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# Research on Optimal Design of Fixed Asset Management Information System Based on RFID Technology

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***Abstract:*** An efficient fixed asset management information system is of great importance to traditional companies with many years of production experience, especially in the current trend of digital transformation. It is of great significance to make full use of the existing information tool system, management experience and development cooperation resources to optimize and implement it for managers of grassroots enterprises. The use of Internet of Things technology can quickly improve the work efficiency and cost control of enterprises. Based on RFID technology, the overall structural design of the system is mainly explained, and it is optimized and implemented.

***Keywords:*** RFID technology; Fixed asset management; Information system

## Introduction

The management information system based on RFID technology aims to enable enterprise managers to effectively grasp the information data of items in the area under their jurisdiction. For large institutions or enterprises, the overall management should also be able to conveniently divide the management of different regions and multiple organizations and departments. It is convenient for financial managers to assign tasks to various levels, different departments, and fixed asset management personnel, and ultimately all data can be summarized, using digital management methods to reduce workload in the process.

## 1. RFID Technology

In recent years, RFID technology has continued to develop and its application areas have continued to emerge. This is mainly because, compared with other traditional tag identification methods, RFID has the advantages of simple operation, strong signal penetration, sensitivity at a certain distance, easy maintenance, and strong anti-interference. The most intuitive feeling is that in complex environments, its information collection efficiency is more than ten times higher than that of traditional manual counting [1]. Because the application scenarios of RFID technology are mainly composed of tags and reading terminals, nowadays, the materials of tags are constantly changing. Some have begun to appear on textile products, which greatly expands its scope of application. In addition, due to the great demand for it, its price is also constantly falling with the scale effect of mass production.

The RFID technology system essentially uses electromagnetic signals to identify objects. Specifically, it uses radio waves of corresponding frequencies for transmission and reception, and uses changes in electromagnetic properties to achieve contactless information transmission.

In addition to using bands and specific technical implementation methods, in actual applications, more attention is paid to the characteristics of the tag and the performance of the reader PDA. Considering the adaptability of these two aspects, under the guidance of the standard, it is usually determined through a large number of simulation tests based on specific scenarios, drawing on exactly the same usage scenarios, or referring to similar scenarios.

However, after years of development, this type of RFID tag has become very mature, and there are mainly the following options. Active tags have a longer and more accurate recognition range than passive tags, and passive tags have basically occupied most of the market due to their low price and increasingly mature radio frequency technology.

For the identification of items that are both anti-theft and closely monitored, tear-proof labels are used in relatively closed environments. Tearing off the label will damage the circuit in the label, making it unrecognizable by the PDA. Most banks will set up fixed scanning and identification devices at the counter to monitor important assets [2]. Most label printers can print some basic information directly on the label, or print it out with an ordinary barcode printer and then paste it on the RFID tag, so that the corresponding information can be identified. If the RFID tag is accidentally damaged, it can be quickly replaced based on the information on its surface.

## 2. System overall architecture design

Among the hardware required for the implementation of the system, there are various types of label printers, Windows servers, and office computers with browsers such as PDA, RF1D tags, etc. The system adopts the B/S architecture and summarizes it into Java, Tomcat, Eclipse, SQL Server, etc.

B/S architecture: First, the user will send a request to the server through the browser, and then wait for the server's reply. When the service receives a request, it needs to analyze it to understand its intention. It discovers the corresponding data by accessing the database, and then generates a response after processing. Subsequently, the corresponding result data will be sent to the client's browser. The browser on the client computer will display the server's feedback information to the user, interpret it and execute HTML.

Label printer: Install the corresponding printer driver on the computer, and the system sets various types of labels to support calls to different printers. When printing the above labels, in order to improve efficiency, a printing test method is adopted. First, a batch of labels of the same model are selected, and then a group of labels of the same model are printed. At this time, they will not be recorded in the system's label information. After style verification and signal testing, all labels of the same batch are printed out in the normal way, and these label information are simultaneously entered into the system's form.

Windows server: Tomcat 8.0

First, since the enterprise itself has a large number of Windows server resources, it can make full use of the existing idle server resources and build a relatively closed system in the local network, which is of great significance for ensuring the information security of the enterprise and achieving limited control. Secondly, most of the individual business programs of enterprises are developed under the B/S architecture, which can centralize the list of OA office system in a linked way. User login management and other account passwords can also be managed according to permissions like OA, so that all employees can use it easily and will not cause any impact on the hardware of personal office computers [3]. Using open source software for development can also save some development costs, and after demand analysis, the corresponding business logic will become very simple, which is easy for grassroots managers to be familiar with. Drawing on the experience of developing approval systems, factory reservation management systems and other systems in the past, the paths are divided according to similar functional modules, and a system with a very familiar interface can be quickly built based on previous templates or experience.

For example, in this system design, when the management user logs in to the system using a Web browser, he or she will request the fixed assets of the department (using HTML, CSS and other configurations to control the display of data). The controller will process the request, so the type of the query event must be controlled so that the view can change and display the required data results. For example, the view can also receive status information from the model and feedback different data according to time or calculation results, while the model receives data queries through the view, completes the comparison of specific business data based on the state of the view, and gives a screenshot.

In the current environment, the most commonly used and main service object of the system is the warehousing and inventory process of assets. The corresponding data processing logic is the same as the analysis and calculation SAP. On this basis, the system will become simpler and more intuitive. As can be seen in Figure 1:

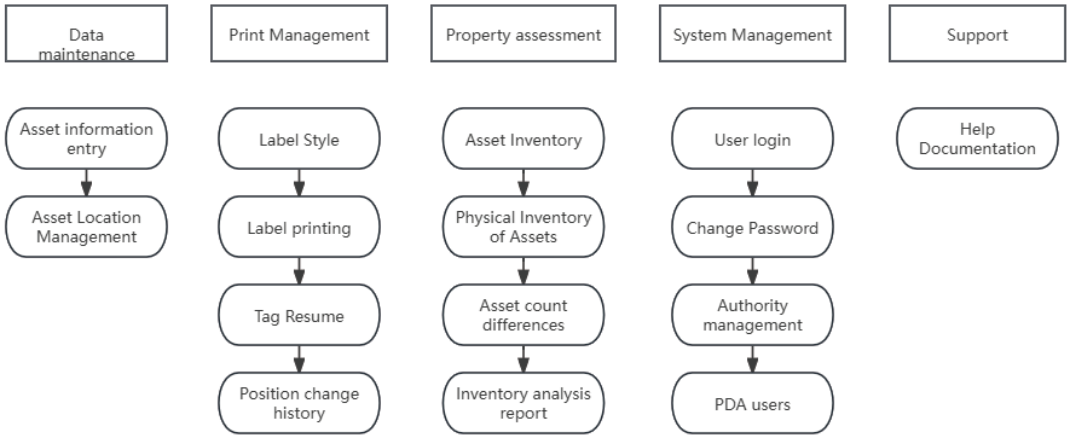


**Figure 1 Basic functions of the system**

## 3. Design and implementation of tag management function

### 3.1 Label group maintenance printing function implementation

Most of the large equipment that has been completed can meet the label size requirements, or fixed assets with higher values need to be

independently labeled. The number of fixed assets is relatively large and concentrated, and the volume or value is not suitable for labeling. For example, some small parts, consumables, tools, labor protection supplies, etc. can be classified and then listed in a group to highlight the number of assets and their location [4]. The financial and user departments will classify the fixed assets that have not been classified and labeled, print them into non-metallic labels, and then stick them together. The competent authorities will randomly check these labels, as shown in Figure 2.

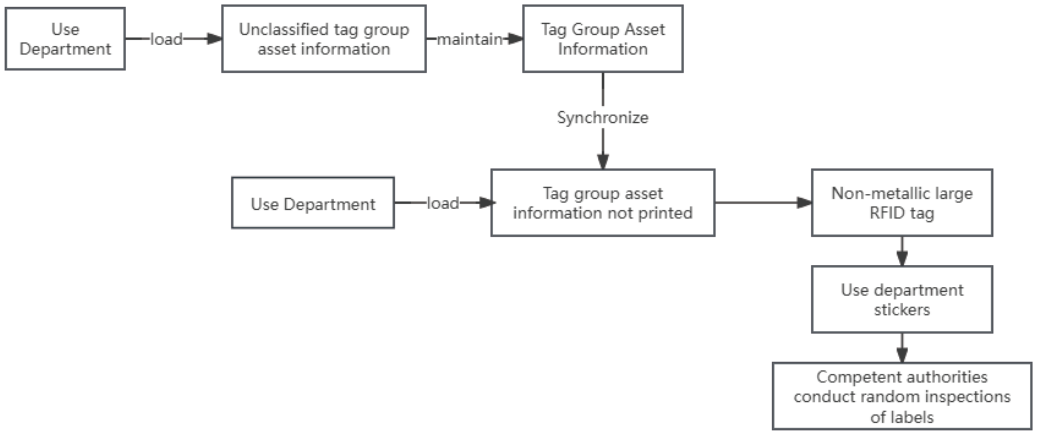


**Figure 2 Label group maintenance and printing**

### 3.2 Label reprinting function implementation

If fixed assets have information changes or label damage while in use, it is necessary to determine the original asset information and the status of the label. If the label information is changed, it is equivalent to changing the data in the system to the inventory printing status and then printing the label again, as shown in Figure 3.

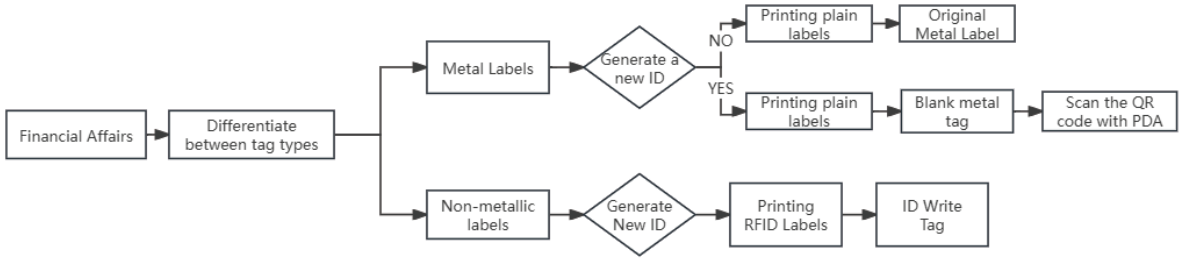


**Figure 3 Label reprinting flow chart**

### 3.3 Design and implementation of inventory management function

Because the assets of an enterprise are constantly changing, some assets have been abandoned, while some new assets have been added. Therefore, when conducting an inventory, we must have a timely and accurate basis for the inventory. When conducting an inventory, we will use time identification (mainly years) to extract the asset information of each department from the SAP data and insert it into the basic inventory data table. The management system is set to use asset identification to compare data (set corresponding field comparison), and check the actual inventory data with the PDA, and process and analyze the differences to form an inventory report [5]. In the actual inventory work, the PDA optimally realizes the direct call of real-time data from the SAP system, and can compare it with the actual inventory asset information and perform simple calculations. As can be seen in Figure 4:

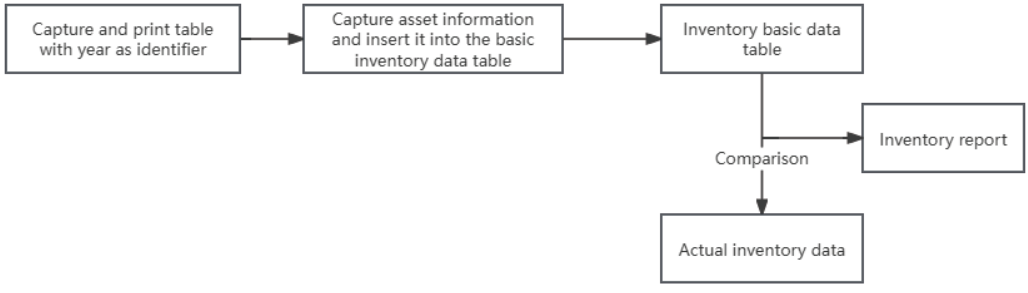


**Figure 4 Basic data inventory process**

(1) Determine the completeness and correctness of the basic information of fixed assets. The basis of this list is obtained from the SAP system provided by the financial authorization, which includes asset attribute classification, etc., and verifies its completeness and correctness by comparing the unique expression form of fixed assets.

(2) After verification, use the web access program to input the original data in the bill of materials. By setting simple logical operations, the quantity calculation and output value calculation can be maximized, and the data in the report format can be generated. The theoretical data package of the bill of materials will also include quantity, output value, etc.

(3) Inform the unit of the unit's usage and download the theoretical data of the unit's actual asset list from the system. In actual applications, due to factors such as poor wireless network signals and security, PDA inventory is mostly offline inventory.

(4) Import the downloaded inventory data into the PDA using the USB interface and upload it to the PDA application to generate the theoretical data of the required inventory.

(5) Each business department uses a PDA to go to the location of the assets to conduct an inventory.

(6) After the inventory is completed, extract the inventory data from the PDA application and copy it to the computer.

(7) Upload the document to the system and generate real data of the inventory;

(8) The relevant statistical data, such as the real-time status of inventory and the corresponding inventory progress, are optimized according to the company's rules for the actual operation process of fixed asset inventory after the implementation of the system. The RF1D tag information attached to the surface of the fixed asset is scanned with a PDA, and compared and analyzed with the fixed asset information in the system to form an asset information analysis report.

## 4. Conclusion

This paper expounds on the design concept of the system database, optimizes its two-way collaboration with SAP data, and describes in detail the table structure related to tag management and inventory management. Then, in the case of actual tag management and inventory management projects, the optimized process is specifically explained, and the corresponding functions are implemented according to the needs and related technologies. After analyzing the implemented functions, in the traditional fixed asset management activities, the fixed asset information management system using RFID technology has solved the traditional manual inventory method in the previous work, which can greatly improve the work efficiency. Moreover, it can manage a large number of assets, so that the final analysis data obtained can support the corresponding fixed asset management decisions.

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