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Research on the Application of Cloud Computing in University Library Management System

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Abstract: At present, most libraries have to build their own library management system, which is undoubtedly a high-input work for large libraries or small and medium-sized libraries in developed areas. As a newly emerging technology in recent years, the huge advantages of cloud computing are incomparable to many traditional technologies. The biggest feature of cloud computing is that it can transfer the computing power of the computer to the corresponding software, from which customers can access the computer's storage system to obtain the information they need, so that resources can be shared and users can get it in time. Therefore, the traditional library management system architecture will also be challenged, and it is urgent to develop a library management system based on cloud computing. This paper studies the architecture of university library management system based on cloud computing.

Keywords: Library Management System; Cloud Computing; Library.

1. Introduction

Although digital library handles all kinds of data and information and provides users with fast and convenient services, its further development is hindered by the separation and relative independence of information sources. As the storage place of social information, libraries need huge storage space, but there is duplication of resources between libraries, which leads to the emergence of information garbage and waste of resources [1]. As a newly emerging technology in recent years, the huge advantages of cloud computing are incomparable to many traditional technologies.

Due to the rapid development of cloud computing technology, the dynamic and extensible virtualized resources using cloud computing can provide users with services such as computing power and storage resources. Therefore, the traditional library management system architecture will also be challenged, and it is urgent to develop a library management system based on cloud computing. This paper studies the architecture of university library management system based on cloud computing.

2. Overview of Cloud Computing Technology

The main function of cloud computing is delivery, increase and use, mainly dealing with virtual network resources. The biggest feature of cloud computing is that it can transfer the computing power of the computer to the corresponding software, from which customers can access the computer's storage system to obtain the required information, so that resources can be shared and users can get it in time [2]. In the process of continuous improvement and innovation, the current cloud computing model has been formed. It is not difficult to see that cloud computing has also undergone continuous improvement and innovation, and its concept is constantly changing with the development of the times and society, and gradually reaches this high level today.

In the cloud computing mode, the computing architecture of software has evolved from "server+client" to "cloud service platform+client". It not only does not need high construction costs, but also can reduce related management costs. Because cloud computing doesn't require much equipment for the client, most of the work can be done in the browser, and the client only needs to run simple browser software.

Up to now, cloud computing can mainly provide users with three levels of services: infrastructure as a service, platform as a service and software as a service [3-4]. In the working mode of cloud computing, data is stored centrally, all kinds of data in the data center are managed uniformly, these resources are allocated and used reasonably, the load is balanced, software is built on the basis of the platform, the security of cloud computing mode is fundamentally controlled, the security situation is monitored in real time, and the data security of users is fundamentally guaranteed.

3. Deficiency of Traditional Library Management System

3.1. High Cost of Infrastructure Construction

At present, most libraries have to build their own library management system, which is undoubtedly a high-input work for large libraries or small and medium-sized libraries in developed areas. Most libraries mainly get limited fixed funds, and the source of funds is mainly financial allocation from government departments. The high cost and maintenance of infrastructure and low utilization rate are common problems in the construction of digital libraries [5]. The framework of traditional library IT transformation infrastructure includes the purchase of uninterruptible power supply, firewall, switch, server and storage, and the need to build, operate and maintain software and hardware, and the later cost is quite high.

3.2. Interoperability between Systems is not Strong

The paper resources and digital resources between libraries are independent and scattered. In the process of construction, the digital libraries of many libraries don't think about research cooperation with other libraries at all, but concentrate on building their own digital libraries, resulting in a lot of data overlapping. The traditional library automation

system adopts C/S mode, and the C/S mode can really play its business function in the whole library under the local area network environment in the library. However, with the change of library working environment and the extension of service, the C/S model has obviously not adapted to the development situation of the library [6]. With the extension of library business, the business processes such as cataloging, purchasing, borrowing and returning may not be carried out in the library, so a new model is needed to break the shackles of the conventional model and truly give play to the service ability of the library.

3.3. The Repeated Construction Rate of Digital Resources is High

Generally speaking, each university library will have its own set of management system, which includes hardware system and software system, and it needs to organize a special library management department to manage it [7]. This function is mainly to set users' permissions, and different users have different permissions after logging into the library system. Due to the current conditions, many libraries don't know whether the digital resources and paper resources in their own libraries overlap. Therefore, unwittingly, in order to constantly improve the materials in the digital library and meet the needs of readers, the library will repeatedly purchase the materials and information that were already available in paper resources, thus causing a great waste of resources.

4. Application of Cloud Computing in University Library Management System

4.1. Library Management System based on Cloud Computing

At present, the mainstream automation system is basically a C/S structure. In this structure, the client has certain data processing and data storage capabilities, and the system distributes the calculation and data to the client and the server for processing respectively through application software to realize the whole business logic [8]. At present, the library management system can't meet users' demand for cloud resources and services, and it has the defects of low concurrent operation efficiency and poor retrieval performance. On the basis of the obtained facilities, various book resources are integrated, and a university library management system with good economy and high standardization is designed.

At this stage, to build a university library management system based on cloud computing, it is necessary to build an effective cloud access platform first, so that system users can log in to this "cloud" through clients. This cloud access platform should have an effective security system to prevent user information from leaking, and also meet the relevant requirements of university library management system [9]. The cloud access platform should be able to identify valid users and prevent illegal intrusion. Fig. 1 shows the overall architecture of a university library management system based on cloud computing.

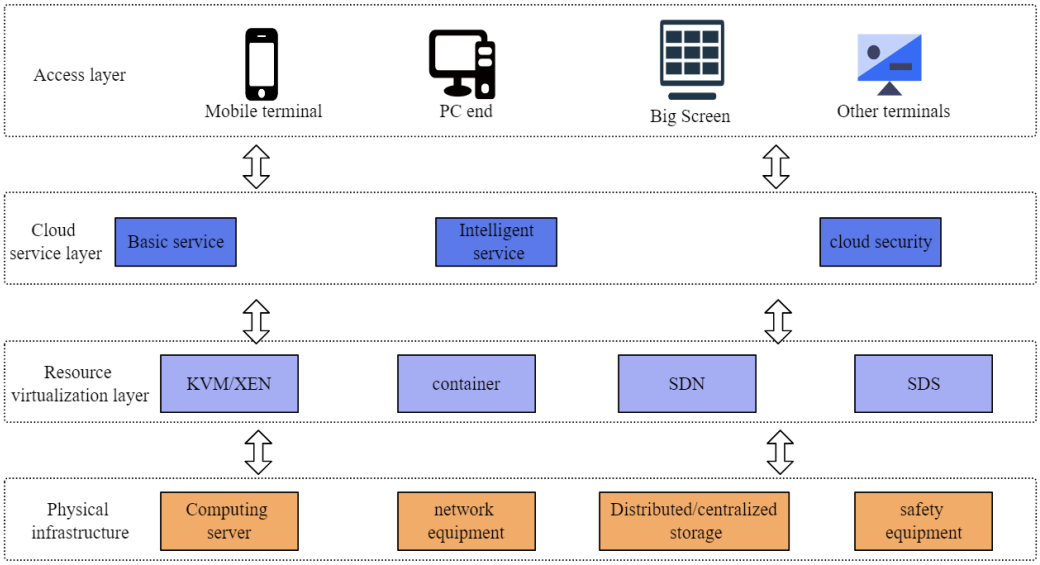


Figure 1. Overall architecture of the system

In the cloud computing environment, when the library automation system is presented to library users, it is no longer a system encapsulated by multiple modules. In the cloud computing environment, the library can also attach various Open API interface applications to its own system, which completely breaks the conservative service mode of the library in the past. The library database is updated very quickly, and new bibliographic information is added to the database all the time. Under the cloud service mode, the library can integrate the latest bibliographic information into the "cloud" as long as it pays according to the required service type and usage, and users can enjoy more even more comprehensive consulting services [10].

4.2. Design of System Function

The management system of university library should have the necessary functions of the traditional book management system, mainly including the functions of book inquiry and lending management, basic information management, administrator management, user and authority management, book ordering management and other modules. Compared with the traditional library management system, the function of cloud computing is more humanized and comprehensive. In a word, the university library management system under cloud computing will better meet the needs of users and create greater economic benefits.

Theoretically speaking, using cloud computing technology, users can use the relevant resources of the library through the Internet only through local terminals. The existing library electronic resources can be put on the "cloud" platform, thus replacing the existing desktop computing model. Data update is synchronized with cloud computing services, which can effectively reduce the dependence of software on cloud computing services and improve the usability of software. When there is a problem in the local data server that leads to data loss or even irreparable damage to the server, data backup can also be obtained from the cloud computing service, so that the software can get double data security.

4.3. Private Cloud Design of Library

The data center of digital library cannot be separated from the normal operation of the server. In order to make the digital library work normally, we must first ensure the normal service of the server. Otherwise, once the server goes wrong, it will affect the normal operation of the library, or even lose some data and bring some losses to the library. The emergence of cloud computing technology and its application in digital libraries have brought new benefits to small and medium-sized libraries. Come on. The application of cloud computing technology enables each library to know the information and resources already existing in other libraries, which can effectively save costs and truly realize sharing.

After the library decides to implement the application of cloud computing, it should combine the hardware environment used by the existing library automation system, analyze the types and characteristics of services that the library has been able to provide, and determine which services are more suitable for implementing cloud computing, and then consider the types of cloud computing platforms and cloud service providers that are suitable for this. Unionlib system is an automatic management system with pure B/S architecture, which is convenient to deploy by SaaS. Specifically, the library establishes a private cloud of Unionlib system, as shown in Figure 2 below.

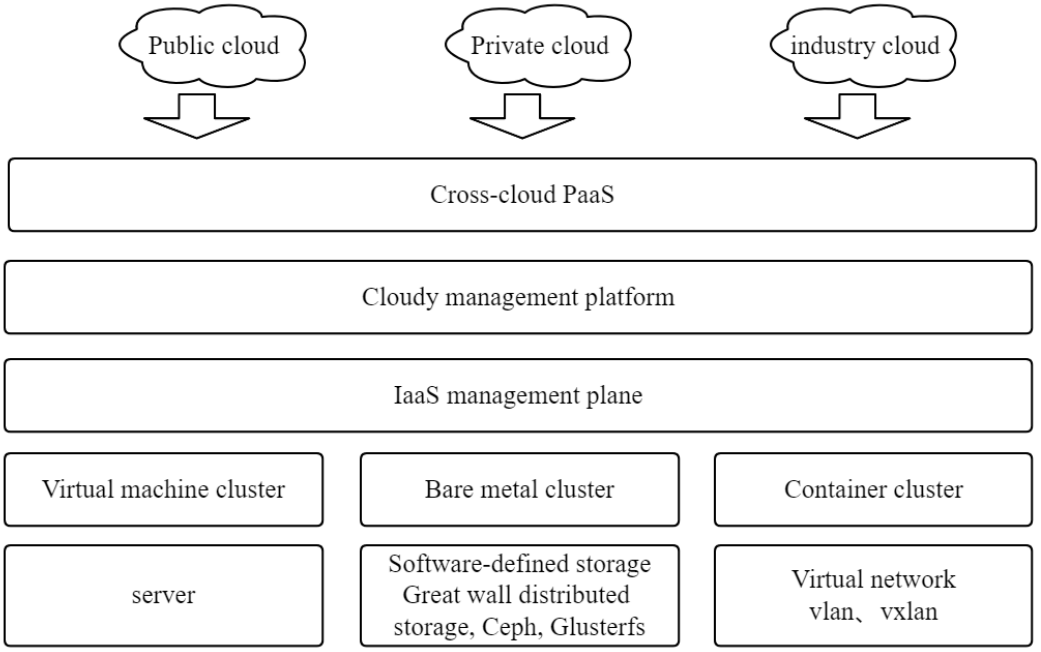


Figure 2. Library private cloud

Many sub-libraries are established in the background of Unionlib system, which are distributed to the reference rooms of various departments according to different port numbers. This way, the advanced management and setting of cataloging and circulation rules are handed over to the library, and the department reference room only needs to conduct circulation operations through the Web.

For the department reference room, this method is based on Web, and the collection management and circulation are realized based on "cloud". The structure of the system is optimized, which fully follows the criteria of computer database. The structure is very advanced. After many experts and scholars' argumentation and supplement, the related contents of its cloud service platform and cloud module are not available in other software and technologies.

5. Conclusion

Due to the rapid development of cloud computing technology, the dynamic and extensible virtualized resources using cloud computing can provide users with services such as computing power and storage resources. In the cloud computing environment, libraries can also attach various Open API interface applications to their own systems, which completely breaks the conservative service mode of libraries in the past. The library database is updated very quickly, and new bibliographic information is added to the database all the time. Under the cloud service mode, the library can integrate the latest bibliographic information into the "cloud" as long as it pays according to the required service type and usage, and users can enjoy more comprehensive consulting services.

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