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FLASH MYTHS MEET FLASH FACTS



ABOUT THE AUTHOR

Michael Zwolski is a z Systems and Storage Solution Advisor with LRS® IT Solutions. With more than 30 years of experience supporting Fortune 100 IBM customers in the areas of mainframe and enterprise storage, Michael is skilled at interfacing between technical and business resources.

His deep knowledge of IBM® storage solutions including DS8000, XIV, A9000, SVC, Storwize, TS7000 and others make him a valuable asset on storage projects.

Flash is the newest storage technology available for your IT environment, but it's no longer really "new." IBM introduced its first FlashSystem products in 2013, so flash storage has already attained a level of maturity.

But that doesn't mean the technology has been embraced by all data center personnel. Some are skeptical about this new medium while others resist change. They'll need to get in the game soon; Gartner has predicted that half of all data centers will be using flash storage for high-performance computing and big data workloads by 2021.

Flash storage will obviously continue its steady march to replace spinning disk drives. So far, though, there is one market segment that is often overlooked: the small-to-intermediate size mainframe customer.

There's really no reason for this, because flash storage can provide an immediate and significant benefit to all mainframe customers, regardless of size and workload types. You may not believe me, and that's probably because you've heard some of the myths about flash storage.

In this ebook, I want to discuss the top 4 Flash Myths and bust them with Flash Facts. Read on!

Flash Myth 1

Flash and SSD are the same.

I often encounter people who think that flash and SSD – Solid State Disk, that is – are the same thing. Nothing could be farther from the truth! Be careful if a vendor interchanges the terms flash and SSD.

The term “flash storage” refers to flash cards packaged in an enclosure that’s designed for their performance capacity. If you put flash cards in disk drawers architected for spinning disks (aka, Hard Disk Drives or HDDs), you get some performance benefit. That benefit, however, is limited by the disk drawer itself.

But that’s just what SSD really is: the placement of flash cards in an HDD disk drawer. It’s faster than spinning disk, to be sure, but still limited. Packaging flash cards in an enclosure designed for their performance capacity is the key to flash storage’s advantage.

See, the flash cards themselves have become a commodity, much like spinning disk has. They are a technically impressive commodity to be sure, but all the big players buy their flash cards from the same manufacturers. It’s not the flash card itself that’s the “secret sauce” of flash storage. The secret sauce is the packaging of the flash cards into a unit that delivers both better performance, and also consistent performance over time (i.e. no degradation).

When you swap out the disk for flash cards, you get benefit, but only up to the capability of the disk drawer itself. The placement of flash cards in a disk drawer is what is called Solid State Disk (SSD). Faster than spinning disk, but still limited.

When you not only replace the spinning disk, but also the whole disk drawer itself, you start to have more options available. The repackaging of flash cards into a new flash enclosure that is designed for the performance capacity of flash cards is key. This new enclosure provides the data paths to allow the flash cards to be utilized so that they deliver on their potential. This is flash storage.

The net effect is that moving from spinning disk to SSD might yield a performance benefit that is several-fold in scope. The move from SSD to a true flash architecture will deliver yet another several-fold increase in performance.

Since the purchase price of SSD and true flash storage in a new disk system are very close, flash is the only good business decision. For a small gap in price, you will receive an order of magnitude benefit with true flash.

Ignore the myth. Understand the technology. Buy true flash capability for your mainframe.



**Ignore the myth.
Understand the technology.
Buy true flash capability.**

Flash Myth 2

All Flash providers are technically equal.

Like any other technology, flash storage has had early adopters and it will have late joiners. Some providers are delivering their first or second generation of flash to the market, while others are already delivering their twentieth generation. But the idea that each vendor provides products that are technically equal is just a myth.

The technical leader in this field is Texas Memory Systems. Founded in 1978, TMS has sold solid state drive products longer than any other company.

TMS' large customers were organizations like the US Department of Defense. Its solutions were viable because the need for information was of such great importance that the cost wasn't a limiting factor.

Here's just one example: Think of using face recognition to identify bad guys at a sporting event the President of the United States is attending. This isn't some batch job you can just re-run. You need to stop the bad guys at the entry gate the first time because there really is no second chance. That's the type of workload that TMS designed flash storage to handle.

IBM acquired TMS in 2012 to integrate their unique technology into the IBM suite of storage offerings, and to make flash the cornerstone of all those offerings. IBM understood ahead of time the value of acquiring a mature technology to build on in this exploding storage arena.

It's worth mentioning that IBM has been in Gartner's Magic Quadrant for flash storage since it acquired TMS. IDC has also placed IBM at the top in terms of flash sales. They were a leader in their field and their "secret sauce" was their packaging.

That "secret sauce" is now being used within IBM (as in the HPFE), and has resulted in IBM flash product and product vision, being best of breed. Not in IBM's words, but in the words of the major industry consultants.

Ignore the myth. Consider the pedigree of the solutions you are evaluating.



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Flash Myth 3

Flash doesn't help cache-friendly workloads.

According to this myth, flash is valuable for open systems, but less so for mainframe environments. After all, the myth says, mainframe applications were generally written to be cache friendly, and getting data from cache is faster than getting data from flash, so why bother adding flash to a cache friendly workload?

That might sound reasonable, but it's actually incorrect. If you have a mainframe workload, or a mainframe-like workload, consider this example.

Let's say you have a 3:1 read/write ratio, with an 80% read cache hit rate, and you're doing 10,000 I/O's per second. With cache and spinning disk today, you might have 1 ms response time for a cache hit and 5 ms response time for a cache miss.

In this example, the time it takes to handle the 15% of the I/O that are cache misses is almost equal to the time it takes for the other 85% of the I/O to occur.

By contrast, in a Flash environment, all reads and writes are effectively cache hits, so 10,000 I/O's per second equals 10,000 ms total.

That's a reduction in total time of 37.5%, which is a lot of time saved from a cache-friendly workload. Less friendly workloads will benefit even more, of course.

Ignore the myth. Even the friendliest cache workloads can benefit from flash technology. A lot.

10,000 I/O operations per second, with a 3:1 read/write ratio:

= 7,500 reads + 2,500 writes

With an 80% read cache hit ratio:

**= 6,000 cache read hits
+ 1,500 cache read misses
+ 2,500 cache write hits ***

**= (6,000 x 1 ms)
+ (1,500 x 5 ms)
+ (2,500 x 1 ms)**

**= 6,000 ms
+ 7,500 ms
+ 2,500 ms**

**= 8,500 ms for the 85% that are cache hits
+ 7,500 ms for the 15% that are cache misses
= 16,000 ms total**

* Note that cache hits are always 100% due to Cache Fast write technology

**Ignore the myth.
Cache-friendly
workloads benefit
from flash. A lot.**

Flash Myth 4

I can't afford Flash.

Now that I've busted the three biggest flash storage myths, the technology's benefits should be clear. So now we face the biggest myth of all: I can't afford flash.

The affordability myth is the easiest to use when you're resisting a technology. But even if the purchase price is higher than another technology, the real point is that you think you can't justify the price.

Here's the myth busting sentence: You need to look beyond the initial price and focus on total ownership costs in order to justify the price of flash storage.

Compared to spinning disk, flash requires about one-fourth the power, one-fifth the cooling expense, and one-fifth the floor space. Those are real dollar savings, no matter what size organization you are, and they will have real impact on your organization's bottom line.

IBM's big customers saw these savings early on, and so did IBM. Some customers can now justify new technology with energy savings as their leading argument. Flash can also help with the increasingly common corporate "green" initiatives in many large and small companies.

Being green doesn't just mean loving the planet; it means green as in hard dollar savings as well. Saving money in energy costs is real. It's now more likely than ever that corporate executives will find that argument resonates.

Be sure to research the potential savings your organization can realize from implementing flash. You just might find you are leaving solid business justification on the table if you don't.

Ignore the myth. You can justify the price of flash storage.



**Ignore the myth.
You can justify the price of flash storage.**



Flash product focus: DS8880

IBM's various storage products implement Flash differently based on the underlying product technology. For the mainframe customer, IBM® offers the DS8880 subsystem.

The flash-only models of the DS8880 employ a new IBM technology called a High Performance Flash Enclosure (HPFE), which is designed for faster access to the Power8 processors under the covers of the DS8880. This design is a flash designed architecture. The result is performance far beyond what any SSD can deliver.

This delivers two benefits. The first is that traditional I/O is delivered much faster to the host than is otherwise possible. The second benefit is that entirely new technologies are enabled by the increased performance capability.

One such technology is IBM zHyperLink, built exclusively for IBM Flash Storage technology. This new I/O architecture, the first since FICON, is an ultra-fast link between the IBM mainframe and the DS8880. On the server

side, zHyperLink is a function available starting with the IBM z14 family of servers. On the storage side, zHyperLink is a function available starting with the DS8880 family of disk subsystems.

The zHyperLink design point is for I/O so fast that processors will no longer dispatch other work when waiting for a zHyperLink I/O to complete, but will instead wait for the data. Think about that: Storage I/O delivered at the speed of a memory-to-memory connection.

The design goal is to deliver performance comparable to that delivered by IBM Coupling Links today in IBM Parallel Sysplex customers. In order to work, zHyperLink requires flash in an HPFE, and current microcode. Every DS8880 has the support built in, as does every IBM z14 server. So real flash is enabling real mainframe functional enhancements available now for IBM's Db2 customers. Other subsystems will surely follow.

Get in the game

I realize that some data center personnel are skeptical about this new medium while others resist change. You'll need to get in the game sooner or later, so why not research flash more thoroughly today?

You can start by contacting LRS® IT Solutions. We're even better at configuring storage solutions than we are at busting myths.

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