Volume 5, Issue 5, May 2015 ISSN: 2277 128X
International Journal of Advanced Research in Computer Science and Software Engineering
Research Paper
Available online at: www.ijarcsse.com

Cloud Computing based Disaster Recovery: An Introduction

Ashish Ranjan* M.Tech, CSE, NIT Patna, India
Sudhir Kumar Gupta Keshav Mahavidyalaya, Univ of Delhi India
Gagandeep Sharma Aryabhatta College, Univ of Delhi India

Abstract— Disaster never comes with prior warning. Business model in the new era has changed. The security and availability of business data has been become most important requirement in this time. For solving the problem related to business database services like storage, security, stability, load, scalability and many other issues cloud based database platform were used. Services related to data were put on the cloud and the powerful operating systems and platform were used to process the data. This survey paper describe the different methods and architecture of cloud storage and present the disaster recovery based on the cloud computing.

Keywords— Cloud Computing; Disaster Recovery; Data Migration; Cloud Storage; Cloud Storage Services.

I. INTRODUCTION

Cloud computing is defined as the delivery of computing services over the Internet. The services provided by cloud allow individuals and businesses to use software and hardware that are managed by third parties online from remote locations. A new business model has been evolved with the development of cloud computing. The main reason behind turning to the cloud by enterprises is to enrease reliablities and protecting business data. In this system, the computing tasks are distributed to a large number of computers, so that all applications can access the calculation capability, storage space and software services. The service providers use cloud computing technology to deal with large number of information in seconds. Cloud computing system provides a powerful network service as a super computer. Data calculation and processing are the main aim of cloud computing. The independent and personal computing which run on PC or a single server would migrate to a cloud in which there are a large number of servers. The cloud system deal with the user's request and output the result.

Cloud storage is a new concept extended and developed from the concept of cloud computing. While large amounts of data are stored and managed, a large number of storage devices must be configured in cloud computing system. The cloud computing system to transform itself into a cloud storage system and the cloud storage is integral part of cloud computing system which aims is to manage data and storage. Compared with the conventional storage device, cloud storage is not just a hardware cloud, but the network equipment, the storage equipment, servers, applications, public access interfaces, and the client programs. Cloud storage provided the storage service, which stored local data in the online storage space provided by storage service provider (SSP) through network. Users don't need to build their own data centers, but apply the SSP for the storage services. Cloud storage would avoid the duplication of storage platforms and save the expensive of software and hardware infrastructure.

II. CLOUD STORAGE SYSTEM

In order to provide data storage services, cloud storage employs software to interconnect and facilitate collaboration between different types of storage devices. Compared to traditional storage methods, cloud storage poses new challenges in data security, reliability and management. Cloud storage uses application software to make numbers of different types storage devices work together and provide data storage and business functions. While we use cloud storage, we need not know the details of the storage devices as we use a single independent storage, which including what model the storage devices are, what the interface and transmission protocol are, how many number of disks and what type, how much capacity, what kind of connection cable between the storage and server are using. User also not required to build their corresponding data backup systems or disaster recovery systems for data security and business continuity as it is being taken care by cloud computing itself. In addition, user need not to care about storage equipment condition monitoring, maintenance, software and hardware updates and upgrades. All the devices are completely transparent to the user in cloud storage system. any authorized user can connect with cloud storage through a cable and access data on cloud storage in any place.

Cloud storage system architecture model consists of four layers, shown in Figure 1

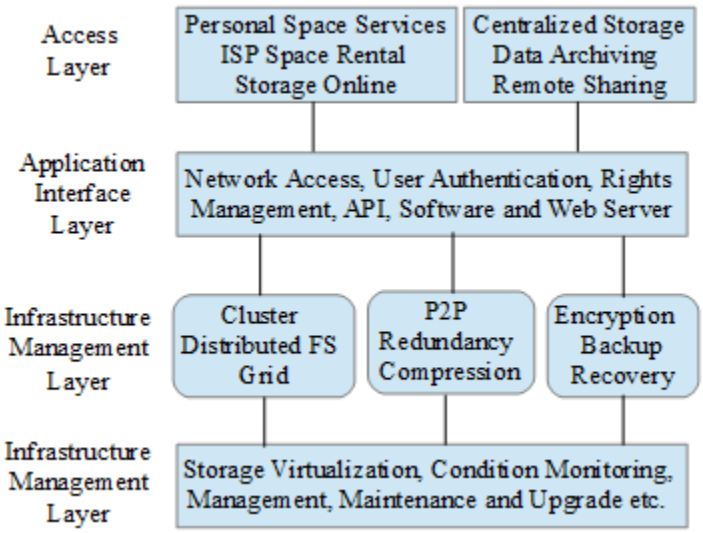

Fig. 1 The architecture model of cloud storage system

A. STORAGE LAYER

Storage layer is the most basic part of the cloud storage. Storage devices can be the Fibre Channel (FC) storage devices, can be the IP storage devices such as NAS and iSCSI, and can also be the DAS storage devices such as SCSI or SAS. There are a huge number of storage devices in cloud. These devices distribute in many different regions, and are connected with each other through the wide area network (WAN), Internet, or fibre channel. There is a unified storage device management system above storage devices, which can realize the virtual storage management, multi-link redundancy management, hardware equipment condition monitoring, and fault maintenance.

B. INFRASTRUCTURE MANAGEMENT LAYER

Infrastructure management layer is the core part of the cloud, and also is the most difficult part in cloud storage. Infrastructure management layer uses the clusters, distributed file systems and grid computing technology to realize the cooperation between multiple storage devices in cloud, make a number of storage devices provide the same service, and provide more powerful data access performance. The content distribution systems and data storage encryption technology can ensure the data in cloud will not be accessed by unauthorized users. At the same time, a variety of data backup and disaster recovery measures can guarantee that the data stored in cloud will not be lost. These technologies can ensure the security and stability of cloud storage.

C. APPLICATION INTERFACE LAYER

Application interface layer is the most flexible part of the cloud storage. Different cloud storage provider can develop different application interfaces and provide different application services based on actual business type. For example, video surveillance application platforms, IPTV and video-on-demand application platform, network hard drive reference platform, and remote data backup application platforms, etc.

D. ACCESS LAYER

Any authorized user can login the cloud storage system via a standard public application interface to get cloud storage service. Different cloud storage provider provides different access types and access methods.

A major function of cloud storage is to share data. Common file system only allows visiting data exclusively, but commercial applications require sharing data between the operating system and the "data warehouse". Different copies of data on different server with different operating system should overcome the I/O access conflicts when data were share and stored in parallel memory. This requires a good lock algorithm, multi-level locking mechanism and Cache consistency techniques to ensure the consistency of the data. Another major goal of cloud storage is to achieve device interoperability. Cloud storage can simplify the system management and user actions in a heterogeneous storage environment composed of different types of operating systems and different devices system and achieve real storage equipment transparency

III. DISASTER RECOVERY OF CLOUD STORAGE

While applications and data services are transparent, malicious attacks must be avoided. It is important and difficult to ensure data security in cloud storage system. It is necessary to establish fault tolerant function in less cost for cloud storage. The fault tolerant function can overcome single point failure and avoid data loss. At the same time, there must be fault-tolerant backup system, which can ensure that data have a reliable backup if they are lost due to force majeure[4].

In order to satisfied the continuity of application and the security of data, the structure of disaster recovery system is "distributed computing, centralized storage". According to different requirements, disaster recovery has three levels.

They are data-level disaster recovery, system-level disaster recovery, and application-level disaster recovery. Data-level disaster recovery is the most basic and it can ensure the security of the application data. System-level disaster recovery disaster has further requests for operating system of application server, making disaster recovery time can be as short as possible. System-level disaster recovery requests real-time by which users could not feel that any disaster occurred.

A typical architecture of disaster recovery system is shown in Figure 2

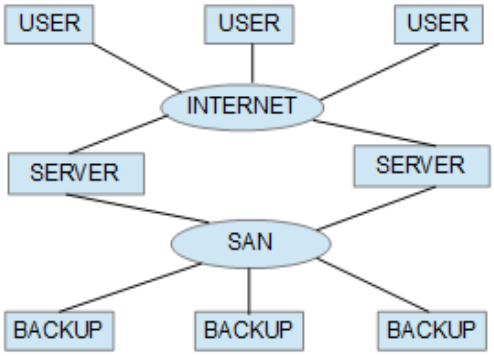

Fig. 2 The typical architecture of disaster recovery system

The greatest feature of this system is to use the Storage Area Network (SAN) to support the application data access and backup. SAN is constituted by a number of high-performance routing devices, and its robustness is very strong. SAN provide a redundant links for the application server to access the file server and to backup data. SAN as a large, stable data transmission network requires a number of high-performance routing equipment to build and the hardware cost is relatively high. Because SAN only provides application data access and backup, to achieve the response process cost only very little time, it is need to design their own associated routing protocols. One solution is to hire ISP's lines, but the SAN network and the ISP's network is not homogeneous. In addition, the bandwidth of ISP's network would be restricted, so it is difficult to achieve the theoretical various indicators.

From a technical development trend, the cloud storage architecture has the excellence of high reliability, high performance, and easy to expand, etc., the online backup service based on it can adapt to Web 2.0 requirements. The online backup service cloud-storage-based can provide dynamic scheduling, standardized access interface, and dynamic memory map management. Cloud storage is becoming the preferred online backup service programs. Users connect to the cloud storage pool by Intranet (such as SAN solution) belonging to the concept of private cloud storage. Private cloud storage is usually established behind the firewall of a company. It is need to use all of the authorized hardware and software, and all the enterprise data are stored in it.

According to SNIA standards of the network storage industry, Disaster recovery must be equipped with at least three different geographical locations. If an enterprise private cloud storage is equipped with all of the disaster recovery and redundant backup systems, then the private cloud should not be seen as a cloud in the strict sense, because it is not thorough in rationalization of resources reform and still has the characters of heavy local configuration, high cost, lack of flexibility and other typical properties of non-cloud computing. More reasonable and more thorough approach is to let private clouds share a common cloud storage service. This shared public cloud storage services will be placed in many of the private clouds, and it can be called "inter-private cloud storage". It not only offers for enterprise private cloud with specialized storage services of disaster redundant backup, but also for the cloud computing users with convenient and efficient mobile service.

Figure 3 shows the mode of disaster recovery system.

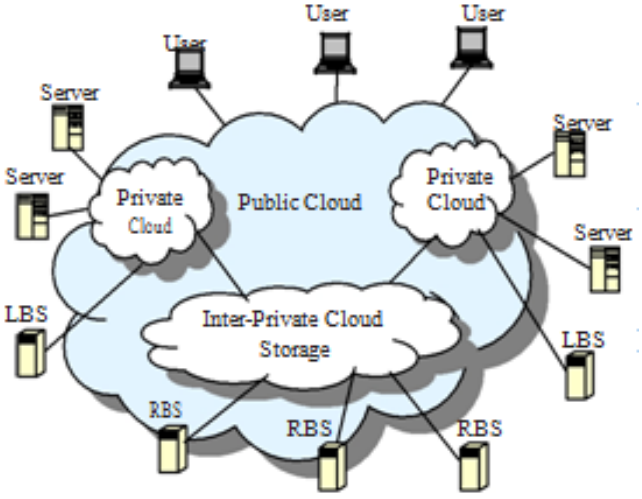

Fig. 3 The model of disaster recovery system.

Applications data of the system are stored in server. All servers have some backup servers. The backup servers and master server can be distributed in different cities. The backup server includes the local backup server (LBS) and the remote backup server (RBS). After the data are stored in LBS, data integration can be down in a leisure time, including redundant data delete, disk compression and finishing work. Remote backup stage is limited by the network connection ability of the cloud. The upload of GB, PB magnitude of data between enterprises and cloud storage is a great challenge. Therefore, in the initial remote backup, the method of physical transfer can be used and the temporary line from cloud storage node to business users can also be provided to move a large amount of data into the cloud.

After the initial backup, in data backup daily, incremental backup approach can be used to reduce pressure on network bandwidth and improve speed of data backup. To reduce the data traffic is also an important means to enhance the service experience. In the case of using a dedicated client, compression and encryption can be done before the data backup to replace the SSL encryption during transmission and reduce transmission costs.

Backup service can not only support the application integration, but also satisfy the requirements of magnanimity, concurrent and common application interface. In the hardware architecture, inter-private cloud storage does not require high-speed data processing in real time, so it is not need very high-end storage technologies (such as the Fibre Channel attached disk array), and the Iscsi channel disk array is enough. However, in software architecture, the inter-private cloud storage requires a high intelligence, policy-based SaaS service standards and information management functions. In particular, it is important to achieve a strong separation and protection technology of security data.

IV. CONCLUSIONS

With the transformation of domestic ISP new requires were proposed, including content integration, cross-boundary storage, magnanimity, and centralized storage. Business diversification focused on the needs of storage shared, and especially several terminal expansions were dependent on storage. For businesses with limited resources, cloud storage appears to be a good solution. Cloud storage is not refer to a specific device, but to aggregates composed of a great many of storage device and server. Users use a data access service of the cloud storage system. Inter-private cloud storage provided users with a value-added storage services. To deploy the disaster recovery and other applications in inter-private cloud storage can achieve a true cloud computing.

REFERENCES

[1] K. Keeton, D. Beyer, E. Brau, A. Merchant. "On the Road to Recovery: Restoring Data after Disaster". Proceedings of the 1st ACM SIGOPS/EuroSys 06, European Conference on Computer Systems, ISBN:1-59593-322-0, 2006.

[2] T. Wood, E. Cecchet, K.K. Ramakrishna "*Disaster Recovery as a cloud service: Economic Benefits &deployment challenges*" university of Massachusetts AT&T LABS – 2nd USENIX conference on Hot topics in cloud computing Boston Year of Publication: 2010

[3] R. Chow, P. Golle, M. Jakobsoon "*Controlling data in cloud: outsourcing computation without outsourcing control*" Fujitsu Laboratories of America ISBN: 978-1-60558-784-4 doi>10.1145/1655008.1655020

[4] G. Zang, L. Chiu "*Adaptive Data Migration in Multi-tiered storage based cloud envoirnment*"Cloud Computing (CLOUD), 2010 IEEE 3rd International Conference On page(s): 148 - 155 Print ISBN: 978-1-4244-8207-8, Date: 5-10 July 2010

[5] ARMBRUST M, FOX A, GRIFFITH R, et al. "Above the Clouds: A Berkeley View of Cloud Computing" [R]. Berkeley, CA, USA: University of California, 2009.

[6] Dai Yuanshun. "The Brief Review of Cloud Computing Technologies". *Information and Communications Technologies*. 2010.2,pp 29-35.

[7] ZHOU Ke, WANG Hua, and LI Chunhua. "Cloud Storage Technology and Its Application", *ZTE Communications*, 2010.16(4),pp 24-27.

[8] QU Ming-cheng, WU Xiang-hu,; LIAO Ming-hong, et al. "A Disaster-Tolerant Storage Model and a Low Data Failure Model for Data Grid". *Acta Electronica Sinica*. 2010.38(2),pp 315-320.

[9] G. Zhang, L. Chiu, Ling Liu "Adoptive Data Migration in Multi-tiered Storage Based Cloud Environment" *CLOUD '10 IEEE 3rd International Conference in Cloud Computing* ISBN: 978-0-769541303 doi>10.1109/ CLOUD. 2010.60; Year-2010.

[10] W. Hoe, I - Len Yen "Dynamic service and data migration in clouds" *Computer Software and Applications Conference, 2009. COMPSAC '09. 33rd Annual IEEE International* ISBN: 978-0-7695-3726-9 doi> 10.1109/COMPSAC.2009.127

[11] A. Greenberg, J. Hamilton, D. A. Maltz, and P. Patel, Cost of a cloud: Research problems in data center networks. In ACM SIGCOMMComputer Communications Review, Feb 2009.

[12] K. Keeton, C. Santos, D. Beyer, J. Chase, and J. Wilkes. Designing for Disasters. Conference On File And Storage Technologies,2004.

