Brief study on Cloud Storage

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ABSTRACT: This paper mainly proposes a general overview about one of the latest technological point which is about theCloud Storage system, that is it mainly discusses about the storage options, needs, services and key technologies, etc. Cloud Storage, it is one of the novel storage service mode in which the service providers supply storage capacities and data storage services through the internet to the client in the meanwhile the clientsneed not know the detailed, lowered structure and mechanisms of it. The Cloud Storage architecture is basically a layered cooperative andthe main idea behind the Cloud Storage is that, the information can be accessed over the internet without having any exhaustive familiarity of the communication which is used to enable it. The major services existing in the Cloud Computing is the Cloud Storage. With this Cloud Storage, data can be stored on multiple third-party servers. With the increase in size of the data every day, there is a need to handle, manage and mainly to store data &this is one ofthe major problems faced by the people or an organization. This paper specifies about various approaches in storing data in cloud. So, in this paper an overall viewpoint to Cloud Storage system is illustrated.

I. INTRODUCTION

Cloud Storage is one of the service models in which data is transmitted and stored on remote storage systems, where it is maintained, managed, backed up and made available to users over a network (typically the internet). Users generally pay for their cloud data storage on a per-consumption, monthly rate. Although the per-gigabyte cost has been radically driven down, the cloud storage providers have added operating expenses that can make the technology considerably & more expensive to use. The security of cloud storage services continues to be a concern among users. Service providers have tried to allay those fears by enhancing their security capabilities by incorporating data encryption, multi-factor authentication and improved physical security into their services. Cloud Storage services may be accessed through a cloud computing service, a web service Application Programming Interface (API) or by applications that utilize the API, such as cloud desktop storage, a cloud storage gateway or Web-based content management systems.

Cloud computing is a hot topic in the field of research and applications. At present, there has been a lot of attention on cloud security and storage. Two areas in the field of cloud storage are worth mentioning. First, it is the lower layer of the cloud infrastructure which supports the functions of other layers above it. Second, through the cloud infrastructure and utilization of virtualization and distributed computing techniques, resources from server clusters are made available to enhance the data redundancy factor and efficiency for document access.

II. WHY WE NEED CLOUD STORAGE?

As we all known disk storage is one of the largest expenditures in IT projects. Computer World estimates that storage is responsible for almost 30% of capital expenditures as the average growth of data approaches close to 50% annually in most enterprise. Amid this milieu, there is a strong concern that enterprise will drown in the expense of storing data, especially unstructured data. To meet this need, cloud storage has started to become popular in recent years. Cloud Storage is a new concept come into being simultaneously with cloud computing, virtualized and high scalable storage resource pool. Cloud user's access to cloud computing services based on the cloud storage resources pool, but not all storage part can be separated in cloud computing. Cloud Storage

means that storage can be provided as a service over the network to the user. User can use storage pass through a number of ways, and pay by the use of time, space or a combination of both. Obviously, such statement is not tightly defined in this new concept of cloud storage. In addition, the relationship between the concepts of Cloud Storage, Storage as a Service, Cloud-Based Storage should be cleared.

1. Optimize your cooperation

Cloud drives is a perfect instrument for immediate data exchange. The option to give access to multiple people makes this service a perfect tool for both distant and in-house work. People have a need to transfer each other information every day. For instance, if you work as a freelancer, you can send files to your supervisor faster than via email. Usually offices create a local network to provide the connection between all workers. The creation of local network requires a long work of system administrator. Also, some companies create a corporate email to spread necessary information. However, people can get lost in heaps of messages to find a certain file.

2.Create backup for your private files

Usually, when PC or smartphone breaks down, firstly owners of these devices suffer because of wasted money, and then because of lost data. In the previous paragraph I have emphasized on data important for work, now I want to dwell upon private files, such as personal photos or videos. It is true that technical devices can get broken quite easily. And the number of phone pocketing is too immense and impressive to say it aloud.
In fact, I have witnessed for too many times such picture: a girl has lost her phone and memorable photos with them. I completely agree the loss of private content can really make your heart broken.

3.Protect your work from being wasted

Every intellectual work is precious. But in a digital world, it can be destroyed in a few moments. There are many occurrences when students google "help me write an essay" in search entry because they have not saved their own file with homework and spend time for nothing. People are aware of all unexpected incidents that may happen with their PC during the work, but they often forget to initiate measures to prevent themselves from force majeure. The electricity can crash in the area you live. As a result, your computer will be switched off and the file with your tasks will be not saved. You will have to start work from thebeginning under the risk of new voltage frisk.

4.Get more space for less money

A fee for unlimited storage in the cloud is cheaper than buying and maintaining lots of hard drive storage space. People still buy hard drives to multiple levels of storage in their homes and offices. But any physical device you can drop because of different reasons. The most stupid way is to spill coffee on and ruin gigabytes of data.

In the past nearly ten years, the academia and business put forward similar "Cloud computing" concept and mode in succession, such as "Grid Computing", "On demand", "Utility Computing", "Internet Computing", "Software as a service", "Platform as a service" and other, in order to achieve the target or to make full use of network computing and storage resources, wide range of cooperation and resources sharing, high efficiency and low cost in computing, but the concept of "Cloud computing" formally advanced recently in 2 years. Because of its clear commercial pattern, Cloud computing has become the widespread concern and be generally recognized in both industrial and academic circles, as one of the ten most popular IT technology in 2009. According to (International Data Corporation) IDC, the global market size of Cloud Computing is expected to be increased from 16 billion dollars in 2008 to 42 billion US dollars in 2012, and the proportion of total investment is expected to rise from 4.2% to 8.5%. Moreover, according to forecasts, in 2012, the input of Cloud Computing will take up 25% of the annual increase of IT investment, and 30% in 2013.

III. HISTORY OF CLOUD STORAGE

Cloud Computing is believed to have been invented by Joseph Carl Robnett Licklider in the 1960s with his work on ARPANET, to connect people and data from anywhere at any time.
In 1983, CompuServe offered its consumer users a small amount of disk space that could be used to store any files they chose to upload.

In 1994, AT&T launched Personal Link Services, an online platform for personal and business communication and entrepreneurship. The storage was one of the first to be all web-based and referenced in their commercials as, "you can think of our electronic meeting place as the cloud". "Amazon Web Services" introduced their cloud storage service AWS S3 in 2006, and has gained widespread recognition and adoption as the storage supplier to popular services such as Smug Mug, Dropbox and Pinterest. In 2005, Box announced an

online file sharing and personal cloud content management service for businesses.

IV.   Popular Cloud Storage Options
1.Dropbox

- Dropbox business is more than just secure file storage – it's a smart workspace where teams, tools, and content come together.

- Dropbox offers 2GB of free storage.

- Dropbox gives users the capability of sharing entire folders with other Dropbox account users, which allows updates to be viewable by all collaborators. Users can download shared documents directly from Dropbox's web interface without having to install the Dropbox desktop client.

- Storing files in the Dropbox "Public" folder allows the links of files to be sent to the Dropbox and non- Dropbox users; however non- Dropbox link recipients must download the file to access/edit it.

- Mobile App Support: Documents are easily accessible through phone and tablets using the Dropbox mobile app.

- Sharing folders is available by simply right- clicking the file or folder on the desktop, and by choosing Share. You can also determine how fast files are synced in Preferences. You can also recover the deleted files in Dropbox easier than some other options.

- Lowest amount of free storage of the offerings reviewed in this document. Also, when inviting users to share files/folders, the email invitation must be sent to the email address that is associated with the users Dropbox account.

2.Google Drive

- Google Drive is a file storage and synchronization service developed by Google. Launched on April 24, 2012, Google Drive allow the users to store files on their servers, synchronize files across devices, and share files.

- It offers 5GB of free storage.

- Users of Google Drive documents must have a Google Drive account. All updates and editing by collaborators will be synced to Google Drive. For documents that you have permission to access, you can receive notifications when changes are made. You can share files with people by sending them a link to your file.

- Google Drive has an Android app which gives you the ability to share the files on your Android device using your Drive account. You can also share any file from Drive with your phone contacts.

- It has built- in document editor so that programs such as Microsoft Word are not required to be installed on computer in order to edit document. It allows comments to be left on any files stored.

- Sharing is not as easy and intuitive as Dropbox—must use the Google Drive web application to set it up. Also, no ability to set preferences on syncing speed.

3.Apple i-Cloud

- i-Cloud is built into every Apple device. That means all your stuff -photos, files, notes and more-is safe, up to date and available wherever you are.

- i-Cloud was launched by Apple in 2011. It allows users to always have access to the latest information from their Apple devices (iPhone, iPad, Mac, etc.).

- It is not necessary to have an Apple device to have an i-Cloud account, but you can only access your information when using an Apple device or a PC to which you've downloaded the i-Cloud software. However, you can get web-only access to your account that allows you to create new documents—use 'Pages' to create letters, flyer's, use 'Numbers' to create spreadsheets and use 'Keynote' to create presentations. You have 1 gigabyte of free storage for any documents you create in i-Cloud.

V.   KEY TECHNOLOGIES FOR CLOUD STORAGE

Key technologies include the types of cloud storage as shown in figure no.(1), they are as follows:

1.Private Cloud Storage

Private Cloud Storage is exactly what the name says. This system is designed for one person or company that is specific to your needs. These types of cloud storage come in two formats: on-premise and externally hosted. Both works well, but primarily for businesses, not individuals, unless you are running a smaller home-based company. You have more administrative control and can design the system to what you want it to accomplish in the way of business needs.

2.Public Cloud Storage

This is a cloud service that requires little administrative controls and can be accessed online by anyone you authorize. You get the same security, but do not need to maintain the system as much as you would with a private cloud. You do not need a rigid integration with your business needs or private storage concerns.

3.Hybrid Cloud Storage

Hybrid clouds offers a combination of private and public clouds. You can customize your features and insert the applications that meet your needs, as well as the resources that work for you. The most important data can be kept on a private cloud, while the less important data can be stored on a public cloud and accessed by a host of people remotely. You can store data in an efficient storage environment, which saves time and money.
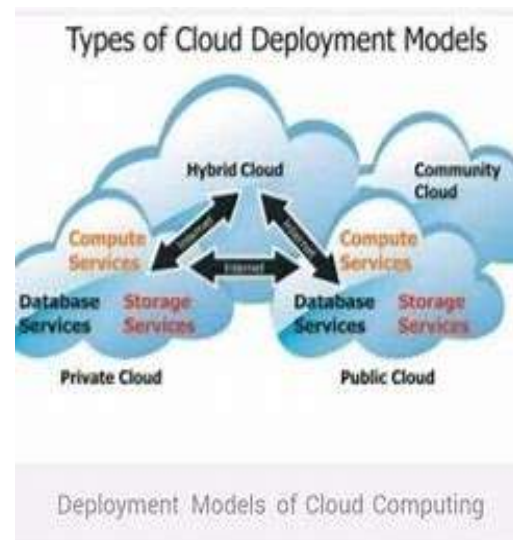

Figure no. (1)

VI.   CLOUD STORAGE SERVICES

Cloud Computing provides three services as shown in the figure no. (2):
1.Infrastructure as a Service (IaaS),
2.Platform as a Service (PaaS) and
3.Software as a Service (SaaS).

1.IaaS

Infrastructure hardware resources provide cloud service vendors to users with cloud services. The most typical examples of applications in this area are Amazon Web Service (AWS), IBM, VMware. They are available as an infrastructure rental service. Elastic cloud in the field of IaaS propose to achieve on-demand characteristics, so users can choose their own needs of the basic resources and only pay the corresponding costs.

2. PaaS

Provide a service as computing, development environment and other platforms. Users do not have to buy a server, use the platform to develop their own applications, it provided by the server and the Web for other users. The most typical application case in this area is Google's App Engine and Windows Azure. Both of them are served as a distributed platform.

3.SaaS

SaaS is more targeted that providing computing or storage resources service. And SaaS is also different with IaaS which provides a running environment for users to customize the application SaaS only provides some special services for application calls. SaaS Provider deploys unified application software on the server according to their actual needs. Customers can order the necessary application software to the server through the Internet service provider. In this mode, the user can order the software without the need for maintenance of the software anytime anywhere. Service provider solely responsible for the management and maintenance of the software and also provides off-line operation and local data storage to users.
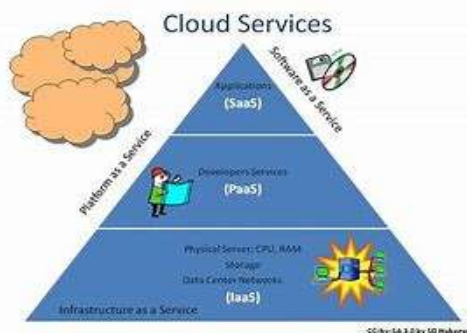

Figure no. (2)

VII.   CLOUD STORAGE REFERENCE MODEL

The appeal of cloud storage is due to some of the similar attributes that define other cloud services which has, pay as you go, illusion of infinite capacity and the simplicity of use or of management. It is therefore necessary that any interface for cloud storage should support these attributes, while allowing for a multitude of business cases and offerings, long into the future.

As shown in the figure no,(3), Cloud Data Management Interface (CDMI) is one of the functional interfaces that has applications which are used to create, retrieve, update and delete data elements from the cloud. As a part of this interface the client will be able to discover the capabilities of

the cloud storage offering and be able to use this interface to manage the containers and the data that is placed into them. In addition to this the metadata can be set in the containers and their contained data elements through this interface. It is expected in cloud that the interface will be able to be implemented by the majority of existing cloud storage offerings today. One way in which this can be done is with an adapter to their existing proprietary interface or by implementing the interface directly. In addition to this we can as well interface the existing client libraries such as Extensible Access Method (XAM) can be adapted to this interface.
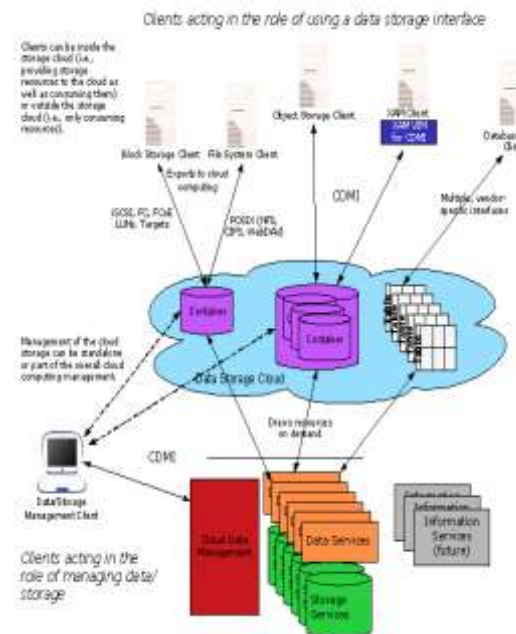

Figure no. (3)

Mainly this interface is also used by the administrative and as well as by the management applications to manage containers, accounts, security access, monitoring/billing information and even for storage that is accessible by other protocols. The capabilities of the underlying storage and data services in cloud are exposed so that clients can understand the offerings provided to them. Conform-ant cloud offerings may offer a subset of either interface as long as they expose the limitations in the capabilities part of the interface.

VIII.   HOW CLOUD STORAGE WORKS?

In the simplest level of thinking, Cloud Storage can just be used with one user with access to only one server. In this a user would be able upload his data through a terminal and be able to store it on a server for safe keeping. In one of the

scenarios where the server was to malfunction there the retrieving of your data files would be an impossible task until that server comes back online. From a customer standpoint, this system is highly ineffective as it would be unreliable for the customer and the consumers would reject such an unreliable product in marketplace. For the idea of cloud storage to be a feasible business, the simplest level of cloud storage would have to be expanded immensely to address the issue of reliability.

We can see that Cloud storage is achieved through following concepts of redundancy and repetition. Redundancy is really the core of cloud storage. Cloud Storage at its basic level is just backing up data enough times so that the chance of losing that data becomes nearly irrelevant. Having multiple data servers to store data decreases the chances of losing data. In this single data server store data is good, but ten data servers are a lot better that that. We can discuss this better by understanding the figure no. (4) as shown.

The data centers are well known to house several, even hundreds of data servers. Along with these multiple data server comes this multiple power supplies. Having all data servers on one power supply would as well counteract the use of having multiple servers. And now to combat this issue, servers are in being groups and each of them is given their own power supply. By doing this you can lessen the chance of all your equipment going offline. Having multiples of equipment also solves half the problem of cloud storage. The other half is what to do with all the user data provided.
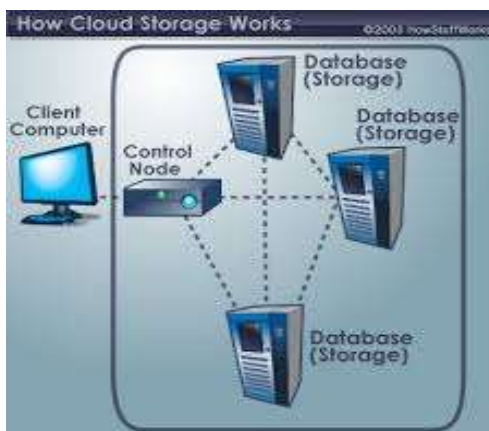

Figure no. (4)

Through the use of an operating system, all servers are able to act as one, even though they are made up of many. Each server is at the same time, separate but still the same. All information provided on each server is the same. Repetition is the key factor here. Here the user data is copied and

distributed to each of the server. The data servers, receive their own copy of the data. If one copy is changed on a server, all copies are changed. Having the same information on each server along with redundant equipment is how cloud storage functions.

With multiple data servers and multiple copies of information the companies are also able to hedge their bets against the loss of data and server downtime. Companies will be no longer in need to house their own special equipment for their own data. By this they can outsource this process to Cloud Storage businesses and save money and time.

IX.   BENEFITS
1.   Cloud Storage Can Save Costs
Economies of scale. Cloud vendors usually buy a lot of storage and pass those savings onto customers. But it is usually more than a low per-GB cost that provides savings. Moving to the cloud it mainly reduces the need to purchase hard disks, the enclosures that contain them, the RAID cards that power the data redundancy, the electricity that powers them, and the hardware warranty services that protect them. But it also lowers the management costs by reducing the on-premise hardware and software management, simplifying monitoring, and reducing the need for extensive capacity planning. Instead of this the administrators can focus on other most important tasks.

2.   Data Redundancy and Replication
Data redundancy is included in Cloud. Most Cloud Storage vendors keep multiple copies of the data even within a single "data centre" and offers a great object durability to reduce any likelihood of the data loss. But for those who are looking for even more protection, geographic replication options can make multiple copies of the data across different regions. Some may offer geographic replication as a storage class option, while the others may offer for replication services that quickly move data between the data centre. The backups are as well protected.

3.   Data Tie-ring for Cost Savings
Many cloud storage vendors offer different storage classes / data tiers. It is select on the basis of how quickly and frequently you restore your backups and how long you plan to keep your backups in the storage. For the backups which need quick and/or frequent restores, consider using the vendor's hot storage as in this the retrieval is fast and is the most cost-effective. For long-term

storage, consider moving data to archive storage. Restores can be slower at times and there might be an additional cost required to retrieve the data, but the storage costs are considerably lower especially if you plan to keep the backups for many more years. Some vendors may offer object life-cycle policies that can automatically move data between tiers, which will reduce the administration and lets you easily realize cost savings.

4.   Regulatory Compliance

Keeping your backups in the same region as where the data originates may be best for regulatory compliance. Many cloud vendors offer data centre's options all around the globe. If you have a need to store your EU customer data in an EU data centre you need to look for a cloud storage vendor that can accommodate your data. An added benefit to this is that the moving data to cloud storage in the same region is best for its performance. Even if you are not bound by regulation, you may find the improved performance worthwhile.

5.   Ransomware/Malware Protection

Ransomware is just bad. Unfortunately, it is also in the news with great frequency. One of the most sinister ransomware attributes is that the malware will look beyond the locally infected computer till the network for shares that has documents and files to encrypt. If you are hit by ransomware or some other malware that is encrypting or destroying files, you might be happy that your cloud storage can help you to protect against this ransomware by offering some backup security advantages as it is more difficult to access without proper authentication.

X.   LIMITATIONS

1.   Backups May Be Slower

The Internet bandwidth and Cloud Storage max ingest speeds may be more limited than the local network/disk. There is also more communication latency involved in this. This is not normally an issue for backups of file servers and workstations, as the larger, more time-consuming full backups can usually run in the background for a longer period without any ill effects. After the initial full backup, incremental backups serve to reduce the backup size and reduce backup times. Data compression and de-duplication help this too. But the specialized applications like databases (for example, Microsoft SQL Server and Exchange) can be affected by longer backup at times. If you want those applications backed up during times of low activity and within your maintenance windows, in

those cases you should look for back up critical applications locally for best speed and then sweep up the backups to the cloud. Some cloud backup storage will automate this process for you.

2.   Restores May Be Slower

It is all about internet bandwidth and rated cloud storage speed. Restoring an entire server may take longer. But you might find file-level restores are just as fast. The important takeaway is to make sure you can meet your contracted Recovery Time Objectives (RTO's). If you cannot restore what is needed in the committed time then consider the performing hybrid backups on those critical servers and send your backups to both local and cloud storage. Having two backup copies provides those critical workloads with the benefit of fast local restores (with no reliance on internet and cloud storage vendor availability) and the benefit of off-site, cloud storage protection for disaster recovery.

3.   Higher Internet Utilization

If backups are running during business hours or times of heavy internet use, you may find internet-related activity performance suffers. Internet bandwidth may need to be controlled. Look to set up bandwidth utilization rules in your backup software (or limit via other network-controlled means) to ensure you do not saturate your internet connection during the time when access to the internet is needed for other critical business activity.

4. Costs

For a corporation or a small business, cloud storage services are best sound solutions. However, for the home devices these costs may be too high to handle.

5. Hard Drives

Although the goal of cloud-based services is mainly to minimize our dependency on physical storage devices, where a large number of business Cloud Storage services requires the presence of a physical hard drive as well.

6. Customer Support

Customer support may not be one of the stronger points of Cloud Storage vendors. Cloud Storage providers usually instruct their clients to take a closer look at the FAQ or follow any of the online forums.

XI.   FUTURE

All Cloud Storage services will eventually reach a level of "saturation", as all services will be

lightning quick, safe and secure and they all will offer a huge amount of storage space. Since they will be too similar by this point, each service will begin looking to differentiate their service from the competitors. One such possible way is by dropping the price to be cheaper than the competitors, but I really do not see that happening as the market will eventually mature and giving storage away for free is not an efficient business strategy.

Clearly, it would be necessary to preserve the ability to read or automatically convert outdated formats to maintain the continuity of access as more people rely on cloud storage and backup and adding decades worth of data to hard drives on servers in sprawling the data centres. Online converters will likely tackle this job, although what that really means is that the users will upload a file to a server, the server will do the complicated job of reformatting the structure of the bits and bytes in that file then add a new extension, and allow the users to download the result in the desired format when they need their data. Looking for this to become the most common one with the newer generations of formats, slowly but surely being adopted by large enough software ecosystems. After more than a decade of popular, widespread cloud storage and petabytes of data uploaded by hundreds of millions of people, we will be certainly due for some of those file formats to become obsolete.

Cloud Storage is a data storage model that manages, maintains, and provide back up for critical data. Emergence of the big data globally and rising the demand for secured and efficient data storage systems has significantly influenced the growth of Cloud Storage market. Moreover, cloud storage is considered to increase the work efficiency and reduces the operational cost, thus widely deployed across all major industry verticals. Cloud Storage market across the globe is intense and have attained significant market penetration across the globe. Further, upcoming technological development in this market is anticipated to motivate the vendors to introduce more efficient and hi-tech cloud storage solution.

As we move further and further into the SSD age, the reality of what we store will begin to become overwhelming. Smart storage will automatically look for duplication and if you have not marked a file for backup (make another copy) then delete the duplicate. It is partially here today and improving. Faster HD's, slowest component of a computer and honestly the least improved in the past ten years. So drives that are much faster.

XII.   CONCLUSION

Cloud emergence transforms the way in which IT infrastructure is constituted and managed through consumable services for infrastructure, platform, and applications. This idea converts IT infrastructure from a "factory" into a "supply chain". There may be a stage to come when Internet is going to be the communication channel for mass media, then we cannot imagine a world without cloud storage because keeping ownership and maintaining huge volume of data on our own infrastructure is unimaginable. So automatically cloud storage will capture the entire market. By meeting the needs of storage providers or cloud service, providers will be able to create multi-tenant storage infrastructure security flexibility high functionality and interoperability. Using distributed cloud storage technology to storage terminal data, while ensuring the integrity and security of data. Although there are downsides to cloud storage, many organizations believe the benefits to far outweigh the risks. The cost savings, disaster-recovery, security, and accessibility are just a few intriguing benefits to businesses. Cloud storage can reduce costs, simplify IT management, improve user experience, and allow employees to work and collaborate from remote locations. This simplifies sharing and collaboration among staff, and easing IT logistics as a whole.

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