

# Your Guide to Choosing the Right Flash-Optimized Solution



COMMITMENT BEYOND COMPARE



# Your Guide to Choosing the Right Flash-Optimized Solution

## The view from 30,000 feet

After spending its formative years in the consumer products industry, flash storage is now making inroads into enterprise data centers and the mainstream of the IT world.

There are good reasons for this trend. Flash-based solid state drives (SSD) and storage platforms can deliver exceptional performance and application response time (with low latency), along with better power efficiency than conventional spinning disk, all in a compact footprint. And it's a technology that is up to the challenges of the most demanding applications. But the benefits of flash are not a given. To deliver on the promise of this emerging data center technology, flash-optimized solutions need to be architected with a few fundamental design requirements in mind. These requirements, explored in this e-book, are focused on increasing performance, efficiency, resiliency, and data mobility.



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## The word on the street: Change is good

“Solid-state storage is an important emerging change, not just an addition or tweak, in the world of storage.”

— Mark Peters, Enterprise Strategy Group<sup>1</sup>

“SSDs’ unique attributes provide the enabling technologies for the future of data efficiency in primary storage.”

— Dan Iacono, IDC<sup>2</sup>

<sup>1</sup> “Market Landscape Report: Solid-state Storage,” Enterprise Strategy Group, April 2012.

<sup>2</sup> “Primary Storage Data Efficiency with Solid State Storage,” IDC, February 2013. What is flash? A 60-second primer.

# What is flash? A 60-second primer.

**Flash takes various forms.** Flash is a term that refers to semiconductor technology used to build solid state storage. This can be in the form of solid states drives and other form factors like storage on interface cards.

While its a hot topic of conversation among IT managers and storage vendors, flash storage is not new. It's been in use for decades in a wide range of consumer products, from cameras and smartphones to game consoles and GPS navigators.

## Flash is everywhere.



Today, storage vendors are putting the technology to work in everything from servers and networking gear to flash-optimized appliances and solid-state storage arrays. Flash is now emerging as a key technology for enterprise storage systems.

## Flash is aptly named.



The term "flash" sounds fast—and that's accurate. While it has many benefits beyond speed, flash storage is known for its low latency and exceptionally fast performance. Because of that speed, flash is particularly well suited for applications that require high I/O and low latency—such as online transaction processing and financial trading.

## Flash is not just a type of disk.



You'll hear people refer to flash as "NAND solid-state disk" and "solid state disk drives," among other terms. While those are acceptable, commonly used descriptions, the term "disk" is somewhat of a misnomer. Unlike hard disk drives (HDDs), flash storage has no spinning disks and no moving parts. Data is stored in integrated circuits.

## The word on the street: Performance Matters

"Improved performance is by far the most recognized advantage that solid state storage provides over traditional mechanical drives."

—Mark Peters, Enterprise Strategy Group<sup>3</sup>

"Everyone wants better storage performance and solid-state drive devices can deliver data at phenomenal speeds while also saving energy. But can your data center's network handle the data equivalent of switching from a water bubbler to a fire hose before making such a costly investment?"

—Dennis Martin, founder and president of Demartek<sup>4</sup>

<sup>3</sup> "Market Landscape Report: Solid-state Storage," Enterprise Strategy Group, April 2012.

<sup>4</sup> "Five questions on solid-state drive technology," Search Data Center, January 15, 2012.



# Hewlett Packard Enterprise is no stranger to flash storage solutions

Since 2011, we have shipped more than 104 petabytes of SSD/Flash in 412K drives.<sup>7</sup>

While flash is a relatively new technology in enterprise data centers, it's not new to HPE. We have years of experience with flash and other forms of solid state devices.

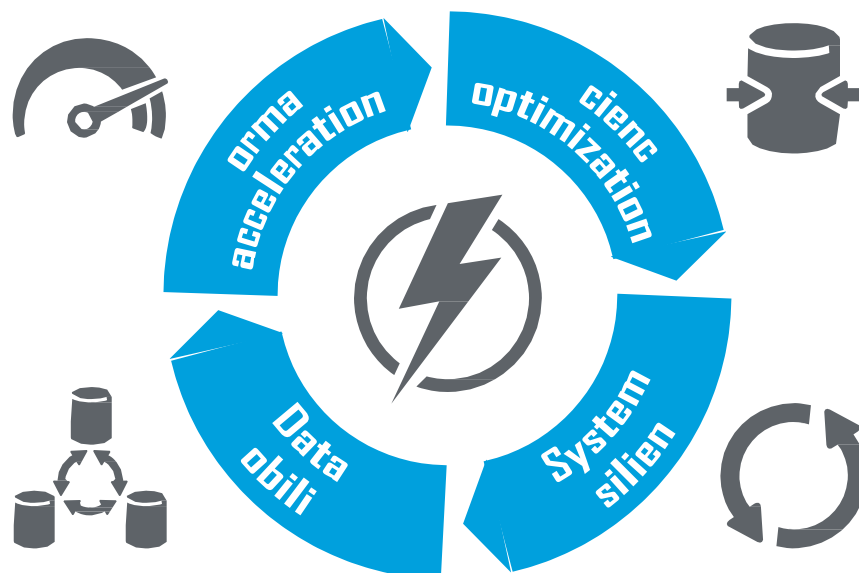
Over the years, we have made flash a focal point for our storage engineering and innovation efforts. This focus has led to the availability of flash storage in our servers and disk array systems. Along the way, we've worked side by side with enterprise customers to design and deploy storage solutions that incorporate flash technology to accelerate performance-hungry applications.

Our engineers have thought long and hard about the architectural requirements for using flash in enterprise-class storage systems. This vendor-independent guide summarizes some of the key lessons they have learned about those requirements.

7 HP supply chain analysis for ISS and HPSD SLC, MLC, and host cache SKUs from 2011 to 2013.

## Day 1 Design Requirements for Flash

To make the most of flash technology—and deliver all of the associated payoffs—storage solutions need to meet four key design requirements.



# 1. Performance acceleration



If they can't keep up with the performance of flash drives, the storage controllers that sit between servers and back-end flash devices can become performance bottlenecks. To gain the full performance advantages of flash, you need to be sure your architecture is ready to scale up to flash speeds.

## Why it matters

For most adopters in the enterprise world, flash is all about performance. They look to flash to greatly accelerate IOPS (input/output operations per second) while reducing latency. Flash devices can deliver 50 times the IOPS performance of conventional spinning HDDs—and do so at very low latency. A flash device can deliver IOPS at less than 1 millisecond—or 1/1000th of a second. In contrast, spinning media has typically 10 times that latency—or even more.

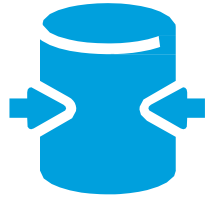
But there's a catch: If you don't have the right architecture in place, you won't realize the full performance potential of flash storage. You need to have a storage architecture that avoids bottlenecks in the entire I/O path—controllers, cache, firmware—to deliver accelerated IOPS at low latency. Without a truly optimized design you will flood the ability of controllers to keep up and cap the performance of the system. You also need to be able to assign those IOPS intelligently to various applications to ensure you can meet your service level requirements.

## The payoff

The performance of flash storage can have a direct impact on your bottom line. Flash can greatly accelerate your business by allowing you to process far more transactions within a given time window. Along the way, it can help you deliver a better customer experience—because things happen a lot faster. Flash can also help you control operations costs. That's because 10 flash drives can potentially do the work of 500 hard drives, which allows you to reduce the footprint and power consumption of your storage environment.



## 2. Efficiency optimization



While prices have fallen in recent years, the acquisition cost of flash storage is still much higher than that of hard disk drives. This reality makes capacity utilization and media endurance extremely important. When you bring flash storage arrays into your data center, you want to make sure you can take full advantage of your investment.

### Why it matters

IT managers often prepare for growth by buying and provisioning more storage capacity than they need for their immediate requirements, and then letting capacity sit idle. This is one of the reasons why most legacy storage systems are massively underutilized—they have an average utilization rate around 30%. This model is bad enough with spinning media but completely fails with flash media, which can sell for up to 10 times the price of HDDs on a dollar/gigabyte basis. The higher upfront cost creates the requirement to use every kilobyte of flash media as efficiently as possible.

To make this happen, and to lower your costs, you need a storage architecture that is designed to make optimal use of flash. One way to do that is to make better use of the available storage capacity through data compaction and thin storage technologies. Another is to increase the endurance and lifespan of the media by reducing the number of times you write data to it. Unlike mechanical HDDs, flash is an electronic media that wears down with each write. This means you need a flash-optimized architecture that helps you avoid unnecessary writes to the media.

### The payoff

With the efficient use of flash media, you can actually reduce your costs of storage. Here's why: While the dollar/gigabyte cost of flash may be 10 times that of HDDs, your dollar/IOPS costs is far lower—given that flash delivers 50 times the IOPS of spinning media. So in ballpark numbers, you're getting 50 times the IOPS performance for 10 times the upfront cost. While early adopters of all flash systems crave the performance of flash, they are also looking to lower their storage costs by getting more bang for their IOPS buck.

## 3. System Resiliency



If data is unavailable, your business can come to a stop. To enable reliable access to your data, flash storage solutions should provide rich data services, such as clustering and multisite replication.

### Why it Matters

While flash is a relatively new media in enterprise environments, it still must meet all the classic high availability and business continuity requirements that are taken for granted in traditional Tier 1 disk systems—such as the need for multisite replication and application integrated disaster recovery capabilities.

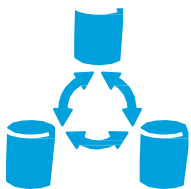
The providers of Tier 1 storage array solutions have spent hundreds of millions of dollars and many years developing robust resiliency features. Flash storage can't live outside this realm. To enable system resiliency, you need an architecture that allows you to protect data stored on flash media with the same battle-tested processes and Tier 1 capabilities used to protect data stored on spinning media.

### The payoff

In an online world, the success of your business depends on the performance and availability of the applications your customers use to interact with your enterprise. Downtime can be extremely costly in terms of both lost revenue and lost customers. To keep the revenue flowing, and to keep your customers happy, you need uninterrupted access to you data—regardless of the media it is stored on.

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## 4. Data Mobility



In today's information-driven world, data must move seamlessly and non-disruptively among systems, disk tiers, and physical locations. This data mobility is one of the keys to IT and business agility.

### Why it matters

For your business to deliver consistently great application performance at an affordable cost, your storage architecture must





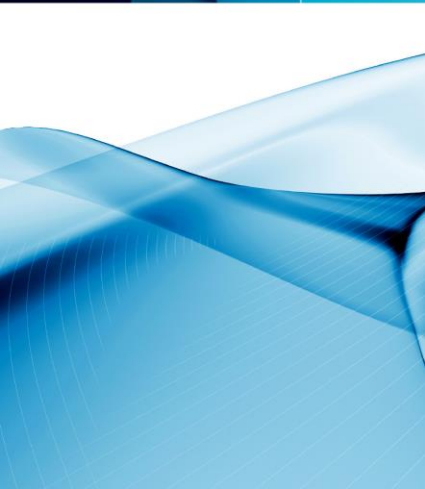
allow data to move easily to keep up with the pace of change. At times of peak demand on certain applications, you want the associated data on your fastest storage technology—flash media either on backend storage or in some cases at the host level in a server.

At other times, when demand on the application is lower, you may want to move the same data to a lower-cost tier of storage—and save your flash capacity for other applications that could benefit from the performance boost.

In addition, you need to deploy on an architecture that can enable load balancing and technology refresh using technologies such as storage federation to avoid disrupting critical applications without disrupting critical applications.

### The payoff

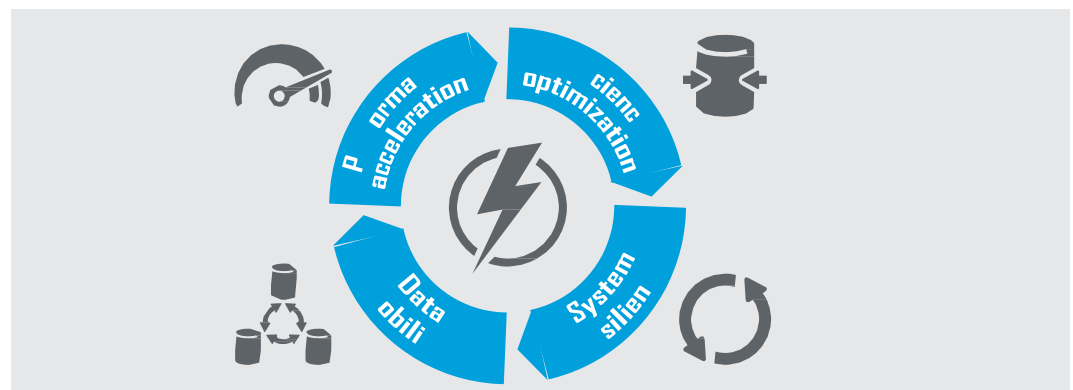
The ability to move data non-disruptively between types and tiers of storage can help your organization increase revenue by accelerating transaction throughput on your applications that are experiencing spikes in demand—such as an e-commerce application on Black Friday or a financial application at the end of a quarter. At the same time, this dynamic response, enabled by transparent and non-disruptive data mobility, allows you to save money by storing data on the most cost-effective media.



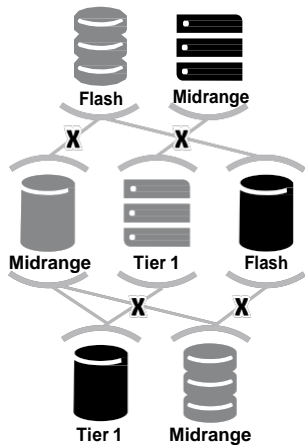
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## Don't settle for less. All four requirements are essential.

Requirements are requirements. When it comes to flash storage, two out of four or even three out of four isn't good enough. To fully capitalize on the technology, storage solutions need to meet all four design requirements.







Efficiency ↓  
Cost ↑

Many vendors can currently meet some—but not all—of the four design requirements for flash.

Most of the storage deployed in data centers today was architected close to 20 years ago—long before flash media was a consideration.

The legacy storage market-share leaders have evaluated those siloed architectures and

have been forced to add completely segregated flash-based disk systems to already-complex portfolios.

Flash array startups have been focused on maximizing performance but lack the rich data services and system resiliency features found in more established platforms. Those established platforms have spent hundreds of millions of R&D dollars to build a robust set of advanced data services. It will be difficult for those smaller players to match the investment cost and time required to deliver Tier 1 resiliency.

There is no doubt that flash is a disruptive force in the market and offers great potential to performance-hungry applications. But before moving forward with flash, it's important to ask yourself, and your storage vendor, why you would want to choose between flash-optimized performance and Tier 1 data services when you really need both.

Architecture matters, and storage innovation is thriving at HPE. We don't think you should have to compromise anything—and we invite you to ask us those same tough questions.

## Comport Aligns Enterprises with Optimal Storage Solutions

With the benefit of 30 years' experience in infrastructure solutions for data centers, Comport aligns enterprises with the right storage solutions and services to scale easily, and eliminate expensive silos in support of today's business and technology goals. To reduce operational risk and bring the promised cost savings to fruition, Comport analyzes specific pain points and provides



solutions and services to help enterprises get the most out of their infrastructure. Through honest and direct consultations, Comport will be pleased to discuss your storage needs and how flash storage may apply and improve your environment.

