Survey Paper on Features and Security of Personal Cloud Storage Service Providers

Sanjna Sinha
MIT College of Engineering, Pune
Savitribai Phule Pune University

Puneet Gupta
MIT College of Engineering, Pune
Savitribai Phule Pune University

Shivam Raj
MIT College of Engineering, Pune
Savitribai Phule Pune University

Priyansh Bendre
MIT College of Engineering, Pune
Savitribai Phule Pune University

Abstract

Cloud computing holds the potential of eliminating the requirement of setting up high-cost and complex IT infrastructure for solutions and services. It provides flexible and scalable resources [1] for easy access and development through lightweight portable devices. In cloud computing the entire data resides on the networked resources, which can be shared over the internet [2]. The implementation and the extent of usability is limited for now, but is increasing over the period of time. The productivity can be increased by using the existing features of the cloud which is possible only after detailed study of the features, scope, security of the cloud and innovating a newer ideas to utilize the cloud to its full potential.

Keywords
Comparison; Dropbox; Google Drive; One Drive; iCloud; Personal Cloud

1. Introduction

Personal cloud storage services allows to synchronize their local folders with server in the cloud. They have gained the popularity among all the levels of computer users after the companies started providing easy access and abundant storage space on affordable pricing. More and more people are subscribing to these cloud storage services attracted with the prices and services provided by the companies. Companies are trying to simplify the services to reach out to a greater audience. The companies are in an unending race towards simplicity. But, as perfectly quoted by “Simple can be harder than complex” - Steve Jobs.

The high public interest is also a driving force for the service providers like Google Drive, Dropbox, Box, One Drive etc. to innovate, simplify and meet the raising demands. These services are data-intensive and their continuous usage already produces a significant amount of Internet traffic.

The goal of this paper is twofold. Firstly, we investigate how many features these cloud storage providers dispense, which is important to compare the services for the productivity and usability of a service. Secondly, the security [3]. Without security the service cannot be trusted with sensitive data and in-turn is of no particular use for the users.

Our survey reveals some interesting insights such as the usability of personal cloud for small-scale industrial usage and ease of interfacing and readiness of the service for larger application.

2. Features

Some of the key features of cloud computing are

- Users
- Reliability and Efficiency
- Compatibility
- Pricing and,
- Security

These features make the cloud storage services more distinguished. This is why one
cloud service may not be an optimal choice for absolutely according to some other person’s requirement. The choice of service provider depends on the features the cloud provider offers and is a personal preference at last. Many Cloud service providers like amazon, Microsoft, Rackspace today offer a wide variety of features, which make them more versatile than others but the implementation and maintenance of such complex system can push the customer to choose a more and more suitable other service provider.

2.1 Number of Users

The number of users using the service reflects the popularity and awareness about the product. More number of users are attracted towards the cloud service which has a low learning curve and is easily accessible. Number of users also indirectly gives an idea about the traffic that storage service may be facing, and the scale of data which is being analyzed in the cloud and it’s data handling capacity.

One Drive currently has 250 million users[4] compared to googledrive, which has 240 million (Oct 2014)[5]. Dropbox on the other hand has 300 million users (July 2014)[6]. iCloud’s last officially announced number was in 2013. It showed that iCloud had 320 million users[7].

![Image](https://example.com/image1.png)

The above graph shows the number of users in millions.

**Figure 1**

From the bar graph given above, we can see the approximate market share of Google Drive. It shows that the most popularly used cloud services makes up just a small chunk of market share.

2.2 Reliability and Efficiency

Reliability and Efficiency is the most important aspect of a cloud service provider. The one person or industry while it can work customer satisfaction, customer royalty and long term benefits of cloud computing all are achieved only by maintaining high efficiency and high reliability.

The faster upload, download and total ‘up-time’ of a service, collectively contribute to reliability. But, reliability does not depend on only these factors and can depend on many other measurable and non-measurable aspects. Non-measurable aspects include customer’s trust which can be a result of social engineering or reviews from other users. Efficiency, on the other hand largely depends on the facts and numbers like error rate, retrieval time, searching algorithms and many more.

Background traffic and data upload and download time reflect the efficiency and reliability of a service. According to the report “Benchmarking Personal Cloud Storage”[8], the graphs are,

![Image](https://example.com/image2.png)

The graph shows the traffic while the services are idle[9]

**Figure 2**

As expected, the cloud service providers with higher user base have sizably large background data transfer activity.

![Image](https://example.com/image3.png)

The graph shows the upload of random bytes[10]

**Figure 3**

By the graphs, it is evident that the choice should also depend on the traffic on a
particular service and its ability to handle it. With these graphs, we could say that optimal choice would be Google drive because of its ability to handle upload and download of random byte streams and background traffic.

2.3 Compatibility

Compatibility refers to the ease of porting or implementing your existing workspace to the cloud. Every cloud platform provides some features to the customer for customizing and porting their data to the cloud as easily as possible. The difficulty of the procedure to port this existing data from the existing system to the cloud is the factor, which majorly affects the compatibility of the cloud storage service provider with the existing platform. If the porting is hassle free, then the softwares are called more compatible. The compatibility is increased with added functionalities and features which the cloud service provider provides. Simply, 'if the more number of features a cloud service provider provides to the developer to flexibly port their existing data, the more compatible the cloud will be to a greater number of platforms'. Compatibility depends on the interfacing options, ease of synchronizing the existing data, ease of implementing the existing software as SaaS (Software as a Service) [11,12] and so on.

As the definition of compatibility can differ in terms final desired product. But we can easily compare some of the major features which can result in choosing a service over the other. Microsoft’s most popular cloud service, Azure, provides some exceptional connectivity features [13] including live streaming (for streaming live video of events), Content Protection (provides industry standard static and dynamic encryption), Machine learning, Auditing SQL database, Azure automation and azure remote control. These features help the developer to develop a user friendly and secure environment for the work. Microsoft azure is dominating the industry level cloud service market share due to these reasons. But, a personal cloud storage service provider can too provide some necessary options to optimize your work product like Google Drive. Google drive helps users to autosuggest research topics related to the field of study, Power linking, integrating surveys, maps, and use hangout for face-to-face collaboration [14]. Amazon AWS offers straight forward solutions for integrating the cloud service to the current operating system of the company [15]. These operating systems range from Ubuntu, CentOS, Microsoft Server and webservers like apache, IIS to databases like MySQL and Microsoft SQL server.

Today, many service providers like Bluemix [16] and Apple [17] are providing services like integration with third party software [18], their own development kit (apple has introduced Home kit [19] for home automation etc.) for competing with the giants. The final choice depends upon the developer’s comfort with any particular service provider and the final product. But, most developers prefer Microsoft azure due to it’s sheer range of integrated services it offers for the developers which makes the development and implementation part easier.

2.4 Pricing

The pricing is one of the key features of cloud computing. Cloud computing can bring down the initial set-up cost, maintenance cost, and complexity of the infrastructure to a really low level [20]. By the newly introduced schemes like pay-as-you-go and easier scaling of the cloud, it is getting easier to take the data online.

Pricing is an important aspect for the customer to choose a service provider over the other. The companies are coming up with some aggressive pricing for the industries. The prices for the most famous personal cloud storage service providers were found out to be reasonable for the amount of services provided. Google, One drive, Dropbox and iCloud charged $9.99, $6.99, $9.99, and $19.99 respectively for 1TB of storage on monthly basis [21, 22, 23, 24].
The prices shown in the graph are in US Dollars for 1 Terabyte of storage on monthly bill cycle basis. Clearly, One Drive, a service provided by Microsoft was proved to be the cheapest among the competition listed above. One Drive also provides 15GB of free storage without any subscription fee [25]. Which is better than the Google Drive’s 15GB of combined storage [26].

2.5 Security

Security is the most important aspect of selecting a cloud service provider. Without proper security, the cloud will simply not work for any kind of services. There are some misconceptions like only industries working on some sensitive data need proper high standard encryption or any strong protection against many types of breach, which could result in their data loss. But putting forth an example is really easy for us in the case where flawed personal cloud service security proved to be disastrous for many celebrities - The iCloud incident [27]. Though apple has introduced 2-step authentication [28] and revised their encryption techniques for any loop holes, the incident gave a clear idea whether the personal cloud’s security is important or not.

In the recent past, many other personal cloud service providers have suffered similar problems in terms of security from Evernote’s password leakage to dropbox’s accounts being compromised. It is evident that security is the most important feature to consider before considering any cloud service provider. Service providers like CloudMe, implements security on many levels. The security features of CloudMe includes prompt for stronger and 6 letter password verification and a very secured centralized storage server in Sweden. But, like many other cloud service providers, it does not encrypt the data and the data is transferred in plain text format which can be easily intercepted. It also does not provide any encryption to the stored data [29].

Dropbox is a widely used cloud storage service which is comparatively secured than many other cloud storage service provider. It does not provide encryption to the files stored on server but is very secured in terms of transmission. The synchronization and sharing is allowed among multiple platforms and the data travels to the other device securely and is difficult to intercept. It also frequently provides the software updates which constantly patch any security issues if found [30].

Google Drive provides 2-step authentication and notification of access of the drive which helps the account to be secured and keeps the user well notified. Google provides a facility with collaboration with third-party applications to encrypt the data on cloud and constantly through research and development keeps up with the norms of cyber-security [31].

One Drive provides password protection for the file’s access. It also provides Account verification and 2-step authentication for secure login [32].

So, no cloud storage provider is clear choice in terms of security. But, he security can be increased by an exponential factor if the file to be stored is split into 2 or 3 parts and then each part is stored on different clouds storage services and the transmission packets are encrypted.

3. Conclusion

The importance of cloud has increased tremendously in the past few years. It is being used for many new field of application, which were not even considered in the spectrum of cloud computing in the past. Personal cloud services are being used for professional and private uses collectively and hence the need for security to avoid incidents like iCloud and Evernote password leak has increased.
We would like to propose a generic approach towards cloud to optimize the available space, and decrease the dependency on the third-party cloud service providers. It can be done by splitting the file on a private server and then sending the file over the network to increase the security. It can result in a radical decrease in data leakages in case a cloud service provider's security is compromised.

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AUTHOR'S

Sanjna Sinha is pursuing her Engineering from MIT College of Engineering, Pune. Her interests include Cloud computing, Business analysis and analytic interpretation. Contact on sinha.sanjna18@gmail.com.

Puneet Gupta is an Engineering student of MIT College of Engineering, Pune. New to the world of programming he studied different languages and later developed a keen interest in the field of Cloud Computing. He studied about the importance of Auto- Scaling on the cloud along with its features. Other fields he is interested in are Computer Networks and Mathematics. Contact on puneetgupta0000@gmail.com

Shivam Raj is pursuing his Bachelor of Engineering (B.E) degree from Savitribai Phule University of Pune, India. His research interests are in the areas of cloud computing, database management systems, data analysis and data security. Contact on rajshivam9@gmail.com

Priyansh Bendre is an Engineering student of MIT College of Engineering, Pune. He is an avid programmer and Technology enthusiast. He also is a member of Computer Society of India. He is working on cloud computing for the past 2 years and is studying Auto-scaling in cloud closely. His other interests include data security and data analysis. Contact on priyanshbendre@gmail.com