

# Design of Unified Campus Identity Management System Based on NFC Technology

Wang Lang

School of Arts and Sciences, Yangtze University, Jingzhou, China

## Abstract

The rapid development of identity authentication technology makes it play an increasingly important role in public security, network security and other fields. As a closed place with high crowds, schools face such a complicated teacher-student management system. Under the rapid development of the mobile Internet, it is particularly important to realize unified identity recognition. This paper first introduces the research background of the unified campus identity management system based on NFC technology, and on this basis, introduces the research content and technical route of the unified campus identity management system based on NFC technology, and analyzes the functional requirements and system requirements, and finally The system design. For mobile terminals, Android system functions are designed.

## Keywords

Identity authentication; NFC technology; system design.

## 1. Introduction

Identity authentication technology has a long history as a subject. In recent years, the rapid development of various identification technologies has made their application fields more and more extensive, making them more practical, especially the combination of identity authentication technology and communication information technology, so that remote authentication has been realized and quickly The development of it makes its potential in the market very huge. It is widely used in public security bureau detection, securities trading, network security and other fields. It has the advantages of accuracy, speed, reliability, and scalability. At the same time, the identity authentication technology is very confidential and safe for the privacy of the other party, so it can be accepted by users.

As an indispensable part of school management, identity authentication system is playing an increasingly important role. At present, the number of faculty and students in the school is increasing, and the mobility of faculty and students is also increasing. Every new faculty and freshman needs to apply for various ID cards through multiple departments, which is cumbersome and brings safety. Loopholes. Therefore, through the unified campus identification equipment in the personnel department to go through the certification procedures, not only reduce the burden on employees, but also save personnel post expenses.

## 2. Research background and related concepts

### 2.1. Identity authentication technology

Authorization control is closely related to personnel authentication. The concept of authorization control is that as long as the user's identity is confirmed by the system, the user's authority can be selectively allocated and accessed. In the systematic work operation system, the use of related application systems is provided by the unified campus identity authentication management system, but the authorization control can be managed by the relevant application management system. The hierarchical and progressive structural design is an important design

for a unified campus identity authentication system. There can be multiple functional modules, the most important of which are authority management and identity authentication.

Member site identities and administrator user identities are realized by a unified campus identity authentication module. The online registration function of the member site is also provided by the identity authentication module. When you click to register, you need to provide the necessary information about the member site. This information is the scope of rights authorized by the user to the member site. Once the unified campus identity authentication system is passed, The user's detailed basic information can be directly inquired, and the user's authority has been assigned accordingly. With the authority obtained, the user can pass through the unified campus identity authentication system and can access the member's site with a reasonable identity. The interface between the user and the unified campus identity authentication system can generally support the browser/server model (B/S) and the client/server model (C/S), and it must also support the Notes application authentication interface.

## 2.2. NFC technology

NFC technology evolved from non-contact radio frequency identification (RFID) and was jointly developed by Philips Semiconductors (now NXP Semiconductors), Nokia and Sony. It is based on RFID and interconnection technology and uses both active and passive reading mode. NFC technology is a short-distance high-frequency radio technology that realizes communication information between a short distance, and has three transmission speeds such as: 106 Kbit/sec, 212 Kbit/sec or 424 Kbit/sec.

NFC supports fast and convenient data exchange in active or passive mode. It is the device (master device) that initiates the NFC communication in the passive mode and provides the RF-field. It can select a transmission speed suitable for the user, transmit data to other devices, and use Load Modulation (load modulation) technology to transmit data back to the initiating device at the same speed. This communication is fully compatible with contactless smart cards based on ISO14443A, MIFARE and FeliCa.

NFC technology and RFID have many similar characteristics. The information transmission method is wireless transmission through electromagnetic induction coupling, but there are still big differences. The NFC transmission range is relatively small, and realizes fast and easy communication in terms of speed and safety, and has better device compatibility.

## 2.3. Database establishment

The system uses MySQL database, which is currently supported on most operating platforms. It can exist independently in the network environment as a separate application, and it can also provide language support for the software when embedded in other software, so it has independent existence and software Supports two features, common encoding such as Chinese GB 2312, BIG5. The figure shows the MySQL data structure that is widely used today. Compared with other database systems, other databases such as Oracle, SQLServer, etc., MySQL has the advantages of open source code, small size, and fast speed.

The section headings are in boldface capital and lowercase letters. Second level headings are typed as part of the succeeding paragraph (like the subsection heading of this paragraph). All manuscripts must be in English, also the table and figure texts, otherwise we cannot publish your paper. Please keep a second copy of your manuscript in your office. When receiving the paper, we assume that the corresponding authors grant us the copyright to use the paper for the book or journal in question. When receiving the paper, we assume that the corresponding authors grant us the copyright to use the paper for the book or journal in question. When receiving the paper, we assume that the corresponding authors grant us the copyright to use.

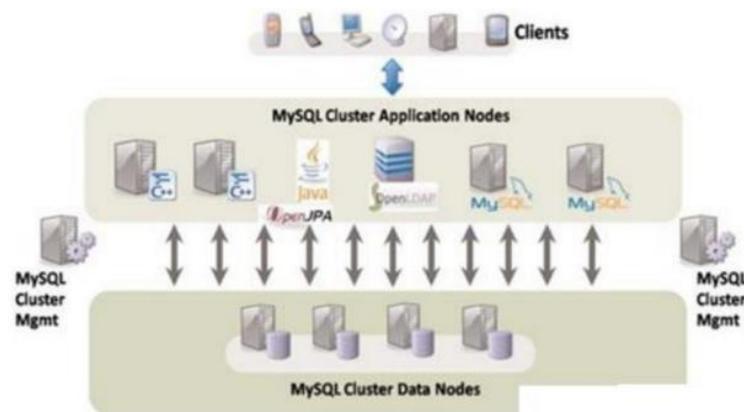


Figure 1. Data structure diagram in MySQL

### 3. Demand analysis

#### 3.1. Application demand analysis

(1) Teachers: Inquiries in the teaching system often require complicated user names and passwords. Traditional spot checks in the sign-in link of classroom teaching often consume a lot of manpower and are not accurate enough. Reading, consumption, parking, dining, etc. on campus all adopt the form of applying for cards. Each faculty member needs to apply for multiple cards at the same time to carry out required activities on campus, and the manpower and material resources are excessively consumed. In terms of finances, inquiries and reimbursements are very inconvenient, and various procedures are required, which brings many difficulties to the faculty and staff, and also causes a large increase in the workload of the financial staff.

(2) In terms of students: Basically, it contains the problems of teachers. On the basis of teachers' needs, the mobility of students should be more frequent, which is much higher than that of faculty. There are two major changes in the flow every year-admission and graduation, all the in and out students have to deal with too much, cumbersome, and error-prone. The activities of students on campus are even higher than that of faculty and staff, and the demand is even more urgent.

#### 3.2. System requirements analysis

The identification system mainly has the following requirements:

- (1) Functional requirements: the realization of the basic business requirements of the software must have complete and comprehensive security features.
- (2) Usability requirements: Provide a guarantee for the friendliness and reliability of the interactive interface, and complete documentation support.
- (3) Reliability requirements: A reliable and complete mechanism for handling system errors in a timely manner can be provided to minimize system abnormalities.
- (4) Convenience requirements: The system should be as easy to use as possible, easier to operate, and operated on the basis of ensuring safety.

#### 3.3. System function module requirements

##### 3.3.1. Back end server module

System information and user data are stored in the MySQL database system to ensure data security and timely maintenance. The functions that the server needs to implement are:

- (1) Provide users with fast and efficient data request response
- (2) Management of user personnel changes

(3) Daily backup and maintenance of the database

### 3.3.2. Mobile device terminal

As the entrance for users to use the system, mobile devices need to provide a friendly and easy-to-use interface design and comprehensive and powerful functional support. The main functions implemented by the mobile terminal are:

- (1) Access control and registration function
- (2) Consumption function
- (3) Information query function
- (4) Cancellation and service activation

## 4. System design

### 4.1. Overall system architecture

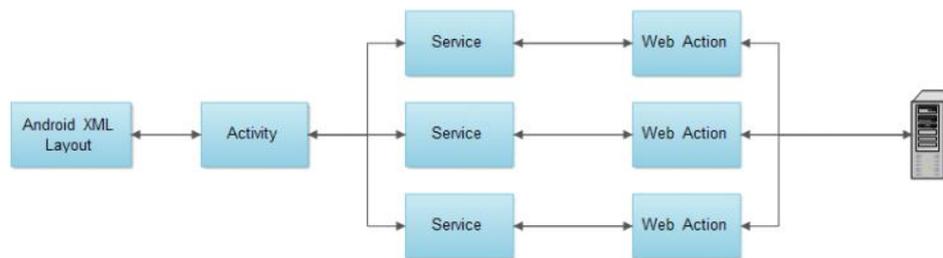


Figure 2. Architecture diagram in the system layers

The system adopts the model-view-controller design pattern. The model is used to represent business rules and system data. Among the three components of MVC (Model-View-Controller), the model that handles the most tasks. The interface that the target user sees and interacts with is completed by the view. In the case of Web applications, HTML elements constitute the interface of the view. Use the controller to accept the user's input and call the existing views and models to finally fulfill the user's needs. Therefore, whenever the user clicks a hyperlink in the Web interface and sends an HTML form, the controller only receives Request and determine the processing request of the required model component. The controller itself does not output any relevant content and do any corresponding processing. It is the final decision to use the view to display the returned relevant data.

Model-View-Controller is a framework model, the input, processing and output of the application are mandatory to be separated. Model, view, and controller are the three core components of MVC. M, V, and C have a clear division of labor and each handle their own tasks. This system adopts REST (Representational State Transfer) architecture style. We can design resource-centric Web services based on the architecture principles defined by REST, including how clients written in different languages process and transmit resource status through HTTP.

### 4.2. Analysis and design of public modules

View is responsible for the design of the interactive interface, focusing on providing a simple and easy-to-use operation process, and does not rely on any back-end data. For different usage scenarios, such as access control registration, information inquiry, credit card consumption, and library borrowing and returning, the user experience-oriented interface design process is used, and optimized and adjusted at any time based on user feedback.

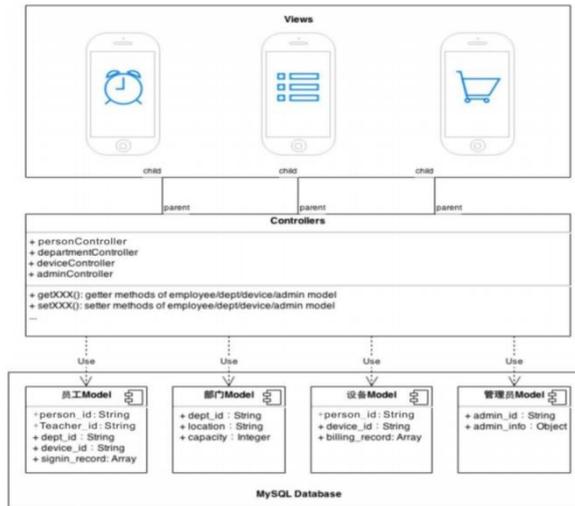


Figure3.REST architecture of the system

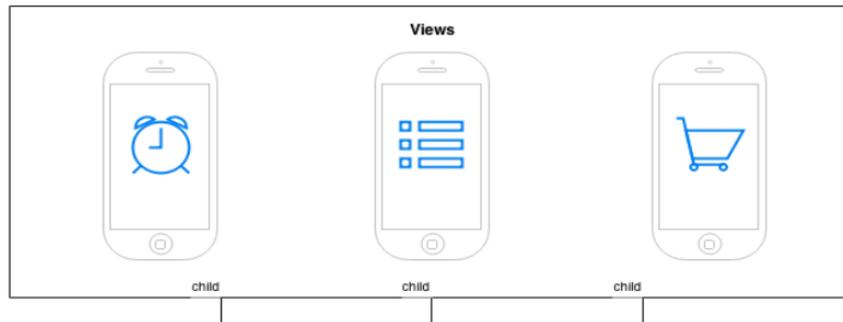


Figure 4. Diagram of view example

Controller is responsible for the front-end and back-end interaction logic such as data acquisition and rendering. The switching logic between different interfaces is also defined in the Controller, and View can be regarded as a sub-module for the Controller to choose and call. Different Models are independently controlled by the corresponding Controller. When the View needs to display information from a model, the corresponding Controller will respond to the request, get the data and render it to the View.

Modal is designed based on entity relationships. Different entities are encapsulated in independent models, and the tables are designed to be stored in the MySQL database system. The relationships between entities are stored through primary keys and foreign keys, and complex queries such as join table queries are supported.

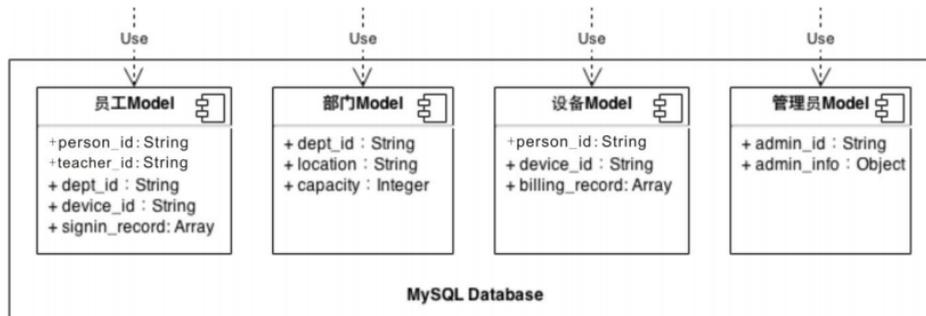


Figure 5. Diagram of model example

### 4.3. Server system architecture

The MySQL server is based on a replication architecture. The master server generates binary logs. The slave server (slave) requests the log file to transfer the log to the slave server host through binary data, write the relay log, and then call the SQL process from the server to read the relay log content and write it to the database to ensure data synchronization.

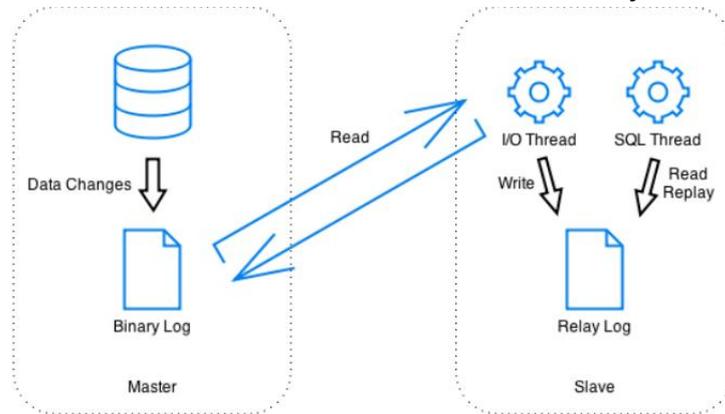


Figure6.The server system architecture

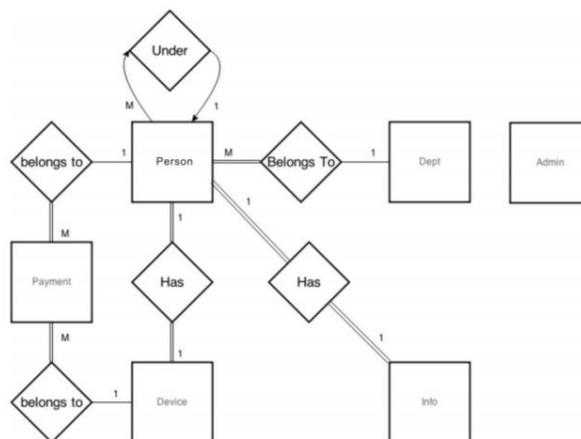


Figure7.Entity relation diagram

### 4.4. Database design

Database design refers to a specified application environment. The database model aims to optimize the structure, so that it can establish the corresponding application system and its database, and finally achieve the ability to store data very effectively, so as to meet the application of different users to a large extent. Need [26]. Database design is the basic design of application system and its establishment of database, and it is the core component of system construction and development. For this system, an excellent database design scheme should match the upper-level design style, such as REST style, to support efficient retrieval.

This system uses MySQL database. As the most popular open source database at present, it occupies a large number of markets for distributed databases with its light weight and convenience of expansion. MySQL database plays an important role in large Internet businesses such as Taobao and Tencent QQ. Choose MySQL database as the back-end database of the system.

First of all, considering that the system has a small amount of user access in the initial stage of the system, the lightweight MySQL database can provide higher database access performance while saving hardware investment; later user volume and database After the scale is expanded,

the MySQL database can be easily expanded into a cluster, providing stronger database access performance, and the cluster mode can facilitate the construction of a remote disaster tolerance environment. All these advantages are based on MySQL, an open source database. Database management includes: backup, recovery, data cleaning, data import and export.

## 5. Conclusion

Based on NFC technology, this paper introduces the research background of the unified campus identity management system , and on this basis, introduces the research content and technical route of the unified campus identity management system based on NFC technology, and analyzes the functional requirements and system requirements, and finally The system design. For mobile terminals, Android system functions are designed.

## References

- [1] Dai Te, database design and relational theory [M], Beijing, Machinery Industry Press, 2013.08.
- [2] Jeffrey D. Ullman, Database System Implementation [M], Beijing, Mechanical Industry Press, 2010.05.
- [3] Li Yangjun, MySQL-based open source database application research [J], Digital Technology and Application, 2014 (6), 71-72
- [4] Liu Xiangyu, Design and Implementation of Server Side of Campus Social Mobile Internet Platform [D], Tianjin, Nankai University, 2012.