes difficulty in preservation, low efficiency, and inconvenience of inspection and storage. Moreover, It is easy to cause some students and supervisors not to complete the graduation thesis (design) in accordance with the school requirements and regulations, thus threatening the quality and significance of graduation thesis (design).

In this paper, clear norms and standards will be formulated and the management platform of graduation design process in colleges and universities will be developed with focus on the standardization, high efficiency, networking and digital application requirements of the management and supervision of the graduation design process in colleges and universities, as well as the key links such as topic selection, guidance, mid-term inspection, review, group defense and material filing, thereby realizing the digital management of graduation design in the whole life cycle. This system can be utilized to effectively manage students' graduation design process, improve the quality of graduation design, and provide data support for the digital construction of colleges and universities.

2. SYSTEM ARCHITECTURE DESIGN

The graduation design management system is mainly aimed at monitoring the whole process of graduation design and setting different roles for classified management. Relying on the advantages of the Internet and mobile Internet, the system realizes an online, intelligent and digital management process. Based on the concept of micro service, the platform integrates MyBatis+Spring Boot framework, and uses Ajax technology and MySql database technology. To facilitate its use, the platform is structured in the way of PC client + mobile client, in which the mobile client is developed based on WeChat applet, achieving data

unification between the PC client and the mobile client.   Figure 1 shows the system architecture:
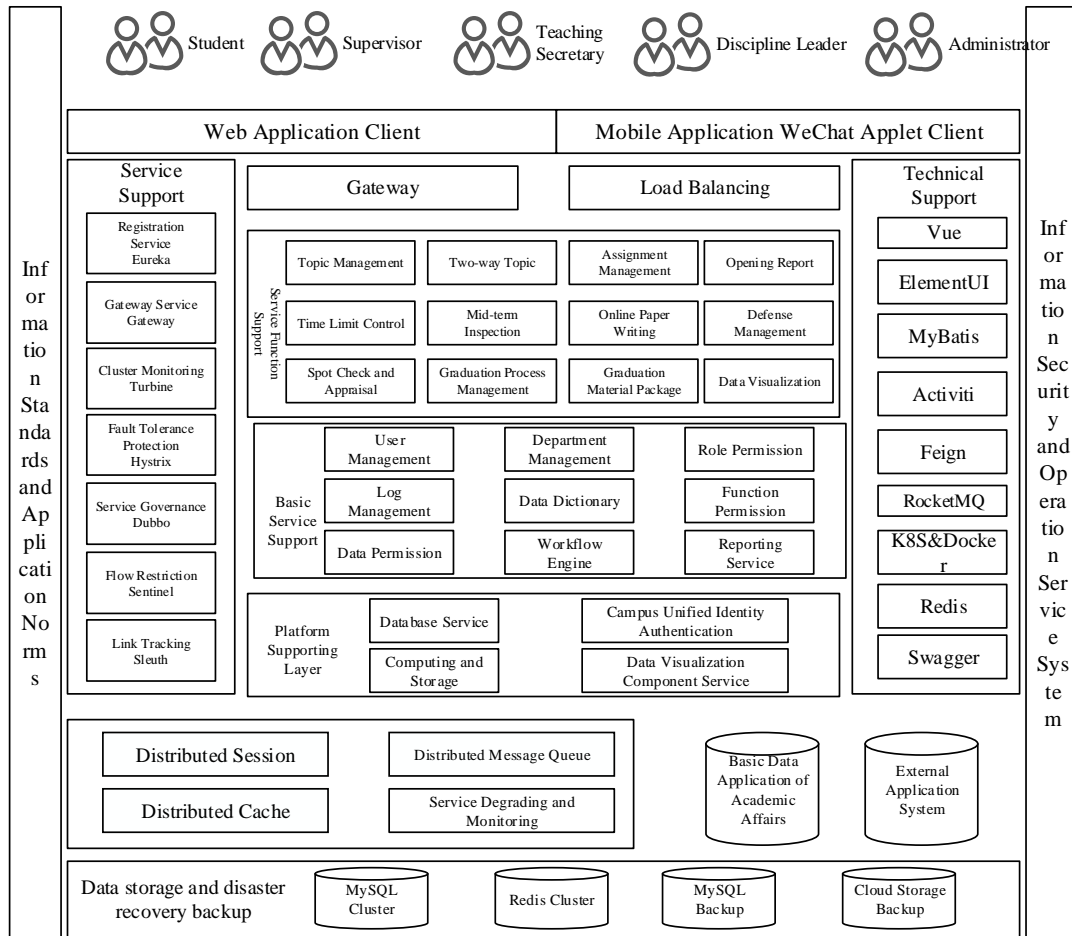

Figure 1 System Architecture

3. SYSTEM DESIGN

3.1. Business process design

According to the relevant management standards and requirements of graduation design, analysis is carried out on the work that core user roles such as teacher, student, teaching secretary, discipline leader and administrator need to participate in different stages of graduation design, and some processes are optimized [3]. It is concluded that the core business process of graduation design includes 14 core links, such as project declaration, topic selection, assignment, opening report, mid-term inspection, paper submission, paper review, defense and material filing, as shown in Figure 2, among which the graduation design topic becomes the main clue throughout the graduation design process.
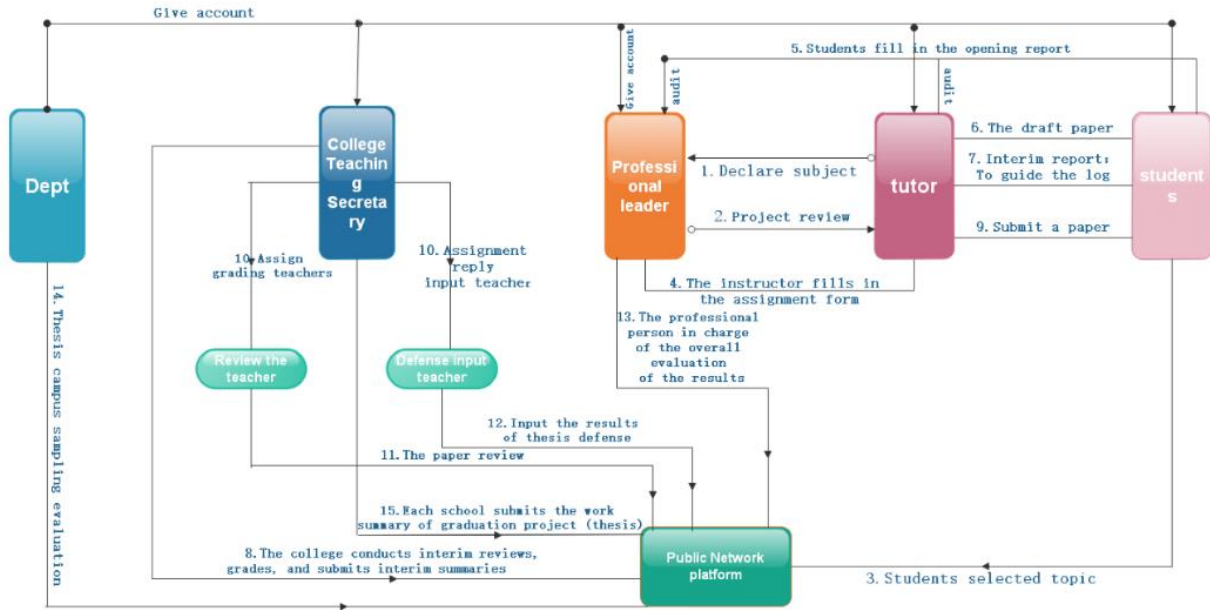
Figure 2 Graduation Design Business Process

3.2 Design of core business modules of the system

3.2.1.Time setting module

After entering the system, the system administrator or college administrator can set the start time and deadline of each stage in System Configuration. Through this function, the college administrator can control the time nodes of each stage of the college, including project declaration, topic selection, assignment, opening report, mid-term inspection, paper submission, defense and results.

3.2.2.Project declaration and review module

After entering the system, the supervisor can add, delete and modify the topic information, check the information of submitted topics, and print the topic application forms. After logging into the system, the department head can review the topics declared by the teachers in the department. The topics that pass the review will be made available to students. If the topic fails the review, a review comment will be returned, and teachers can modify the topic information again and submit it for review until being approved. Figure 3 shows the system interface.
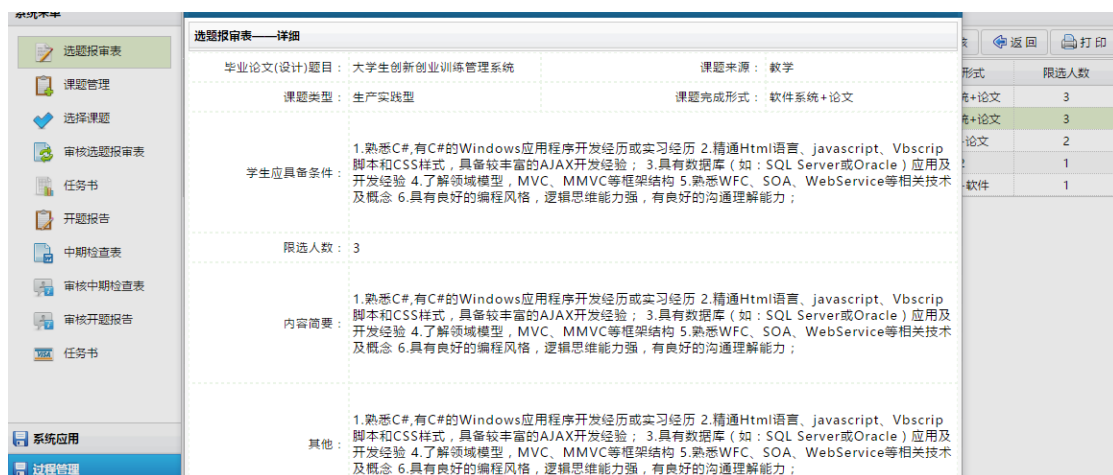

Figure 3 Project Declaration and Review Module

3.2.3. Topic selection module

After entering the system, students can view the relevant information such as graduation (design) thesis topics and supervisors offered by their departments and majors [4]. In addition, students can view the detailed information of specific topics, select topics and view the basic information of teachers (including teachers' basic information, research interest, etc.) in the interface, and also can modify the results of topic selection submitted before they are reviewed by relevant teachers. Figure 4 shows the system interface.
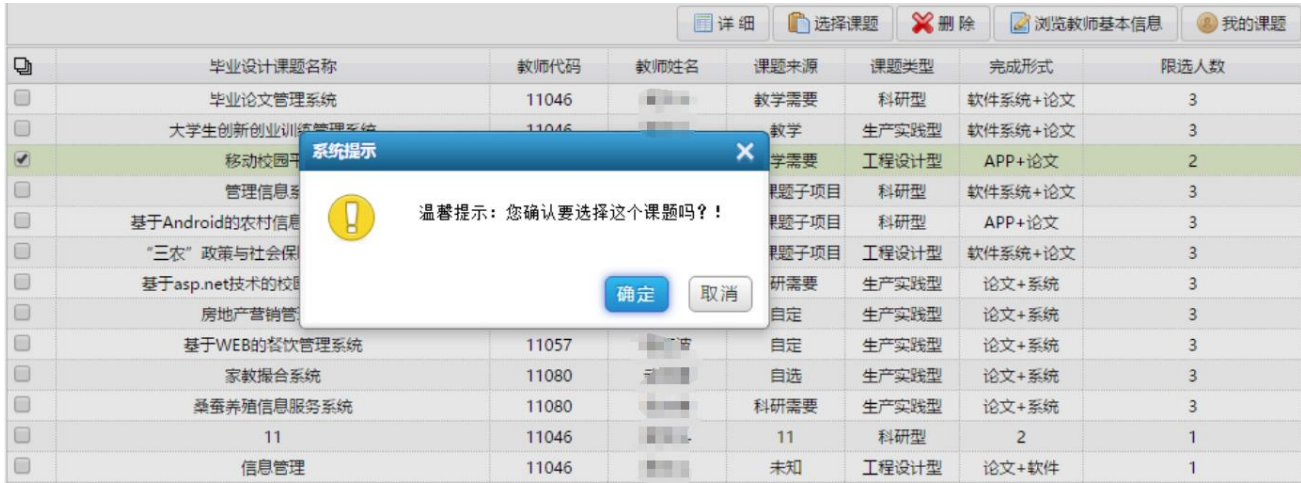

Figure 4 Topic Selection Module

After entering the system, the supervisor can view the relevant information about the students who have chosen his/her topics, including the basic information of the students, their academic achievements in school, honors and awards, etc. The supervisor determines whether the students have the ability to complete the selected topic through comprehensive evaluation. If the students fail, they need to select the topic again.

3.2.4. Assignment management module

This module is mainly used for the supervisor to add, delete, modify and view assignment information, select specific students and issue the assignment. After the students log into the system, they can accept the supervisor's assignment and start the follow-up work.

3.2.5. Opening report management module

Students can add, delete, modify and view their opening report in the system. For those opening reports not reviewed by the supervisor, students can modify them without any restriction, but those reviewed will not be edited again. Figure 5 shows the system interface.
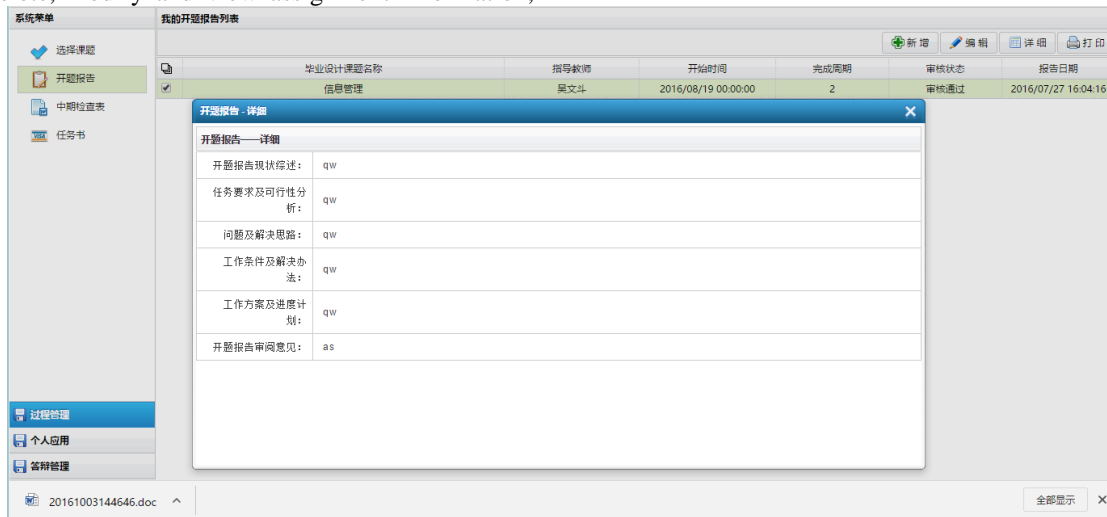

Figure 5 Opening Report Management Module

3.2.6. Mid-term inspection form management module

Colleges are required to carry out mid-term inspection on graduation (design) thesis. Student, teacher and administrator can enter the system and submit mid-term inspection information, which can be printed or exported by users with permissions.

3.2.7. Paper submission module

Students can submit their paper in the system, and after they select the paper and relevant annexes, fill in the title, number of words and figures of the paper and submit the paper and relevant information, the supervisor, department head and college head can check and review the graduation thesis online in the system and provide revision suggestions for students' reference. After that, students are required to upload the final thesis within the prescribed time, and the supervisor checks the paper in the system and gives its grade. Figure 6 shows the system interface.

Figure 6 Paper Submission Module

3.2.8. Management module of paper review, defense and grade evaluation

This module is mainly used to manage the information of the defense committee, teachers and students in the defense, defense groups and review teachers, realizing the business functions of assigning cross-review teachers for students, managing the defense process, submitting defense records and review results, and making summaries.

3.2.9. Head teacher business module

After entering the system, the head teacher can query and monitor the whole graduation (design) thesis process of the students in the class, such as topic selection, assignment, opening report, mid-term inspection, thesis writing progress and score management.

3.2.10. Statistical analysis module

This module performs statistical analysis from the dimensions of topic source and type, supervisors (number, title, education background, major, gender, etc.) and scores according to the specific business needs in the whole process of graduation design, and also performs comparative analysis crossing different years and different majors to objectively reflect the quality and problems of graduation design, thereby providing data support and decision analysis for quality monitoring and evaluation of graduation design.

3.2.11. Spot check and appraisal module

This module enables the administrator to set self-defined appraisal rules and quantitative proportion, and the system selects papers according to the results of comprehensive evaluation and the experts review them; after colleges recommend their excellent thesis, the system finally exports the summary sheet of recommended excellent undergraduate theses.

3.2.12. System management module

This module mainly realizes the functions of menu management, operating button management, role management, department management, user management, user group management, system log, resource management, data backup, etc.

3.2.13. Paper database management module

This module is mainly used to store papers and related materials according to year, college, major and student (distinguished by student ID), forming a graduation thesis library, realizing digital filing of graduation thesis related materials, and providing data sources for subsequent spot check and duplicate checking of papers.

4. SYSTEM FEASIBILITY AND APPLICATION VALUE

4.1. Feasibility analysis

Graduation thesis (design) is a practical teaching link for colleges and universities to achieve the objective of training students' comprehensive qualities and abilities, and its quality is an important basis to measure the teaching level of colleges and universities. Undergraduate thesis (design) is the last learning link for undergraduates in colleges and universities. As a very important link in undergraduate education and

teaching, it aims to test not only the students' theoretical and practical knowledge, but also their comprehensive abilities to analyze and solve problems.

On the one hand, most of the local colleges and universities in Yunnan still adopt the traditional manual mode for the management of graduation thesis (design): The supervisor first gives the topics, and then instructs the graduates to select their topic. After the graduates finish the opening report, the supervisor instructs them to write the paper. The college conducts mid-term inspection of the papers, followed by paper review, defense and filing. In the entire process, the graduates are required to communicate with the supervisor face to face in each link, while other means such as mail, Email, telephone and QQ are also suitable. This mode makes for face-to-face communication and problem solving between the supervisor and graduates. However, it also has many drawbacks, which are mainly manifested in low efficiency, long time spent in topic selection, opening report, paper revision, filing and consulting and other links, heavy management tasks, and easy to cause problems. As a result, the quality of graduation thesis cannot be guaranteed, and a large amount of resources are wasted. With the popularization of Internet technology and mobile Internet technology as well as the development and reform of undergraduate education model, it is imperative to develop an undergraduate thesis (design) management platform that meets the development trend of colleges and universities in Yunnan.

On the other hand, even though colleges and universities in Yunnan have developed their graduation thesis management system, such system cannot meet the requirements of the credit system reform. The construction of the three centers (student, teacher and curriculum) in the credit system reform needs to develop or introduce a new student management platform, teacher management platform and educational administration platform. In addition, the data interchange and interservice functions of these three platforms are still in their exploratory stage. For example, the graduation thesis (design) management platform provides the basis for teachers' performance assessment and graduation thesis guidance workload for the teacher-centered platform, and provides the basis for students' process management for the student-centered platform.

The graduation design management system of colleges and universities based on micro service architecture applies "Internet Plus" to the management of graduation thesis, which reforms the management mode of graduation design (thesis), realizes the searchable, controllable and manageable course of graduation thesis (design), and improves the management efficiency. This system has important application value in exploring the new modes of

graduation thesis (design) under the credit system reform in Yunnan, popularizing and applying them in other peer colleges, and building "intelligent management" and promoting digital campus construction in colleges and universities.

4.2. Application value

The graduation design management system of colleges and universities based on micro service architecture has its distinctive application value, which is manifested in the following aspects: first, it explores the new modes of graduation thesis (design) to realize paper-free, standardized, normalized, digital and network-based graduation thesis (design); second, it is designed with dynamic data interfaces to realize the seamless connection between business systems such as educational administration; third, it realizes network-based management of graduation thesis (design) in the whole process, monitored business process and controlled progress; last, it enables dynamic analysis of graduation thesis (design) data from multiple dimensions.

5. CONCLUSIONS

In view of the current needs and existing problems of information-based applications of university graduation design, the core business process of university graduation design is analyzed, and a full-life-cycle graduation design management system is developed to realize procedural, digital and online application and monitoring of the whole life cycle, including supervisor's design topic declaration, topic review, students' topic selection, opening report, mid-term inspection, and paper writing, submission, review and filing, etc., and to fully implement real-time guidance, intelligent retrieval and paper-free storage [5], which has greatly reduced the cost and improved the work efficiency and monitoring level. At present, this platform has been piloted in Baoshan University, Yunnan Agricultural University and other colleges and universities, and is widely acclaimed by teachers and students, which plays a positive role in improving the quality of talent cultivation.

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