The Design and Implementation of Distributed Cloud Disk and Resource Sharing Platform based on IPv6

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Abstract

At present, most of cloud storage and resource sharing systems are developed under IPv4 network environment. According to existing data fusion and the requirement of teachers and students, this paper utilizes the technical principle and development method related to IPv6, adopts the software structure on the base of modularization and componentization, and BS (Brower/Server) pattern to do development, finally integrates the resources of FTP and PT system based under IPv6 environment, access app by mobile terminal IPv6 has come true. Incorporating distributed cloud storage system into resource sharing cloud platform to realize unified logging in and management between the front and the back-end, to make sure the platform running normally and improve the interaction process with users, providing the theories and method for the similar system development of other academies.

Keywords

Resource Sharing Platform; PT; App; IPv6; Design and Realization.

1. Introduction

About the theory of cloud storage and resource sharing systems and how to design and realize by technology, the scholars from home and abroad have done a lot of research [1-12], but most of the research are built under IPv4 environment, have not integrate cloud storage, PT and FTP to establish resource sharing platform under IPv6 environment. With the rapid development of internet technology and the government's strong support of IPv6 technology, many domestic universities have established their own PT (Private Tracker) resource sharing platform, some of the famous ones are BYR of Beijing University of Post and Telecommunications, sextuple space of Northeastern University, grape PT of Shanghai Jiao Tong University and so on, Cornfield PT of North West Agricultural and Forestry University also has a certain influence. Based on the existing IPv6 environment, this paper integrates existing resources to establish cloud storage and resource sharing platform on the base of IPv6. It makes sure the platform running normally and improves the interaction process with users to provide basis for the popularization and application of this platform under IPv6 environment.

2. The design and realization of distributed cloud storage based on IPv6

With the popularization of computers and intelligent mobile terminals, mass of data are produced by teachers and students in teaching, researching, working and life. In traditional data storage, backup and sharing mode, U disk and mobile HD have hidden dangers, such as hardware fault and virus infection; while, the sharing means such as mailbox and FTP have limitation in convenient degree and cross-

platform aspect. Therefore, reliable storage, rapid and seamless sharing of campus network data have become an issue that needs urgent solutions during the process of university informationization.

Cloud storage has become an effective way of backups to personal users for its low cost and easy moving. Cloud storage has gained wide attention and applied research because of its low cost, high availability and dynamic scalability. Cloud storage provides a network storage space with dynamic extensible capacity to users, and the users could access the internet to upload/download personal document data (such as document, picture, music, video and so on) conveniently and quickly through multi-terminal (PC, mobile device). In literature [3], it mentions that 60 percent data saved in cloud storage data center are superfluous, the repeating data ratio in backups and archival storage system is as high as 80%-90%, and this ratio will continue to increase over time. The literature [2] [4-10] elaborates the fact that large amounts of repeating data in document system, and try to eliminate these repeating data in various ways. The foreign public cloud disk is limited by access speed of foreign website, the user experience is not good. The upload/download speed of domestic public cloud disk is relatively fast, but limited to the tight outlet bandwidth of university campus network, the speed is not guaranteed, users need to pay the net flow and free storage capacities are limited. This paper designs a distributed cloud disk system on the base of Web. To deploy cloud disk system in campus network can make full use of the advantage of high speed campus network (ten gigabit backbone, 100 Mbyte to desktop). It can bring a good user experience of upload and download while meet the teachers and students' storage demands for free high-capacity.

After taking consideration of such factors as functional requirement, cost and software maturity of cloud disk, this paper selects to operate the secondary development and application deployment of domestic open-source cloud disk system miniyun. Miniyun is a web program with open-source PHP and close-source client program. The systematic frame design of cloud disk shown in Figure 1, includes four parts: LVS load balancing layer, Nginx Web clustering layer, MooseFS cloud storage layer and MySQL master-slave clustering layer. LVS load balancing layer uses LVS+Keepalived to request distribution, load balancing and fault detect to Nginx Web server farm. Nginx Web clustering layer is using to deploy miniyun application, and provides web service and communicates with the client. Cloud storage layer is established by MooseFS distributed file system to store the document data in cloud disk system. Database uses MySQL master-slaver structure and separate read and write by MySQL-Proxy. The capacity fo Nginx Web clustering layer, MooseFS cloud storage layer and MySQL master-slave clustering layer can be expanded breadthwise and smoothly according to actual load requirement. It provides clients to terminal devices such as Windows, Android, MacOS and iPad/iPhone 4 which involve all mainstream terminal platforms at present. After the secondary development, it can be applied on a small scale, if deployed it on a large scale, some problems such as high concurrency and mass storage need to be solved.

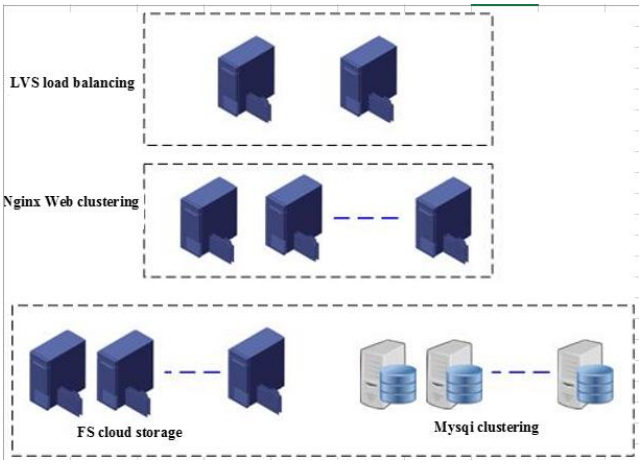

Figure 1. Distributed cloud disk structure based on IPv6

3. PT app design and realization based on IPv6

3.1 IDE Android Studio and LiteOrm frame

Android Studio is an IDE (integrated development environment) which made for Android by Google. It provides compositive Android development tool for development and debugging based on IntelliJ IDEA. On the base of IDEA, Android Studio provides structure based on Gradle, supports refactoring and quick fix of Android exclusively. Its tooltip catches the problems of performance, usability and version compatibility and supports ProGuard and signature applications. Common Android's practical designs and elements are produced based on template guide. It is a strong functional layout editor with fast speed, beautiful UI design, intelligentize and more complete plug-in system and version control system.

LiteOrm is an open-source Android database frame on Github with characteristics of speediness and smallness. It can only use one line code to add, delete and check the data in database, and achieve the persistence and auto-mapping of entity relationship. The main thinking of LiteOrm is that promise is bigger than configuration, so it could use few comments to complete complex data's storage. In most cases, developers are not required to add a non-parameter to each object, pay attention to performance, the achievement of each function bypasses the direct interface provided by Android and close to the bottom. It has characteristics of multi-base support, SD disk storage, flexible query and deletion, automatic identification and abundant API supports.

3.2 System function and frame design

Basis on the analysis of running condition of Cornfield PT, the system mainly includes the following functions: (1). Web access on Cornfield PT; (2). Remote downloading; (3). Log in Cornfield, sign in and obtain the currency of Cornfield; (4). Remote torrent protection.

Based on the needs of system, we design App frame on PT platform shown as Figure 2. The resource sharing platform adopts B/S structure. This paper designs and realizes App for PT part, to realize remote download function through RSS feed; to realize database's visit and establishment through LiteOrm frame; to request and response http through Lite-http frame.

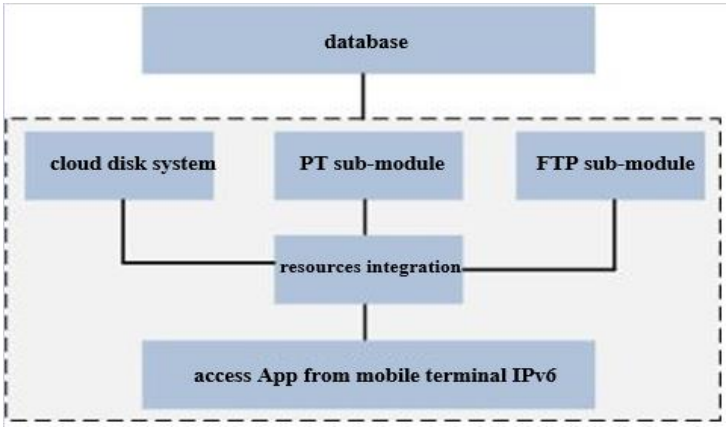

Figure 2. Resource sharing platform frame

3.3 System UI realization

UI design is an important part of Android system software development. Graceful interfacial design could improve users' experience, and then improve system's high praise. Meanwhile, it is easy for users to get their data. The main interface of system realization shown as Figure 3.

3.4 Realization of PT function on mobile phone

RSS based on XML standard, XML standard is the content packaging and post office protocol which is widely used on internet. RSS (Really Simple Syndication) is a format that describes and synchronizes the website content, and it is the most widely used XML application. When we release a RSS document, the information in RSS Feed could be invoked by other websites, and these data are in the XML format,

so the data could be used directly in other terminal and server, which is a format that describes and synchronizes the website content.

Lite-http is a simple, intelligent and flexible http framework library which could build requests and parse responses automatically, is mainly used in Android rapid development. With the help of Lite-http, you just need one line of code to realize http connect perfectly, it fully supports eight base types: GET, POST, PUT, DELETE, HEAD, TRACE, OPTIONGS and PATCH. Lite-http can turn Java Model into http request parameter.

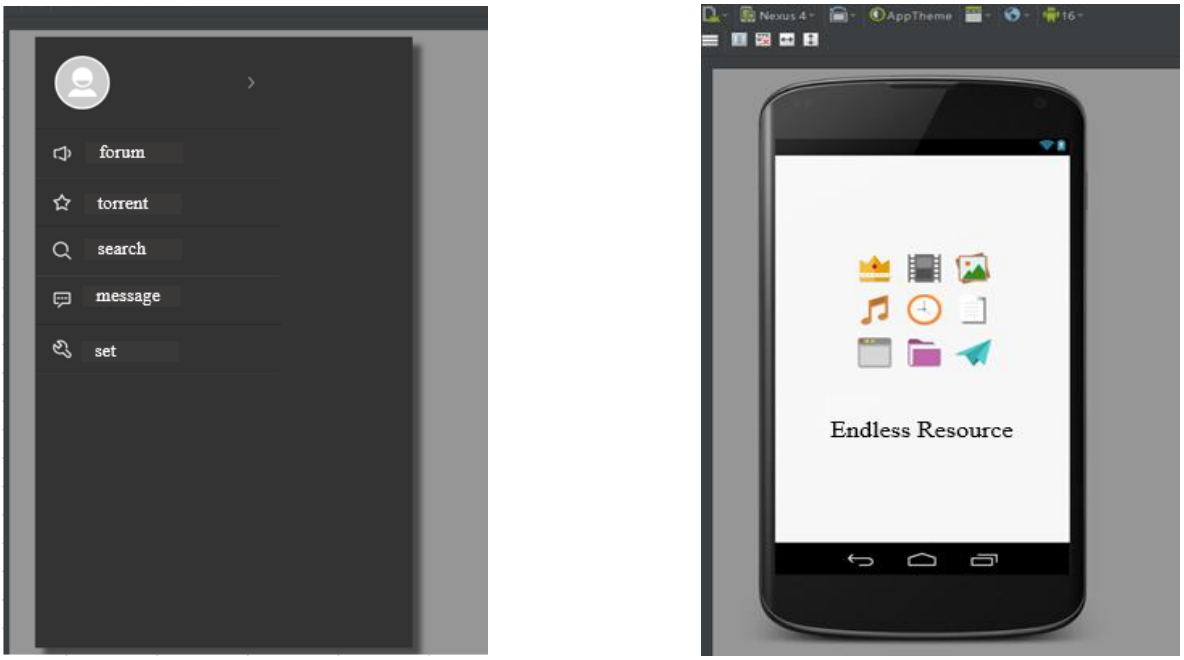

Figure 3. The main interface of App

4. FTP build based on IPv6

The next generation protocol, Internet Protocol version 6 (IPv6), is widely considered to be the future of Internet and cyber world. IPv6 is compatible and collaborative with IPv4, and allows you to upgrade your internet equipment. This paper will tell you how to deploy IPv6 in linux operating system Centos6.5 in order to support FTP service under IPv6 environment. Specific steps are as follows:

(1). Log in as root user, and then open proftpd.conf which is usually located under the proftp installation directory path. In this paper, the server directory is: /data/servers/proftpd/etc. Modify the BOOT PROTO in network configuration file to static option, change UseIPv6's default option from no to yes, add actual used IPv6 address to Default Address option, and delete or note the configure options of IPv4. In this paper, the configurations in experiment are as follows:

Default Address 2001:250:1002::11

UseIPv6 on

(2). Open the ifcfg-eth0 network configuration file as root user, this file is usually located under the user installation directory path: /etc/sysconfig/network-scripts. Modify the BOOTPROTO in network configuration file to static option, set IPv6INIT option to yes, add actual used IPv6 address to IPv6ADDR option and add actual used IPv6 gateway address to GATEWAY6 option, and delete or note the configure options of IPv4. In this paper, the configurations in experiment are as follows:

############IPv6 Configuration ################

DEVICE=eth0

TYPE=Ethernet

HWADDR=54:04:A6:DC:16:DA

BOOTPROTO=static

IPV6INIT=yes
IPV6_AUTOCONF=no
IPV6ADDR=2001:250:1002::11
IPV6PREFIX=64
GATEWAY6=2001:250:1002::1

(3). Save changed configuration file, and then restart the service using the service proftpd restart command. If restart failed, please check the proftpd.conf configuration items.

5. Resource sharing platform integration and realization based on IPv6

PT has met the needs of teachers and students of North West Agricultural and Forestry University, and it can shield the interference or invasion from outside school. To integrate existed resources based on existed PT and ftp application system, plug in to the distributed cloud disk system based on IPv6 to establish the resource sharing platform. The platform is developed based on modularized and componentized software structure and BS (Browser/Server) model. The presentation layer uses WEB mode and HTML5+CSS3 mainstream technology. Accessing app by mobile terminal IPv6 and unified logging in and management between the front and the back-end have come true, function integration and function extension, running under pure IPv6 environment. This can significantly shrink the outlet pressure of campus network and improve users' experience. The system interface of integrated platform shown as Figure 4:

Figure 4. Resource sharing platform interface based on IPv6

6. Conclusion

In conclusion, with the background of the actual requirement of North West Agricultural and Forestry University, through detailed design and optimize, this paper realizes system architecture by component develop method, designs the distribution cloud disk system, deploys the proftp service based on IPv6, integrate existed PT resources, designs and develops Android App for PT part, and establishes the resource sharing platform based on IPv6. The test result indicates that this platform runs stably and easy to use, could meet the resource sharing requirements of some teachers and students based on IPv6 and improve the interaction process with users. All of these will have important significance in IPv6's industrialization and commercialization process and the next-generation internet (IPv6) deployment.

Acknowledagments

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