

# Construction of Service-Oriented Postgraduate Management Information System

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**Abstract:** The function of the graduate school has changed from management to providing quality services for teachers and students. The original postgraduate management information system was developed for management purposes and cannot adapt to new requirements.

This paper introduces the construction method and technical route of implementing the service-centered graduate management information system with microservice architecture. It also introduces several convenient functions to improve the work, study and research efficiency of teachers and students.

## 1. Introduction

The postgraduate management information system (MIS) of our university has been developed and used for more than ten years. Its functions include enrollment management, student status management, training management, degree management, teacher management, quality management, etc. It has become an indispensable tool in postgraduate management. It has played a positive role For the refinement and scientificization of management.

However, there are problems such as imperfect functions, unclear division of function modules, unsmooth data exchanging between modules, and insufficient data sharing with other systems.

In the tide of the construction of school smart campus, under the background of the widespread application of big data technology, especially under the drive of the transformation of graduate school functions from management to service, the need for upgrading the old postgraduate MIS has been imminent.

In the process of development and construction of the new information system, the aim is to provide comprehensive and high-quality personalized services for the supervisors, teachers, doctoral students, master students and alumni, adopting mature and advanced technology architecture and development model; reorganizing the business process of the graduate school To sort out the needs of teachers and students in work, study, and research; to clear the data transfer channels between the various departments within the graduate school; to establish data links between the graduate school system and external information systems to achieve full data sharing; identifying the postgraduate MIS's position in the smart campus Architecture, make full use of the functions of the school's shared platforms; provide a full and comprehensive one-stop service for teachers and students at lower cost, and help the improvement of the school management level and the quality of graduate students' training continuously[2,4].

we design and implement new management information system for our Graduate School Based on the J2EE, SOA, ESB and HTML5 technologies.

## 2. System function requirements

Requirements analysis is an important activity in the software planning phase and an important part of the software life cycle. This phase is to analyze what the system needs to implement, rather than how to implement. The goal of requirements analysis is to divide the system into several relatively independent functional modules by analyzing and sorting out user requirements[3,5].

For the purpose of serving the users, according to the needs of graduate school management and the needs of teachers and students in work, study and research, the new graduate system has been divided into enrollment management, student status management, training management, degree management, and subject construction, etc. 17 modules.

Table 1 User permission analysis table

		doctor	master	professor	manager	leader	Alumni	admin
1	Enrollment	Y	Y	Y	Y			
2	Student management	Y	Y	Y	Y			
3	Training management	Y	Y	Y	Y			
4	Degree management	Y	Y	Y	Y			
5	Quality Control	Y	Y	Y	Y			
6	Teacher management			Y	Y			
7	Graduate work	Y	Y	Y	Y			
8	Subject management	Y	Y	Y	Y			
9	Innovation management	Y	Y	Y	Y			
10	Online lessons	Y	Y	Y	Y			
11	Alumni management	Y	Y	Y	Y			
12	Video communication	Y	Y	Y	Y		Y	
13	Resource aggregation	Y	Y	Y	Y		Y	
14	Data management	Y	Y	Y	Y		Y	
15	Data research	Y	Y	Y	Y	Y	Y	
16	Statistical Analysis	Y	Y	Y	Y	Y	Y	
17	System Management							Y

Table1 analyzes the system user's operation authority for the system modules. The first line describes the user roles in the system; the second column describes the system's function modules; in the middle part 'Y' represents that the role have Operation permission for the module, otherwise there is no operation permission.

### 3. System design concept

#### Key technologies used in this project

*J2EE* (Java 2 Platform, Enterprise Edition) is a Java platform designed for large enterprise host level computing. J2EE provides a good mechanism for building a scalable, flexible, and easy to maintain business system[1].

*SSH* is an integrated framework of struts+spring+hibernate, which is a popular web application open source framework. By adopting the above development model, not only the complete separation of the view, the controller and the model is realized, but also the separation of the business logic layer and the persistence layer is realized.

*SOA* (service-oriented architecture) is a component model that splits an application into different functional units (called services) and links them through well-defined interfaces and contracts between these services. It will help enterprise system architects to construct the entire business system faster, more reliably, and more reusable.

*ESB* (Enterprise Service Bus) is a key part of the infrastructure used to build a service-oriented architecture (SOA) solution. ESB supports services, messages, and event-based interactions in heterogeneous environments and is manageable.

*HTML5* can implement responsive web design, that is, the same web page automatically adapts to different screen sizes, and automatically adjusts the layout according to the screen width.

*RESTful* lightweight interface standard for implementing microservice calls here.

## General design principia

By providing convenient services to save valuable time for teachers and students, improve the work and learning efficiency of teachers and students, improve the research level and technical ability of teachers and students, so as to reach the goal of improving graduate school's management level and school effect. Such service concept must be reflected in the design of the postgraduate MIS:

Compliancing with the school's data standards and the school's smart campus master plan, based on the results of the top-level design to determine the function of the system and its relationship with other parts of the smart campus. Avoid repeated data input by teachers and students through adequate data sharing.

The system module is further subdivided into several microservices. Each microservice has a definite function and it can be executed independently. According to the time period requirements, the corresponding microservice functions are attached to the PC portal, the mobile portal and the graduate school's system portal on time, and the relevant personnel are humanized reminded by means of WeChat, SMS, and mail.

Through the adaptive UI page design, the system can be executed on mobile phones, tablets, and PCs without modification.

Introduce convenient accessibility functions for teaching and research, and provide tools for communicating with the community so that providing consulting services to the community conveniently.

## 4. System function implementation

### The Postgraduate MIS communicate with other parts of the Smart Campus

Fig. 1 show that the postgraduate MIS completes the authentication of user information through the unified identity authentication system in the smart campus; realizes the Business Process Management in the system through the BPM platform; and realizes the output of various forms and statistical analysis charts through the report platform; Through the data exchange platform, exchanging data with other information systems. for example the HR system, scientific research system, financial system, and student work system etc., thereby achieving data sharing, avoiding repeated data entry, and ensuring the consistency of data in the smart campus.

### System functions of The Postgraduate MIS

Table 1 lists the functional modules included in the new postgraduate MIS. The blue text part are the existing functional modules of the old system, and others are new modules.

Through careful analysis, each system module is decomposed into several independent microservice components that can run independently.

for example:

The *Enrollment* system module can be decomposed into the online registration, the exam information inquiry, the examination room inquiry, the result inquiry, the admission result inquiry, etc.

The *Student management* can be decomposed into the basic information check, the student card information check, the student status management, the test registration management, the online payment, the dormitory allocation inquiry, etc.

The *Training management* can be decomposed into score entry, courses selection, Start research application, training plan inquiry, transcript inquiry, teacher evaluation, classroom inquiry, class inquiry, examination inquiry, etc.

The *Degree management* can be decomposed into sub-committee voting results entry, teacher review dissertations, sub-committee chairman review, doctoral defense announcement inquiry, degree information inquiry, scientific papers, scientific research results, patents, paper reviewers ,

defense committee management, degree office review, defense committee score, degree certificate management, etc.

The *Teacher management* can be decomposed into teacher basic information maintenance, enrollment application, supervisor qualification application, etc.

As shown in Figure 1, users can access the required microservices through the PC portal, mobile portal, and graduate system portal to view the required resources, data, and charts, or to complete their own work tasks.

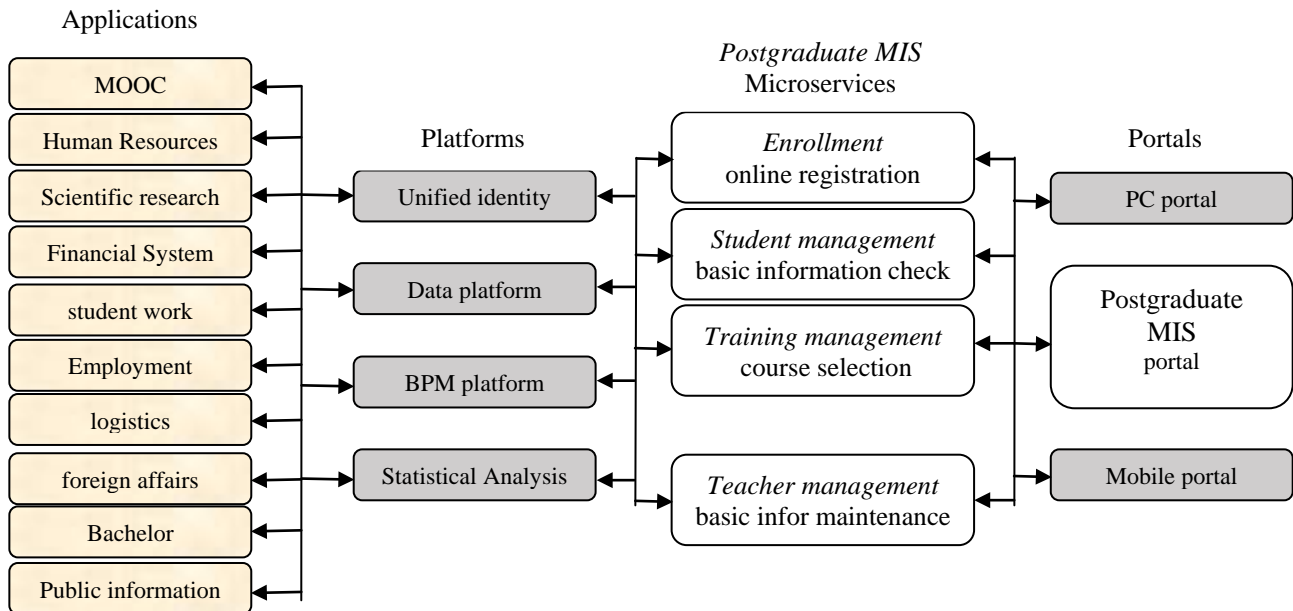


Fig. 1. Postgraduate MIS communicate with other information systems and public platforms

## 5. Conclusion

By subdividing the functional system modules into microservices which can be developed separately and run independently, the postgraduate MIS's architecture is more standardized and clear; the architecture is beneficial to gradual improvement and convenient maintenance; it is beneficial to the reuse of system functions also. This way we can speed up the development, reduce development costs, and reduce the risk of system construction.

At the same time, through multi-channel message push and event reminding, teachers and students can get the to-do message at any time and deal with the events that need to be processed in time.

Through these aspects of work, the postgraduate MIS has been completely upgraded to a humanized helpful tool for teachers and students.

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