Innovative Research on the Construction of University Digital Library Based on Cloud Computing

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Abstract: With the rapid development of modern information technology and Internet, cloud computing has changed from a conceptual hype to a deployment practice. It is user-centered and provides powerful data storage and network services. This paper discusses the characteristics and benefits of cloud computing in digital libraries, analyzes on the problems existing in cloud computing in digital libraries, expounds the important significance of developing digital libraries under cloud computing environment, and points out that the application of cloud computing technology in digital libraries must have a bright future.

1. Introduction

Cloud computing is a mode of increasing, using, and delivering Internet-based service, which usually involves providing dynamic, scalable, and often virtualized resources over the Internet. Cloud is a metaphor for the Internet. Cloud computing in narrow sense refers to the mode of delivery and use of IT infrastructure, refers to the network to obtain the required resources in an on-demand, easy-to-expand manner; the network has penetrated into all aspects of people's lives and work, coupled with the rapid development of digital libraries, readers for the use of digital libraries has become a fixed daily consumption. Generalized cloud computing refers to the delivery and use of services. With the rapid development of the Internet and the continuous improvement of the degree of interconnection, the library has entered the information age, the construction and development of digital library has become an important symbol of the level of Library modernization. This paper enumerates the application and problems of cloud computing in digital library [1].

2. The basic connotation of cloud computing

With the development of information technology, traditional libraries are gradually replaced by cloud libraries, and the innovation of Digital Libraries in cloud environment has become the trend of the development of modern libraries. In the near future, cloud computing will play a greater advantage in the industry as a whole.

2.1 The concept of cloud computing

Cloud computing was first proposed by Google in 2007 when it introduced information processing tools such as word processing and spreadsheets. However, cloud computing is a concept, not a specific technology or standard, so there are often different interpretations from different perspectives. At present, the industry does not yet have an authoritative and accurate concept. There are 20 opinions on the definition of cloud computing in the IT industry.

The economics of cloud computing. In the cloud computing environment, there are other resource services besides computing resources, which can directly pay part of the cost of use, not only saving the cost of system upgrade, but also saving human resources, material resources and time to optimize economic benefits.

The flexibility of cloud computing. In the cloud computing environment, users can flexibly use cloud resources in a short time according to their own needs, and cloud computing operating system compatibility is strong, merge various file formats, adapt to commonly used equipment, can obtain

the required resources through common equipment without time and place constraints, to achieve resource sharing. In the cloud computing environment, users use the information resources in the sea of cloud confidentiality is strong, do not need to worry about information leakage, data loss and other insecurity issues, more worthy of user praise.

2.2 Cloud computing technology

Cloud computing is the development of parallel computing, distributed computing and grid computing, or the commercial implementation of these computer science concepts. Cloud computing is the result of the mixed evolution and leap of virtualization, utility computing, infrastructure as a service, platform as a service, software as a service and other concepts.

2.3 Characteristics and basic characteristics of cloud computing

Although the concept of cloud computing has different understandings in different fields, cloud computing is user-centered, providing secure, fast and convenient data storage and network services, making the Internet a data center and Computing Center for every user, and transferring users from desktop-centric applications to desktop-centric applications. Through the summary and analysis of the characteristics of the various activities that take the Web as the core, we can find that cloud computing has the common basic characteristics:

Dynamic scalability, flexibility and rapidity. That is, cloud computing can increase or decrease the amount of IT resources according to the number of users accessed, which makes the scale of IT resources have dynamic scalability, so as to meet the needs of changing number of users. Cloud computing model has great flexibility, can be achieved in various stages of development and deployment of various types and sizes of applications quickly adapt. Providers can deploy resources in a timely and timely manner, and users can also choose on demand.

Abstraction, measurement and charging. Cloud computing enables users to use a variety of terminals anywhere to obtain the required application services, and end users do not need to know or worry about the specific physical resource location of the application services used. Cloud computing enables systems to charge according to load and user usage, and provides application services that change with demand and do not need to be managed [2].
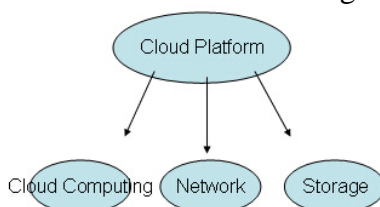

Figure 1. Cloud platform

3. The importance of developing digital library under cloud computing environment

Cloud computing environment, mainly through the network computer split computing processing procedures, divided into a number of subroutines can quickly process batches of data in a short time, storage or mining of massive data for digital libraries to provide effective data and technical support, in order to meet the needs of users to provide quality services. From the Internet perspective, the essence of cloud computing mode is an Internet mode. In this mode, the entire Internet has become a supercomputer, through which people can complete most of the computing tasks and realize the processing and transmission of information. In short, in the cloud computing environment, we should change the digital library management service mode and positioning.

3.1 The transformation and development trend of Digital Library in cloud computing environment

In May 2009, Richard Wallis, a British supplier of library automation systems, discussed cloud computing and proposed the concept of "cloud computing library", which can be understood as a

digital library in the cloud computing environment. Digital libraries are entering the era of cloud computing after experiencing the Internet era, the Web era, the grid era and the Web 2.0 era. The information service of digital libraries has been developed to the point that users can receive the information service provided by libraries through mobile terminal devices (such as mobile phones, PDA, etc.) by wireless access, which is not limited by time and place. The Digital Libraries in the cloud computing environment will have significant changes, compared with the digital libraries in the Web 2.0 era. There are obvious differences, and the changes are mainly manifested in the elements, resource integration mode, service mode, working principle, technical line and so on.

Comparing with commercial, the development and application of cloud computing in foreign libraries are relatively slow, but there are also many public and university libraries trying to use cloud computing to provide services. At present, the application mode of "cloud" is single and relatively slow in China [3].

3.2 Application of cloud computing in Digital Library

Characteristics of mass storage and resource sharing in cloud computing. Cloud computing technology is powerful in scale and mass storage of cloud databases. The storage of mass data in cloud computing mode is not only on the servers of digital libraries, but also on millions of servers in the "cloud", which determines the speed and efficiency of information updating, even if a server in the "cloud" appears. Failure, the cloud will have other servers to replace the crashed server to work, mutual cooperation between digital libraries can timely transfer new information and data to the cloud database, cloud database will update a large number of information and resources every day.

Cloud computing is characterized by its convenient and efficient service and insufficient funds. In the process of using cloud computing in digital libraries, sharing is devoted to the calculation and acquisition of digital information resources in a more relaxed and open environment. Digital libraries need to invest a large amount of material and financial resources every year to update and upgrade the equipment in the libraries in order to make all kinds of business develop smoothly. Providing more information service and knowledge recommendation has important value and basis in promoting complementary disciplines, expanding research space, enriching management system and promoting practice innovation.

3.3 Application examples of cloud computing in Digital Library

With the advent of cloud computing, digital libraries need not be equipped with huge computer room facilities, librarians can use the same computer as readers in the reading room, as long as they can connect to the Internet, each device can carry out library business processing. Cataloging data is already in the cloud, which is loaded by OCLC or other joint cataloging centers based on publisher-in-print cataloging data service transformations, and publishers and several large cataloging centers operate directly on the "data cloud".

According to user's interest, knowledge structures and so on, the system can also select information from all the information resources of the library to meet user's needs. Through analysis and synthesis, the system builds a reasonable knowledge information customization model for users, thus realizing the timing and fixed-point push of relevant letters for users through a variety of terminal devices. Information resources, in order to achieve personalized customization services, better meet users' personalized needs.

In terms of data storage, digital libraries already have a huge amount of data, and data is growing. The application of cloud computing technology provides a huge amount of data storage function for digital libraries. At the same time, it also needs to integrate different sources of information systems through technical means to make them interconnected and realize resource sharing. Because of this, resource integration in cloud computing environment is urgent. By decomposing and grouping the application system and resources, a unified resource management platform can be formed, and an integrated keyword retrieval or virtual resource system can be formed by integrating the database. At present, most libraries adopt the storage methods of direct additional storage, storage area network and network additional storage, and there are many problems. The so-called integration of

information resources is to integrate information systems from different sources through various technologies, so that different types of resources in different formats can be seamlessly linked. Cloud computing provides a huge amount of storage capacity for digital libraries, but in order to achieve the interconnection and sharing of information resources and realize the interoperability of information resources, information resources must be integrated [4].

4. The application and innovation of cloud computing technology in the construction of Digital Library

4.1 The change of new cloud library service concept

The development of Digital Libraries in the cloud computing environment is inseparable from the concept of personalized services. With the development of modern market economy, it is necessary to constantly update the concept of information support services with the new era in order to achieve a wider range of services. Libraries can recommend the latest book information and services for users according to their short-term usage, establish friendly relations with users, improve their loyalty, and also check the user's usage information according to the historical accumulation of information, dig out the user's usage rules and analyze relevant information, and formulate effective plans according to users. Personalized information services need to be provided.

4.2 Problems and prospects of digital library resource storage, integration and sharing under cloud computing technology

New problems of information service in Digital Library under cloud computing technology

a) Information security of Digital Library in cloud computing environment

In cloud computing systems, many digital library builders do not know where their data is stored. Data security is the guarantee and basis of library services for readers, so data security is very important. In the era of cloud computing, we hand over data to the cloud, managed by network agents, and the way security is managed has changed.

Smart phones can store large amounts of data, and in special circumstances smart phones will become the forefront of the fight against cyber crime. Cloud computing technology ensures the reliability of digital library resources storage, avoids the loss of digital library resources caused by network security problems, and avoids the loss of data caused by server errors.

b) The Problems of Copyright Disputes and Intellectual Property Protection in Digital Library under Cloud Computing Environment

In the management of cloud computing, the digital libraries that join the cloud computing model can share their information resources through the relevant protocols, which lead to the problem of intellectual property protection. Users should ask whether cloud service providers' data is stored in a specific jurisdiction, and whether they comply with privacy agreements and intellectual property protection provisions. Although cloud computing has brought tremendous advantages to digital libraries, copyright issues still exist. In order to protect the legitimate rights and interests of authors, effective solutions should be made before establishing digital libraries in the cloud computing environment, so as to lay a foundation for avoiding legal disputes, so as to give full play to the huge "cloud library" Advantage.

At present, the research on cloud computing is mostly limited to technology and application, and there is no relevant law to regulate it. It is precisely because cloud computing is not mature enough to develop detailed laws to regulate its application. Cloud computing service providers may do everything possible to use these digital resources, and carry out data integration, data mining, and knowledge services in the name of legalizing the use of user data, and then seek private interests, infringement of intellectual property rights.

4.3 New development of information service in Digital Library under cloud computing technology

Based on cloud computing technology, part of the library business management can be managed

by trusteeship, thus greatly improving the library's business ability and management efficiency. Cloud computing technology, based on its powerful data storage and processing capabilities, has brought a lot of innovative development to digital library information services, summarized as follows:

Cloud computing technology can provide a cloud service portal platform, cloud computing technology can provide one-stop services. Under the cloud computing technology, all user services and digital resources are carried out in the cloud. Following the requirements of the corresponding cloud service protocol, the construction of the cloud service portal platform of the digital library is centered on the user services. Through the integration of information resources under the cloud computing technology mentioned above, the semantic Web and R are combined. SS technology can provide users with one-stop information retrieval service platform, making the retrieval more simple, convenient, fast and intimate. To provide users with a quick search "one-stop" search interface, and can update the system portal in time, accurate and fast for all kinds of users to provide various types of cloud services, so that users can provide personalized intelligent services.

Digital libraries under cloud computing technology also attach great importance to user interaction services, cloud computing technology can provide multi-terminal personalized customization services. Cloud computing can not only achieve instant messaging online services, but also through video, voice interaction, users can express and display personal needs in time, combined with multi-dimensional data mining technology, users can recommend the most suitable information resources according to the needs of user description. In today's era when almost everyone has a mobile phone and terminals such as tablets are constantly penetrating into the lives of users, building a variety of terminal compatibility models will make the use of digital libraries more convenient and easy for users, cloud computing technology can also provide library management hosting services [5].

5. Conclusion

The emergence of cloud computing technology provides more technical and service support for the development of digital libraries, and provides more ways for digital libraries to provide more comprehensive user services. Cloud computing is a new high-efficiency and low-cost operation mode of modern digital libraries, which brings new challenges and opportunities to the development of Digital Libraries in the cloud computing environment. Although cloud computing is still in its infancy, its popularity in the IT sector shows its strong vitality. Applying cloud computing to digital libraries, other librarians will concentrate on their own business, get rid of the shackles of computer technology, give full play to their own maximum benefits, reduce the difficulty and complexity of computer applications, thereby reducing management costs, reducing the risk of system security, and promoting the sustainability of digital libraries continued development.

References

[1] Research on mobile digital library construction in China [D]. Li Binbin. Xiangtan University 2014.

[2] Research on Personalized Information Service of Digital Library under Cloud Computing Environment [D]. Hu Xiuyun. Hubei University of Technology 2014.

[3] Research on information services of Digital Library Based on big data [D]. Su Rong Huazhong Normal University 2014. Application of [4] cloud computing in digital library [D]. Guo Li. Xi'an University Of Architecture and Technology 2013.

[4] Research on the Construction of Anhui University Digital Library Alliance Platform Based on Cloud Computing [D]. Yu Xiujing. Anhui University 2013.

[5] Cloud Computing Based Library Alliance Service Platform Construction Research [D]. Ni Yu Jia. Northeast Normal University 2012.