

Think Your Business Can't Afford to Implement Flash Storage? Maybe You Can't Afford *Not* To

An Executive Brief Sponsored by IBM

Introduction

Storage growth consistently ranks among the top data center concerns cited by IT leaders in a Frost & Sullivan annual survey. If the issue were simply one of volume, storage administrators would just load the data onto tape and send it to an offsite vault. Instead, enterprises want to unlock the value of their growing data assets. And therein lies the challenge.

In a hypercompetitive business environment, organizations expect their data to work harder than ever before. Data is accessed by multiple applications; combined with data from multiple sources; analyzed, replicated, encrypted, and utilized over an extended period of time. Storage administrators, long accustomed to buying more hardware to accommodate the growing volumes of data, are now facing urgent needs for performance—that is, ensuring the data is continually available for processing in real time, as needed, for a reasonable cost.

The right flash system will deliver performance benefits that can offset topline costs.

To respond to changing needs, storage technologies have evolved. New systems are being introduced that rely on flash (or solid state) technology, which provides greater density, faster transactions, higher availability, and greater power efficiency than traditional hard drives. Unfortunately, many businesses associate flash with a premium price-point, and decide they cannot justify the investment.

Perhaps they're looking at the wrong flash systems. The right flash storage system can fit right into the enterprise data center environment, optimizing the most critical data workloads, including those that rely on powerful, next-generation mainframes. Furthermore, the right flash system will deliver performance benefits for the business that offset top-line costs.

In this paper, we explore flash storage technology, and offer tips for selecting a system that can deliver the performance you need in a budget-friendly way.

Comparing Hard Disk and Flash Storage

For decades, enterprise storage has been dominated by the hard disk drive (HDD), a reliable and cost-effective technology originally introduced by IBM in 1956. While HDD continues to serve as the foundation for the vast majority of today's storage, flash or Solid State Drive (SSD) technology has recently emerged as a strong and forward-looking alternative for many enterprise workloads.

The two technologies differ in the way they store and access data, which impacts performance and data reliability.

Hard Disk Drive (HDD)

HDD works like an old-fashioned record player. Data is written to a magnetic spinning disk via a “head” affixed to a mechanical arm that floats above the disk. For each Input/Output request, the storage operating system directs the read/write head to locate one or more physical locations on the spinning disk.

The major advantage of HDD storage is its ability to handle large volumes of data at low cost. On the negative side, the mechanical nature of HDD storage means transactions can be subject to performance-impacting latency. Furthermore, because of its moving parts, HDD is vulnerable to errors and malfunctions: like an old-fashioned record player playing a vinyl record, a jolt to the server could damage the disk and potentially cause the loss of data.

Flash or Solid State Drive (SSD)

With flash, data is stored on interconnected memory chips. “Flash” describes a type of Electronically Erasable Programmable Read Only Memory chip, which stores and erases data in large blocks. The term Solid State Drive (SSD) simply means a computer drive that has no moving parts; the terms are often used interchangeably, because flash drives are all solid state drives.

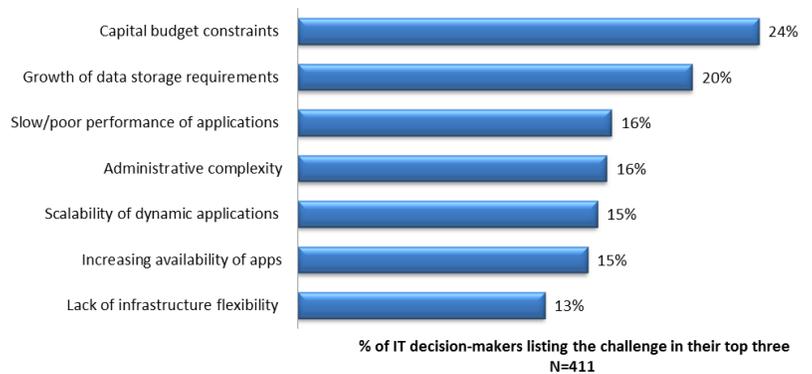
Flash offers higher levels of availability, data integrity, and performance than HDD.

With flash memory, there are no moving parts as there are in HDD; data is written to the chips using transistors and must be electronically erased. This is why flash technology is considered “non-volatile.” Flash does not require continual power to retain the data. As a result, flash offers advantages in performance and resiliency over HDD. In addition, the greater density of flash systems often introduce significant savings on energy costs. While more costly than HDD, flash technology prices are dropping to the point where some systems being used for primary storage.

Why Flash? How Flash Storage Can Address Top IT Concerns

The advantages offered by flash address some of the top issues facing IT leaders as they transform their old, inflexible data centers to serve a new, agile business environment. In a recent Stratecast survey, IT decision-makers cited storage growth among their top-three IT concerns. Storage also contributes to other top-ranked challenges.

- **Budget-friendliness** – Budget challenges continue to plague IT organizations, with 24% of IT decision-makers ranking “capital budget constraints” as a top IT challenge. To minimize ongoing investments, flash storage solutions are dense and able to grow incrementally. In addition, flash storage systems can introduce business value that offsets top-line costs.



- **Storage growth** – 20% of IT decision-makers cite “growth of data storage” as a top concern. Because optimized flash systems generally offer greater density (storing more data in a smaller footprint) than HDD, flash can more easily handle the influx of data.
- **Performance** – 16% of IT decision-makers cite “slow or poor performance of applications” as a top IT challenge. Flash storage is able to process transactions more quickly than traditional HDD.
- **Complexity** - 16% of IT decision-makers cite “administrative complexity” as a top IT challenge. A next-gen flash storage system is simple and easy to manage, with intelligence that supports efficient and flexible configurations.
- **Scalability** – 15% of IT decision-makers cite “scalability of dynamic applications” as a top challenge. Well-designed flash storage systems can accommodate data growth without incurring performance loss.
- **Availability** – 15% of decision-makers list “increasing availability of apps” as a top challenge. Non-volatile flash storage facilitates resiliency, to enable always-on business operations.
- **Flexibility** – 13% of decision-makers list “lack of infrastructure flexibility” as a top challenge. A well-designed storage solution should be able to support a hybrid environment, to meet changing business needs.

Is Your Company Ready for Flash? Understanding the Business Value

How can you determine whether your business can benefit from flash technology? Is flash a difficult-to-justify luxury, or an essential part of your IT transformation initiative?

Data is a strategic business asset, and your storage solutions enable you to leverage that asset.

The first step in your assessment is to recognize that data is a strategic business asset, and your storage solutions enable you to leverage that asset. Consider your company’s top business goals: for example, market

agility, analytics-based decisions, customer data privacy, perhaps new revenue streams from Internet of Things. Such goals rely on your business’s intellectual property; and achieving each of them can be helped or hindered by your storage solution.

With an understanding that storage can materially impact your ability to attain business goals, start to quantify the business value. For example,

- **Work with your Line of Business colleagues to understand how they use the stored data** to meet their business goals. And not just how they use strategic data assets today, but how they *could* use valuable data assets to make smarter decisions, faster, to drive revenue and maintain a competitive edge. For example, the customer care organization may be measured on transactions per hour and customer satisfaction—both of which are negatively impacted by slow system responsiveness. Or perhaps your data analysts require constant access to sales data—and any delay or loss of data (due to an outage) can significantly curtail productivity. Maybe your strategic marketing team could take immediate action in response to competitive price changes if their analytics software had real-time access to customer, market, and pricing databases. In each LoB discussion, seek to translate business impacts into dollars—for example, calculate the positive value associated with handling 10-30% more

care transactions per hour; and the negative value associated with employee downtime from unavailable or corrupted data.

- **Consider actual or “soft” costs associated with ensuring compliance and security** of data in your current environment. Compare with equivalent costs in a next-generation flash system; for example, a system in which the flash drives are self-encrypted so that the data is protected without impacting performance.
- **Consider costs (in time and labor) associated with managing your current storage environment;** compared with lower costs that may be associated with an easy-to-administer flash system.

By quantifying the business value associated with high-performance, high-availability, secure storage, you are in better position to build a business case that considers both the top-line cost of implementing a flash system and the lost-opportunity cost of *not* choosing a flash system. It is likely that your business, like many others, will find you can easily justify the investment in flash.

Starting on the Journey to Flash

Once you have determined that flash is the right direction, you are ready to build your roadmap. The good news is that the transition to flash does not require a forklift change. Nor do you need to deploy flash only for new databases. With the right system, you can easily integrate new technology into your data center infrastructure, replacing your current storage with next-generation flash systems as it needs refreshing.

Your flash storage system must integrate with a range of servers, support local and remote workloads, scale as needed, and secure data in primary and backup environments.

More importantly, your “journey to flash” should be part of your IT transformation journey. If, like most businesses, you are moving to a future that will integrate multiple services, infrastructure options, and deployment models to support your company’s technology needs, then your storage evolution must follow the same path. This means your flash storage system must be able to integrate with a range of servers and systems, including mainframes; must consistently support both local and remote workloads with minimal latency; must scale as needed; and must support governance policies for secure data storage both in the primary and backup environments. In addition, your system must support your goals for cost-optimization and performance-optimization, allowing you to deploy and move data as needed to the best-suited technology or tier.

Selecting the Right Flash System for your Business

Flash seems to be everywhere, with many storage vendors rolling out new products in the past months. But not all flash systems are the same. Among the important criteria that differentiate flash-based systems are:

- Architecture, which can impact density, performance, and availability.
- Security components, including how (and whether) the system secures your data.
- Intelligence and automation, which can impact system efficiency and management complexity.
- Administrative tools, which can impact time and labor, and maximize business value.

- Flexibility and hybrid support, to integrate with other data center components and cloud services.

As you research various vendors' flash systems, consider the following attributes:

Performance – Depending on how they are engineered, flash systems vary in speed and consistency of transaction processing, as well as how much control you have over the performance. Look for systems with the latest, high-performance processors. Furthermore, ensure you have the flexibility to match the right amount of processing power with the workload need, including extreme performance for your most sensitive workloads.

Low latency – In general, flash technology is faster than HDD; however, not all flash systems offer the same results. To handle your latency-sensitive storage, look for a system that is specifically designed to minimize delay, with streamlined data throughput and faster read/write transactions.

Scalability – With some systems, adding arrays can degrade performance. Ensure the system you choose allows you to configure your storage so that critical workloads consistently perform as needed, even as the data volume grows.

Efficient capacity utilization – By maximizing the available storage capacity, you can avoid overprovisioning and better manage your capital budget. “Thin provisioning” and automated capacity allocation enable you to reduce storage costs.

Reliable disk operation – Like all hardware, SSDs are prone to wear and tear, even failure after performing a large number of transactions. Vendors try to address the issue in various ways, including RAID rebuilds when the system is under stress. A better option is to build ongoing flash disk inspection and rebuilds into the normal storage operating instructions. Look for a system that includes intelligent algorithms to rebuild SSD before vulnerabilities are introduced.

Security and compliance support – If your data must pass through a separate encryption software layer, it can incur latency. Look for a system with self-encrypted flash drives that do not compromise performance.

Integration with a variety of systems, servers, and mainframes – Your flash storage system must support all the systems you use for your workloads, including multiple generations of mainframes, without any compromise to performance or availability.

High availability and business continuity – In a 24x7x365 business, critical workloads cannot tolerate lost or unavailable data. Nor can they tolerate the performance degradation experienced by some vendors' storage systems when replication processes are running. Make sure your system supports your Business Continuity needs, including assurance of at least six-nines availability (99.9999% uptime - or about 30 seconds of downtime per year). In addition, look for the system's architecture to support Disaster Recovery scenarios, including data mirroring and replication across multiple sites with no loss of performance.

Intelligent platform – Efficient storage is dynamic, not static. Look for a platform that performs tasks such as data tiering, efficient caching, and Quality of Service prioritization, to ensure your storage and workloads are continually optimized. In addition, look for a platform that supports key integration points and enhanced functionality between the application hosts and storage system; this will optimize performance while reducing host processor utilization.

Simple administrative tools – The system should provide visibility and control at a granular level, to enable storage and workload administrators to easily understand capacity and performance and manipulate the levers in real time. It should also provide robust reporting capabilities to enable storage professionals to share data with business stakeholders.

Stratecast The Last Word

In the economy of the future, data is king. Successful businesses will harness, track, manipulate, replicate, analyze, and act on data faster, more consistently, and more securely than ever before. And that calls for a new way of storing and accessing data.

Flash technology is at the heart of next generation storage systems. Businesses that have been hesitant to adopt flash because of cost concerns may be heartened to learn that flash can be a highly cost-effective solution to a number of business challenges – including increased agility, data availability, application performance, and security. In fact, in calculations that include overall business value, flash can easily beat HDD in price-performance.

However, the technology alone will not meet enterprise needs. Enterprises need flash storage systems that can take them into the hybrid future; where applications may access data from multiple sources, and data may be accessed by multiple applications; where workloads may be split among premises-based mainframes, multi-tenant clouds, and even third-party software. To support such hard-working data – to ensure each workload can consistently access the data it needs, as quickly and securely as needed – the flash storage system must be flexible, intelligent, efficient, and adaptable to multi-environments.

The bar has been raised for acceptable technology performance. Once considered a niche technology for the highest-performing workloads, flash will soon be the norm, providing secure, resilient, high performance Tier 1 storage. Don't be the last business in your industry start on the flash journey.

Lynda Stadtmueller

Vice President – Cloud Services

Stratecast | Frost & Sullivan

lstaadtmueller@stratecast.com

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