Data Storage using Cloud Computing

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***Abstract*— Cloud Computing is an emerging technology of the twenty-first century. Parallelly, the concern of storing data increases as things need to be handy in this fast-paced growing world and needs a solution that can fulfill the needs at the same time stay secure and affordable. With the ease of internet access across the globe, Cloud Computing brings us this solution with some merits and demerits. Data Storage using the cloud is one of the growing aspects of cutting-edge enterprise technology.**

***Index Terms*—Data Storage using Cloud Computing, Components, Working, Types, Benefits, Challenges, Trends, Scalability, Models, Public Cloud, Private Cloud, Hybrid Cloud Future, Acknowledgement, References.**

I. Introduction

Cloud computing can be defined as a distributed and parallel computing system consisting of a pool of interconnected computing system which is dynamically purveyed and acting a single computing resource to fulfill the user demands while following all the terms which are often referred as SLA(Service Level Agreement). This is where Data Storage comes in play by acting as a vital component of the Cloud technology.

II. Components of Data Storage

There are five different components of data storage in cloud computing:

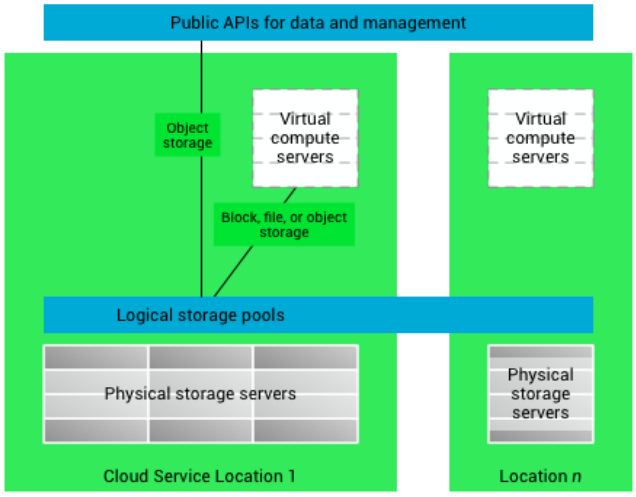


Fig. 1. Components in Data Storage

A. *Public API's for Data and Management*

An API (Application Programming Interface) is a defined public persona for the company/cloud provider by which they provide the defined data assets and services to the public/customer. It helps setting up a unique, dedicated and shared server to every customer without data breaches.

B. *Object Storage*

Object Storage is a storage mechanism through which the data is being stored as an object. This is different from traditional block storage and file storage system. By using this mechanism, we can access even a huge amount of cloud data without any loss as the data is being stored as it is. Also, it enables easy fetch of data.

C. *Virtual Computer Servers*

VCS is the type of Virtualized Computing Server which are running virtually and many of the small servers are combined to make up one big server which will act as one powerful and strong server and will perform all the computing

D. *Logical Storage Pool*

This is a collection of many small pools to combine and make one big pool for the storage of the data with ease. It works on the pre-defined algorithms and helps the storage of data by mapping it with physical storage.

E. *Physical Storage Area*

This is where the data got stored in the backend. These servers are often termed as '**bare-metal server**' where the user's data is being stored. The logical pools map the data into these servers w.r.t availabilities of the blocks.

Generally, these are in big warehouses where the temperature is kept lower to reduce the risk of loss in efficiency due to heat as due to continuous use and no downtime, they heat a lot.

III. Working of the Mechanism

The working of data storage using the cloud is simpler to understand yet complex to implement due to concerns like security. The cloud service provider provides a dedicated storage size to the client through the API and the user having that API can only access it. When the user wants to store some data on the storage space on the cloud, He uses the account provided to him through which he uploads the data which can be anything like text file, music, videos or games. When he requests the server for the upload, the server tries to figure out the size of the file and then looks for space on the storage pools. These spaces can either be a continuous block or dynamically assigned blocks but in general, the algorithms prefer dynamic ones as it reduces the memory wastage. One's the space is found the task of uploading begins and at the end-user can get a link to get back the file or can view it online.

This link generated is nothing but the address of the memory block where the data is stored in the storage pool.

IV. Types of Data Storage

There are three types of Data Storage services available in cloud computing based on its usage type. They are:

A. *Personal Cloud*

This is also called the Private cloud. This is a personalized data storing and processing system. They can only be accessed by them who are having valid authentication credentials for it. They are generally owned by big IT firms and businesses who are keen to have complete control over their computing infrastructure and are Costlier. They are limited to the premises of the building where they've been set up.

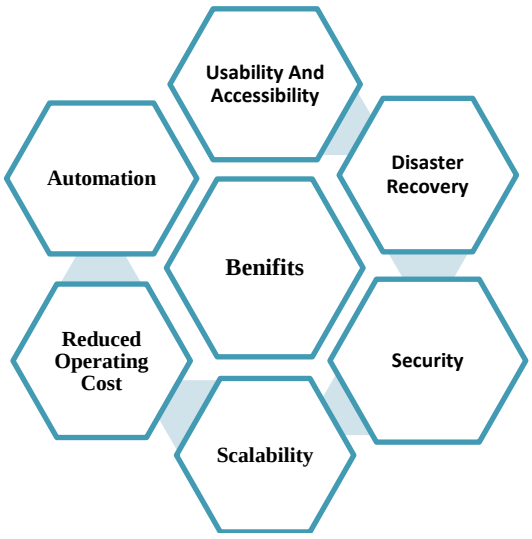
B. *Public Cloud*

Public Cloud is the cloud service in which the cloud provider provides the service to the users either on the free to use basis or via pay-per-use. In contrast to the private cloud, users don't have much of the access to the management part and are managed by the provider limiting the access of the user to only storage access.

C. *Hybrid Cloud*

This service is a combination of both personal and public cloud. These implementations enable businesses to get the advantages of on-demand IT infrastructure for non-sensitive statistics, however, they also hold sensitive records in a private cloud if needed.

V. Benefits of Cloud Data Storage



A. *Usability and Accessibility*

Using cloud services for data storage is quick and easy. Knowledge of the computer domain is not necessary to use cloud services. Things are available in the form of drag and drop and are much easier to use. The stored files in return can also be accessed from the servers from anywhere in the world with the use of an internet connection.

B. *Disaster Recovery*

In this world of IT networks, it is recommended for every business to have a backup of their data to tackle data losses and leaks as losing data can cost huge losses to the business. Cloud storage is a perfect plan to back up the business data as the files are stored securely and remotely that means they can be accessed anytime from anywhere.

C. *Security*

Business owners can be always assured that if the data is stored in the cloud, it is safe. The data is stored on distributed servers across many places which makes ensures that data breaches will not happen. Also, cloud servers have an inbuilt automation system for regular backups and snapshots which keeps the data safe.

D. *Reduced operating costs*

Often it can be difficult for the businesses to set up data centers on traditional hardware system as hardware always costs more due to its maintenance costs, the cloud can be the best alternative in this case as the service is quite cheap as compared to the traditional methods and also it offers way more benefits w.r.t traditional system.

E. *Scalability*

It is also simpler to scale up or down the capability of the systems as the services are handy and you only have to pay for what you want. One doesn't need to change the system again and again if the needs are getting increased as the cloud is solely managed by software which ultimately saves a lot of money.

F. *Automation*

One of the best things about cloud data storage is Automation. With the help of this, problems of regular backup get solved without hampering the daily operations. With cloud data storage, hectic tasks of backup get easier as you can do everything on one click and things will be set to automated daily at a selected time.

VI. Challenges of Cloud Data Storage

A. *Performance*

With so many benefits, everyone nowadays chooses cloud as a first choice and this is where real-time performance lacks. With an increase in the number of users daily, the performance becomes a real issue as the cloud provider needs to continuously monitor the working of servers and ensure 0% downtime.

B. *Data Security*

As stated in Spiderman, "With Great Powers comes Great Responsibilities" applies completely and undoubtedly here. With so much data being exposed to cloud servers, security is a major challenge. The unseen loopholes in the security can cost a business millions and may lead to legal disputes between both provider and consumer.

C. Insecure API's

Most of the cloud providers don't pay attention to the security of the APIs and don't manage the dead API's which can become a big source of the data breach as API are the ones which take care of your private allotment of the connection and cloud storage.

D. Managing Cost

The pay per use and scaling methodology of the cloud technology often get in the minds of the consumers and many times they overestimate the usage and pay for services that are not being used leaving it to be underutilized.

E. Managing Multiple Cloud

With the increase in demands, IT firms and businesses often choose to have both personal and public cloud and it is often harder to shift from one cloud to another as there is no linking between both and it becomes harder to migrate and keep the data consistency.

VII. Future of Data Storage

Since the technology is new and the demand is high, Data Storage using the cloud is going to be the future of the Computer Industry. Since it has just started and the demand is already so high, we can easily say that in upcoming years every industry, company, IT Firm, and business will prefer cloud technology to store their data and use it at their convenience. According to me, the following would be the future aspects of the cloud industry:

A. Everything as a Service

As the demands would be high, the models would be changed. Since the implementation is easy, many tech-giants will come in to play and will get into this business which will help them grow even bigger.

B. More Storage

As the demands go higher so the specifications will! Even now we are getting GB's of storage for free and TB's on a paid basis, they all are not going to be reduced but will be increased to a greater extent. With this increment, they are also going to be cheaper as more competition would be there between cloud providers and the number of users would be more.

C. Security will be an Issue

Security has always been a concern in the IT industry and will always remain as nothing is perfect and might have hidden loopholes in it. Similarly, as the Cloud would be taking over the traditional data storage, issues like a data breach, data leaks, and data theft will also increase. These all can only be solved if we plan a good steady and systematic approach towards our future.

D. Cloud for IoT and Websites

Even now many of the IoT devices have started to keep the data of the user on cloud and let the user know what all data is being recorded and use them wisely for the user-specific recommendations. Similarly, most of the websites on the internet are hosted over hosting networks which in the future will be turned into cloud servers and will be more speedy, safer and reliable.

VIII. Acknowledgment

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IX. References

Apart from the unconditional help from my mentor, I have taken help from the following sources while completing this research paper and tried my best to keep this paper unique and informative.

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