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FLASH IN THE PLAN?

Does your business need the all-flash array as much as it needs your business?

As every IT professional will attest to, the central problem with storage is that the technology has kept up with neither client-side improvements nor the data explosion, creating what is essentially a supply and demand imbalance - more demand for more data coupled with stagnated delivery capabilities. The result is latency, bottlenecks, boot storms and, ultimately, lowered productivity. Until recently the answer to storage issues was to throw more disks at the problem (more disks that are still focused on capacity vs. performance).

Disk Performance Improvements Mostly Limited to Capacity

While there has been significant improvement in disk performance over the past several years (high-performance HDDs can offer as high as 210 IOPS) most of it has been in terms of capacity. All the disk space in the world, though, can't remedy one fundamental limitation. To work, a disk must rotate and an arm must seek data, creating two unavoidable latency opportunities.

The time required for actual data transfer will always be a fraction (a tiny fraction as it were) of the time required for any data operation.

Access Density: The True Measure of Storage Performance

Storage performance is generally measured in IOPS (input/output operations per second), but access density is actually a much more incisive measurement in terms of ROI as it has a closer relationship to price per gigabyte ($/Gb). Essentially, access density is the ratio of IOPS to the capacity of the drive. For example, a 1TB disk with an IOPS of 150, has an access density of 0.15. The reason this number is important is that disk performance advances at a much slower rate than disk capacity. So, in our example, if a second 1TB disk is added just to help allocate the load and the IOPS is unchanged, the access density actually decreases by half to 0.075.

Welcome to the storage abyss: a vacuum that can quickly start swallowing investment with only marginal return.

The Effect of Big Data on Our Storage Uses

There have always been business sectors with huge storage requirements. As the digital economy continues to grow, however, the amount of data produced (as well as the value placed on it and the demand to access it) is changing for every business - across the board. CDI predicts that the amount of data being stored will expand at a rate of over 50% per year in the next few years. But it's not the sheer amount but the increased usage of data that's driving demand and storage innovation. As data continues its transition from a business necessity to a mineable asset, the need for performance-based storage to support applications that access and process stored data will increase as well.

An All-flash Array-
The HP 3PAR
StoreServ 7450

As the world steams along its path toward a digital economy and businesses transition from data-dependent to data-driven, the demands placed on storage performance continue to escalate. With performance increasing at less than one-third the rate of capacity, disk technology, the foundation of non-human memory and the workhorse of the datacentre, seems to be headed out to a much-deserved pasture.

Enter flash, not a new technology by any means, but a relatively new player in the enterprise storage world. The use of hybrid (disk/flash) arrays has grown in the

datacentre over the past several years, with their effectiveness in resolving specific performance issues paving the way for the all-flash array. The AFA has been hyped as the future of enterprise storage, but before you go out and scrap your disk arrays for an all-flash solution, a few important considerations and some planning can help you maximize your storage investment over the longer term.

Flash or flash memory is a solid state design (SSD) storage system. Solid state, by definition, has no moving parts. Unlike spinning disks that store data magnetically and use a mechanical arm to retrieve it, flash technology stores data electronically (on a circuit board). The term flash refers to the ability to quickly erase (or "flash") and rewrite a given block of data.

Most people associate flash memory with camera cards and those ubiquitous USB sticks, but the technology is also what makes consumer devices – from the smartphone to the mp3 player – better, smaller and hotter. It's this ferocious demand for consumer applications of flash memory which is driving down price and pushing performance to a point where it's increasingly applicable to the storage needs of the enterprise.

After a more than twenty year upbringing, flash storage is now taking its rightful place in the datacentre, where its advantages (including blistering speed and predictable failure) can have a multifold effect on productivity. To put it another way, this isn't your father's flash.

Hybrid Flash Goes Mainstream

As early as 2013, an IDC survey showed that over 50% of enterprises with at least 1,000 employees used some flash storage in their external disk storage environment. Nearly two thirds of those enterprises added SSDs to their existing HDD arrays – either as cache (37.3%) or as a flash storage tier (23.4%).

These self-styled hybrid storage environments and vendor-labelled hybrid offerings have a firm foothold in the new datacentre where they are proven to offer a blend of performance (SSD) and cost-effectiveness (HHD). Even adding a small flash splice (say 5% of capacity) into an existing disk array has the potential to double IOPS and cut read latency by up to two-thirds.

All-Flash Begins its Own Invasion

The all-flash array is hot on the heels of this new reality. According to IDC, worldwide enterprise all solid state spending is predicted to be 1.6 billion in 2016, up dramatically from 0.3 billion in 2012. In 2014, vendors shipped 1.3 billion dollars worth of all-flash arrays on top of 10 billion in hybrid arrays. The primary influencer in the solid state storage array market is the declining solution price, from $11.12/GB in 2012 to IDC's forecast 2016 price of $2.88/GB.

THE BIG 4 REASONS FOR DEPLOYING FLASH IN YOUR STORAGE ENVIRONMENT

1. Alleviate IO starvation of virtualized disk-based environments caused by Virtual Machine Density

2. Address IOPS concerns, bootstorms and bottlenecks in VDI environments

3. Prepare your datacentre to meet the exponential storage needs of big data

4. Increase productivity, especially in situations where data transfer time is critical to competitiveness

It's not secret that vendors are aggressively positioning all-flash solutions as the saviour of the datacentre. They also show no signs of deviating from this path. Whether through development or acquisition (in the last few years EMC, Cisco and IBM bought SSD heavyweights XtremIO, Whiptail and Texas Memory Systems, respectively, in deals totalling over one billion), each of the enterprise storage leaders has teased their way to unveiling impressive mainstream all-flash array products.

Not a Perfect Technology

Though positioned as the next wave of enterprise storage, the all-flash array is not without its inherent limitations and is also in its infancy in the enterprise compared to disk technology.

First generation AFAs were plagued by limited scalability and a lack of enterprise-class reliability. By its very nature, there is less to go wrong with solid state equipment. However, it's important to remember that flash storage is a consumable - quite simply, it wears out. Unlike disks, each segment of a flash drive has a finite number of writes. While having array technology behind it spreads the wear more evenly, the fact is flash storage will need to be replaced.

All-flash Appears Pre-destined to Dominate the Enterprise

Despite the fact that hybrid flash solutions are 10 times more common in the enterprise than all-flash arrays, experts believe that within a few years that ratio will reverse and the majority of storage will in fact be flash-based.

To predict whether all-flash really is the next wave of enterprise storage, again we need only look to the consumer example. Not only has the disk drive been virtually eliminated in this market, but with it has disappeared a commensurate portion of investment in disk technology. As the price per gigabyte ($/G) ratio of flash storage continues to fall in step with both increased demand and investment in density and speed, vendors are sending the message that all-flash arrays will be here to stay (for the time being anyway).

Flash is expensive. Period. It's widely accepted that the three year total cost of ownership (TCO) of HDD storage arrays is approximately 500% of the purchase price. SSDs do offer a lower TCO. Power consumption per terabyte can be as low as 1/10 that of HDD arrays. Add to that higher utilization as well as smaller footprint and less cooling power (thanks to a lack of moving parts) and the savings begin to manifest.

All-flash arrays may have a lower TCO, but currently it's more than made up for in purchase price. Even if flash storage falls below the $3/Gb mark as promised by vendors, it will still be a whopping 5 times the $/Gb of disk storage (which is also falling). At $3/Gb, 10T of solid state storage would cost $30,000 whereas the same amount of HDD (at $.60/Gb) would come in at $6000.

The consistent manufacturer-side argument is that the higher initial $/Gb investment will be offset over time by increased productivity. But, while a million IOPS (compared to 200) sounds great in theory, if your business's productivity isn't dependent on storage performance, the argument has considerably less weight. If you're not running multiple databases and/or high-performance applications, an all-flash array is probably like a sledgehammer on a nail. The higher price per gigabyte simply can't be offset by higher performance in situations where performance isn't an issue. For most businesses who run, say, a single database, even a VDI, a hybrid array with a flash slice dedicated to those performance-driven applications is the most cost-effective use of flash technology right now.

It's important to consider where your business is headed in terms of storage. The balance between archived and mineable data is shifting as the digital economy grows. If you consider that vendor investment in flash technology is a response to changing demand, it's wise to take a look at where your demands on storage performance are now and where they will be next quarter, next year and beyond.

Regardless of whether or not the all-flash array becomes the mainstay of enterprise storage (and all signs point to yes), except in the case of performance-driven storage users, the $/Gb ratio will be the key factor in the adoption of the technology. With a sticker price of up to ten times that of hard disk storage, as long as a slice of flash can have the same effect on productivity as an all-flash array, the hybrid array will continue to meet the needs of the majority of enterprises.

Even though you may not require storage performance on the scale of an all-flash array right now, chances are your performance needs are changing. As those needs go up and the price of flash comes down, you should have a solid plan to meet in the middle, enabling you to maximize ROI across this inevitable transition.

Finally, when comparing your current disk investment to a potential all-flash investment, it's important to look at the access density as opposed to just the capacity of your disks. Consider how many disks in an array are used just to split the load and keep IOPS treading water - as opposed to increasing storage performance and capacity.

Duologik is a Toronto-based IT solutions provider with expertise in building and managing enterprise infrastructures. Our team of engineers is partnered with industry-leading manufacturers to provide scalable, cost-effective solutions that help our clients minimize risk and maximize return on their technology investments. For more information, please contact chief technology officer, Adam Kwiecien-Fisher at adam.kwiecien-fisher@duologik.com.

About the author: Tom Prittie is a lawyer and technology writer who works in the IT sector. You can reach him at tom.prittie@duologik.com.

DUOLOGIK

100 Leek Crescent, Unit 9
Richmond Hill, ON
L4B 3E6

info@duologik.com
phone: +1 (905) 709-4900
toll free: 1.866.853.6318