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Construction and Application of University Welcome System under the Background of Informatization

Rong Su

Information Network and Data Center, China University of Geosciences (Beijing), Beijing, China
Email: surong@cugb.edu.cn

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Abstract

The rapid advancement of information technology has promoted the development of informatization in universities. The freshmen welcome information system of universities is the first important system to showcase the digital level of the university to new students. With the expansion of the enrollment scale of universities, improving the efficiency of welcoming work has become an urgent problem to be solved. This article analyzes the characteristics and existing problems of the welcoming work, combined with the main technical methods of information system construction, and based on the comprehensive situation of information systems in our university, proposes the construction goals and ideas of the welcoming information system, summarizes the construction process and operation results of the welcome system, and explores possible directions for future optimization.

Keywords

Welcome System, Informatization, University, Digital Campus, Registration

1. Preface

The welcoming process in universities is the first launched work after the college entrance examination enrollment. It is an important way for freshmen and parents to understand the university's work style, and also an important platform for the university to showcase its comprehensive management capabilities. The convenient and smooth welcome process can help students better adapt to their identity as college students, and also put forward higher efficiency requirements for various management departments on campus. The welcoming work in universities has the characteristics of expanding student scale, involving multiple departments, complex business, and concentrated time. How to use information tech-

nology to improve efficiency is an increasingly important issue in the current welcoming work.

2. Background and Current Situation of the New Students Welcome System Construction

2.1. Construction Background

In 2021, the Chinese Ministry of Education issued a notice on strengthening the informatization of education management in the new era, which requires all educational units to use information technology to transform management concepts, innovate management methods, improve management efficiency, support educational decision-making and services, promote the modernization of educational governance [1]. At present, all universities are utilizing the new information technology to improve the digital level of management, fully leverage data efficiency, and enhance the information service experience. As the first task of serving students, the level of service and convenience in welcoming students have been highlighted in the most prominent position. In order to adapt to the development of smart campus, strengthen integration with other business systems on campus, and improve the efficiency of welcoming students, our university has constructed a new version of the welcoming system by sorting out the needs of various departments and analyzing the current situation of university informatization, and hopes to achieve the goal of fast and convenient welcome process.

2.2. Previous Welcome Situations

In terms of administrative arrangements, our university's welcome work is led by the school office, coordinating with multiple departments such as the academic affairs office, graduate school, student affairs office, finance office, security office, logistics group, information network and data center, school hospital, and various colleges to organize the welcome work. Important departments and all colleges have registration points, and new students must go to these registration points to register after entering the university.

In terms of informatization, various business departments, such as the academic affairs office, graduate school, student affairs office, finance office, logistics group, etc., have already established mature information management systems. Our university's original old version of the welcome information system is an independent existence, operated by the information network and data center, using traditional B/S website architecture with relatively simple functions. Faculty members responsible for welcome work from various departments can log in and manage data, including process settings, new student data import, and updates on new student registration status. The usage mode is relatively simple, lacking interaction with other systems and the participation of new students.

2.3. Issues Exposed during the Welcome Work

In recent years, with the improvement of the overall informatization level of the

campus, our university has made significant progress in data fusion and business information integration, and the construction of a smart campus has gradually been strengthened. In this situation, the shortcomings of the welcome work have also been revealed [2]. Firstly, the interaction between the welcome information system and other systems is minimal, resulting in a lack of information sharing. Secondly, the enrollment scale of universities is expanding year by year, and the number of students and parents who arrive on the day of registration is increasing. The frequency of use is becoming higher, and the functions and performance of the original welcome information system are overwhelmed. Thirdly, there are multiple registration points and procedures for new students, which puts a lot of pressure on staff and freshmen, inevitably leading to errors and queuing. Finally, the development of big data, network technology, and mobile portable devices in recent years has put forward more requirements for the convenience of the registration process.

3. The Construction Goals and Plans of the New Welcome System

By analyzing the current feedback on major issues, and comprehensively sorting out the requirements, we classify and process online and offline transactions, optimize the scheduling of welcome work, want to achieve data integration and sharing, improve the speed of new student registration, real-time counting of registration quantities, enhance the interaction capability of mobile devices, and achieve the goal of fast and efficient registration process [3].

3.1. Strengthen Overall Planning and Sort out Business Requirements

The welcome work is generally completed by multiple departments of universities, including the school office, academic affairs office, graduate school, publicity department, student affairs office, finance office, information network and data center, logistics, college, security office, campus hospital, etc., working together within one or two working days. It has the characteristics of short time, large number of personnel, and complex business. This requires overall planning from a global perspective, and the online and offline affairs of each business department's welcome work should be well coordinated and classified. Technicians visited frontline staff in various business departments to understand their scope of welcome work and expected goals for the welcome information system. They collected and sorted out online affairs that can be processed through the welcoming information system and the other offline businesses affairs.

3.2. Optimize the Timing of Business Processes

On the day of registration, new students need to do a lot of registration work, such as verifying their identity information at the academic affairs office or graduate school, paying or verifying fees at the finance office, receiving student manuals

and other materials from the college, handling the green channel procedures for student aid at the student affairs office, receiving military training materials at the security office, receiving keys for check-in at the logistics office, and handling medical examination information at the university hospital. There are many locations to find, and there are many affairs to handle, which can easily lead to boredom, mistakes or disputes. In fact, many businesses do not need to be completed on the day of enrollment. Process steps can be optimized by dispersing some transactions before enrollment and only placing important transactions related to new students' process status on the day of enrollment.

3.3. Effective Data Exchange and Sharing with Existing Business Systems

As various business departments currently have mature information management systems, some functions related to welcome work may have already been involved. The welcoming system only needs to do a good job of information exchange with them, reduce redundant construction of functions, achieve effective data flow, and highlight the most important aspects of welcoming, such as updating the registration status and data statistics.

3.4. Strengthen the Mobile Registration Function

In order to facilitate the quick registration of new students and combine with the current mainstream concept of portability, the welcome system should fully utilize the usability of mobile devices, allowing new students to actively understand, participate, and quickly implement, and improve the friendly experience of the welcome process.

4. Construction Process

4.1. Architecture and Functional Design

Based on our university's experience in information technology work, the welcome system is designed with a three-tier architecture: data layer, business layer, and access layer, as shown in **Figure 1**. The data layer consists of business databases, including new student enrollment data, user access data, etc. The business layer mainly includes the implementation of functional requirements proposed by various departments, such as new student filling out forms, photo updates, data statistics, etc. The access layer is the path control for user access [4].

1) Data layer

There are two sources of data for the data layer. One is the university's public database, where basic data such as organizational structure and personnel information are shared by the data center. Other data such as payment status and accommodation information are also obtained from the data center. The second is the data used independently for welcoming students, such as some data generated during the enrollment process, which does not exist in the data center, so it needs to be shared with the business department of academic affairs and enrollment.

The welcome database obtains data through data synchronization, and also supports the import way of data. In addition, the data generated during the operation of the welcome system, such as filled forms, reviewing information, etc., is also directly stored in the welcome database.

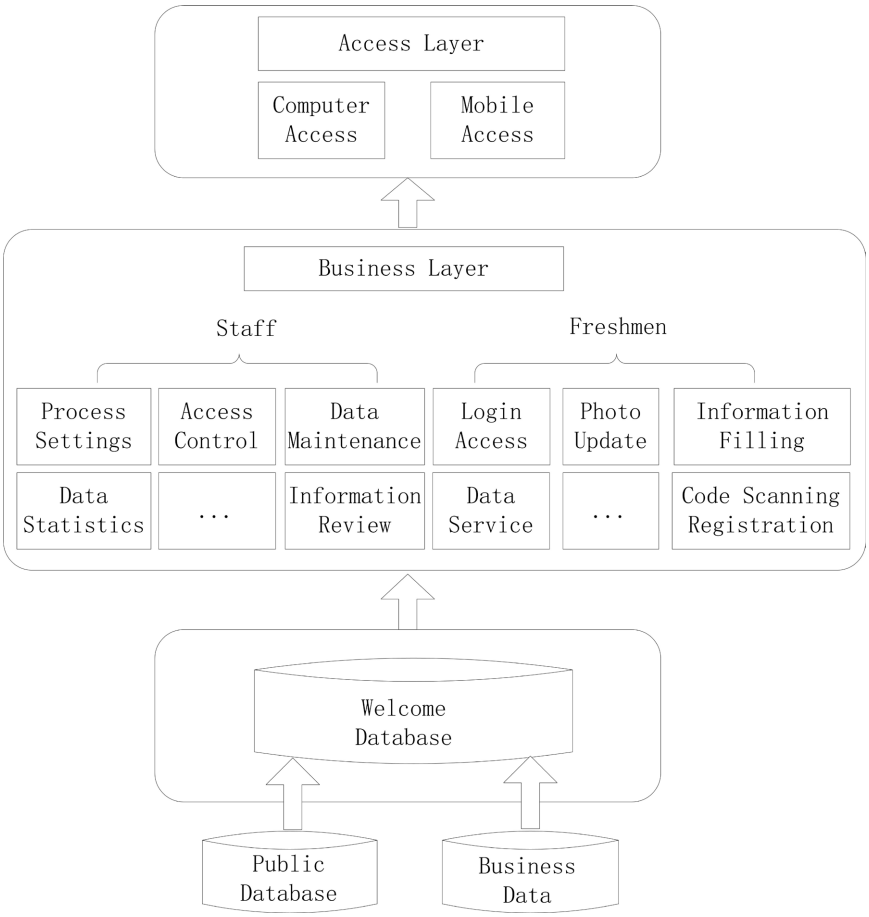

Figure 1. Architecture and functional design diagram.

2) Business layer

The business layer is the stage of implementing functions. After sorting out the requirements, the most concerned online businesses are summarized and implemented through programs. Administrators can set system operations such as technical parameters, registration points, registration time, user management, and new student data for processes. New students can view the university introduction and notices through the website page, log in according to the requirements of the admission letter, and fill in personal information and update personal photos. The photos will be used in the welcome and other information systems on campus, such as access control system, campus card production, student ID production, etc. The updated photos will be judged by the parameters of the welcome system to meet the requirements when they are being uploaded. After uploading, they will be double judged by the counselor's approval to ensure the authenticity and validity of the photos. If no new photos are uploaded, the entrance examination

photos will be used directly. New students can scan the QR code on their personal WeChat account for quick registration. If there are any abnormalities, staff can also submit the registration through the faculty interface, ensuring the effectiveness of registration through multiple methods. The staff interface can also support various functions such as querying, statistics, exporting of welcome data, and real-time viewing of registration rates [5].

3) Access layer

The users of the access layer include faculty and freshmen. In addition to the original computer page, the mobile terminal WeChat official account is added for access, which allows real name authentication within the service number set up by our university. After authentication, students can register and perform other campus operations, such as campus card recharge and other convenient functions. The mobile access method allows new students to check their personal enrollment information anytime and anywhere.

4.2. Implementation Process

Based on past experience in information technology construction and the actual situation of our university, the following implementation plan has been formulated.

1) Adjust various transaction schedules

Technicians are responsible for conducting extensive research and demand sorting, collecting demands from the enrollment administrators of various secondary departments, and coordinating with the school office to determine which problems can be solved in advance and which problems must be solved on the day of enrollment. This disperses the work pressure of enrollment, and fully uses the summer holiday before enrollment as a starting point for work. During this period, much work is done in advance and meticulously, leaving more flexible time for the day of registration. The specific arrangement is shown in **Figure 2**.

2) Environment and Technology Implementation

The welcome system consists of one physical machine running the database, one physical machine running the main program, and one virtual machine running the WeChat flashing program. The database is built on our university's data center hardware and shares data with other databases through reading views or web service interfaces. The technology of the program development adopts the SSH framework under the currently mature Java language. The functions of each page comply with the requirements document. In the process of functional development, the technical team needs to start from the enrollment work, track the time flow of new student data, such as the new student admission process, the new student login process, the generation process of student ID and class numbers after enrollment, the operation process of new students logging into other systems after obtaining their personal student ID, and the operation process on the day of registration, formulate the effects that the welcome system needs to achieve in each step. Then, according to the functional design of the business layer, implement

each effect one by one, and finally generate the registration data that the new student cares most about. The new students can view personal registration status such as class and student ID information, photos, dormitory arrangements and so on by scanning the college QR code on the day of registration. Administrators can also query statistical data on the status of new students as needed, and the data can be accessed and calculated at any time. Due to the involvement of user login and personal information security, the system uses vulnerability scanning security tools for detection to meet security requirements.

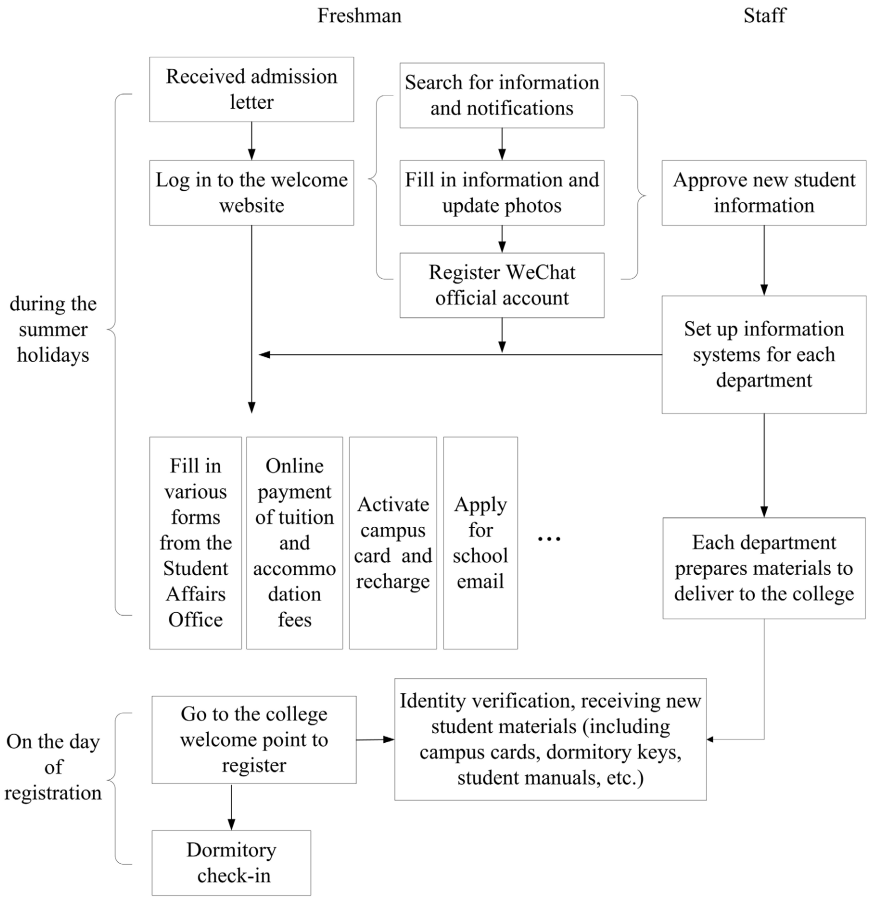

Figure 2. Process optimization diagram.

3) Performance and functional testing

The program server adopts the latest pressure decomposition performance to ensure the concurrent number of code scanning for new students' mobile phones on the day of registration. The program undergoes multiple tests by testing engineers, information network and data center technicians, departmental welcome administrators, and some new students to ensure that the operation process meets the requirements.

4) Operational system guarantee

As the colleges are the ultimate departments for freshmen, in order to ensure the normal operation of the welcoming work, the university's student affairs de-

partment holds welcoming training every year. The information network and data center also provides detailed training on related work arrangements and system usage, and provides online support and problem solving for counselors throughout the summer vacation to ensure the smooth progress of the welcome work.

5. Construction Achievements

5.1. Sharing of Freshman Information

Freshmen information is obtained from the enrollment business department in the way of primary synchronization and import assistance. Similarly, business data such as freshmen finance and housing management are obtained from the data center. The information in the welcome system that has been supplemented and updated by freshmen can be provided to the university's official account service, card printing, access control, student arragement, college and other departments, realizing data sharing.

5.2. Add the Usage of Mobile Devices

New students can directly use their mobile phones to scan the QR code for registration, and after registration, they can directly see various admission information such as assigned student ID and dormitory. The statistical data of registration can be updated in real time, allowing the leadership department to view the registration status of the whole university anytime and provide technical support for campus arrangements and decisions.

5.3. Improve the Registration Speed

Due to the extensive preparation work during the summer vacation, the on-site welcoming process has been simplified to a minimum, greatly reducing work pressure and minimizing queue situations, achieving a comfortable registration state. And after implementing the functional requirements of each stage and optimizing server performance, the stable operation status of on-site registration using only wireless network has been achieved, without network congestion or slow website speed.

In summary, since the application of the new version of the welcome system, the registration rate has significantly improved. From 7:00 am to 12:00 am on the registration day, more than 80% of undergraduate students have registered, and more than 60% of graduate students have registered, with a comfortable on-site environment. At the new student registration site, our department's technical personnel visited and investigated various college welcome points, and users expressed satisfaction with the simple operation. The ideal registration effect has been achieved, and the satisfaction of teachers and students has been greatly improved.

6. Summary

The construction of the welcome information system has improved the speed of registration work, optimized the data usage process, enhanced the convenience of

new student registration, reduced the on-site pressure on faculty, and met its construction requirements. In the future, more advanced technologies can also be considered for application in welcoming students. For example, some universities are currently implementing facial recognition registration, some universities develop their own welcome apps instead of WeChat mini programs to achieve more complex functions, some universities directly connect with the Ministry of Education's information interface for identity verification, and some use big data technology for multi-dimensional data mining, such as data drilling and display on large screens according to various fields and features such as province, time period, gender, ethnicity, college, major, and place of origin, to support decision-making work at the university level. These ways all put higher requirements on the hardware, program, and network environment of the system [6] [7]. These are the key directions that our university can continue to explore in the future. With the rapid development of information technology, we believe that we can better optimize the welcome system, better implement the concept of serving students, and further improve the informatization level of campuses.

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Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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