Strategy of Building Perfect Campus Security Management Mode under the Internet Age

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Abstract. At present, many colleges and universities are building various information systems in order to improve the efficiency of campus management. Due to the frequent occurrence of campus security incidents, management organizations at all levels are demanding to strengthen management and improve campus security management through informatization. This paper mainly studies the strategies of constructing perfect campus security management mode in the era of "Internet +". According to specific research requirements, this paper integrates J2EE technology to build the system architecture, such as network structure, architecture module, performance module, database operation and other aspects. Through the study of the system comprehensive testing, a series of functional testing and performance testing. The system realizes the refinement, digitalization, automation and mobility of campus security management, so as to improve campus security and provide support and data basis for campus information construction, talent reserve and information decision-making.

Keywords: "Internet +" Era, Campus Security Management, Security Management Platform, MVC Architecture

1. Introduction
Information technology has been involved in all walks of life, mature after years of use, all industries are popular, but in different industries, companies use their focus in the field of information technology to solve the problem, especially with the concept of "Internet +" unleash a revolution of science and technology industries, many areas and businesses begin to comprehensive information, intelligent [1]. The Internet model, as a beacon for the future long-term development, is an essential link for the development of science and technology. Efficiency of computer technology and intelligent concrete solved many problems of science and technology, many administrative units also started by the information technology to solve the problem of their own development and management of specific, government departments at the same time of institutional reform, both in the government of the construction of the platform system at the same time, perfect service in order to better serve the community and residents. With the introduction of the "Internet plus" policy, the integration of the Internet into all walks of life has become an inevitable trend. The traditional management mode of learning will also be eliminated. Those who rely mostly on manual operation to achieve management,
time and effort, and cannot avoid human negligence work will also face obsoletion. The use of campus student safety management system not only brings convenience to school management, but also reflects the modernization of school management.

With the rapid development of the society, the security construction of schools is also changing with each passing day. Throughout the world, all sectors of society are sparing no effort to develop security integrated management system as the focus of the development of this industry. Plante believes that the university public security prevention and control system mainly includes the leadership and command system, information early warning network, patrol prevention and control network, key security network, internal and external cooperation network, management responsibility mechanism, mass prevention and control mechanism, rapid response mechanism, assessment, reward and punishment mechanism, publicity and education mechanism and population management mechanism [2]. Haupt presents the security and stability of the prevention and control system is mainly composed of organization command system, network system and safeguard mechanism of three parts, including the prevention of early warning system, education guidance system, public opinion guidance system, emergency management system, the disposal system, as well as the supervision and inspection mechanism, evaluation mechanism, emergency safeguard mechanism and the responsibility mechanism [3].

According to the relevant business requirements put forward by the school, this paper comprehensively analyzes the situation of practical understanding, and at the same time carries out careful combing, and comes to the module standards required for each function, and combines the existing Internet technology and computer performance, to create a comprehensive campus security management system.

2. Campus Security Management Platform under the Background of "Internet +"

2.1. "Internet Plus" Features

Extensive connectivity is the basic attribute of "Internet +", which is built on the basis of extensive connectivity. By integrating a series of new technologies, such as cloud computing and big data, "Internet +" realizes the connection between all kinds of things in society. The advantage of extensive connectivity of "Internet +" has changed the relatively closed situation of the traditional ideological and political education management system in colleges and universities, so that the internal and external elements of the system, as well as internal and external elements, form a relationship model of interconnection [4]. The connection between "Internet +" and the management of ideological and political education in colleges and universities is hierarchical. First of all, the connection between various elements of the internal management system of ideological and political education in colleges and universities is manifested as the connection between the subject and object of management with the help of the Internet platform and the connection between them and the management content, management mode, management process, etc. The second is the connection between various elements of the external management system, such as the connection between universities and national, social, family and other off-campus LAN through the network; Again, it is shown as the connection between various elements of the internal and external management system, such as the connection between the managed objects and external management resources such as the state, society and family by means of the Internet [5]. Extensive connection has become an important feature of security management in colleges and universities in the era of "Internet +", which provides a direct driving force for the combination of online and offline management.

2.2. Campus Security Management Features

(1) Differences in Management Objects

China has a vast territory and a large number of universities, and each university has an internal staff of more than 10,000 people. The internal staff of these universities include students and teaching staff, who come from different regions and countries, which indicates that there are differences in the
objects of safety management. For different management objects, our emphasis on safety management will be slightly different. For example, for students, we may focus on food safety, electricity safety, psychological safety and other aspects, while for faculty and staff, we may focus more on traffic safety, property safety and other aspects.

(2) Diversity of Management Methods
As the main task of colleges and universities is to carry out teaching and scientific research, the main part of colleges and universities is students, which determines the particularity of colleges and universities [6]. In the safety management of colleges and universities, we can use a variety of management methods and means, such as in the form of a safety lecture to the students science popularization corresponding safety knowledge, let the students master the actual in the form of fire drill to escape skills, in addition, we can also use the method of system, legal method, economic method of the safety management of colleges and universities.

(3) Dynamic Management Scope
The scope of security management in colleges and universities is not only inside the colleges and universities, but also some potential security risks around the colleges and universities should be taken into account, rather than just guarding a fixed land, which makes the scope of security management dynamic [7]. First of all, with the expansion and integration of education scale in China, the situation of multi-campus running of institutions of higher learning is more and more common, which also increases the scope and difficulty of safety management virtually; Secondly, as long as the safety related to teaching activities should be brought into the scope of safety management in colleges and universities, and nowadays, many colleges and universities no longer confine their teaching activities to schools, but also set teaching activities in factories, enterprises, hospitals, parks and other places when necessary, which also extends the scope of safety management accordingly.

(4) Mandatory Management Means
The safety management of colleges and universities strictly follows the national laws and the rules and regulations of the university. For the dangerous behaviors that destroy the safety of the university, the subject of the behavior will be held accountable and punished compulsively. Within the school, according to the severity of the incident, they will be given administrative sanctions such as notification of criticism, warning, severe warning, demerit recording, school detention, expulsion and so on. If the case is serious and beyond the scope of school handling, the school security management department will be handed over to the public security organs to handle.

2.3. Campus Security Management Platform Architecture
(1) Core of Campus Security Management Platform Architecture
In the security management system architecture of campus platform, the core is mainly divided into three parts: client, server and database. The effective operation of the system architecture in terms of functional services is mainly carried out through the linkage of three levels, specifically as follows:

The first layer: based on the security "civil air defense", the traditional attendance checking and patrol mechanism will be eliminated, and the patrol mode and attendance monitoring will be replaced by the smart system, so as to further enhance the initiative and enthusiasm of personnel.

The second layer: relying on intelligent "technical defense", it integrates into the system platform through GPS positioning, surveillance video inspection, police wired attendance, etc., so as to make the multi-system operate efficiently and master the basic situation of campus security accurately and scientifically [8].

The third layer: with the equipment of "physical defense" as the guarantee, the campus traffic safety facilities, fire safety facilities, protective lighting facilities and other implementation of the system dynamic monitoring, timely check and fill the gaps, timely dynamic update.

(2) Campus Security Management Platform Architecture is Layered
The security system of campus platform is based on MVC pattern, mainly consisting of four levels, namely, performance level, application level and data level:
1) Performance level, the system function performance level is the foundation, which is to realize the combination between the system operation user and the system, that is, through the design of the system interface to complete the output of the system data, store the user's input content, and pass the input value into the system business logic layer to complete the corresponding processing.

2) The application layer, the layer is used to define the internal logic of project quality evaluation, all the function layout system, the link between the data and so on, are defined by business rules, business logic defined in system data table or some configuration files, if with the method of configuration file, place a configuration file on the server, when the business logic updates, the server-side business logic can be updated, don't need to update the client and maintain [9].

3) At the data level, MySQL database is used in the bottom layer of university positioning management, and the data layer is the interface layer of system data access. Its main responsibilities include two kinds: to realize the storage function of the basic data of the system, and to read the data through this layer when each functional module needs to read the data.

In the early stage of campus network structure design, we need to comprehensively analyze the usage of inner network and outer network. To make internal network and external network is to communicate with each other at the same time ensure the safety of the whole data, also will be a lot of platform system are compatible, this is a very important premise and guarantee, will set access between network servers and web servers outside wall, set up the security policy, so can't fully realize physical isolation, in the premise of safety, ensure the external users can't access to the internal network resources [10].

(3) Correlation Formula

In security management system, correlation coefficient is often used to measure the similarity between users. The formula is as follows:

$$\text{sim}(a,b) = \frac{\sum_{i \in I} (r_{ai} - \bar{r}_a)(r_{bi} - \bar{r}_b)}{\sqrt{\sum_{i \in I} (r_{ai} - \bar{r}_a)^2} \sqrt{\sum_{i \in I} (r_{bi} - \bar{r}_b)^2}}$$  \hspace{1cm} (1)$$

Evaluation formula:

$$p(a, i) = \bar{r}_a + \frac{\sum_{b \in N} \text{sim}(a,b)(r_{bi} - \bar{r}_b)}{\sum_{b \in N} \text{sim}(a,b)}$$  \hspace{1cm} (2)$$

Similarity formula:

$$\text{sim}(\vec{a}, \vec{b}) = \frac{\vec{a} \cdot \vec{b}}{\| \vec{a} \| \cdot \| \vec{b} \|}$$  \hspace{1cm} (3)$$

3. Campus Security Management Platform Test

In order to achieve a safe and efficient campus security work, provide more effective information management means. The system test is mainly about the function and performance of the system. The following describes the system's test environment and system deployment in detail, as well as the test plan in detail.

3.1. Test Environment

In the laboratory environment, the campus security service management system was designed and functional coding was realized. In order to make full use of various resources of the laboratory, the development and testing of the system made use of multiple high-performance PCS and servers of the laboratory.
### Table 1. Platform development and test environment

| Configuration items       | Configuration information          |
|---------------------------|-----------------------------------|
| Development tools         | Eclipse                           |
| Runtime environment       | Chrome                            |
| Development of language   | Java, HTML, CSS, JavaScript        |
| Development framework     | Spring, Mybaits, SpringMVC, REST   |
| Testing tools             | Apache JMeter                      |

As shown in Table 1, platform development and test configuration information is listed, including development tools, running environment, test tools, etc.

#### 3.2. Test Description

The real purpose of the test is to test whether the campus security management system can realize the safe and efficient campus security information management and provide more effective means of information retrieval. The following two schemes are mainly used for testing:

- **Integration test scheme:** Each functional module is combined through the black box test method to observe whether it conforms to the original real logic of the design scheme and meets the requirements of the actual business.

- **System test scheme:** After the end of the previous test, in order to verify whether the system follows the original design principles and ensure that the system can be applied in line with the actual business needs of users, further comprehensive and multi-detail system tests are required in the experimental environment.

### 4. Test Results of Campus Security Management Platform

#### 4.1. Single User Request Database Docking Application Interface Response Time

First, a single scenario verifies the transaction number of a user with different continuous requests, the request interval time is 0.01 seconds, and the database connection pool is set as 60, so as to obtain the theoretical length of a single database docking.

![Interface data responds to record data](Figure 1)

As shown in Figure 1, when the total number of transactions is 8500, the average interface time is 7ms, the maximum interface time is 814ms, and the minimum interface time is 5ms. When the total number of transactions is 24,000, the average time of the interface is 8ms, the maximum time of the interface is 406ms, and the minimum time of the interface is 4ms. When the total number of
transactions is 40,000, the average time of the interface is 8ms, the maximum time of the interface is 1169ms, and the minimum time of the interface is 5ms. As can be seen from the benchmark results, when the continuous sending of requests, each request completed the whole process from acceptance to distribution within 0.03 seconds on average, meeting the second response requirements.

4.2. Single-User Application Interface Server Response Time

| Total number of transactions | Max   | Min   | Average |
|-----------------------------|-------|-------|---------|
| 750                         | 378ms | 41ms  | 79ms    |
| 2200                        | 429ms | 54ms  | 75ms    |
| 3800                        | 423ms | 52ms  | 74ms    |

As shown in Table 2, when the total number of transactions is 750, the average transmission time is 0.02843s, the average interface time is 0.079s, the average leading time is 0.163s, and the average trailing time is 0.197s. When the total transaction number was 2200, the average transmission time was 0.3254s, the average interface time was 0.075s, the average leading time was 0.194s, and the average trailing time was 0.0421s. When the total number of transactions is 3,800, the average transmission time is 0.3028s, the average interface time is 0.074s, the average lead time is 0.182s, and the average rear time is 0.04s. According to the benchmark test results, when the continuous sending of the request, the average time for each request is 0.035 seconds from the data transmission request to the successful transmission, meeting the requirements of second transmission.

4.3. Compatibility Test

As shown in Figure 2, the response time of page landing and data query should be controlled within 3 seconds according to the requirements of system stability. The system stability test mainly uses the stress test tool Loadrunner. First, the test time is set to 5 minutes, and the recording script begins the test. The user concurrency is gradually increased from 2 to 10, and the user concurrency is gradually reduced after running for 5 minutes, until all users exit. It can be seen from the test results that the response time increases with the test time under different users. The maximum response time is 5 minutes under 10 users and 2.8s, which indicates that the response time of page login and data query in the campus security management system designed in this paper fully meets the requirements of the system.

![Figure 2. Pressure test curve](image)
5. Conclusions

In this paper, the campus platform security management system is designed, on the basis of the completion of the preliminary survey, complete the system requirements and analysis, including the system requirements of the functional zoning, to achieve the functional analysis, and determine the non-functional requirements of the system. When the system function analysis is completed, the modules that the system needs to implement are determined, and other non-functional requirements of the system are analyzed. The technical forms adopted by the platform are mainly B/S architecture and SSM framework, and the database management is completed by MySQL database technology. In the technical architecture of the system, the client, presentation layer, business layer and so on are divided. Through the test, the results have been achieved and the expected purpose has been achieved, which is also in line with the design of the campus security platform.

References

[1] Christiansen B O, Cappello P R, Ionescu M F, et al. Javelin: Internet-Based Parallel Computing Using Java. Concurrency Practice and Experience, 2015, 9(11):1139-1160.

[2] Plante C N, Sweet D M, Groves C. "A silver lining": Violent media, perceptions of a dangerous world, and campus safety intervention. Journal of Threat Assessment and Management, 2018, 5(2):75-83.

[3] Haupt B, Kapucu N, Morgan J. The use of social media for campus safety. J Emerg Manag, 2017, 15(1):17-28.

[4] Jianqiu Z, Mengke Y. Internet Plus and Networks Convergence. Wireless Communication over ZigBee for Automotive Inclination Measurement. China Communications, 2015(04):42-49.

[5] Hilsden R J, Meddings J B, Verhoef M J. Complementary and alternative medicine use by patients with inflammatory bowel disease: An Internet survey. Canadian Journal of Gastroenterology, 2016, 13(4):327-332.

[6] Warren L, Grime K. The evolving nature of university campus safety in Australia. Journal of Threat Assessment and Management, 2016, 3(3-4):200-214.

[7] Crawford C, Burns R. Preventing school violence: assessing armed guardians, school policy, and context. Policing an International Journal of Police Strategies & Management, 2015, 38(4):631-647.

[8] Wei M, Hong S H, Alam M. An IoT-based energy-management platform for industrial facilities. Applied Energy, 2016, 164(feb.15):607-619.

[9] Lakshminarayana R, Wang D, Burn D, et al. Using a smartphone-based self-management platform to support medication adherence and clinical consultation in Parkinson's disease. Npj Parkinsons Disease, 2017, 3(7):A700-A700.

[10] Gangat Y, Payet D, Rémy Courdier. Methodology for a New Agent Architecture Based on the MVC Pattern. Lecture Notes in Computer Science, 2015, 755(755):230-239.