Slash Storage Costs, Archive to the Cloud

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Technology workers today are well aware of the tremendous data tsunami, which keeps growing ever larger and larger while swamping the storage capacity and backup windows of businesses all over the world. Additionally, shrinking IT budgets and staffing levels have severely hampered IT staffs' ability to properly store and protect the ever increasing amounts of data while also providing the business with ready and secure access to all that data.

This situation has driven businesses to look for more innovative ways to address this growing problem but without breaking the budget and the company in the process.

Over the last few years there has been an increasing amount of interest in data archiving as a possible solution to help address various factors of this problem such as:

Explosive growth of data quantities on corporate networks
Need to retain more and more data for longer periods of time to meet various legal, corporate and governance requirements
Need to properly protect increasing amounts of data in the face of shrinking backup windows
Need to contain or reduce costs wherever possible

Along with this growing interest in data archiving we have also seen the evolution of data archiving that has now culminated in Cloud Based Archive Solutions.

As most IT professionals know, approximately 20-30% of the data on most networks is active data while 70-80% is static or inactive data, which is unchanging and infrequently accessed. Keeping this inactive data on primary Tier 1 storage is expensive and inefficient. Nevertheless, it is often necessary and/or desirable to preserve this inactive data for future reference and to comply with various legal and governance requirements. It makes sense to store it on the least expensive media available while preserving the security of this data and providing access to it in a reasonable amount of time, should it be required.

The most common method of achieving this goal is through the process of archiving which, unlike backups, moves inactive data from primary disk based storage to an easily accessible, less expensive secondary storage tier which then deletes it from the disk source locations. This can help realize the objectives of cutting costs by freeing up expensive primary storage, reducing backup windows thereby increasing operational efficiency and providing reliable protection of the data for the long term. A viable and effective data archive should provide:

• Scalability
• Cost effectiveness
• Availability
• Secure long term protection for the data

A more in depth examination of various available archiving methods will reveal how they can significantly impact several key areas of data storage, protection and management such as:

• Data storage and infrastructure costs
• Data accessibility and access control
• Data backup and recovery processes

The Evolution of Archive

A closer examination of the evolution of the archiving process and the tier it uses for storage will focus on the differences and advantages of the available archiving methods. Those methods are:

- Legacy or traditional tape based archiving
- On-premise disk based archiving
- Cloud Storage archiving

Legacy Archiving

This type of archiving is the traditional tape based method that saves data from disk to tape as part of a backup process using backup software or system utilities to write the data to tapes in stand-alone tape drives or automated tape libraries. These tapes and the data they contain are segregated from normal backups by assigning a lengthy retention period, ranging from 10 years to infinite. These archive tapes are then sent to an off-site storage facility for permanent storage while the data backed up to them is deleted from the server's disk drives.

The primary advantages to this method are that tapes are relatively inexpensive, easy to handle, last a long time and provide very scalable storage, which makes storing large quantities of data very cost effective. To increase your storage capacity, simply add more tapes. Creating copies or clones of the data sets and/or primary data tapes with certain types of backup applications would provide additional data redundancy.

On the downside however there could be a lengthy wait for tapes to be brought back from off-site storage before data can be retrieved from them and there would also be the time involved in scanning the tapes, locating the required data and restoring it using the application which created the tape. Additionally there are the constraints of explosive data growth resulting in ever shrinking backup windows, limited retention capabilities and no practical means to verify the integrity of the tape media and its data as they age in storage.

On-premise Disk Based Archiving

The last few years have seen significant growth in the amounts of data and in the increasing requirement in today's business environment to store and access ever increasing amounts of archive data. Much of this is the result of evolving legal compliance requirements such as SOX, along with the globalization and decentralization of traditional company structures, which now have multiple offices scattered across large geographical areas instead of having one or two centralized locations as in the past. The need to quickly and easily access large quantities of archived data for collaboration, research and other business processes can be best addressed by disk based archive systems.

In order to address these evolving requirements to access archived data more efficiently and store ever-increasing amounts of new data, such as email, databases, etc., businesses began looking at other storage alternatives that would meet these needs in a cost effective manner.

The first step in the evolution and modernization of archiving was the deployment of disk based solutions using less expensive standard off the shelf hardware and SATA drives as well as inexpensive NAS devices. This allowed companies to maintain their data archives on-site where they could access them easily and quickly whenever necessary. However these early implementations did not adequately address the unique requirements of an archive, such as the ability to scale to Petabytes to accommodate explosive data growth and lengthy retention periods, or provide means to protect and insure the integrity of this data beyond basic RAID 6 levels in order to meet legal and corporate governance requirements. They also lacked the means to manage the archive process automatically and to impose specific retention policies on the data.

This led to the next step, which was the introduction of specialized archive systems designed to manage the data archiving process. These systems provided fast, well managed storage that could scale in capacity easily and that came with the necessary tools and software to manage the archiving process. These systems also provided data protection features beyond basic RAID 6 as well as retention policy inclusion, data integrity verification and WORM (Write Once Read Many) capabilities.

The advantages to this method of archiving were that the data copies were stored on-site and could be accessed quickly and easily. There was no more waiting for tapes to return from off-site facilities and there was no need for special hardware or backup software in order to restore the data from tapes. It was also very easy to index and search for specific data on disk. Data could be moved easily from one location to another on the network by simple copy commands and the capacity of these systems could scale easily to accommodate data growth. The major benefit was in reducing the primary storage needs, thus avoiding the need to purchase additional expensive primary storage for quite some time.

The disadvantages for a business with these disk based archive systems however was the initial buy in cost for systems that frequently started out with approximately 50 TB of disk. For many businesses it simply was neither practical nor cost effective to buy so much disk space up front when they might only need one or two Terabytes initially. In effect you would be paying up front for a lot of storage that you might not fully utilize for years. There are also the ongoing costs of powering, cooling, managing, maintaining and upgrading these systems along with their support infrastructure.

Cloud Storage Archiving

Faced with frozen or slashed budgets and minimal staffing levels but ever growing data storage demands, businesses began to look for other means to expand their storage capacity in the most cost effective manner possible. Consequently businesses are now looking at the latest development known as cloud computing, more specifically as Cloud Storage-as-a-Service as a possible means to meet their growing storage needs while minimizing their costs and need for additional personnel, hardware, infrastructure, etc.

Service providers in this new area of cloud computing provide almost infinitely scalable storage to businesses as a service with a fixed cost based on usage. This allows businesses to expand their storage on an as-needed basis without having to concern themselves with the usual costs normally associated with expanding a disk environment such as building more infrastructure, hiring and training more personnel to manage the additional storage, increased cooling and power costs for the additional storage, etc. Among other advantages, this service model also provides a geographically aware infrastructure with multiple locations. This allows businesses with multiple locations in different geographical areas to access their data from any point where they have some type of Internet access. All of this access is provided transparently to the user and appears as a simple mount point within their LAN or WAN. These solutions usually integrate easily with a business' existing infrastructure and applications while providing secure connections for all data transfers with the data secured in-flight and at rest.

These services also usually provide the ability to impose data retention policies on the stored data. Among the major providers in cloud storage archiving are Iron Mountain Virtual File Store™ (VFS), Nirvanix, Rackspace Hosting Inc.'s Mosso Cloud Division, Vaultscape and Amazon.com's S3 service. Iron Mountain is among the most experienced of these companies with many years of extensive expertise in storing and archiving information.

Among the advantages offered by this type of storage-as-a-service are the ability to scale storage almost instantly without incurring large up front capital expenditures for neither hardware nor the need to expand network infrastructure along with hiring and training more personnel to manage the additional storage. It also avoids downstream costs to upgrade and refresh the storage hardware as it ages.

The only disadvantage to this type of service is that the company's data now resides on someone else's systems rather than on the company's local systems. Therefore, it is necessary to analyze carefully what types of data would be archived to the cloud and also how the data is protected before it's moved to the cloud. In this use case experience matters, having an organization that has a proven track record of archiving and storing data securely is a clear and distinct advantage.

Because of improved access and reliability the evolution of data archiving has allowed customers to be more aggressive with moving data from primary storage. Doing so not only reduces costs in primary storage it also reduces costs in data protection and disaster recovery. Cloud storage archive is the next step in the evolution of data archiving.

A Closer Look at Cloud Archive

Now let us examine how cloud storage and archiving can help us deal with this data tsunami problem while also helping us to contain or reduce the costs of storing and protecting all this data.

The amount of data companies are required to manage and protect continues to grow at an increasing pace with some estimates running at 50% or more compounded annual data growth per year. Various factors, to name a few, such as regulatory compliance (i.e. SOX, etc.), possible litigation and e-Discovery requirements, DR mandates, collaboration requirements for decentralized offices and users saving all types of data "just in case" are helping drive this phenomenal growth in data quantities. This increasing load is impacting IT budgets, which are already strained by other economic factors, more and more heavily. This is why many companies are now examining cloud archiving to see how it can help reduce or contain the costs associated with storing, protecting and managing all this data.

All of this new and older data requires more and more storage space, which increases the demands placed on IT staffs to provide that storage space as well as the means to manage and protect the data on it. This in turn increases operating costs as companies face the need to purchase still more servers and disk, which naturally increases their requirements for more floor and rack space, more power, more cooling and more personnel to manage all this new storage. All of this drives up acquisition and operating costs straining budgets already stretched to the breaking point.

Other areas impacted by this continuing data explosion are the costs associated with protecting all this data properly. As the data sets grow ever larger, the backup and recovery windows also keep increasing until they reach a point where they can't effectively do the job properly in the time available. This makes it more difficult to meet DR objectives and time frames as well. To meet these backup and recovery needs, companies are faced with buying still more disk to hold all this data.

So is there a way to increase storage and accessibility for all this data without incurring major capital expenses and yet still providing proper protection and control of that data? To answer that question it is necessary to examine a couple of things. First, what technological developments are available to address these ever increasing storage needs cost effectively? Second, what types of data would provide cost savings by being stored on these new technological developments?

First it is necessary to determine what technologies could address these increasing storage needs economically. Some companies are now looking at "cloud computing" for a possible solution to this dilemma. This is not a new technology but one which has actually been around for some time now, and in the past has had names like storage-as-a-service and storage utility or software-as-a-service. In addition to the modernization of the term, this has been helped by increased access and bandwidth to the Internet as well as developing some new capabilities and services.

So just what is "cloud computing" and what can it provide to address the storage problems faced by so many companies these days? The definition of "cloud computing" is in a state of flux these days as various people and groups are refining the definition to reflect the new types of remote aggregator services now available on the Internet. In truth there may never be an agreed upon use of the term.

For many that have been in the computer industry for a long time (since the early 80s), they still remember "the cloud" as referring to the Internet itself. Essentially, "the cloud" was any computing or data resource and service that was outside of your own intranet or LAN. People and businesses connected to them over the Internet on a one by one, as needed basis. Old database services such as Compuserve, Delphi, Prodigy and a few others are examples of some of these "cloud" resources available back then.

Now development has moved beyond "the cloud" into "cloud computing" which in its simplest form or definition is a style of computing that makes available dynamically scalable and often virtualized services and resources, to users via the Internet. The users do not necessarily need to have any in-depth knowledge of or expertise in the technology infrastructure made available in "the cloud" in order to use it.

In the last few years it has become necessary to broaden the definition of "cloud computing" as new services and computing resources became available from various integrators and aggregators. A couple of the more familiar services are infrastructure-as-a-service (IaaS) and software-as-a-service (SaaS) along with Web 2.0 and other recent technology trends, all of which share the common theme of users relying on the Internet to satisfy their computing needs. These real time services and resources are most frequently a subscription based or pay-per-use service that extend IT's existing capabilities. Some examples of these software-as-a-service providers are Salesforce.com, Google Apps and QuickBooks, to name a few. Then there are other companies that offer on-line backup of data as a service such as Carbonite's Online Backup, EMC's Mozy, Seagate's Evault and Iron Mountain Digital's LiveVault.

More recently we have seen an addition to the definition for SaaS, which is storage-as-a-service. This new development is catching the attention of budget constrained IT as a possible means to increase storage capacity and add other capabilities on the fly without the need to invest in new hardware, infrastructure, new software or training new personnel. So now in addition to "cloud computing" there is also "cloud storage" as the latest service which is designed to address the ever increasing storage needs of IT in the most cost effective manner possible.

So what are some of the features that would need to be available in a "storage cloud" offering to make it a viable alternative for IT? It would need to:

- Have a geographically aware infrastructure that is not tied to a specific geographic location
- Present a single name space to users and administrators via the Internet
- Provide highly and easily scalable, readily accessible storage on the fly
- Be based on commodity components
- Be application agnostic
- Provide secure connections for all data transfers
- Provide data dispersal to multiple locations
- Deliver transparent file access to users and applications from the geographically closest access point
- Provide world wide collaboration on documents, etc., while keeping the user experience local
- Be billed on a usage basis
- Integrate easily and seamlessly with your infrastructure without need for custom API or interface programming on your part
- Provide automatic migration of selected and inactive data to provider's secure data centers
- Provide a means to move massive amounts of data to and from the user rapidly on request
- Provide readily accessible and qualified technical support
- Provide high security levels physically and electronically for data you store there

Ideally you would also want a provider that has been around for a good while and that has a lot of experience in data storage and archiving on a massive scale.

As this is a relatively new area of "cloud computing", there are only a few major providers in this area now. Among those are Amazon.com's S3 (Simple Storage Service), Nirvanix, Rackspace Hosting Inc.'s Mosso Cloud Division, Vaultscape Inc., and Iron Mountain Inc.'s new Virtual File Store (VFS) service. Each of these companies offerings will have different strengths and weakness that will need to be evaluated going forward. Iron Mountain is the most experienced of these companies and has been in the business of storing and archiving information for over 55 years.

Now with an idea of what "cloud storage" is and the various companies offering this service, it is necessary to determine what types of data we are dealing with and which would be good candidates for archiving on "cloud storage" services.

All data can be divided into two broad categories:
1. Active data – all data being used, modified and accessed frequently by users as well as data that is not being modified but is accessed frequently for reference or research purposes
2. Inactive data – all data this is no longer being modified and is accessed infrequently or not at all

In general, only 20% to 30% of data on most networks is active data. The other 70 to 80% of data is inactive. The problem with this inactive data is that it costs quite a bit to let it sit idle on expensive, high performance Tier 1 storage. Simply moving this inactive data, as it increases in quantity, to cheaper Tier 2 or Tier 3 storage in the data center will not eliminate other costs associated with storing and protecting this additional data. Some of those costs are:

More disk and associated enclosures

- More servers to host the additional disk
- More rack space to hold the additional disk enclosures and servers
- More floor space to accommodate additional racks
- More cabling and switches added to your infrastructure to support the new hardware
- More electrical power to run the drives, servers and associated hardware
- More cooling capacity to protect the additional hardware
- More backup software licenses
- More personnel to manage it
- Training for new personnel that will manage it

Still, it may not be possible or even desirable to simply move all this inactive data from the Tier 1 disk to tape and store it off-site in order to try and cut costs. However, if it were possible to move this inactive data to cheaper, long term, highly scalable storage that was readily accessible to users, it could possibly result in a significant cost savings by avoiding additional capital expenditures to expand current storage and infrastructure. It would enable a business to purchase storage on an as-needed basis as an ongoing monthly expense instead. The focus of cloud storage is on this particular area and it has the potential to provide significant savings while providing a company with the ability to expand its storage on the fly to meet demands while significantly minimizing costs.

So what would a cloud archive solution look like? Among other things, it should appear as just another server or mount point on your LAN. It should allow copying and moving data to it, at LAN speed, as easily as to any other server or storage on the network. It should be simple to implement and integrate easily and simply with the company's infrastructure. It should provide highly scalable, near infinite storage quickly and transparently on demand. It should support any type of data that can be put on CIFS or NFS. It should be able to work with existing backup applications, HSM and archive applications. It should also provide some means of moving massive amounts of data between the data center and the provider's data center quickly. It would provide secure links for the transfer of data over the Internet and it would provide secure physical and electronic storage of all data sent to the provider's data center.

Cloud archive solutions like Iron Mountain's Virtual File Store (VFS) are a good example of this type of service. Iron Mountain's Virtual File Store provides customers with a virtually infinite storage area to which they can easily move old data. Virtual File Store looks and acts just like any other file server on the user's local network and data can be moved to it as easily as to any other server or storage on the corporate LAN. Additionally, archive applications can also leverage Virtual File Store if they can use network mount points.

From an architectural viewpoint, Iron Mountain's Virtual File Store solution uses a semi-cloud deployment model, which consists of mixing on-premise equipment and off-premise equipment. They place a NAS appliance on premises in the data center, which receives data locally from the LAN via CIFS or NFS. It then replicates this saved data over secure VPN connections to the Iron Mountain data center where the copy is placed on their secure storage. Among the various features provided in the Virtual File Store service are:

- Virtually unlimited storage on demand
- On-site cache
- High security data centers with redundant power and cooling
- Multiple sites
- Continuous data integrity and health checks
- Secure and fast movement of large amounts of data via a physical data shuttle
- Ability to implement retention policies
- Data migration and copies occur at LAN speed
- Transparent file access to end users and applications
- Integration with Windows Active Directory
- Simple configuration and remote management
- Data is secured in-flight and at rest
- Data is replicated to secondary Iron Mountain site in a different geographic location

This semi-cloud approach is a deployment model, which will probably become more and more prevalent over time as it provides some excellent advantages such as:

- No large capital outlay for new equipment, infrastructure, personnel and maintenance
- It "feels like a local solution" because of the on-premise appliance
- Scalable capacity on demand without a corresponding investment in infrastructure or personnel
- Low, predictable, manageable costs
- Avoids costs associated with equipment obsolescence
- Avoids additional power, cooling costs, space and storage costs
- Continuous data replication of saved data to secondary sites which provide fast, uninterrupted access to company data in case of a disaster
- Easily deployed as a stand-alone solution or integrated with existing file archiving and virtualization technologies
- Single centralized storage system supporting any client OS or application that can access data via CIFS or NFS
- Supports all data types that can reside on CIFS/NFS servers
- Can be used as target for off-the-shelf backup programs
- Can be incorporated into existing HSM and Archiving solution implementations
- Files are transmitted over secure VPN network to the remote data center
- Helps meet DR requirements
- Helps meet BC requirements

These various advantages and features should help to reduce TCO thus improving ROI in this type of technology.

<u>Cloud Archive and its Effect on the Backup Process</u>

The next consideration is traditional tape backups of corporate data. Are they still necessary?

With all of the attention and discussion focused on disk based backups and archives lately, one might wonder what ever happened to tape and tape backups as well as where do they fit in the new evolving order of things? The answer is that tape is still alive and well as it continues to fulfill an important, traditional role in the data backup strategies of most businesses. The next step is to examine the idea of improving the backup process with cloud archiving which is the latest evolution in data storage services such as those provided by the Iron Mountain LiveVault and Virtual File Store services. This will also show how tape still has an important role to play in helping to manage an organization's data assets.

The primary traditional role of tape has been to make backup copies of an organization's data so that in the event of some catastrophic event or Disaster Recovery (DR) type emergency, the company could retrieve the data critical to it's ability to continue to do business. Almost every large and mid-sized company or business today has at least one dedicated backup server and tape unit or library of some type. The larger companies usually have extensive backup infrastructures consisting of multiple backup servers and tape libraries to help protect the ever-increasing amount of data on their networks.

Even when companies began to deploy disk to handle backups, it was frequently for speeding up the backup process in order to deal with shrinking backup windows caused by explosive data growth. Once the disk backup process completed, the backup application would copy or migrate the backup data from the disk cache to tape.

Moreover, until recently a secondary role for tape was the long-term storage or archiving of static data stores. In most cases this was for historical purposes as well as protecting against possible future litigation needs. It also allowed IT to free up valuable primary storage and reduce the backup window by removing large quantities of static data from the backup path.

Tape was a good choice for these tasks at the time because it was inexpensive, compared to disk, and easy to handle. It was also a well established, proven technology as it still is today. But there were some challenges in using tape for archiving through the backup application. In many cases the archiving function simply consisted of segregating different types of data to tape with moderate to long retention periods compared with the normal retention periods used for active data sets. Current active data backups were primarily for DR purposes while the inactive data was stratified into inactive data that was accessed from time to time for research and reference purposes while the rest consisted of inactive data that was accessed rarely or not at all. The backup applications were also limited in the granularity of information they could provide on the data stored in the archive. To search for and retrieve specific data sets you usually needed to know the time frame in which the required data existed as well as the name of the system that contained the data during the specified time frame. You generally needed to use special third party applications to gain greater ease and granularity in tracking and searching for specific data in tape archives.

However, significant changes in business models and requirements made companies look at their data in new ways that changed their requirements for storing and accessing their data. It was no longer sufficient to protect the data against some potential future DR needs alone.

Among some of the changes affecting companies storage requirements were:

- Decentralization of companies across large geographical areas
- The rise of collaboration on documents, databases, spread sheets, etc., among decentralized offices
- The need to access various types of historical static data for research, reference, data mining, etc. from decentralized offices
- Evolving legal and government compliance requirements such as SOX, HIPAA, etc. with increasing retention requirements with decreasing time frames to comply with data requests from courts or government entities
- The need to locate quickly, specific data in response to e-Discovery requests from legal staff, courts and government entities and to protect that data from deletion or modification
- The need to protect data generated at remote offices in the most cost effective manner possible
- The need to protect ever increasing amounts of data while containing storage and infrastructure costs

Early methods of addressing these new data protection and storage needs were on-premise solutions utilizing various technologies such as inexpensive disk arrays, NAS appliances, replication technology, deduplication appliances, additional tape servers and tape libraries, etc. However, these various solutions usually required significant up front investments in infrastructure, new hardware and trained personnel along with associated costs for power, cooling, rack space, floor space, cabling, etc. As the economic environment deteriorated and IT budgets became more and more constrained, it became necessary to find more cost effective methods of storing and protecting ever increasing amounts of data while retaining a very high degree of rapid data accessibility.

So how do you store and protect ever-increasing amounts of data and make it readily accessible across large geographical areas while containing your costs? Many companies are now taking a hard look at cloud storage services as a potential solution to this problem.

Ideally such a service would provide features such as:

- Ability to quickly and easily extend your storage capacity without incurring capital costs
- Solution integrates seamlessly with your existing infrastructure
- Ability to set retention policies on specific data sets and/or directories
- Ability to access your data from any geographic location
- Data is protected by multiple copies stored at different secure sites
- Data transfers are secured in transit and at rest
- Provides fully automated backup and recovery services for remote offices with little or no IT involvement
- Tracking and audit features that provide chain of custody information
- Data stored in a manner that complies with legal and government requirements for data integrity and auditability
- Ability to quickly and easily retrieve data
- Ability to easily and quickly perform e-Discovery searches for specific types of data
- Ability to extend retention periods for data flagged by e-Discovery searches
- Means to handle large scale data movements
- The provider is a solid company that has been around for a while

In looking at the various companies now providing cloud storage, backup and archiving services, it makes sense to look for one that has a comprehensive set of services to complement the backup process in a one-stop manner. This is because backup and archive are complementary processes. A reliable archive greatly reduces the size and scope of the backup data set. This actually broadens the case for using an online backup service since the service needs to manage less data.

Traditionally online backup has been considered for protection of remote branch offices and for small businesses that may not have the local technical expertise and resources to maintain a traditional tape backup environment. Although those of course are still viable, archiving also enables larger companies to consider online backup services.

Even without archiving, larger organizations should consider online backup as it might prove more cost effective for protecting data at remote offices than having to manage and maintain remote backup servers or transferring their data back to the main data center where it is then backed up. These services provide features such as scheduled automated backups (these are continuous backups), centralized management accessible over the Internet, cluster and VMware support and rapid recoveries using unique block level restore capabilities.

With aggressive archiving, larger organizations can now consider bringing the above advantages of online backup into the data center as well, where they can leverage a cloud archive to migrate data thus reducing the size of the data protection data payload.

Deploying the cloud archive at an organization's main offices provides companies with the ability to rapidly and transparently expand their data storage infrastructure without incurring capital costs for new hardware, personnel or infrastructure. It also allows them to properly protect ever-increasing amounts of data that need to be shared across large geographical areas while preventing loss or unauthorized access of that data.

For example, Iron Mountain's Virtual File Store (VFS) service lets you define retention policies while providing tracking and auditing capabilities that provide full chain of custody information as well as protecting data from accidental or deliberate modification or deletion. The data sets are replicated to different geographical locations which are completely secured and equipped with their own emergency power generators capable of handling an extended power failure situation.

Organizations will and should continue to count on tape. Tape provides that last line of defense that some organizations will want to maintain. Finding an organization that can blend both the management and secure storage of traditional tape based backups, archives as well as the management of digital backups and archives is an ideal data assets management strategy.

In the final analysis organizations will still want to continue using tape for some backups and even data archiving as a compliment to cloud based archive and backup. Tape provides that last line of defense against the possibility of some major problem with the cloud service or Internet access or anything else that may keep a company from being able to access it's data online. Cloud or online services can improve the backup and archive process, extending the user's ability to access their data in new and more cost effective ways.

This close examination of the various cloud storage and archive services along with the various factors involved in managing the data explosion provides the necessary information to evaluate how these services can significantly enhance a company's ability to effectively manage the data beast while maintaining data integrity, security, control, protection and accessibility while still containing or reducing costs.