Cloud Computing Based Disaster Recovery

1.Anjani Kumar Singha

Department of Computer Science and Engineering, Gurukula Kangri Vishwavidyalaya Haridwar,

2.Anshu Singla

Department of Computer Science,Jamia Millia Islamia, New Delhi

3.Sudhir Kumar Gupta,

Guru Jambheshwar University of science & Technology,

Abstract— Disaster recovery is a persistent problem in IT platforms. This problem is more crucial in cloud computing,because Cloud Service Providers (CSPs) have to provide the services to their customers even if the data center is down, due to a disaster. In the past few years, researchers have shown interest to disaster recovery using cloud computing, and a considerable amount of literature has been published in this area. However, to the best of our knowledge, there is a lack of precise survey for detailed analysis of cloud-based disaster recovery. To fill this gap,this paper provides an extensive survey of disaster recovery concepts and research in the cloud environments.We present different taxonomy of disaster recovery mechanisms, main challenges and proposed solutions. We also describe the cloud-based disaster recovery platforms and identify open issues related to disaster recovery.

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

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.

CLOUD STORAGE SYSTEM:is a cloud computing model in which data is stored on remote servers accessed from the Internet, or "cloud." It is maintained, operated and managed by a cloud storage service provider on a storage servers that are built on virtualization techniques

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

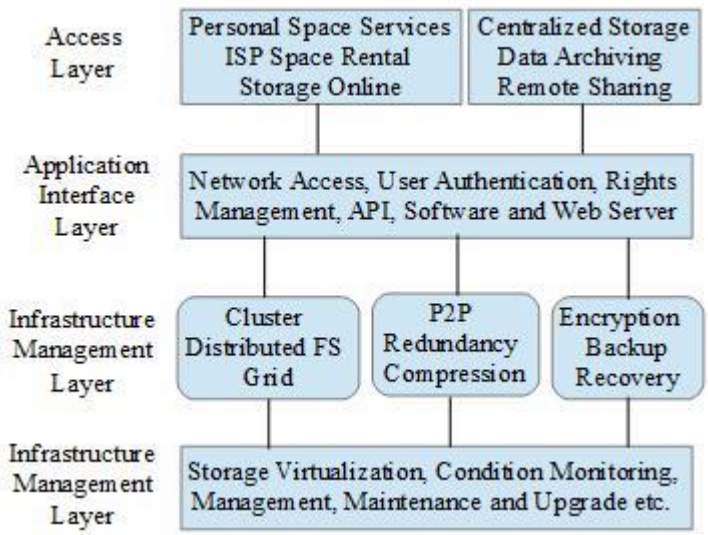


Fig. 1 The architecture model of cloud storage system

A. STORAGE LAYER:*There are hundreds of cloud storage providers on the web and their numbers seem to increase every day. Not only are there a lot of companies competing to provide storage, but also the amount of storage each company offers to clients seems to grow regularly.*

You're probably familiar with several providers of cloud storage services, though you might not think of them in that way. Here are a few well-known companies that offer some form of cloud storage:

B.INFRASTRUCTURE MANAGEMENT LAYER :

is taking the physical hardware and going completely virtual (e.g. all servers, networks, storage, and system management all existing in the cloud). This is the equivalent to infrastructure and hardware in the traditional (non-cloud computing) method running in the cloud. In other words, businesses pay a fee (monthly or annually) to run virtual servers, networks, storage from the cloud. This will mitigate the need for a data center, heating, cooling, and maintaining hardware at the local level.

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.

ACCESS LAYER :

Cloud computing is made up of a variety of layered elements, starting at the most basic physical layer of storage and server infrastructure and working up through the application and network layers. The cloud can be further divided into different implementation models based on whether it's created internally, outsourced or a combination of the two.

DISASTER RECOVERY OF CLOUD STORAGE:

Cloud computing, based on virtualization, takes a very different approach to disaster recovery. With virtualization, the entire server, including the operating system, applications, patches and data is encapsulated into a single software bundle or virtual server. This entire virtual server can be copied or backed up to an offsite data center and spun up on a virtual host in a matter of minutes.

Since the virtual server is hardware independent, the operating system, applications, patches and data can be safely and accurately transferred from one data center to a second data center without the burden of reloading each component of the server. This can dramatically reduce recovery times compared to conventional (non-virtualized) disaster recovery approaches where servers need to be loaded with the OS and application software and patched to the last configuration used in production before the data can be restored.

The cloud shifts the disaster recovery tradeoff curve to the left, as shown below. With cloud computing (as represented by the red arrow), disaster recovery becomes much more cost-effective with significantly faster recovery times.

In order to satisfied the continuity of application and the security of data, the structure of disaster recovery system is as follows.

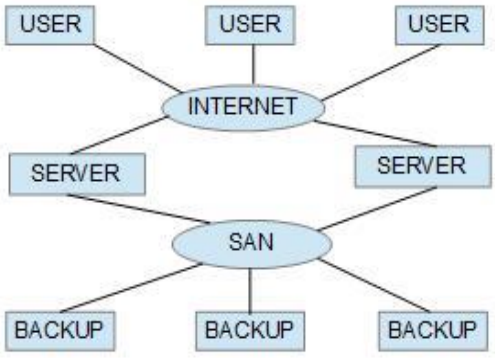


Fig. 2 The typical architecture of disaster recovery system

When introduced with the cost-effectiveness of online backup between data centers, tape backup no longer makes sense in the cloud. The cost-effectiveness and recovery speed of online, offsite backup makes it difficult to justify tape backup.

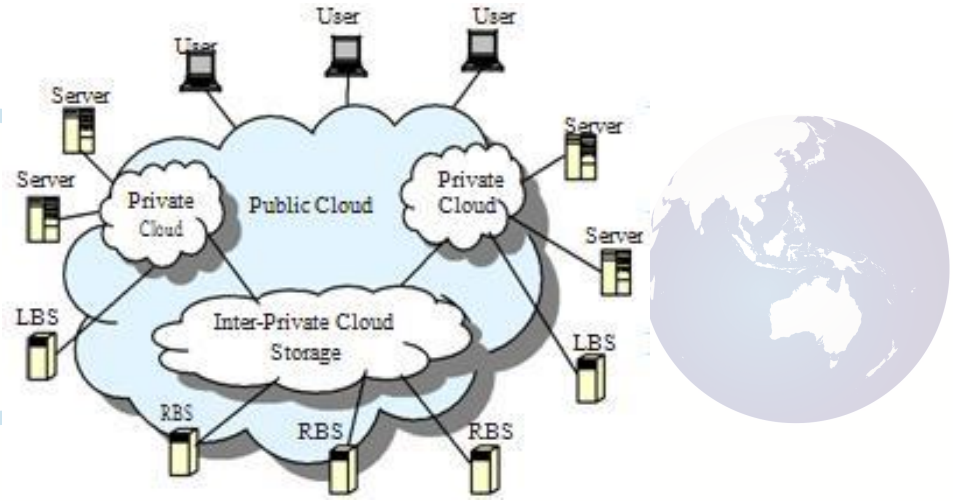
The cloud makes cold site disaster recovery antiquated. With cloud computing, warm site disaster recovery becomes a very cost-effective option where backups of critical servers can be spun up in minutes on a shared or private cloud host platform.

With SAN-to-SAN replication between sites, hot site DR with very short recovery times also becomes a much more attractive, cost-effective option. This is a capability that was rarely delivered with conventional DR systems due to the cost and testing challenges. One of the most exciting capabilities of disaster recovery in the cloud is the ability to deliver multi-site availability. SAN replication not only provides rapid failover to the disaster recovery site, but also the capability to return to the production site when the DR test or disaster event is over.

One of the added benefits of disaster recovery with cloud computing is the ability to finely tune the costs and performance for the DR platform. Applications and servers that are deemed less critical in a disaster can be tuned down with less resources, while assuring that the most critical applications get the resources they need to keep the business running through the disaster.

Critical Path in Disaster Recovery – Networking

With the sea change in IT disaster recovery delivered by cloud computing, network replication becomes the critical path. With fast server recovery at an offsite data center, the critical path for a disaster recovery operation is replicating the production network at the DR site including IP address mapping, firewall rules & VLAN configuration.Smart data center operators are providing full disaster recovery services that not only replicate the servers between data centers, but also replicate the entire network configuration in a way that recovers the network as quickly as the backed up cloud servers.



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.

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