Research on IT Management and Service of Small and Medium Sized Libraries Based on Cloud Computing and Virtualization Technology

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Abstract. At present, digital resources have become an important part of the collection resources of modern small and medium-sized libraries. As a new technology, cloud computing technology has been widely used in the field of small and medium-sized libraries, and has just begun to enter the vision of professional researchers. This paper studies the application of cloud computing and virtualization technology in IT management and service of small and medium-sized libraries. In order to better understand the application and help of cloud computing and virtualization technology in IT management and service of small and medium-sized libraries, this paper applies cloud computing and virtualization technology to IT management and service in a university library, and then carries out a survey and statistics of the figure The library has developed a questionnaire to investigate the library staff and readers' feelings about the application. The results show that under the support of cloud computing and virtualization technology, IT management and service for small and medium-sized libraries can significantly improve the management efficiency and service quality of libraries.

Keywords: Cloud Computing, Virtualization Technology, Small and Medium Libraries, IT Management

1. Introduction

Cloud computing¹-² is a very popular new service technology and has a very broad development prospect. Its development and application will completely change the existing computer network³-⁴ and media mode⁵-⁶, and then have a profound impact on the development process of human beings. Cloud computing will continue to develop in this stage. Because cloud computing service can effectively solve the long-term problems in library information management and service work from
the aspect of infrastructure[7]. Therefore, many libraries began to use cloud computing technology, and achieved some success.

In the cloud computing environment, this is an effective method to use virtualization technology[8-9] to schedule cloud computing digital library resources, which are safe, efficient, dynamic and economical, and realize centralized IT resources and dynamic management, operating system, hardware, software, data, network, storage, and other key equipment and system structure. It is an effective way to improve the flexibility, operation, management and return on investment of cloud library[10]. According to Gartner's virtualization research released in November 2010, more than 50% of the workload of enterprise data center will run on virtualization platform by 2012, and 60% of virtualized servers will be more vulnerable than physical infrastructure. By 2015, nearly 40% of the security software that controls internal data centers will be fully virtualized. Therefore, secure virtualization technology and application environment in cloud computing environment are not only an important factor affecting the reliability and effectiveness of cloud service content of Library cloud service system, but also the key to market competitiveness of cloud library and reader satisfaction and cloud reading activities.

This paper studies the changes brought by the integration of cloud computing technology and virtualization technology into IT management and service. Through the results of statistical experiments and questionnaires, it is found that these two technologies can effectively help small and medium-sized libraries to manage and improve better services for readers.

2. Cloud Computing and Virtual Library Management and Service

2.1. Library Cloud Service

How to apply cloud computing services to small and medium-sized libraries directly affects the operation of small and medium-sized libraries. When analyzing the main industrial chain of enterprise cloud computing business, some scholars divide the main industrial chain of cloud computing business in China into users, suppliers and operators. According to the different characteristics of users, suppliers and operators. In a short time, small and medium-sized libraries will become the recipients of cloud services. But in the long run, with the further improvement of cloud computing technology, small and medium-sized libraries, as cloud service providers, are still worth looking forward to in terms of software platform and dynamic data processing.

2.2. Virtual Cloud Library

Cloud database virtualization application has the characteristics of extensive content, complex organizational structure, high security management requirements and poor stability of managed objects. Therefore, in the application virtualization security management, the demand scheme of security management should be scientific, efficient and should include the virtual operating system, virtual hardware equipment, virtual application software, user identity and the efficiency of virtualization application management, virtualization, network virtualization and management system. For example, the interface of cloud library should be simple and friendly; Virtualization can implement virtualization, monitoring, isolation and bypass flow control of devices, effectively control the number and structure complexity of virtual machines, and manage the risk of hacker attacks.
Secondly, cloud library should focus on strengthening the security operating system, management system, application system and security system, improve the structure and logic, controllability, enforceability and system compatibility, and ensure that the core system of the design, production, use and elimination process conforms to the life cycle management process. Third, the virtualization application management platform should have strong openness and compatibility, and support mutual trust and interoperability with the third-party management platform software.

3. Experimental Correlation Analysis

3.1. Experimental Background

With the continuous construction and improvement of library facilities in China, the library began to introduce modern service mode, and combined with the function of information technology, introduced cloud computing and virtualization technology to build the cloud computing service mode of library. Under the cloud computing mode, the construction of the library means that the overall service mode of the library has changed, and its service mode has begun to integrate into the information technology, such as network, media, computer, etc., and establish the cloud platform of the library, so as to effectively use the cloud service. In addition, there is a big difference between cloud management and traditional library services. Cloud services have more storage capacity to manage information content and occupy less space resources. Compared with the information management mode of traditional library, cloud service has more advantages. This paper analyzes and discusses the IT management and service of small and medium-sized libraries based on cloud computing and virtualization technology.

3.2. Experimental Design

This paper carried out a survey in a university library. It has been a month since the library applied cloud computing and virtualization technology to it management and service. This paper starts from the month before the application of this technology in the management and service of the library, and takes a week as a time period to count the book borrowing amount of the library before and after the application of the technology, so as to get the influence of the technology on the operation of the library. The experimental results are shown in Table 1.

| Week | Before | After |
|------|--------|-------|
| 1    | 1801   | 2578  |
| 2    | 2022   | 3112  |
| 3    | 1975   | 3360  |
| 4    | 1880   | 3734  |

4. Discussion
4.1. Application Analysis of Cloud Computing and Virtualization in Library IT Management and Service

As shown in Figure 1, generally speaking, the attitude of library staff towards it management based on cloud computing and virtualization technology is recognized, and most of them are satisfied with the use of this technology to assist management. Among the employees surveyed, 70.1% were very satisfied and 23.6% were satisfied. These people accounted for the majority of the total number of employees interviewed. Only 4.1% of employees think that this technology has not brought obvious effect, and the effect is very common, only 2.2% of employees think that the application of this technology is very poor. The above results show that: cloud computing and virtualization technology applied to library it management can bring obvious benefits to the work of museum staff.

![Figure 1. Analysis on the Use of New Management Methods of Library Staff](image)

As shown in Figure 2, cloud computing and virtualization technology has brought new IT services to libraries, and readers are generally satisfied with this service. Among them, 64.2% of the readers participating in the survey are very satisfied with the service effect, 30.3% are satisfied with it, only 3.2% of the readers think that the application of the technology is not different from before, and the effect is very general, only 2.3% of the readers think that the experience brought by the application of the library is very bad. The above results show that: the application of cloud computing and virtualization technology has a good effect on improving the quality of IT management and service of small and medium-sized libraries, and can better attract readers for the library.

![Figure 2. Analysis of Library Readers' Experience of New Service Mode](image)
4.2. Advantages of Small and Medium-sized Libraries in IT Management and Service by Using Cloud Computing and Virtualization Technology

In the face of the rapid growth of digital information resources, libraries not only need professional technicians to build hardware and software platforms for electronic resources, but also need a lot of money to purchase computer hardware such as servers, storage arrays and various network equipment. The construction and maintenance of digital resources has undoubtedly greatly increased the human and financial costs of the library. For most small and medium-sized libraries, the funds for equipment procurement are very limited, which greatly restricts the pace of digital resources construction. In the network environment, how to solve the above problems with less investment and more reasonable use is a new problem that needs to be solved urgently in small and medium-sized libraries. The current cloud computing technology has opened up a new method to solve the above problems, because cloud computing technology can not only provide powerful data storage and network service functions, greatly reduce the cost of digital resources stored in the library, but also solve the problem of heterogeneous digital resources in different databases, and further improve the efficiency. And provide more personalized information services for readers.

First of all, cloud model can help the library to solve the problem of fund purchasing equipment. Because in the cloud environment, the small and medium-sized library itself does not need to buy a large number of servers and storage devices. They can use resources in the cloud in rental, on-demand, and pay as you go. For small libraries with small business volume but having to provide users with information services through the network, it undoubtedly saves a lot of equipment purchase costs in the early stage. Taking into account the large-scale Library in the future, they also provide a large amount of money for the maintenance of modern equipment, because they do not provide a lot of money for maintenance. Moreover, because it does not need to buy a large number of computing equipment, it also solves the problem of library space to a certain extent, so the library no longer needs to establish its own data center. Using the services provided by cloud computing, we can provide users with modern information services. Secondly, after the small and medium-sized libraries use the resources in the cloud in the form of leasing, they hardly need to consider the updating and maintenance of infrastructure equipment, and all maintenance work is provided by "cloud". This also solves the problem of lack of IT equipment professionals in small and medium-sized libraries.

Through cloud computing, small and medium-sized libraries, small and medium-sized libraries and large-scale libraries can jointly construct library information commons. In this way, many small and medium-sized libraries can share a large number of network system infrastructure, which not only reduces the operation cost, but also greatly improves the service efficiency. In addition, in cloud computing, digital resources from different libraries will be stored on thousands of servers in the remote cloud rather than on a local computer. The single collection resources of small and medium-sized libraries are relatively poor. Resource sharing cloud has undoubtedly become the extended collection resources of multiple collection resources, and the resources used by users are just like the library resource cloud roaming around the world in the ocean.

The traditional library service mode usually requires users to use the digital resources of the library through the computer. At present, the way for users to obtain library information services is generally through the use of fixed equipment such as computers. With the development of the library to the cloud, users can use a variety of mobile devices. In the cloud computing mode, users can freely use
mobile phones, PDAs and other devices to enjoy the digital resource services provided by the library. Because cloud computing provides powerful wireless access, users can break geographical and time constraints and get the services they want when and where they need them. It can be predicted that in the near future, users can use all kinds of digital resources of the library through various flexible terminals, so as to truly play the role of resource center of small and medium-sized libraries, and libraries can also realize real personalized services.

4.3. Library Services Based on Cloud Computing and Virtualization Technology

The main object of technical training is readers. The training of small and medium-sized libraries is mainly to improve the use value of libraries, which is reflected in the teaching of readers. This kind of training is a kind of technical training, which aims to improve the readers' ability of searching information. The training includes the skills of retrieval function, retrieval method and the use of new applications.

Knowledge service is a value-added service project of cloud computing library. In the information age, integrating cloud computing technology into library construction and service can effectively improve the efficiency of users' access to literature information. Compared with the traditional library information acquisition method, it has the advantages of fast and convenient. However, readers need an intermediary organization to meet the needs of different users for book information. Therefore, the future development of cloud computing library needs to take knowledge service as the core development goal, and provide knowledge service for different users such as universities and social groups. This is the fundamental evolution of cloud computing library and the value of library itself.

The application of cloud computing technology is the need of library development and modern market. Under the cloud computing mode, the traditional library service mode and service items have undergone great changes, effectively changing the scope of traditional fixed services, expanding the campus and social groups, and facing a larger user group. Cloud computing has changed the traditional books in the library reference service and theme to determine the service and mobile cloud computing platform, to provide users with more efficient and faster access services.

5. Conclusion

This paper introduces cloud computing and virtualization technology, aiming at the difficulties of IT management and service in small and medium-sized libraries, puts forward the application of cloud computing and virtualization technology in library it management and service mode, and carries out a survey in a library which has applied the method, and issues questionnaires to library staff and readers to understand the application situation. Based on the questionnaire, this paper analyzes the advantages of small and medium-sized libraries in IT management and service by using cloud computing and virtualization technology.

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