Study on Construction of Digital Cloud Services Platform of College Library

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Abstract. The Digital Library cloud services platform based on cloud computing technology has become a new direction of development of digital libraries. Cloud service platform can achieve intensive management for digital library resource, and bring more convenient and efficient information service for readers. In this article, we propose a kind of digital cloud service platform architecture for college library, and explore the operation mechanism of the cloud services platform.

Introduction

Cloud computing has the advantages of large scale, virtualization, high reliability, high scalability and cheap etc. Cloud computing platform can integrate dynamic and heterogeneous information resources effectively, provided the services to the user through the Internet. Digital library cloud service platform can be defined as virtual and digital library that concentrates information resources on the Internet and provides services to readers.

The combination of cloud computing technology and mobile communication technology is a new technology trend, and mobile digital library service has brought convenience to users. However, in Chinese colleges and universities, the existing service model also has a lot of limitations, e.g. in terms of user's operation, the response time and network quality of the platform brings some obstacles to the real-time communication between user and the server, and thus affecting the quality of service of digital library; the WAP services are also subject to the existing equipment, data, network and other factors, so cannot achieve the desired speed of service.

Cloud computing can improve the status of mobile digital library services. Taking advantage of the cloud computing technology, it is possible to store huge amounts of data resources in the cloud, and readers can use the network directly in the cloud platform to get their own resources and services, instead of setting up SMS communications or site access with the library server. In this article, we propose a kind of digital cloud service platform architecture for college library, and explore the operation mechanism of the cloud services platform.

Digital Cloud Services Platform Structure

Construction of digital library cloud services platform should fully consider the present construction situation of the hardware and software infrastructure and the library information resources, and aiming at achieving integration and sharing of information resources, relying on infrastructure construction, discipline distribution and user demand characteristics, to expand information sharing channels. Based on cloud computing technology, we design and construct the digital library cloud services platform basic frame, shown as Figure 1. The platform mainly includes infrastructure

services, basic platform services, public service platform appearing in public cloud way, local services platform appearing in private cloud way, and mixed services platform appearing in hybrid cloud way.
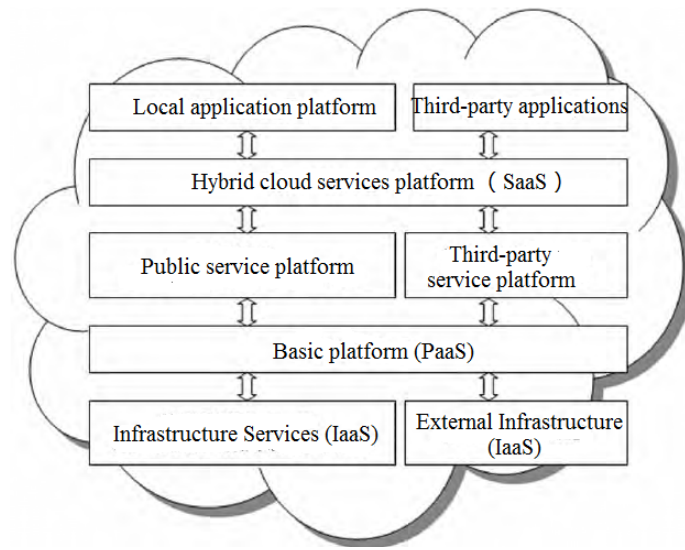

Figure 1. Basic Frame of Digital Library Cloud Services Platform

The digital library platform based on cloud computing is a systematic service platform. Through the virtualization, parallel computing and distributed technology, the platform extends the functionality of hardware devices and software facilities, so as to effectively combine the software and hardware resources of the remote digital libraries with operating platform. The digital library cloud services platform can be divided into three parts: IaaS, PaaS, SaaS. The functional architecture based on the three services model is shown as Figure 2:
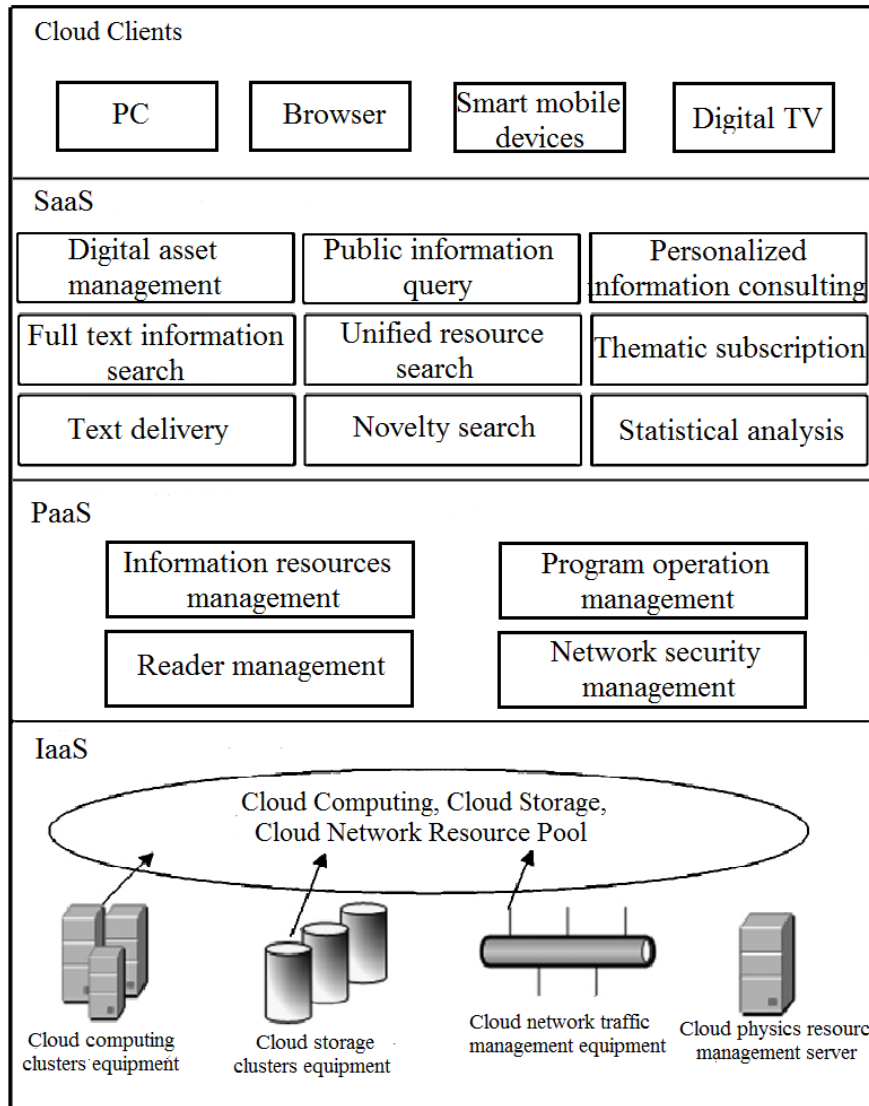
Figure 2. Functional Architecture of Digital Library Cloud Services Platform

IaaS (Infrastructure as a Service) is the foundation for cloud computing digital library to provide cloud services, which is at the bottom of the whole framework, and is the integration of hardware resources and related management functions with virtualization technology. IaaS mainly contains two aspects of content: on the one hand, by the distributed cluster, abstraction and virtualization treatment of the hosts, storage devices, network and other hardware equipment, put them together into a cluster virtualization, to constitute the entire cloud computing and cloud services infrastructure, so that it seems to be a unified entirety, and the users don't need to care about the specific use of the device, but just send the agreed device call instructions to obtain the cloud hardware resources required; on the other hand, based on the infrastructure hardware distributed cluster, abstraction and virtualization treatment, develop the interface service functions that can be called, for data storage management, computing service management, load management and backup management, so that provides dynamic and flexible infrastructure layer services for college digital library.

PaaS (Platform as a Service) is the second layer of cloud service framework of digital library, which is also called management middleware layer. PaaS is responsible for information resources management, program operation management, reader management and network security

management, etc. Among them, information resources management is responsible for balanced use of cloud computing information resource node, and fault monitoring of information resource nodes. Once a node fails, the middleware layer will restore or shield it, and make statistics on the use of resources; program operation management is responsible for the implementation of the tasks submitted by readers or applications, including task deployment and management, program scheduling, program execution, and program feedback management, etc.; reader management is an indispensable content to realize the digital library of cloud computing, including providing user interface, managing and identifying user identity, operation management of reader's program and reader accounting management, etc.; network security management is mainly to protect the security of cloud computing facilities to avoid attacks by hackers, including readers identity verification, access control and virus protection, etc.

SaaS (Software as a Service) is the third layer of cloud service framework of digital library, which is the core of the whole digital library cloud service system. SaaS provides application software and services required for the digital library. By conducting software service (SaaS) applications in coordination with user needs, the digital library provides software or applications to the library and readers in the form of a lease. The core service projects of digital library include book management, digital asset management, public information query, personalized information consulting, full text information search, unified resource search, thematic subscription, text delivery, novelty search, technology assessment and statistical analysis, etc. In addition, the user authorization charging interface module mainly provides the interface support for user management, rights demonstration, platform billing and platform payment.

Cloud clients are the uppermost layer of the entire digital library cloud services framework. It is not only a communication tool with cloud server, but also the reality carrier of the user to use cloud services. The cloud clients can be any devices access to cloud services network, such as browser, smart mobile devices and digital TV, but not limited to the computer.

Digital Cloud Services Platform Operating Mechanism

Digital resources collection mechanism could enable cloud services platform to collect information from each node platform using search methods, instead of concentrating the resources of each node. Through the unified search interface, users are able to retrieve all kinds of information. Cloud services platform is responsible for assigning the query request of users to every node platform, and then conducting acquisition and scheduling on the digital resources, so as to select and integrate information resources of node cloud platform according to users' requirement. This mechanism has been proved to be a good solution to the problem of information storage duplication and lack of information storage space.

Digital resource organization and management mechanism is the core of cloud services platform running process. It can automatically assign workloads, and effectively use the idle computing capacity. To deploy core application software in the cloud service platform such as database virtualization technology, would concentrate the single resource for coordination utilization; correspondingly, deploy slave platforms in other node servers, then the data in node platforms will be managed and dispatched by the cloud service master system. Meanwhile, use data harvesting technique to create a form for the data in node platforms, which can improve the efficiency of the service platform. Through the management of the data, the platform could provide a great deal of valid data, and thus meet the user's personalized requirements.

The digital library cloud service platform is a complex system including many hardware and software facilities and applications. Cloud services platform is to use virtualization technology to

provide users with the operating system and services. User can submit service requests through the operation interface, and then the platform would launch the program to achieve analysis and standardization of the requests, and release the user need to each node service platform. Under the customer service scheduling mechanism, the system will conduct classification and processing on the data required, and publishes the data to the platform, and finally provides information feedback to the user.

With mutual action of the three operation mechanisms, the functions of the digital library cloud service platform have been played.

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