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Cloud Storage Service using Personal Desktop Computer

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ABSTRACT

Given the current state of technology, as a group in the classroom, we often run into the problem of teachers struggling with the files and notes needed for their lectures. Teachers also bring USB sticks to access notes and files. We decided to set up a cloud storage service specifically for our college. Teachers can access files at once. The technology being used here is going to be NAS (Network attached storage systems) Organize various subject notes in one place to save time searching for files. Students can access files uploaded to the system. In today's world, the world of cloud computing has become more sophisticated. Would you like to take advantage of such cloud enhanced technology? Cloud computing is one the most important advancements in the world and we must be able to use it at full potential. These innovations often make our lives easier. The goal is to provide similar services to our teachers, friends and other colleges.

Keywords – NAS (Network attached storage systems), Cloud computing, cloud storage service, architecture.

I. INTRODUCTION

The use of cloud services has made it possible for individuals to store their digital data and access it from any location. Essentially, cloud storage is a virtual hard drive that can be utilized for storing important data such as Word documents and video files, as well as for performing complex data processing and running applications. Cloud storage is a flexible and versatile system that offers numerous benefits. To determine the most suitable cloud storage service for your needs, it is essential to evaluate your specific requirements and usage patterns.

What does it mean to store data in the cloud, or does one store data virtually? First, there is no such thing as virtual data storage. The concept of storing data in the cloud means that data is stored virtually on physical hard drives. Usually, large companies like Google or Microsoft have huge databases that provide a huge amount of physical storage. They use this physical storage to store their clients' data virtually in the cloud. Creating a service where the data is stored virtually in

the cloud with our own hard drives. This means that the data is only accessible to you. They're easy to set up and use and offer a variety of benefits such as expanded storage, private cloud storage, music and movie streaming, and even automated backups. Plus, they're regularly as modest as buying additional hard drives for your local computers. Schools, colleges, and universities almost no longer have blackboards. Instead, they have moved to using smartboards, which teachers can conveniently use for teaching, accessing files, sharing content, and more. The main problem now is storing and sharing data on different subjects.
To solve this problem, we decided to set up a cloud storage service for our graduate course through which teachers and students can access the shared notes.
We also sorted everything for the different subjects. Teachers do not have to carry laptops, pen drives, or other physical storage. All they must do is come into the classroom, log into the cloud and start teaching. We eliminate the time commitment factor, which is by far the most important in students' lives. The world of cloud computing has reached greater heights in today's world. Why should not we take advantage of these advanced technologies? Progress always leads to new innovations.

II. LITERATURE SURVEY

Dimas Sketi Adji, Gabriel Eduardus, Michael, Minawati, Widoda Budiharta [1] have written an article on cloud storage and NAS (Network – attached storage) and how to improve performance. Storage systems are one of the most important aspects in Technology world. They are used in small scale organizations as well as large scale organizations for storing data. It boosts their value as an organization or company. Most companies pick their storage kinds without having knowledge of what's best suited for their company. Cloud storage and network attached storage (NAS) are most commonly used systems. For smaller companies, cloud storage is the best choice as it cost lower, has easier configuration and data backup and many more. Whereas NAS is a bit on expensive side but has more reliability, data security and data backup is ahead of cloud storage systems.

Jerwin Baquir Tubay [2] has written an article on student's use of cloud storage in their studies. This paper seeks to find intentions of student's use of technology. A study was conducted in university in Philippines and the data were analyzed using Partial lease square – Structural equation model (PLS – SEM). The results showed performance expectancy and social influence significantly affects the intentions of students to use cloud storage systems. Hence, the morale of the study is universities all over the world should maintain subscriptions for their students as it increases productivity of their schoolwork and helps to build a better community as well.

Yuhui Deng [3] from Jinan university has written a brief paper about Network attached storage (NAS) systems. NAS has been gaining popularity in recent years because it can be managed easily, and file sharing is easy to handle. This paper analyses the layered structure in NAS architecture and to identify bottlenecks. The analysis presented in this document outlines three important considerations for Network Attached Storage (NAS) systems when transitioning to a Gigabit network: (1) The most effective strategy for reducing network congestion is to either increase physical network bandwidth or optimize network utilization. For instance, implementing a more efficient network file system could enhance the performance of NAS. (2) Using specialized hardware to improve the performance of the storage subsystem or the efficiency of the network stack is unnecessary, as it cannot enhance the overall performance. In fact, hardware-based approaches can have a negative impact on performance, especially for small file accesses on NAS.

P.Nagendra Babu , M.Chaitanya Kumari ,S.Venkat Mohan [4] has written paper on importance of cloud

computing. Cloud computing has played a significant role in the past decade, providing on-demand access to computation, software, and data storage services without requiring end users to know the physical location and configuration of the underlying systems. It is a new paradigm for delivering internet-centric services and software, with dynamically scalable and frequently virtualized resources. Cloud computing is a by-product of easy access to remote computing sites provided by the internet, offering web-based tools and applications that users can access through their web browsers as if they were locally installed programs on their computers. This white paper provides a comprehensive overview of the basic concepts of cloud computing, and conducting research in this area can be highly beneficial.

Kun Liua , Long-jiang Donga has written apaper on [5] Cloud computing has become increasingly popular, and one important area of study is data storage. This study begins by introducing the concepts of cloud computing, cloud storage, and cloud storage architecture. The technology behind cloud data storage is then examined, including Google's GFS and Hadoop Distributed File System (HDFS), with a focus on their applications in specific business scenarios. Finally, the paragraph discusses how the conventional file storage technique can be enhanced using the eyeOS Web operating system, which leverages HDFS technology from Hadoop to enable fault-tolerant control and distributed file storage.

Jin hai has written paper on[6] network data increased and usage patterns changed, cloud storage as an extension of cloud computing became a hot topic for research. This paper primarily discusses the characteristics of cloud storage technology, analyses the hierarchical structure of the cloud storage service, and then analyses the cloud storage service's data storage structure, with a focus on the architecture's characteristics of scalability and dependability.

III.Methodology

We all know that local storage is still the preferred option for the majority of users. Yet, services such as Google Drive, Dropbox, and others have persuaded other consumers to place their trust in cloud storage. Next-cloud is open-source software, that allows to establish own personal cloud storage service. It contains functionality similar to other services such as Google Drive, Dropbox and so on.

The Next-cloud server provides a comprehensive online interface for administrators to configure, manage, and monitor Next-cloud installations. The administrator has the ability to manage users, Next-cloud settings, configure, activate or disable features, establish access control permissions, and create workflow features. A subset of capabilities and control may be assigned to designated power users who can be named admin over specific groups and given certain rights include adding or deleting people from that group.

We have two major alternatives for mounting cloud storage for Personal use or Educational Purpose: a PC with appropriate software or a NAS devoted particularly to it. But here we are creating for Educational “College”, so we are using NAS to expand storage capability using two Hard Drives. Relies on connecting the NAS to the router with an Ethernet Cable. Afterwards, using a computer, we will configure the product via the manufacturer's online portal (Free Licensed). We can specify specialized features such as device remote access. A NAS is accessible not just from desktops, but also from smartphones, smart TVs, and other internet-connected devices.

Once installation is done, the application will simply walk us through the configuration process. We will specify parameters such as the login and password to get access and pick one or more folders to be accessible via the web interface according to the need. After

everything is established on the computer, we will input the address of the server, which is our personal / college cloud storage, as well as the login credentials, as described above, in the app for mobile devices.
Next-cloud enforces some rules for controlling the file access, Next-cloud provides administrators /admin control over data access using File Access Control and automated file tagging, allowing them to specify tight criteria that requests must follow. Administrators /Admin may ensure that their Next-cloud instance respects these restrictions if users in certain groups or users should not be granted access to certain file types or if data with a certain tag should not be shared outside the college. enabling admin login or user login to start any kind of operations depending on these triggers, for example converting document file formats to PDF upon upload by members of a particular group. File updating, editing, and deletion can also be controlled based on tags set manually or automatically.

Benefits you get from cloud drives like flexibility, backup, mobility, connectivity and scalability. Cloud technology continues to evolve and even more interestingly, the next generation of cloud computing is just around the corner.

IV.Proposed System

NAS Concept:

Data can be stored and stored in a single location using a NAS system (network attached storage device). A type of network device called a network attached storage (NAS) device connects to the network infrastructure and provides multiple user or client access to a central storage location, providing access to centralized data processing and customers across multiple platforms. NAS devices are specialized storage devices that connect directly to the network and are designed for use by end users. In this case, a stand-alone computer directly connected to a local network is called a network-attached storage server. Small organizations often use NAS, which allows users to store and store large amounts of data more efficiently. Network attached storage is designed to improve user interaction and data sharing. Distributed teams that need remote access or work in multiple time zones can benefit from this. A NAS connected to a wireless router allows distributed workers to easily access files from any desktop or mobile device connected to the network. NAS systems are often used by organizations as storage servers or as building blocks for private or personal clouds.

Cloud Concept:

Cloud computing could be defined as "computing based on the sharing of computing resources, rather than applications being processed on local servers or personal devices". The word "cloud" refers to the Internet; cloud computing then means data processing realized through the Internet, where data and information are stored and shared from one place to another. Cloud data sharing refers to a variety of cloud services that allow people to store, synchronize, and share documents, photos, videos, and other information with others in the cloud. These services allow users to share and synchronize data between multiple devices on a single hostname. Cloud data storage is a method of data storage in the cloud that allows servers and applications to access data from a shared database.This compatibility makes cloud storage ideal for workloads that rely on shared data and can be easily integrated withoutcode changes.

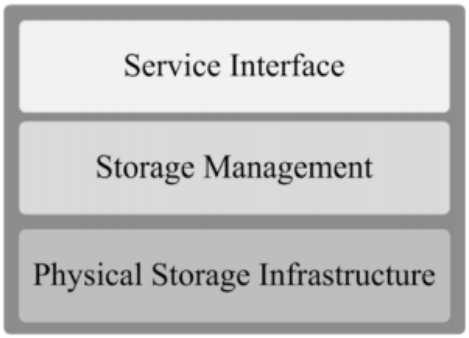

Fig 1. Architecture of cloud storage[1]

Difference between NAS and cloud:

Data stored on NAS devices is backed up at your location, while cloud service providers back up your data to remote locations.

- ✓ When the cloud service manages its servers, the NAS device is always available for upgrade or repair, so you just have to remember to pay for it.
- ✓ NAS is secure and private. You choose the security measures you trust, and when the cloud is secure, you have no say in where your data is stored or who accesses it.

Use of RAID Technology:

This is mostly related to the lack of independent disks. RAID storage uses multiple drives to provide redundancy, improve overall performance, and increase physical capacity. This is in contrast to older products that only used one disk to store data. RAID allows parallel storage of the same data continuously (on multiple drives) to improve overall performance. RAID disk drives are often used in servers, but are generally not suitable for personal computers.

System Architecture:

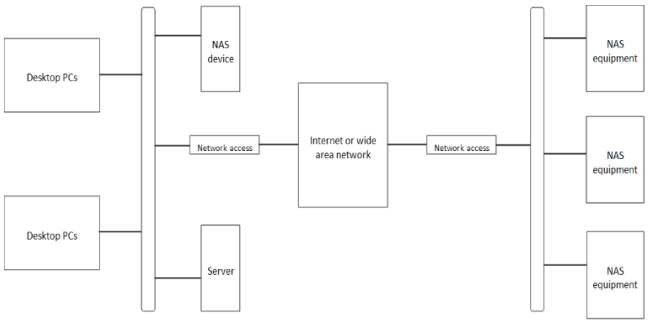

Fig 2. System Architecture

To create a cloud storage service system using Network Attached Storage (NAS), you'll need to consider several hardware components. The primary goal of network shared storage is to facilitate collaboration among users, making it easier to share information and work together more effectively. This is particularly important for dispersed teams who may need remote access to files from different time zones. Since NAS connects to a wireless router, it's easy for distributed workers to access files from network desktops or mobile devices. Organizations typically use NAS in two ways: as file storage or as the foundation of a personal or private cloud. Multiple users with heterogeneous client devices can access data from a centralized disk volume via a local area network (LAN) using standard Ethernet connectivity. NAS devices combine storage in one place, making it easier to archive and backup important data.

System Security:

1) DNS:

When most people use the Internet, they use domain names to identify the website they are visiting, such as checkpoint.com. These domains are usable addresses associated with the Domain Name System (DNS) to IP (Internet Protocol) addresses used by computers and other parts of the network infrastructure to identify different devices connected to the Internet. In short, the Domain Name System is a protocol that makes the Internet usable by allowing the use of domain names.

2) Certbot (https and security protocols applied)

Certbot is generally designed to convert an existing HTTP site to HTTPS (and then continue to renew the site's HTTPS certificates if necessary). Some Certbot documentation assumes or recommends that you already have a working website accessible via HTTP on port 80.

V. Advantages of system

1. Accessibility

One of the main benefits of cloud storage is its ease of use and accessibility. Most cloud storage services feature a user-friendly interface and support drag-and-drop functionality. For instance, Google Drive by Google or iDrive by Apple has a simple interface, and

even non-expert users can easily upload files to their online storage. Whether you saved a file on your hard drive using a mobile device or a computer, you can easily restore it using any other device that has internet access. As long as you have a good internet connection, you can access your files stored in data centers located somewhere on the internet.

2. Automated

Cloud storage services act like a hard drive in your system and when you want to save a file to the cloud, ongoing activities are not hampered. The cloud storage service can be used by multiple users and one user's current responsibility does not affect another's activities as everything is managed and automated by the cloud service provider.

3. Security

When it comes to anything related to the internet, security is always a primary concern. Many schools and colleges use cloud storage solutions for their educational needs. However, it's important to ensure that the cloud service you choose provides adequate security for your data. Cloud storage stores data on redundant servers, meaning that even if one data center fails, your data will still be managed by other data centers, keeping it safe and monitored. In the rare case where all of the storage provider's data centers collapse or are destroyed, it's highly unlikely that your data will be lost since cloud storage services consist of thousands of data centers. Some cloud storage providers also store copies of your data in different data centers, ensuring that backups are available if your data is lost or corrupted on one server.

4. Cost-efficient

By opting for a single cloud storage service, companies can effectively outsource their data storage problems. Using online data storage solutions can help companies reduce their expenses on internal resources. With cloud storage, companies no longer require internal power and support to manage and store their data, as the cloud storage provider takes care of everything. Additionally, there are several cloud storage options available, offering lifetime cloud storage at an affordable price, which is particularly beneficial for individual users.

5. Sharing Files

All cloud storage options provide file-sharing features that enable users to easily share files with others. Users can either send a file to another user or invite them to view their data. Most cloud storage providers offer a cloud environment where two users who use the same cloud service can share their data. However, only a few service providers offer cross-platform file sharing capabilities.

6. Synchronization

Another advantage of cloud storage is the syncing capability offered by every cloud storage provider. With syncing, users can synchronize their data in the cloud with any device. As previously mentioned, cloud storage allows users to access their data from any device and from anywhere in the world through synchronization. By using the right credentials, users can access their subscribed storage service from any device and access all their data stored in the cloud storage. There is no need to copy data from one device to another, but a stable internet connection is required to access the files.

VI.Limitations

Talking about limitations here, there are few which should be considered while operating such personalized systems on your own. Some of the limitations are:

1. Management of hardware failure: If any part of the system fails like a RAM stick, the service may get affected.
2. As projecting on small-scale, limitation of users depends on the specification of the system.
3. Internet connection speed should range above 10 MBPS.
4. Management of overall system/service may require a technical person who has complete knowledge of system.

VII. CONCLUSION

In conclusion, cloud storage services have revolutionized the way we store, access, and share data. With their convenience, scalability, and cost-effectiveness, cloud storage services have become an essential tool for individuals, businesses, and organizations alike. They offer a myriad of benefits, including data redundancy, easy collaboration, remote accessibility, and disaster recovery options. Moreover, cloud storage services continue to evolve with advancements in technology, providing even more robust features and enhanced security measures to protect valuable data. As we move towards an increasingly digital world, cloud storage services will likely continue to play a critical role in meeting our data storage and management needs. Whether it's for personal use or business operations, leveraging the power of cloud storage services can provide unparalleled convenience, efficiency, and peace of mind.

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