

Study on Cloud Storage System based on Distributed Storage Systems

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Abstract—As the latest development of the distributed storage technology, Cloud storage is the product of the integration of distributed storage and virtual technologies. Cloud storage is a method that allows you to use storage facilities available on the Internet. Relative to the current Commercial cloud storage file systems, introducing P2P network of interest groups put forward the idea of a P2P model based on cloud storage online backup prototype system, and the prototype system architecture and topology analysis, research and development for the following provide a theoretical basis.

Keywords- cloud computing;; cloud storage; Distributed storage systems prototype system

I. INTRODUCTION

With the development of the network, the explosive growth of information, data, human unprecedented scale, and to a high growth rate. Large-scale data center storage capacity exceeds the limit of the PB, EB and some had even reach the level of these ultra-large-scale data storage and management has become a major challenge. Existing enterprise data centers in the NAS storage, SAN storage, limited by the bandwidth of the first end and processing power, capacity generally limited to a single set of tens to hundreds of TB, The system capacity is small, the quantity of time management and maintenance costs are high; price is extremely expensive; and the lack of effective off-site backup and disaster automated response function can no longer meet the current large-scale data center storage requirements

Therefore, the industry is witnessing several distributed storage systems for large data center storage, a typical representative, such as GFS / Big Table, Amazon S3, Cassandra, Ceph so. The S3 and Cassandra which are based on DHT (Distributed Hash Table) of the storage system, running on low-cost common server; has a high scalability to support large-scale data storage; fast data access; good Cross-data center backup and replication; node failure recovery automatically.

II. RELATED WORK

Research on distributed storage has been done a long time, but the distributed storage network environment suitable for mass file storage target, still have a long way to go. At present, such as data fault-tolerant distributed storage, routing efficiency, trust, security, system expansion, the search

algorithm, access performance, and many other issues to be studied are forced to solve these problems in cloud storage is also still exists. Nearly 2 years as distributed storage, the latest hotspot, the academic research related to cloud storage include: RSA Laboratories of Kevin D. Bowers et al [1] proposed a high reliability, completeness cloud storage model HAIL, and carried out safety and efficiency of the experiment. David Tarrant of University of Southampton, etc. [2] proposed local storage and cloud storage dynamic integration of knowledge base memory model. University of Illinois for Robert L. Grossman and other proposed and implemented a wide area network based on high-computing and storage cloud Sector / Sphere [3] [4]; University of Melbourne for James Broberg, etc. [5][6]design presented MetaCDN, for the integration of different providers of cloud storage services for content creators to provide uniform, high-performance low-cost content distribution storage and distribution services. In addition, Jin Li, etc. [7] for the ERC (Erasure Resilient Code) code stored in the cloud and in the application, verify the RSC (Reed Solomon Code) encoding effectiveness.

Tsinghua University has designed and implemented by the Distributed File System Carrier [8] and data-sharing system Corsair [9] comprised of community-based data sharing and data download services such as public resources, cloud storage platform. [10] were proposed, including a resource pool, distributed file system, the service level agreement (SLA) and the cloud service interface four main parts of a typical cloud storage platform architecture.

Cloud storage is not the nature of memory, but the service. Like cloud, like the WAN and the Internet, cloud storage to the user speaking, not referring to a specific device, but to a large number were composed of storage devices and servers, collection of. Cloud storage users is not using a particular storage device, but the cloud storage system using a data access service. Cloud storage directly to end users to provide data storage services and systems through the application of indirect forms of data access services, network drives, online storage, online backup, online archiving service is only clouding storage directly to storage provided by one of the many forms of service.

III. STORAGE SYSTEM

Cloud storage in the cloud computing base at the role and status is widely recognized by the industry, regardless of the

operating system, service procedures, user application, or huge amounts of data are stored in the storage system. Currently, Amazon, Google, IBM, Microsoft, Sun companies such as cloud computing or cloud computing infrastructure, cloud computing for business solutions currently existing problems, open source organizations and academics have also made a lot of cloud computing system or platform program.

A. IBM cloud platform

In November 2007 IBM launched the Blue Cloud computing platform, that is buy-to-use cloud computing platform [11]. It includes a series of cloud computing products, so the calculation is not limited to the local machine or remote server clusters, but through a distributed architecture, can gain access to the resource structure of the world, making the data center environment like the Internet running [11]. Use of the process, the need for data distribution to multiple nodes in multiple disks in IBM's Blue Cloud computing platform usually using Hadoop [4] of the HDFS (Hadoop Distributed File System). This method will use the internal disk attached to the node, an externally-oriented Distributed File System shared space, and redundancy in the file system level so as to improve reliability. Distributing data processing in the appropriate mode, this approach can greatly improve the overall efficiency of data processing. SAN system, IBM cloud computing platform is another storage architecture options in the blue cloud platform, there are certain embodiment, IBM SAN platforms also provide access to the blue cloud to the platform. Figure 1 indicates of a SAN system structure.

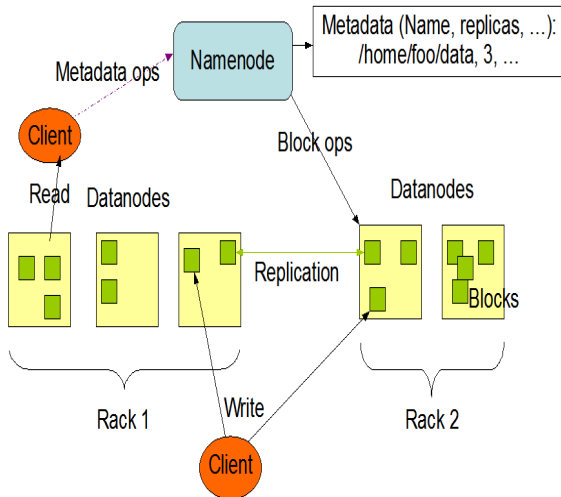


Figure 1 HDFS's master-slave architecture

B. Amazon cloud computing platform architecture

Amazon's cloud computing model follows the tradition of easy to use and built on Amazon's cloud computing company based platform [11]. Elastic Computed Cloud users using the client through SOAP over HTTPS protocol to achieve with the Amazon Elastic Compute Cloud to interact within the instance. Used HTTPS protocol remote connections could be ensure security, prevent the transmission of user data leakage caused the process to ensure the safety of users. From the use of

models, the elastic computing cloud platform for users or developers with a virtual cluster environment, the application allows users to have sufficient flexibility, while reducing cloud computing platform owner's administrative burden.

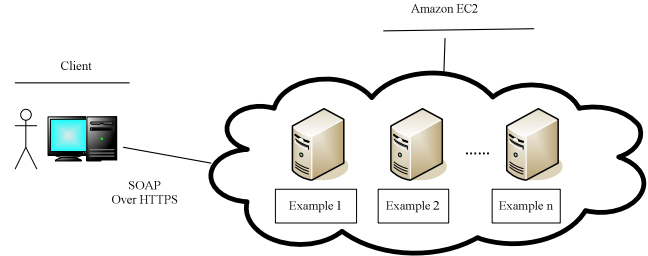


Figure 2 Amazon EC2 Architecture

C. Microsoft Azure

Azure [12] is Microsoft's launch of Microsoft's data centers rely on the cloud services platform, It actually is a public platform composed of a variety of different services, Include Microsoft's cloud services operating system and a set of interfaces for developers to provide services. Azure platform provides services mainly Live Services,. NET services, SQL services, SharePoint services and Dynamics CRM Services. Developers can use these services as the basic components to build your own cloud applications, can be easily created by Microsoft's data centers, host, manage, expand its Web and non-Web applications. Azure platform also supports multiple Internet protocols, including HTTP, REST, SOAP and XML, to provide users with an open, interoperable standards and to the environment. Azure The difference is: Azure platform independent accept to provide Azure hosting service, it is to run on local workstations and enterprise servers and design. This makes the test application becomes easy to support both enterprise applications running on the company's internal network can be run on the external environment.

IV. CLOUD STORAGE MODEL

Construction of cloud in the DHT network storage systems to the effective use of network bandwidth among nodes, storage space and data resources, the system has good scalability, data availability and reliability. The goal of cloud storage system is an effective organizational system nodes to store data. Therefore, the system's topology and storage of data availability and reliability, and cloud storage nodes and data storage backup organization has a great relationship.

A. The group's ideological interest

In human society, people are not existing in isolation. Because people with social attributes, he always forming a group, these groups form a human society further. Abstract speaking, this process is a process from disorder to order, but also a relationship of trust among people formation process. Similarly, studies have shown that: in the DHT network, there is interest in community-based structures [13], that is, file storage and sharing applications, resources, similar to the high number of nodes will form the community, focused on the connection among nodes within the community and fewer connections among communities.

Interest groups: According to the node of interest, hobbies, etc. established by the node set, group members are equal. Inspired by this idea, the interest group is introduced into the cloud storage system which, in view of the current major application of cloud storage to store the backup line among the nodes involved in the "interests" are grouped, according to the following for their data storage and backup. Will have a similar "interests" of the node to the same interest groups gathered inside advantages: (1) can not only simplify the calculation of the node trust policy, but also to some extent reduce the performance overhead; (2) ensure the backup data high reliability and privacy; (3) centralized mass data storage solution brings the cross-regional centralized management, concurrent access issues. (4) cloud storage system optimization and improvement of the performance of the routing algorithm so that nodes can more quicker find can the resources needed. (5) help after the data stored on the cloud to the re-operation.

B. Cloud Storage System Architecture

P2P network reference group thinking, cloud storage system can be abstracted out of a several of different "interests" groups, their topology is shown below.

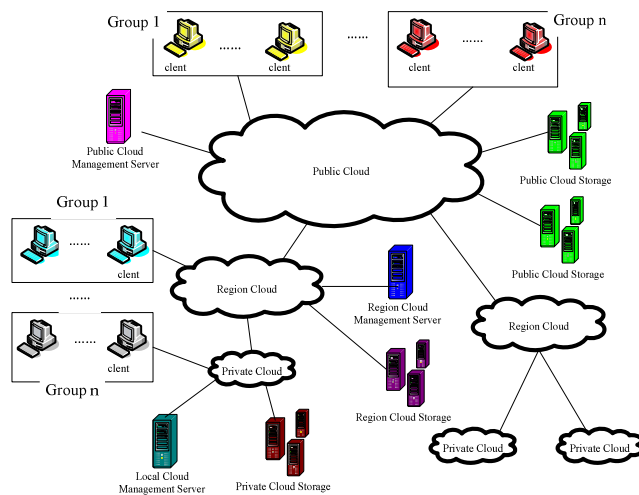


Figure 3 Cloud Storage topological structure diagram

Store in the cloud-line backup service consists of two levels: the upper level of public cloud coverage to all backups WAN clients can gain access to areas; lower for the private clouds, either by a smaller geographical area may also be in accordance with the specific entity division, such as enterprise, organization or school, can run on wide area network or LAN, the user is limited persons within the region, the service node, including local manager, private cloud storage node.

Online backup service system topology can be described as, to cloud as the root of public, private clouds for the branch node, the clouds formed a backup tree, each node has its own backup management servers and storage nodes, of the respective region of the backup scheduling and data access. Cloud physics associated public and private clouds form between the father and son relationship, in which child node the parent node can be seen as a special customer.

New user registration, the first access to the system management server (responsible for all user management), defined by the management server in accordance with the allocation tactics, matching the user's interests and hobbies feature information, assign users to the appropriate backup cloud node, the management by the backup cloud user information server maintenance. After successful registration, each time a client request a backup service, just log in and clouds in the backup node, and the corresponding backup manager, storage nodes three communications, backup and recovery service.

In accordance with the principle of access to nearby, closer location, entity data transfers between the higher efficiency, lower costs. In this hierarchical structure, making backup service system with multiple scheduling servers and storage servers to create a more orderly hierarchy, To better serve the different regions of the multi-backup client.

C. Cloud Storage System Software Architecture

Cloud storage services software includes three modules: client, management server and storage server, the software as shown:

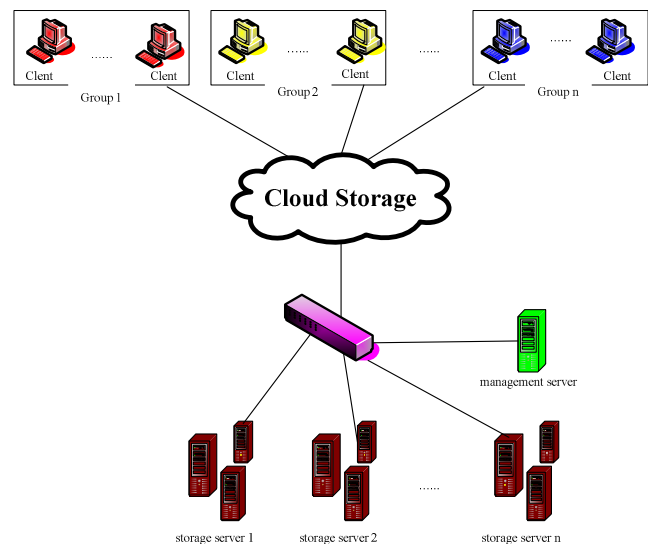


Figure 4 Cloud Storage Software frame diagram

1) Client

Client software distributed in different geographic locations in need of backup host, which can be any Internet enabled device. Client and management server communication between the main data backup or recovery operations preparatory work before the operation process after the completion of all requests and state feedback; between the client and the storage server is simply to complete the requested backup and data recovery process.

2) Management Server

Management Server is the service system monitoring and management center, and storage server for user management, task scheduling, status monitoring. When a client login system, by the management server authentication to confirm whether the legitimate user. Regular scanning task queue, when the

arrival of the task execution time, then start a service thread, depending on the load balancing strategy, the establishment of the client and the connection between the storage server and monitor the implementation status of the task; also monitor the status of each storage server, on a regular basis spatial order, debris recovery and data migration to maintain metadata information. Management server through the logical file and physical storage mapping between data blocks to achieve the correct backup data recovery.

3) Storage Server

The lawful management server certifies storages server node storage medium. In the management server's management, real-time response from the client's request, to receive the backup data, data storage management and is responsible for sending data to the appropriate client recovery. To support the efficient running of backup and recovery operations need to store server-side design reasonable strategies for tiered storage and data migration. Meanwhile, the system supports multiple storage servers, and multiple files within a single server to achieve highly scalable storage side, the way to meet the service requirements of mass data storage.

V. CONCLUSIONS AND FUTURE WORK

As a new mode of Internet applications, cloud storage will become the people's access to service and information-led approach. Cloud storage means that storage can be used as a service to users through the network. Relative to the current variety of commercial cloud storage systems, the introduction of interest group DHT network idea, put forward cloud storage platform online storage backup service concept prototype system.

Evaluation of cloud storage systems, including the general standards of availability, reliability and durability and so on. Although this article was designed based on DHT network cloud storage prototype, but due to experimental conditions and environmental constraints of the work is not perfect. Discussion groups did not develop the appropriate systems and to do simulation, with the current commercial cloud storage systems, there are still some distance and comparability. Therefore, the next step is to continue to improve the design of the prototype system and develop appropriate systems, while

the corresponding simulation to do the availability of the system to do test.

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