Brochure

Invest for the future

Why you can't afford not to consider all-flash HP 3PAR StoreServ Storage

Think you can't afford flash? Think again.

Thin technologies make flash affordable from the start

- Built-in zero-detection and HP 3PAR Thin Deduplication software[1] deliver inline deduplication to reduce capacity requirements by 75 percent[2]
- HP 3PAR Thin Provisioning and HP 3PAR Thin Conversion software reduce upfront storage requirements by 50 percent or more—guaranteed[3]
- HP 3PAR Thin Clones software[4] instantly creates capacity-efficient, non-duplicative virtual machine (VM) clones for Microsoft® Hyper-V and VMware ESXi
- Express Indexing enables deduplication without capacity scalability constraints, so your all-flash array can scale to petabytes
- Reservationless snapshots consume capacity for changed data to reduce overall capacity consumption

Adaptive technologies prolong flash media lifespan to lower TCO

- HP 3PAR Adaptive Sparing uniquely extends SSD usable capacity by 20 percent and aids wear management within the drive, offloading this task from the storage controllers[5]
- A fine-grained allocation unit and the Adaptive Writes feature protect performance while extending SSD lifespan
- System-wide striping avoids hot spots to enable uniform wearing of SSDs

If you're looking to make a primary storage investment in the near future, you can't afford to not consider an all-flash array. HP 3PAR StoreServ Storage was built to make your IT investments go farther and protect them for longer without asking you to sacrifice performance or scalability. That's why the HP 3PAR StoreServ 7450 is the only all-flash array on the market that is flash-optimized without being flash-limited—so you won't have to make business limiting decisions when it comes to implementing your new all-flash array.

All-flash and no compromise

Maybe you think you don't need the ultra-high IOPS and ultra-low latency that flash-based media delivers, but performance isn't the only reason to choose flash. More compact, more energy-efficient, and more predictable than spinning drives, flash-based media is no longer the future of storage—it is rapidly becoming mainstream. Falling drive prices and lower-cost, higher-density SSD options such as commercial multi-level cells (cMLCs) are making all-flash systems more affordable than ever, and are an indicator that flash is here to stay. And with good reason—flash delivers incredible power in an incredibly efficient package. For example, by using SSDs instead of HDDs, the all-flash HP 3PAR StoreServ 7450 uses 92% fewer disks, 76% less power, and 83% less rack space to deliver 7X better IOPS and 5X improved latency at an 86% reduction in software licensing costs.[6] You need the storage platform you invest in today to meet your needs not just tomorrow, but well into the future, and that means you need to be considering flash today. Think you can't afford it? Think again. In terms of power, efficiency, and protecting your storage investments, the all-flash HP 3PAR StoreServ 7450 Storage system cannot be beat. That's because it's the only all-flash array on the market that's flash-optimized, not flash limited.

To understand how the all-flash HP 3PAR StoreServ 7450 is different, it's critical to understand the fundamental limitations of the other all-flash array options available to you today. These options give you a choice between two general categories. On one hand, you have all-flash and hybrid systems from major storage vendors that typically leverage legacy architectures that were never designed for flash, but are now being retrofitted with SSDs. This is an inefficient—and expensive—way to deploy flash, and has resulted in a healthy ecosystem of startups looking to fill the gap with purpose-built, all-flash arrays. This leads to your other option—all-flash systems that are highly specialized—generally targeted at either delivering incredible flash-based media performance or lowering the cost of all-flash arrays. While some of these niche systems may deliver impressive performance or a tempting entry price point, they cannot deliver both ultra-high performance and low all-flash array cost at the same time—so you have to trade one for the other. Perhaps more troubling, however, is that benefits offered by these niche systems come at the expense of adding another silo to your datacenter and require you to sacrifice enterprise-class resiliency, scalability, and advanced data services such as replication, quality of service (QoS) controls, and federated data mobility.

[1, 4] Available in a future release. Supported only on HP 3PAR StoreServ 7450 systems
[2] Based on internal HP analysis using telemetry data.
[3] For details, refer to the Get Thin Guarantee terms and conditions. For more information: hp.com/storage/getthin
[5] With HP 3PAR Adaptive Sparing, a 400 GB drive yields 480 GB of usable capacity for a 20% net capacity extension.
[6] Based on the HP 3PAR StoreServ 7400 configured with 300 GB SAS drives (65 TB usable) versus a 7450 configured with 1.92TB SSDs (65 TB usable).

While it's true that, among these options, you can surely find a balance that fits your specific needs today, they are all inherently limited, requiring you to either make trade-offs or accept limitations. Any system that still relies on a dual-controller architecture cannot offer Tier-1 resiliency. Any solution that is limited in scalability or lacks rich data services cannot give you the most return on your storage investment. Adding flash to the equation only magnifies these limitations.

All of the benefits and none of the limitations

HP 3PAR StoreServ 7450 Storage is unlike any other all-flash array on the market. It is highly scalable in terms of both capacity and performance, and if you're already using HP 3PAR StoreServ, it doesn't require you to introduce an entirely new architecture into your environment to get the benefits of a flash-optimized system. What's more, it's the only all-flash array that delivers the performance and efficiency advantages that come with a flash-optimized architecture—without compromising resiliency, data mobility, cost efficiency, or rich data services.

Built-in resiliency and investment protection provides long-term cost control

- HP stands behind the resiliency of the all-flash 7450 and all four-node arrays or larger with the HP 3PAR Get 6-Nines Guarantee[7]
- Proactive media management monitors flash utilization and wear so you can get the greatest utility from your flash drives
- HP protects your flash investments with a 5-year warranty on all SSDs
- Storage federation with HP 3PAR Peer Motion lets you non-disruptively move data between systems
- One operating system and a uniform feature set across all HP 3PAR StoreServ Storage models make forklift upgrades a thing of the past

Table 1. How the HP 3PAR StoreServ 7450 stacks up against other all-flash arrays

	Flash Appliances	Flash Limited Arrays	HP 3PAR StoreServ 7450
Design focus	Hardware focused	Flash-only point solution	Flash-optimized adaptive architecture
Performance	1,000,000 IOPS	200,000–500,000 IOPs	900,000 IOPs
Architecture	Dual-controller	Dual-controller	Mesh-Active, Quad-Controller
Data Services	None	Limited	Complete
Data Mobility	Siloed within appliance	Siloed within family	Federated. Peer motion to move data. Online Import to bring data across arrays.
Capacity Granularity	Coarse	Granular	Fine-grained
Raw Capacity Scalability	40TB	80TB	460TB
Usable Capacity Scalability	160TB	320TB	1.4PB
Cost	Approximately $6–$10/GB (usable)	Approximately $4–$8/GB (usable)	Approximately $2/GB (usable)[8]

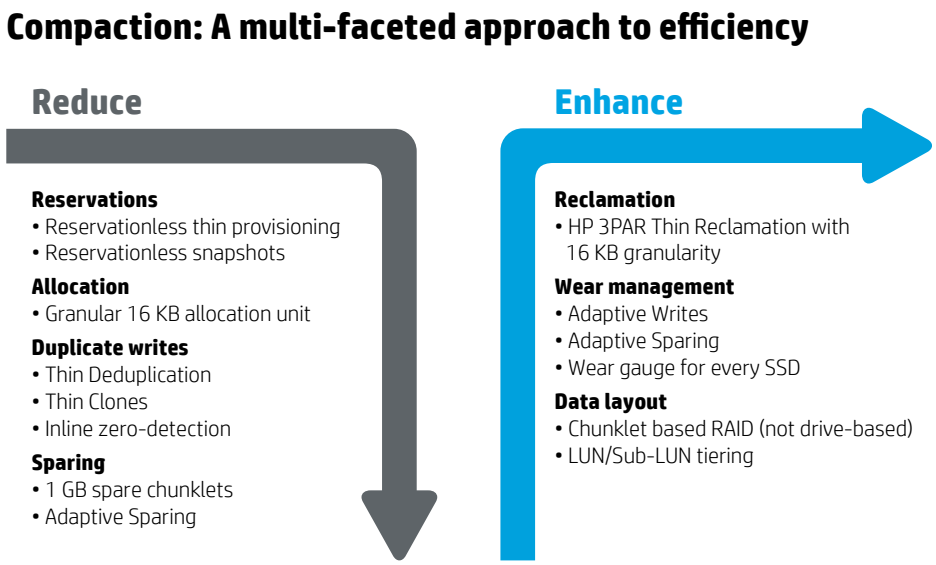
The HP 3PAR StoreServ 7450 gives you the best of both worlds when it comes to flash. Not only does a Mesh-Active architecture remove the bottlenecks that can choke dual-controller arrays and limit scalability, but it makes flash incredibly affordable through an impressive lineup of unique hardware and software innovations that extend your SSD investments. Simply put, it gives you all of the benefits of flash without any limitations, so you can invest in a storage system that doesn't just meet your immediate needs, but is designed to handle whatever your future might bring. An unconditional, 5-year warranty on all HP 3PAR StoreServ SSDs protects your flash investments, and the HP 3PAR 6-Nines Guarantee[9] stands behind the resiliency of all quad-node or larger HP 3PAR StoreServ Storage arrays including the all-flash StoreServ 7450 by assuring 99.9999 percent data availability.

[7] For details, refer to the HP 3PAR Get 6-Nines Guarantee terms and conditions. For more information: hp.com/storage/get6nines

[8] Requires the use of 1.92TB cMLC drives and HP 3PAR data compaction technologies.

[9] Subject to the terms and conditions of the Get 6-Nines Guarantee program. For more information: hp.com/storage/get6nines

Figure 1. How HP 3PAR StoreServ gives you the most from your flash investments



Performance without compromise

HP 3PAR StoreServ 7450 Storage accelerates business agility by boosting application performance with over 900,000 IOPS at less than 0.7 milliseconds (ms) latency.[10] And, it does this while delivering the enterprise-class, rich data services and Tier-1 resiliency you require. How is this possible? HP 3PAR StoreServ Storage is different from all other storage platforms in that it features an architecture that delivers performance without compromise—from midrange to high-end and across flash-optimized and hybrid arrays. This is made possible by an extensible architecture designed to treat flash in an optimal manner—including multi-controller scalability to keep up with flash performance, a fine-grained virtualized operating system so that flash can be consumed efficiently, and mixed-workload support so that you can consolidate with confidence.

These innovations help accelerate performance, improve the use of SSD capacity, and extend SSD lifespan to lower both the upfront and ongoing costs of storage.

Driving down the cost of flash

HP 3PAR StoreServ Storage removes the performance bottlenecks, scalability restrictions, and other architectural limitations that prevent legacy systems and flash-based niche solutions from giving you the most from your flash investments. However, this is only the start of what makes the HP 3PAR StoreServ architecture unique. The following HP 3PAR StoreServ Storage features drive up the efficiency of flash to drive down costs without sacrificing performance, Tier-1 resiliency, scalability, or rich data services:

- **Mesh-Active architecture:** Unlike legacy architectures, a tightly coupled, Mesh-Active design allows each volume on HP 3PAR StoreServ Storage to be active on each controller at all times. A high-speed, full-mesh interconnect joins all controller nodes in the cluster to produce robust, load-balanced performance that removes flash bottlenecks and provides automatic and massive capacity and performance scalability.
- **Highly virtualized storage OS:** To accelerate performance and help increase capacity utilization, the HP 3PAR OS employs a tri-level mapping methodology similar to virtual memory architectures. This fine-grained approach to virtualization enables a single flash-based media device to support hundreds of volumes and up to a dozen RAID definitions at the same time, allowing both all-flash and hybrid arrays to make the most of SSDs.

[10] Based on 4K random read workload with no cache hits and a node-specific volume layout

- **Purpose-built ASIC:** By supporting mixed workloads with extremely high performance levels, the purpose-built HP 3PAR ASIC is one of the keys to alleviating legacy storage performance concerns. The HP 3PAR ASIC also features an efficient, silicon-based, zero-detection mechanism that gives HP 3PAR StoreServ Storage the power to remove allocated but unused space without significantly impacting performance.
- **Built-in zero-detection:** The zero-detection mechanism built into the HP 3PAR ASIC is the driving force behind data compaction using HP 3PAR Thin Technologies—including hardware-based acceleration that enables inline thin deduplication on HP 3PAR StoreServ 7450 Storage.[11] Zero-detection removes streams of zeroes present in I/O prior to writing data on all StoreServ arrays in order to reduce capacity requirements and prolong SSD lifespan. HP 3PAR Thin Provisioning and Thin Conversion software leverage this zero-detection capability to reduce upfront storage requirements by 50 percent or more—guaranteed.[12]
- **Thin Deduplication with Express Indexing:** HP 3PAR Thin Deduplication software uses this built-in zero-detection capability in combination with Express Indexing to deduplicate data inline with a high degree of granularity.[13] Hardware-accelerated thin deduplication delivers a level of capacity efficiency that is superior to other approaches without monopolizing CPU resources and degrading performance, thereby delivering the only primary storage deduplication solution in the industry that is truly enterprise-class. ASIC-assisted, block-level deduplication takes place "inline," which carries multiple benefits including: increasing capacity efficiency, protecting system performance, and extending flash media lifespan.
- **System-wide striping:** On all HP 3PAR StoreServ systems, data is striped across all system resources (controllers, ports, cache, HDDs, and SSDs), which enables the array to simultaneously deliver high capacity utilization (without silos of any kind) and performance levels (with all resources supporting each volume) with extremely high resiliency. System-wide striping also enables uniform I/O patterns across all media resources by spreading wear evenly across the entire system, thereby promoting SSD longevity.
- **Multiple SSDs options, including high-density cMLCs:** New 1.92 TB cMLC drives offer similar performance at a system level as compared to 480 GB and 920 GB MLC drives, but at a 30 percent lower cost per gigabyte. Write performance with cMLCs is slightly lower than 480 GB and 920 GB MLC drives, but still 10X that of spinning media.[14] The use of these large-capacity, high-density drives allows industry-leading all-flash array scalability to 460 TB.
- **5-year SSD warranty:** All currently available SSD options—480 GB and 920 GB MLCs as well as 1.92 TB cMLC drives—now carry an unconditional 5-year warranty to protect your flash storage investments. This warranty offers unconditional replacement due to drive failures, media wear-out, or both, and applies to HP 3PAR StoreServ 7000 and 10000 Storage systems as well as the all-flash 7450.
- **Fine-grained allocation:** With its 16 KB write allocation unit, HP 3PAR StoreServ Storage has long been known for pioneering innovation in storage capacity efficiency. This granular allocation size enables only the right amount of flash media to be allocated, reducing upfront capacity requirements and prolonging flash-based media lifespan.
- **System-wide sparing:** Unlike many competitive arrays that reserve dedicated spare drives that then sit idle, system-wide sparing means that HP 3PAR StoreServ Storage spreads sparing across every single drive. This enables a balanced load that extends SSD lifespan by providing even flash-based media wear. It also protects against performance degradation by enabling "many-to-many" rebuild in the event of a failure.
- **Adaptive Sparing:** Using patented Adaptive Sparing technology, HP has collaborated with SSD suppliers to extend usable capacity per drive by up to 20 percent.[15] This is achieved by reducing capacity typically reserved by media suppliers for wear-management and then using that space more efficiently. At a system level, increasing usable drive capacity also helps spread writes more broadly to extend SSD endurance. When combined with the new 1.92TB cMLC drive, HP 3PAR Adaptive Sparing brings cost per GB to the lowest in the industry[16] for an all-flash array and enables 45TB in only 2U of space to reduce footprint and power cost.

[11] Available in a future release. Supported only on HP 3PAR StoreServ 7450 systems

[12] For details, refer to the Get Thin Guarantee terms and conditions. For more information: hp.com/storage/getthin

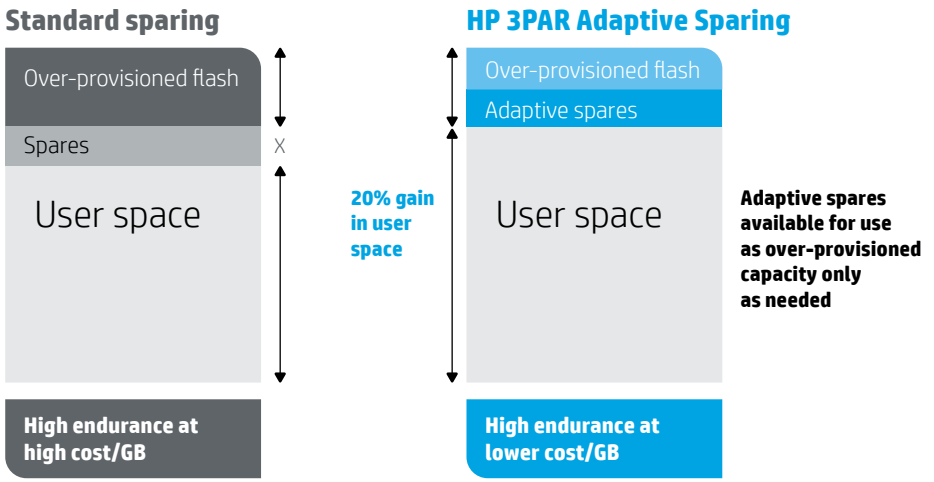
[13] Available in a future release. Supported only on HP 3PAR StoreServ 7450 systems.

[14] Based on typical HDD performance of 200 IOPS per drive and typical SSD write IOPS of 7500.

[15] With HP 3PAR Adaptive Sparing, a 400 GB drive yields 480 GB of usable capacity for a 20% net capacity extension.

[16] Requires the use of 1.92TB cMLC drives and HP 3PAR data compaction technologies.

Figure 2. HP 3PAR Adaptive Sparing—how it works



- **Autonomic cache offload:** By automatically adjusting the frequency at which data is offloaded from cache to flash media based on utilization rates, autonomic cache offloading reduces cache bottlenecks. This helps achieve consistently high performance levels as workloads scale to hundreds of thousands of IOPS.
- **Multi-tenant I/O processing:** Multi-tenant I/O processing delivers performance improvement for mixed workloads and virtual desktop infrastructure (VDI) deployments by breaking large I/O into smaller chunks. This prevents small read requests from getting held up behind larger I/O requests to enable consistently low latencies that are expected of flash capacity.
- **Adaptive reads and writes:** This feature matches host I/O size reads and writes to flash media at a granular level to avoid excess writes that cause unnecessary wear to flash media. Removing non-essential data reads and writes reduces latency and enhances overall back-end performance. The net result enables consolidation of more high-performance applications, thereby driving lower storage total cost of ownership (TCO).
- **Reservationless snapshots:** Snapshots created with HP 3PAR Virtual Copy software only consume capacity for changed data to reduce overall capacity consumption, so fewer SSDs are required upfront and fewer writes are performed overall, thus extending media lifespan.
- **Thin Clones:** An extension of HP 3PAR Thin Deduplication for server virtualization environments, HP 3PAR Thin Clones software[17] provides non-duplicative VM cloning with Microsoft Hyper-V and VMware ESXi to reduce capacity requirements and increase media use.
- **Proactive media management:** Never be caught off guard by planning for future upgrades before your flash-based media is worn out. Media wear guides for each SSD keep you informed of the status of your flash-based media by monitoring the wear levels of each flash device at any given time, so you can get the most out of your flash capacity investments.

[17] Available in a future release. Supported only on HP 3PAR StoreServ 7450 systems

How flash can help you overcome business challenges

Since the introduction of the HP 3PAR StoreServ 7450, this all-flash array has helped a wide range of customers solve real-world business problems, including performance increases that are making a real difference to their businesses. Flash can accelerate any application to improve performance and user experience for internal and external customers. Flash use cases include: database optimization, ERP solutions, Microsoft Exchange, server virtualization, virtual desktop infrastructure, virtualized private cloud, analytics, and specialized industry solutions such as finance and healthcare applications. The question is: where do you start? Database acceleration, VDI deployments, and virtualizing mission-critical applications are areas likely to bring fastest and most immediate ROI. Here are some applications where flash performance without compromise is helping customers like you to overcome business challenges:

Database acceleration
Database performance and availability are so critical that many organizations apply generous capacity and management resources to maintain needed service levels. HP 3PAR StoreServ Storage removes these inefficiencies, getting rid of tradeoffs between capacity utilization, efficiency, and performance. For example, with HP 3PAR Thin Persistence software and the Oracle ASM Storage Reclamation Utility (ASRU), your Oracle databases can stay thin by autonomically reclaiming stranded database capacity. HP also offers cost-effective Oracle- and SQL-aware snapshot technologies—HP 3PAR Recovery Manager for Oracle and HP 3PAR Recovery Manager for SQL Server.

HP 3PAR StoreServ 7450 Storage is ideal for accelerating Oracle and Microsoft databases, delivering increased performance compared to traditional storage that is particularly well suited for online transaction processing (OLTP) environments. One HP customer is using the HP 3PAR StoreServ 7450 with Oracle Demantra as part of its Oracle E-Business Suite environment.

Another HP customer chose the HP 3PAR StoreServ 7450 for acceleration of its Oracle-based, e-banking application. This large national bank already has a total of fifteen HP 3PAR StoreServ systems, so when ultra-high performance was the goal, the HP 3PAR StoreServ 7450 was a natural choice as an extension of the bank's existing, proven environment.

Yet another HP customer with the need for high throughput to serve database batch jobs is using the HP 3PAR StoreServ 7450 to improve performance of SAP® material planning for overnight logistics and order build work where Tier-1 resiliency is a requirement.

Delivering a better user experience
Enterprises in a variety of industries are choosing HP 3PAR StoreServ 7450 Storage for its proven ability to accelerate their business performance, and not just in database environments. For example, one HP customer in the shipping business was looking for a high-performance storage array to improve shipment reservations, especially at peak times. The customer's previous infrastructure could not keep up during peak business periods and, as a result, customers were experiencing unacceptable response times. By deploying the HP 3PAR StoreServ 7450, those problems have gone away and users are able to make reservations without waiting.

Enabling virtual server and desktop solutions
Exclusive virtualization and automation features built into HP 3PAR StoreServ Storage work with HP software products and solutions to deliver unique benefits for VMware vSphere, VMware View, Microsoft Windows® Server Hyper-V, Citrix® XenServer, Red Hat Enterprise Virtualization (RHEV), and Oracle VM. These benefits can help increase your virtualization ROI by enabling greater consolidation, which brings with it multiple benefits such as reduced administration and lower upfront capacity purchases.

With the HP 3PAR StoreServ 7450, customers are seeing accelerated performance with virtual desktop (VDI) solutions as well as with a wide variety of workloads running on virtual servers. With its accelerated application performance, HP 3PAR StoreServ 7450 allows your businesses to consolidate with confidence and grow as needed.

The last primary storage platform you'll ever need

HP 3PAR StoreServ Storage radically improves capacity and performance efficiency, making the all-flash HP 3PAR 7450 StoreServ array more affordable for a wider range of applications and a wider range of data centers than ever before. Unlike bolt-on thin storage solutions available with legacy platforms, HP 3PAR StoreServ Storage features hardware-enabled data compaction technologies that allow systems to run in a state of consistently high capacity utilization without performance tradeoffs. In fact, the HP Get Thin Guarantee promises new HP 3PAR StoreServ customers at least 50 percent reduction in capacity requirements by simply replacing legacy storage with HP 3PAR StoreServ Storage—guaranteed.[18]

Whether you choose an all-flash or hybrid array, innovations to the HP 3PAR StoreServ Storage platform based on the specific characteristics of flash deliver additional media endurance that enables you to extend the life of your SSDs. This lets you get the most out of every dollar and I/O for lower TCO and increased storage ROI, backed by a 5-year warranty on all HP 3PAR StoreServ SSDs.

What's more, with HP 3PAR StoreServ Storage, you get the peace of mind that your performance-critical applications are backed by storage with Tier-1 resiliency. HP stands behind the ability of all quad-node and larger HP 3PAR StoreServ Storage systems to deliver high data availability[19] with the HP 3PAR Get 6-Nines Guarantee, which applies to all-flash HP 3PAR StoreServ 7450 arrays as well.

Combine this with the fact that the HP 3PAR StoreServ Storage family uses the same OS and offers the same rich set of enterprise-class data services across the entire portfolio—from midrange to high-end and across both all-flash and hybrid arrays—and the choice becomes simple. Whether you are selecting an all-flash HP 3PAR StoreServ 7450 or another member of the HP 3PAR StoreServ family, investing in HP 3PAR StoreServ Storage is investing in your future by choosing the last primary storage platform you'll ever need.

Learn more at
hp.com/go/StoreServ

[18] For details, refer to the Get Thin Guarantee Terms and Conditions. For more information: hp.com/storage/getthin

[19] For details, refer to the HP 3PAR Get 6-Nines Terms and Conditions. For more information: hp.com/storage/get6nines

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