The Technology Journey from Floppy disk to Cloud storage

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Abstract

Data storage and backup needs have evolved over the years necessitating the need for evolution of data storage methods and devices. The needs for a higher storage capacity as well as versatility of storage devices and the need for technologically advanced storage devices became apparent.

1. Introduction

Once upon a time, storage devices were simple hardware under the direct control of computer. Since those times, storage devices have grown substantially in quantity and in complexity. The invention of the computer really marked the starting of new era in human life style. It not only made the work simple and easy, but it stored the data in a highly secure manner. In the initial stages the storage devices were mostly based on magnetic elements. This study reviews the evolution of the storage systems from early mechanical systems to magnetic storage to optical storage to cloud storage. Backup is the activity of copying files or databases, so that their additional copies may be restored in case of a data loss accident. Thus, we can emphasize first two

aspects related to backup - storage media for data and depositories for backup media. Another important aspect is growing necessity in backup caused by development of computer technologies and data volumes expansion. The first computer backups were made onto big reels of magnetic tape, and even paper: punch cards and paper tape. In the next era, backups were mostly stored on floppy disks of various sizes. But today's PCs don't even have floppy drives, not to mention punch card processing devices. Backups are now written on CDs, hard drives, flash drives or via network. But some technologies, such as tape backup, still remain very popular and develop. Let's take a closer look at the history of these devices and methods and try to correlate them with backup.

2. Evolution of Backup Devices

2.1. Punch cards

The oldest known form of data storage is from 1725 and was done by Basile Bouchon when he used a perforated paper loop to store patterns that were to be used on cloth. But the first real patent for some

kind of data storage is dated back in 23 Sep 1884 by Herman Hollerith – an invention that was used for nearly 100 years until the mid 1970s. Thus, Punch cards can be considered as the first data storage devices for backup. Punch cards essentially correspond to the definition of backup, because the additional copies of punch cards were made also to restore data in case of a loss.

2.2. Magnetic Tapes

Though punch cards have been used for over than 200 years in various fields of expertise, but they actually were slow, low-capacity and required a lot of devices, efforts and time for processing. That's why, the punch card were gradually replaced by better, more capable and more efficient magnetic tape. In the 1950s magnetic tapes was first used by IBM to store data on magnetic tape. Since one roll of magnetic tape could store as much data as 10000 punch cards it achieved instant success and became the most popular way of storing of computer data until the mid 1980s.

2.3. Hard Drives

In 1956 IBM introduced the first hard drive - IBM 305 RAMAC. It was a revolution since it could store up to 4.4MB of data (5 million characters) – an enormous amount of data back then. The hard drive is still a product that is under constant development. The Hitachi Deskstar 7K500 that you can see on the image above is the first hard disk drive that can store 500 GB of data – or approximately 120 000 times more data than the world's first hard drive IBM 305 RAMAC.

2.4. Floppy Disks

In 1969 the first floppy disk was introduced. It was a read-only 8-inch disk that could store 80kB of data. Four years later, in 1973, a similar floppy disk with the same size could store 256kB of data, and it was rewritable. Since then the trend has been the same – smaller floppy disks and higher data capacity. In the late 1990s you could easily store 250 MB of data on a 3-inch disk. Floppy disks were considered as revolutionary media for transporting data from one computer to another. They could not store as much data as hard disks, but, being much cheaper and more

flexible, they became very widespread. Of course, this trend affected the backup sphere.

2.5. CD-R/RW and DVD

Though the 3.5-inch floppy disk had been a boon to home users and small businesses who needed backups, they had relatively low capacity. This problem had been solved with introduction of the next generation in storage media:

CD-Recordable (CD-R) and CD-Rewritable (CD-RW) drives. The Compact Disc, first invented by Philips and Sony in 1979, reached the market in late 1982. A typical CD of today can store 700 MB of data. A DVD (Digital Versatile Disc or Digital Video Disc) is basically a CD that uses a different kind of laser technology which makes it possible to store more data on the same amount of space. A dual layer DVD can store 8.5GB of data.
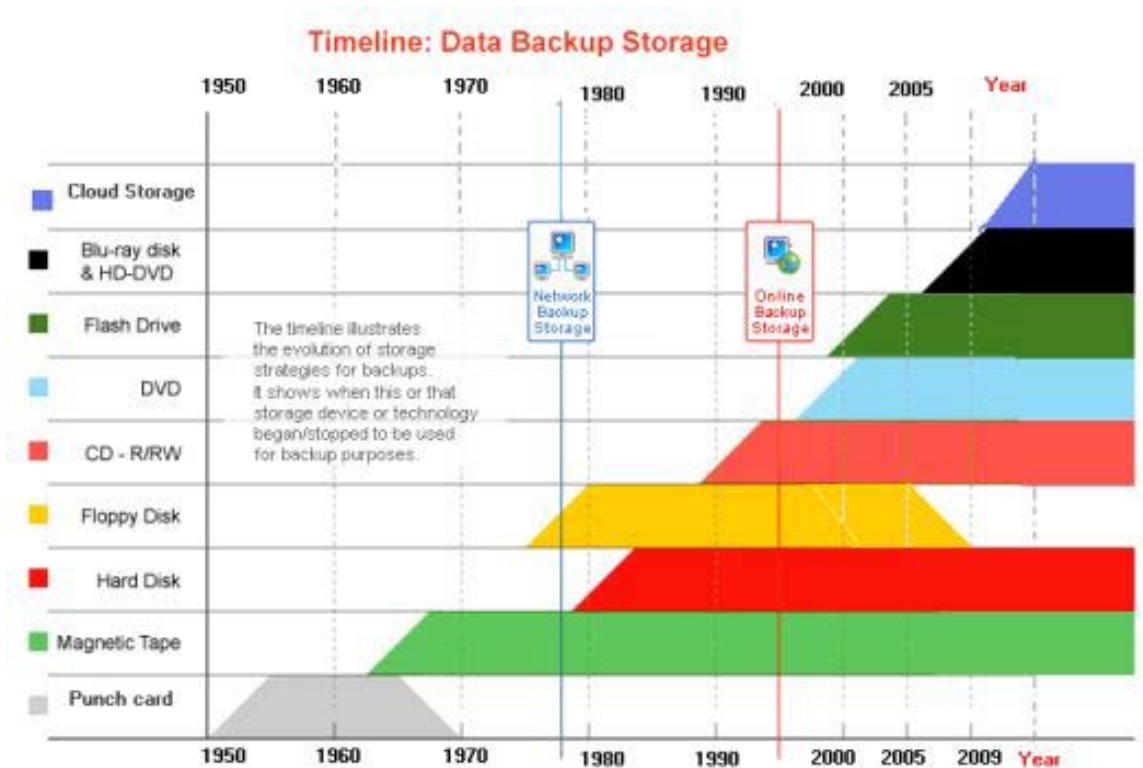
2.6. Flash Drives

Portable USB storage flash drives, invented in 1998, are rather new to the world of data backup, but they have already become very popular. The smallest of these drives stores several times more data than a traditional 3, 5 inch floppy disk, and larger ones can hold as much data as a CD-ROM or even more. Considering the size, power and cost-effectiveness of these drives, it is no wonder that they are becoming a powerful force in the data backup market.

2.7. Blu-ray Disks and HD-DVD

Blu-laser discs using organic dyes, such as the Sony Blu-ray format (between 23GB and 54GB) and Toshiba's HD-DVD are the next step to further reduction of the cost of removable media along with capacity growth and improvement of usability. They appeared on the market in 2006 and are already considered as promising devices for data backup.

2.8. Network and On-line Backup Solutions or cloud storage

Development of backup is closely connected to the evolution of network and Internet technologies. Local and global networks enabled use of remote computers storage volumes all over the world for your critical data backups. To get protected against a disaster or other site-specific problem, many people prefer to send backup files to an off-site vault.

Timeline: Data Backup Storage

The timeline illustrates the evolution of storage strategies for backups. It shows when this or that storage device or technology began/stopped to be used for backup purposes.

Legend: Cloud Storage, Blu-ray disk & HD-DVD, Flash Drive, DVD, CD - R/RW, Floppy Disk, Hard Disk, Magnetic Tape, Punch card

3. Floppy Disk Is Dead. Time to Move to Cloud

Sony has signaled what could be the final end of the venerable floppy disk. The electronics giant has said it will stop selling the 30-year-old storage media in Japan from March 2011.Earlier this year Sony stopped selling the disks in most international markets due to dwindling demand and competition from other storage formats. The slow death of the "floppy" or "diskette" began in 1998 when Apple decided to not include a floppy drive in its G3 iMac computer. Since then various other firms have stopped support for floppy disks, including computer giant Dell in 2003. Computing store PC World stopped selling them in 2007. However, Sony has continued to sell the disks, and continues to ship them in the millions. Now, the firm - which claims to have produced the first 3.5in (9cm) disks in 1981 - has decided to halt sales completely faced with competition from online storage, [online backup] and portable USB drives.

For some computer owners, finding enough storage space to hold all the data they've acquired is a real challenge. Some people invest in larger hard drives. Others prefer external storage devices like thumb drives or compact discs. Desperate computer owners might delete entire folders worth of old files in order to make space for new information. But some are choosing to rely on a growing trend: cloud storage. On the surface, cloud storage has several advantages over traditional data storage. For example, if one stores his data on a cloud storage system, he'll be able to get to that data from any location that has Internet access. One wouldn't need to carry around a physical storage device or use the same computer to save and retrieve his information. With the right storage system, one can even allow other people to access the data, turning a personal project into a collaborative effort. So cloud storage is convenient and offers more flexibility.

4. How Cloud Storage Works?

A cloud storage system needs just one data server connected to the Internet. A client (e.g., a computer user subscribing to a cloud storage service) sends copies of files over the Internet to the data server, which then records the information. When the client wishes to retrieve the information, he or she accesses the data server through a Web-based interface. The server then either sends the files back to the client or allows the client to access and manipulate the files on the server itself. Cloud storage systems generally rely on hundreds of data servers. Because computers occasionally require maintenance or repair, it's important to store the same information on multiple machines. This is called

redundancy. Without redundancy, a cloud storage system couldn't ensure clients that they could access their information at any given time. Most systems store the same data on servers that use different power supplies. That way, clients can access their data even if one power supply fails. Cloud storage clients are not at all worried about running out of storage space. They use cloud storage as a way to create backups of data. If something happens to the client's computer system, the data survives off-site. It's a digital-age variation of "Don't put all your eggs in one basket".

5. Examples of Cloud Storage

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.

- Google Docs allows users to upload documents, spreadsheets and presentations to Google's data servers. Users can edit files using a Google application. Users can also publish documents so that other people can read them or even make edits, which means Google Docs is also an example of cloud computing.

- Web e-mail providers like Gmail, Hotmail and Yahoo! Mail store e-mail messages on their own servers. Users can access their e-mail from computers and other devices connected to the Internet.

- Sites like Flickr and Picasa host millions of digital photographs. Their users create online photo albums by uploading pictures directly to the services' servers.

- YouTube hosts millions of user-uploaded video files.

- Web site hosting companies like StartLogic, Hostmonster and GoDaddy store the files and data for client Web sites.

- Services like Xdrive, MediaMax and Strongspace offer storage space for any kind of digital data.

Some of the services listed above are free. Others charge a flat fee for a certain amount of storage, and

still others have a sliding scale depending on what the client needs.

6. Concerns about Cloud Storage

The two biggest concerns about cloud storage are reliability and security. Clients aren't likely to entrust their data to another company without a guarantee that they'll be able to access their information whenever they want and no one else will be able to get at it. To secure data, most systems use a combination of techniques, including:

- Encryption, which means they use a complex algorithm to encode information. To decode the encrypted files, a user needs the encryption key. While it's possible to crack encrypted information, most hackers don't have access to the amount of computer processing power they would need to decrypt information.

- Authentication processes, which require creating a user name and password.

- Authorization practices -- the client lists the people who are authorized to access information stored on the cloud system. Many corporations have multiple levels of authorization. For example, a front-line employee might have very limited access to data stored on a cloud system, while the head of human resources might have extensive access to files.

Even with these protective measures in place, many people worry that data saved on a remote storage system is vulnerable. There's always the possibility that a hacker will find an electronic back door and access data. Hackers could also attempt to steal the physical machines on which data are stored. A disgruntled employee could alter or destroy data using his or her authenticated user name and password. Cloud storage companies invest a lot of money in security measures in order to limit the possibility of data theft or corruption. The other big concern, reliability, is just as important as security. An unstable cloud storage system is a liability. No one wants to save data to a failure-prone system, nor do they want to trust a company that isn't financially stable. While most cloud storage systems try to address this concern through redundancy techniques, there's still the possibility that an entire system could crash and leave clients with no way to access their

saved data. If a company can't meet these basic client expectations, it doesn't have much of a chance - there are too many other options available on the market.

7. The Future of Cloud Storage

"The big thing this year will be the entrance of traditional IT suppliers, like IBM, HP, and Microsoft. Published reports also continue to stoke discussion on a possible new entry from Google. But it won't just be major vendors capitalizing on the hot trend. Vaultscape launched a storage cloud specifically designed to handle archival storage for enterprise companies that have large amounts of data. Vaultscape's differentiators include a self-healing file system and "multi-master architecture," with two independent vaults that are available at all times. Data is replicated to two different geographic locations, but it is not done through a single core, so there is no single point of failure. Vaultscape is showing how the industry is maturing so there are storage clouds focused on specific needs within the large storage world. "It's not a one-size-fits-all world". Storage Switzerland's Crump predicts the next two years will be good for cloud storage vendors. The challenge for potential customers will be sifting through the many choices that will flood the market."Cloud storage should be one of those technologies that benefits from a down economy". Buying your storage a gigabyte at a time as opposed to a complete system may make a lot of sense for companies with very tight budgets.

8. Conclusion

Thus with the advent of time there is always a need for better options in terms of back up storage and as on date the best option available for internet users is Cloud Storage as backup store.

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