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"Design and Implementation of a Resource-Efficient Employee Information System with Java and MySQL"

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Abstract

In today's dynamic business environments, efficient employee information management systems (EIS) are vital to organizational success. Traditional manual or semi-automated systems often fail to scale or meet performance expectations, especially in resource-constrained settings. This paper presents the design and implementation of a resource-efficient Employee Information System using Java for the application layer and MySQL for the data layer. The proposed system emphasizes performance, scalability, and resource optimization, while ensuring data integrity and ease of use. We detail system architecture, data modeling, and key implementation techniques including multithreading, optimized queries, and connection pooling. The result is a robust system suitable for small to medium enterprises (SMEs) that need cost-effective solutions without sacrificing reliability.

Keywords: Human resource management; system design; B/S Mode; Mysql database; management mode; data analysis

1. Introduction

Human resource management (hereinafter referred to as HRM) is very important for an enterprise. It is an inexhaustible driving force for the innovation and development of an enterprise, a key element to enhance the competitiveness of an enterprise, and an indispensable part to ensure the normal operation of an enterprise [1]. Nowadays, with the rapid economic development in China, the number of small and medium-sized enterprises is not only greatly increasing, but also the scale is expanding rapidly, which makes the NRM more and more difficult, and the corresponding management cost is also rising. The traditional NRM mode is inefficient and lacks management ability, which can not meet the needs of the current information society. With the continuous improvement of information technology, it is imperative to apply computer technology and network technology to NRM. It is also the only magic weapon to solve the problems of traditional NRM [2]. At the beginning, the network technology is not very mature. The enterprise's NRM system basically uses the c/s mode. This mode has its own advantages, such as safe and reliable, powerful interface operation function, timely response and feedback speed, etc. Later, with the rapid development of network technology, the previous NRM system based on c/s mode can not meet the needs of enterprise transformation and development. Under this background, the enterprise NRM system urgently needs to carry out innovation and reform, introduce b/s mode, adapt to the requirements of the current information construction of NRM system, and promote the development of enterprises faster [3].

2. Main technologies

NRM is very important for an enterprise. It is an inexhaustible driving force for the innovation and development of an enterprise, a key element to enhance the competitiveness of an enterprise, and an indispensable part to ensure the normal operation of an enterprise. Nowadays, with the rapid economic development in China, the number of small and medium-sized enterprises is not only greatly increasing, but also the scale is expanding rapidly, which makes the NRM more and more difficult, and the corresponding management cost is also rising. The traditional NRM mode is inefficient and lacks management ability, which can not meet the needs of the current information society. With the continuous improvement of information technology, it is imperative to apply computer technology and network technology to NRM. It is also the only magic weapon to solve the problems of traditional NRM. At the beginning, the network technology is not very mature. The enterprise's NRM system basically uses the c/s mode. This mode has its own advantages, such as safe and reliable, powerful interface operation function, timely response and feedback speed, etc. Later, with the rapid development of network technology, the previous NRM system based on c/s mode can not meet the needs of enterprise transformation and development. Under this background, the enterprise NRM system urgently needs to carry out innovation and reform, introduce b/s mode, adapt to the requirements of the current information construction of NRM system, and promote the development of enterprises faster [4].

2.1. B/S architecture

In fact, the b/s architecture is based on the c/s architecture, that is to say, it is based on the c/s architecture, and it has only been innovated and developed on its basis. There is still a big difference between b/s mode and c/s mode. The former is based on browser and the latter is based on traditional client. B/s architecture is more convenient for system integration. At present, b/s mode has been popular in the field of software development. The main reason is that its advantages are too prominent. It can not only reduce the system scale, but also further reduce the system cost. It is also simpler and faster for developers. There is also a special advantage, that is, users can apply the system to process business anytime and anywhere. They do not need to download some other plug-ins or install other clients [5]. They only need a common browser in the system to operate the system accordingly. In addition, b/s architecture also has great advantages in data sharing and cross platform. The specific working principle of b/s architecture is shown in Fig. 1.

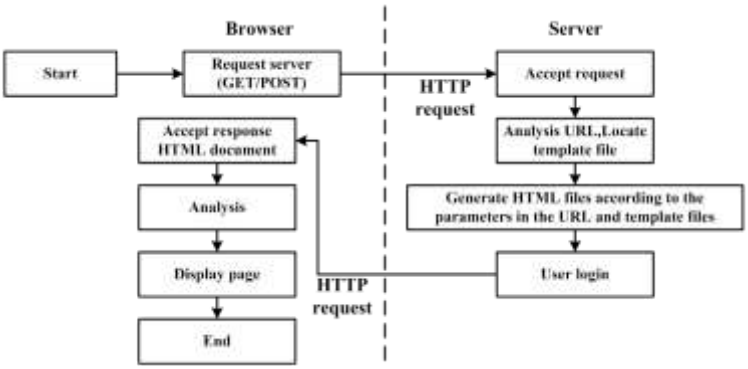

Fig. 1. the working principle of B/S architecture.

It can be seen from Figure 1 that the workflow can be summarized into the following three steps:
Step 1: the user opens the browser and submits the forms of the business to be processed through the browser. These forms should be submitted to the browser, and there are corresponding pages to execute the contents of these forms. After submitting the form, you need to submit a request to the server through the browser, and then wait for the server to respond to the request [6].
Step 2: after the system server receives the user request, the server will perform corresponding operations according to the requirements and make corresponding responses to the user's request.
Step 3: the system server processes the received user request, and the processed data information will be displayed on the user's web interface through the browser, so that the user can intuitively view the results or perform relevant operations on it.

2.2. MySQL database technology

MySQL database is a very popular database at present, especially the websites of some small and medium-sized enterprises. It is widely used and highly recognized. On the one hand, the database is free, and can be downloaded and used in many places without additional charge. On the other hand, compared with some large databases, the database has low construction cost and simple operation, The development of the system can further reduce the design cost of the system. Therefore, for many enterprises, this database is very practical and economical [7]. It is also the first choice for many system developers. The composition of MySQL database is also relatively simple. It is mainly composed of three parts. The first part is several different client programs, the second part is the library required in the database, and the third part is the corresponding server daemon. In addition, in order to make the development more convenient and fast, the database also provides many programming interfaces of corresponding applications, so that developers can use them directly when developing programs, which reduces the development burden of developers and improves the development efficiency. MySQL database provides a lot of operation functions, such as database creation, database deletion, etc. in addition, there are related operation functions of database tables, such as query, addition, deletion, etc.

3. System requirements analysis

Each enterprise has different characteristics in NRM. Therefore, when designing the NRM system, we must first analyze the characteristics of the target enterprise in NRM and the corresponding needs of the target enterprise's human resource system, mainly from the following three aspects [8].

3.1. System feasibility analysis

- Technical feasibility

For the NRM system, the functional requirements of the system are relatively simple, so the hardware requirements are relatively low. General desktops and notebooks can meet the business requirements. In terms of software, because the technology for developing NRM system is very mature and there are many development languages, most developers have this technology. In

addition, the amount of data in enterprise NRM is generally small, so the MySQL database used does not have any problems in terms of technology [9].

- Economic cost feasibility

For small and medium-sized enterprises, NRM systems are generally small in scale, with relatively low hardware requirements and relatively low cost. They can purchase corresponding hardware equipment without investing a lot of money. In addition, MySQL database, the database software required by the system, can also be downloaded directly from the network without cost investment. In terms of software development, the development technology of such systems is very mature, the development cost is relatively low, and the amount of data in the system is small, so the operation and maintenance costs are affordable for enterprises.

3.2. System functional requirements analysis

For enterprises, the NRM system is mainly used by the company's human resource department. Computers are used to process business. Therefore, the basic business systems of the human resource department should be available, and comprehensive automatic management should be realized. Using the HR management system, you need to be able to manage the enterprise's human resources, manage the basic information of enterprise employees, make training plans for enterprise employees, and carry out recruitment according to the needs of enterprises. In particular, the system also needs to provide the functions of daily attendance and performance appraisal for enterprise employees. The data in the database of the whole system needs to be unified and comprehensive, and statistical reports can be generated as required for the use of enterprise management or leaders of human resources departments. For enterprise employees, you can also view their basic personal information and query some information through the system. The background of the system is mainly maintained and responsible by the system administrator. In the background of the system, the system data can be maintained, such as modifying the basic information of employees, managing recruitment plans, etc. in the background of the system, some payroll and performance businesses can also be directly processed [10].

3.3. System non functional requirements analysis

The non functional requirements of the system are mainly to promote the system within the enterprise, so that all employees of the enterprise can easily accept and use it. Therefore, the system should achieve three points in this respect: the first point is that the reliability and security of the system should be guaranteed, that is, the system can run smoothly without problems, and the system data can not be leaked or stolen; The second point is that the system must be easy to use, that is to say, the interface of the system must be clear and intuitive, so that people who just use the system can learn it, and the operation is very convenient and easy to master; The third point is that the system must be highly maintainable. When there are some inevitable problems in the system, the system can be easily repaired. For example, the database can be automatically backed up and restored, so as to avoid the loss caused by system damage to the enterprise.

4. System design and implementation

4.1. Overall system design

The NRM system architecture based on b/s mode is shown in Fig. 2. The system mainly uses JSP development language for programming, and the database adopts MySQL database.

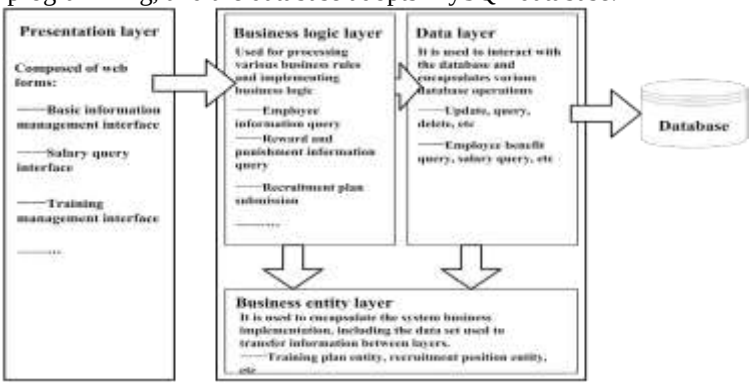

Fig. 2. human resources system structure design diagram.

4.2. System implementation

According to the functional requirements of the human resources management system, the main functions of the system are divided into six modules. The first function module is the basic information management module, which is also the basis of the system operation. The second function module is the human resources management module, which is the core module of the system and the common function of the human resources department. The third function module is the salary management module, The data in this module needs to be shared with the data in the enterprise financial management system to reduce the database development cost. The fourth function module is the attendance management module, which mainly records the attendance of enterprise employees. The fifth function module is the performance appraisal management module, which is also the key to assessing the performance of enterprise employees. The functional modules of the NRM system based on b/s mode are shown in Fig. 3.

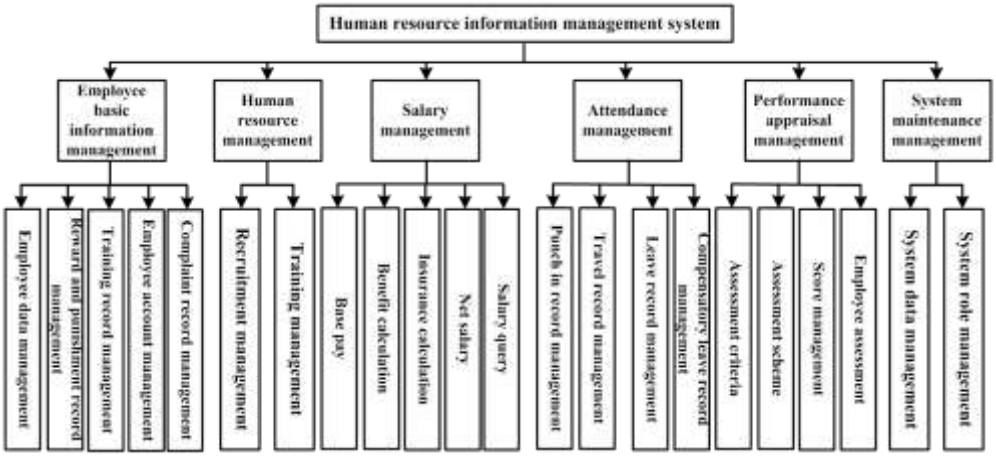

Fig. 3. system function module structure diagram.

(1) Implementation of employee basic information management module

The employee basic information management module is the basic function module of the system. Its main function is to manage the basic information of enterprise employees. For the NRM department of an enterprise, the main work object is the enterprise employees, so the basic information of these employees has become the basic
data of the system operation, and also the most important data. The security of the data is also very important. The basic employee information in the NRM system covers a wide range, but generally it mainly includes the following aspects: employee personal information, reward and punishment information, training information, salary information, etc. When using the system, users only need to log in to the system through the browser, and then the system will verify the information used. If the verification is successful, employees can enter the function page of the system for relevant operations, mainly to manage their own basic information with management authority, including the addition, deletion, modification and query of some personal information.

(2) Realization of NRM module

The NRM module in the system is the core function module of the system. Its main function is to manage the human resources of the enterprise, including recruitment management and training management. Recruitment and training are also the most important businesses of the HR management department. The business processing processes of these two parts are similar, so the management processes in the system are also very similar. For example, an enterprise employee first needs the enterprise HR department to prepare a training plan according to the enterprise's work plan, and then submit it to the enterprise management for approval. After approval, the training plan can be published in the system, and the enterprise employee can query the corresponding training plan in the system.

(3) Implementation of salary management module

The main function of the salary management module in the system is to record all the salaries of enterprise employees. The data in this module needs to be shared with the data in the enterprise financial management system. This module mainly includes enterprise employee salary management, five insurances and one fund management, performance salary management, welfare management, salary query, etc. In the system, employee salary management is automatically calculated by the system according to personnel position, working years, salary standard and other information. As for the five insurances and one fund system, it is automatically calculated and deducted according to requirements. As for the payment of performance and welfare, it needs to be calculated in combination with performance appraisal, attendance and other data, and tax should be deducted at the same time.

(4) Implementation of attendance management module

The main function of the attendance management module in the system is to record the attendance of enterprise employees, so as to facilitate the unified management of enterprise employees, which is also a very important aspect of enterprise standardized management. Generally speaking, the attendance of enterprise employees mainly includes on-the-job, late arrival, business trip, early leave, leave, etc. The attendance administrator will record and upload them to the system according to the performance of enterprise employees. The specific process is as follows: first, the attendance administrator logs in to the system. If the system

determines that he is an attendance administrator, the attendance administrator can record and manage the attendance of enterprise employees.

(5) Implementation of performance appraisal module

The main function of the performance appraisal management module in the system is to assess the work of enterprise employees. This kind of assessment can be all-round assessment or one aspect of employee assessment. The assessment data is based on the daily work data of employees stored in the system, which greatly prevents the possibility of manual operation. In this module, appraisers can take corresponding reward and punishment measures for employees according to their assessment results. In addition, appraisers can adjust the built-in appraisal schemes in the system according to the different positions of enterprise personnel, score the personnel in different positions, and then give feedback. If employees have no comments on the appraisal, they will form a conclusive evaluation. In this way, the simplification of appraisal standards is eliminated, and enterprise employees will more agree with the appraisal scheme.

5. System test

In order to verify the performance of the NRM system based on b/s mode, this paper carries out a system test. Simply speaking, system testing is to test all aspects of the whole system, such as checking whether the system functions meet the needs of the enterprise, whether the system performance meets the requirements of reliability and security, whether the system interface meets the operating habits of enterprise employees, whether the concurrency control of the system meets the requirements, etc. from these tests, we can find out the deficiencies and vulnerabilities of the system, So we can improve the system against these deficiencies and vulnerabilities. There are many testing methods for software systems, including system interface testing, system function testing, system concurrency control testing, etc. The NRM system test environment based on b/s mode is shown in Table 1.

Table 1. The system test environment.

Parameter	Project	Platform content
	16	Memory /GB
Server environment		
Client environment		
Operating system	MySQL Server 2016	Windows 10 Database
Hard disk /TB		2
CPU		Intel E5-2637 v4 3.5 GHz
Memory /GB		6

(1) System compatibility test and analysis

On the one hand, the purpose of the compatibility test of the NRM system is to test whether the system is reliable in the running process without relying on a special browser. On the other hand, it is to test whether the running environment of the system is cross platform without downloading any clients. The test of this paper shows that the developed NRM system has very good compatibility. There is no need to download any plug-ins or special browsers, and only the browser provided by the system can be used.

(2) System concurrency test

The purpose of the concurrency test of the NRM system is mainly to prevent the concurrency problems or system crashes caused by too many people using the system at the same time. Therefore, this test is very necessary for the software system developed in b/s mode, which can verify how many people can be used online at the same time. The test shows that the developed NRM system has very good concurrency and fully meets the requirements of enterprises.

6. Conclusion

This study demonstrates the feasibility and advantages of implementing a resource-efficient Employee Information System using Java and MySQL. The system is capable of handling core HR functionalities while maintaining a low resource footprint, making it especially suitable for SMEs. Future work may include web-based interface integration, mobile accessibility, and incorporation of AI-driven analytics for employee performance forecasting.

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