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3 storage trends...  
1 crucial question

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Whitepaper

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Phil Godwin

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*"Don't believe the hype."*

**- Flavor Flav**

*"Quality questions create a quality life.*

*Successful people ask better questions and as a result, they get better answers."*

**-Anthony Robbins**

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## **Foreword by George Crump**

### Visualizing Before Adopting the Big Three Storage Trends

In a recent paper entitled "3 Storage Trends, 1 Crucial Question" by Phil Godwin, Vice President of Marketing at Clear Technologies, the author describes three storage trends: Flash Storage, Tiered Storage and Cloud Storage. He goes on to point out that IT Managers are aggressively investigating these trends, at a minimum, and in many cases are in the early phases of implementation. Each of these initiatives promises to reduce capital and operational costs while improving data center responsiveness, but each requires an understanding of the types of data sets that are in the data center to begin with and what their access profiles are. This is an area where most storage hardware vendors fall short and, as Godwin correctly points out, is an area that IT planners should be well equipped to address.

### Information Not Data

There are countless tools that can collect data from storage systems, file systems, applications and operating systems. Most of these are provided by the vendor that manufactured the system. While these solutions have come a long way in recent years, there are problems when trying to mine that data for the valuable information it can contain. IT Planners don't have time to sift through data, they need actionable information that can be quickly understood to determine how to best get the most out of the above emerging technologies.

### Holistic Not Myopic

First and foremost, vendor provided data collection tools are usually myopic, meaning they take an overly-focused view of the environment. This probably comes from each vendor's view of reality, that their product is center of the universe. Unfortunately, this view is simply not representative of the modern data center, which has a mixture of storage systems, hypervisors, virtual machines and applications.

The trends themselves are excellent examples of this mixture. Flash systems are frequently bought from a different vendor to augment an existing storage system, cloud storage is often bought or "outsourced" to offload data from an existing storage

system and tiering is often used to help facilitate the movement of data between the two new initiatives (flash and cloud) and legacy storage. A vendor-myopic approach may not be able to analyze data across these different storage platforms and provide the IT planner with the information they need to take advantage of each of their unique characteristics.

### Continuous Not Quarterly

Another key factor in developing an intelligence for the data in the data center is the ability to perform a storage asset analysis as frequently as possible. Traditionally storage assessments have been done by a third-party contractor at most once per quarter. It takes days if not weeks to organize the data which can quickly become out of date. Instead, the data center is better served when this analysis can be done on a continual basis. This near real-time access to information allows data to be relocated as needed and prevents the potential performance impact of data being on the wrong tier.

### Visual Not Verbose

The final challenge with collecting data and transforming it into information is that the typical presentation of that data is textual and too verbose. As Godwin covers in his paper, 65% of people are visual learners. To make matters worse IT professionals are all stretched too thin, they don't have time to plow through a verbose report. They need this data transformed into information and then have specific problem areas brought to their attention visually. As the saying goes "a picture is worth 1,000 words". In the case of the overworked IT professional the visual presentation of this information may be the only way they have the time to consume it.

### Applying Visual Information To Storage Trends

Armed with a visual assessment of their storage assets, IT professionals can make better decisions based on these new storage trends. Flash is still a premium vs. hard disk drives so making sure the right data is on flash storage is critical to maximizing performance and minimizing cost. Cloud storage is ideal for data that has become less active or where recall time will not impact revenue. Again, visualizing which data should be on this tier of storage is critical to project success. Tiering is the engine

that makes the other two technologies practical. Knowing what to feed the tiering engine and when to override it will assure maximum benefit and minimize user impact.

## Conclusion

In his paper, Godwin goes into much more detail about these technologies, their value to the data center, and how to identify this information in his report. In short, IT planners need to avoid the often vendor-motivated suggestion to blindly throw hardware at the problem. Instead, it makes sense to step back and learn what types of data you have and how to best apply these technologies to them.



## **Abstract**

Three storage-related technologies have dominated the headlines over the past several years. They are *flash*, *(auto) tiered-storage* and of course, "*the cloud*". Most, if not all, of these news articles describe what each is and are focused on its benefits. Yet, despite its notable benefits, one crucial question needs to be answered before adopting any of these technologies. This whitepaper describes each of these technology trends and elaborates on a crucial unanswered question.

## Introduction

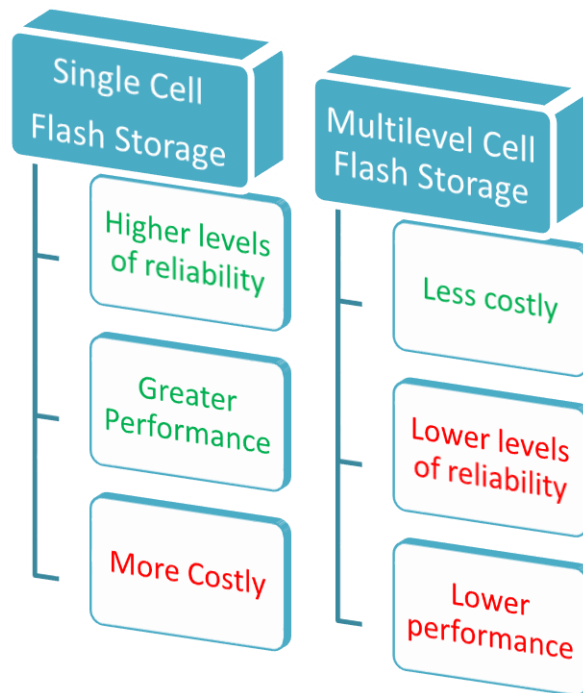
Breakthroughs in the underlying technologies, more cost-effective solutions, and market trends such as big data and socially-connected businesses are making it possible for a wide range of use cases for various storage solutions that span multiple markets. As a result, the terms, *flash*, *(auto) tiered-storage*, and *“the cloud”* have gained in prominence and popularity, steadily beating out other popular technology marketing buzzwords. Moreover, *flash*, *tiered-storage*, and *“the cloud”*, have swept the IT community by storm and have been called revolutionary, exciting, and the next paradigm in IT efficiency and cost containment. However, obtaining notoriety is only the first hurdle in becoming a sustainable long-term trend that delivers value. Business executives must delineate between marketing “hype” and solutions that deliver real functionality and value. This article elaborates on each of these trends and then asks (and later answers) a crucial question, not being asked in discussions about each of these storage technologies.

## What is Flash Storage?

According to Michael Kuhn, Business Line Executive, IBM Flash Systems flash storage is an innovation that will, “...empower clients to push the boundaries of IT.” Based on flash memory, which is a type of storage media that can be electrically erased



and reprogrammed, 'flash storage' can range in complexity and size from portable USB “jump” drives, a single solid-state drive in a laptop, to enterprise-class array-based memory systems. Two material types of flash media are often in use: single-level cell and multilevel cell. Single-level cell has higher levels of reliability but is more costly than multilevel cell flash. Single-level cell is often chosen over multilevel cell, because it offers greater performance. Multilevel cell offers better cost and capacity than single-level cell but with lower reliability.

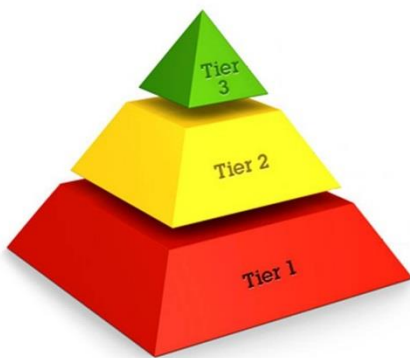


Flash storage systems usually contain a memory unit, which stores data, and an access controller, which manages and controls access to the storage space on the memory unit. In some cases, some systems use a hybrid version, in which hard drives have both a conventional hard drive and a flash memory module. Think of the access controller as Patrick Swayze from Road House for the storage space in your flash unit.

According to one recent article, adoption of flash storage among enterprises is growing at a steady clip, with as much as 30 percent using it and another 32 percent planning to deploy it. Since it uses electricity and has no mechanical parts, flash storage normally uses about 20% of the power and reads more than one hundred times faster than traditional mechanical hard drives. As such, data center managers looking to save on energy costs and IT managers that administrate I/O-intensive applications for big data analytics that utilize fast database transactions often prefer flash storage for its efficient and cost-effective properties. Specifically, in terms of

cost for performance, which is measured by the dollar per IOPS (input/output operations per second), flash has shown to be over seven times cheaper than hard disk drives. Furthermore, with IOPS as the metric, flash surpasses disk with one flash drive producing as much as five times the amount of IOPS than a traditional 15k hard disk. For these notable benefits, Forrester expects that flash will become ubiquitous in transaction-heavy environments, not just performance-sensitive ones, in the near future. Based on this growing need, enterprise storage providers, such as Dell, EMC, IBM, and NetApp, have all entered the flash storage market. In fact flash sales are outgrowing hard disk sales and are on pace to reach \$1.2 billion in sales by 2015 (IT Trends & Analysis, 2013). This makes sense given that flash solutions offer a high performance and now cost comparable alternative to traditional hard disk drives.

## What is Tiered-Storage?



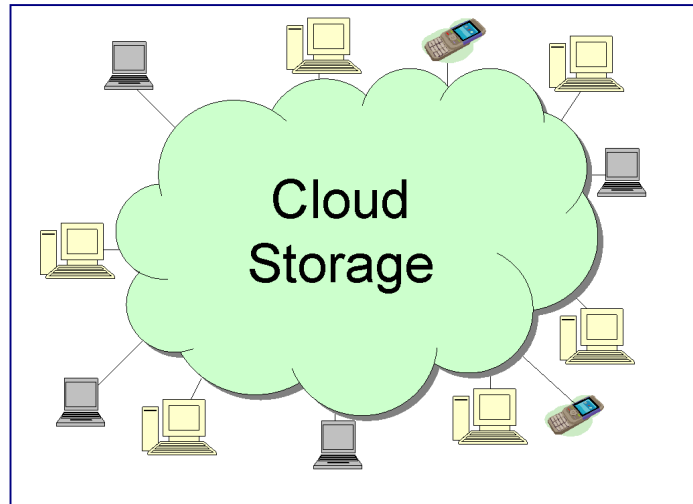
Another storage technology gaining prominence is tiered-storage. Tiered-storage refers to assigning different types of data to different types of storage media to ensure optimal cost and performance efficiency. As Alan Atkinson, Vice President and General Manager for Dell Storage explains, “Though all-flash storage excels in high-performance use cases...they do not compare favorably to high capacity hard drives.” This is true because unstructured data oftentimes is not performance-sensitive, because it does not need to be accessed by thousands of users at a time. Tiered-storage thus enables IT managers to effortlessly allocate data and applications to the most appropriate storage medium by using several sets of workflow rules or algorithms.

Improvements to tiered-storage technologies have resulted in some systems being able to not only assign data between the different hard disk versus flash media, but also the ability to instantly allocate storage across multiple flash drive types. This can increase overall flash reliability because the system first separates non-performance-sensitive, performance-sensitive, and highly-performance-sensitive data and then appropriately (and only places) the highly-sensitive performance data in the most expensive flash tier. Appropriate placement thus drastically reduces the overall cost to implement flash since IT managers need to buy less of the more expensive single cell first-tier storage and more of the less expensive and slightly slower multiple cell

second tiered-storage. Hence, the real value of tiered-storage is that it provides the best of both worlds: data is written to the fastest tier using the more expensive flash drives and as data ages, the data is automatically moved to less expensive multiple cell drives, and eventually to slower and much less expensive traditional hard drives.

## What is Cloud Storage?

One study concluded that although storage is initially cheap to buy, a majority of storage's total cost of ownership is spent on *maintenance*. As a result, because storing huge and growing volumes of enterprise data is not sustainable from either a cost or management perspective, many IT departments are looking to cloud storage as a cost-effective and simpler way to store data.



Hailed by some as a “storage game changer,” cloud storage has a unique architecture as the data is stored on multiple virtual servers rather than being hosted on dedicated servers. Companies that require their data to be hosted either buy or lease storage capacity from information-as-a-service hosting companies and uses it to meet their end-user's storage needs. Hosting companies operate large data centers that may physically span across multiple servers and in multiple data centers. The data center operators then in turn, virtualize the resources according to customer requirements and expose them as virtual servers for the customers to use.

Andrew Reichmann, of Forrester Research summed it up best in his recent article, *Cloud Storage Comes down to Earth*, “Done right, cloud storage promises to free up your I&O staff from complex and onerous storage management tasks”. Most new technologies, however, promise to serve and please but fail to reach their potential because of unforeseen circumstances. Mr. Reichmann echoes this sentiment when stating, “Few advances in storage have been hyped as much as “cloud storage.” Every vendor in the space is painting its products and message with a cloud veneer. But for all this hype, there is little clarity about what cloud storage really means and how it might be used. Currently, only three cloud storage use cases are ready for prime time:

1) whole in-cloud applications with their own storage; 2) backup to the cloud; and 3) file storage in the cloud.” He concludes that in order to achieve the benefits, “you must push for Service Level Agreements (SLAs) that are as good as, if not better than, ones you could offer internally.”



## **What’s the crucial question?**

The real task before moving toward the flash, tiered-storage, or storage cloud is to make sure that you understand your current and future storage needs and then hold your providers accountable. To accomplish this you need to have a grasp of your storage situation...which includes what’s in the current storage environment, the unused/underused amounts, and your storage utilization growth trend. So...do you have a grasp of your storage situation?

A customer of ours recently engaged in iterative adopting flash storage, tiered-storage, and cloud storage. This company, with the help of its vendors, quickly realized the benefits of economies of scale of each and the project sponsor was quite proud about his team’s efforts toward “revolutionizing his storage environment with best of breed technologies”. And, because of the cost reduction and efficiency increase he realized after adopting these technologies, he wanted to move all of his applications/data onto these systems.

However, he was quite frustrated because no one could completely predict his organization’s storage usage of these applications. We probed further to understand the cause of this frustration. He stated he could not make smarter purchasing decisions because of his team’s inability to provide a visual, actionable storage intelligence report. Moreover, although he had both human and technology assets to perform the analysis, his team could not, in a timely manner provide intelligence because of the difficulty of performing the analysis.

He summed it up best when he stated, “I do not need data - I need intelligence!” As a result, we realized that three cloud metaphors were to blame. These include that the analysis was not visual, thorough, and time consuming to attain.



administrators include that it is non-obtrusive, provides visual analytics, does not require learning a new piece of software, does not require any special data-gathering, and enhances future planning.

**Rapidly Ready to Use.** Delivered as a Software-as-a-Service (SaaS) offering or frequent report, Visual Storage Intelligence® tool does not require additional training or data-gathering.

**Rapidly Provides Insight.** Enables IT to realize, reduce and efficiently reallocate storage to meet the needs of the end-user. The summary provides a snapshot of the SAN environment which helps to complete a root-cause analysis of issues.

**Rapidly Reports an Overall Picture.** By consolidating and distilling only those relevant problems, Visual Storage Intelligence™ provides the means from which a person can make accurate decisions. Hundreds of pages are summarized into a small set of charts and graphs. This visual report contains data summarized across all the storage arrays.

**Rapidly Enables Future Planning.** Users are able to obtain tremendous present and future benefits. By quickly and efficiently analyzing the SAN, users spend more time proactively planning future storage allocation needs. This lead time enables the user to be able to stick to budget constraints but also make more efficient use of financial resources.



## References

Bagchi, Kallol, and Godwin Udo. "An Analysis of the Growth of Computer and Internet Security Breaches." *Communications of the Association for Information Systems* 12 (2003): 684. Print.

Reichmann, Andrew. "Cloud Storage Comes Down To Earth." *Forrester*. Forrester, 17 8 2010. Web. 17 Feb 2014.

Trefis, Team. "NetApp's All-Flash Array To Take On EMC In Fast Growing Market." *Forbes*. Forbes, 20 12 2013. Web. 17 Feb 2014.