Hewlett Packard Enterprise

HPE 3PAR StoreServ 7450 all-flash array

Performance without compromise

Are you struggling to balance performance and enterprise-class resiliency while meeting new virtualization, cloud, and IT as a service (ITaaS) demands? What if you could instantly process six times more transactions per second with 90 percent fewer disks—without the real and hidden costs of adding a dedicated storage architecture?

Key features and benefits

Thin Deduplication increases capacity efficiency without compromising performance

- Inline deduplication lowers flash cost by saving capacity upfront without the need for any storage pools or post-processing.
- ASIC-based Thin Deduplication offloads CPUs enabling them to continue delivering consistent high performance.
- Avoids unnecessary writes to flash media extending its life.
- Integration with HPE 3PAR Peer Motion software increases storage efficiency across systems.

Tier-1 resiliency accelerates application performance and enables QoS

- 900,000 IOPS at less than 0.7 ms latency.[1]
- Flash-optimized hardware and software reduce performance bottlenecks.
- HPE 3PAR Priority Optimization ensures consistent quality of service (QoS) levels.
- Persistent technologies deliver high availability and Tier-1 resiliency.
- Multitenant I/O processing efficiently handles media failures.

Improve storage ROI with flash-based media lifespan and utilization enhancements

- Five-year warranty on new 1.92 TB and 3.84 TB, and 480 GB cMLC SSDs and 480 GB and 920 GB SSDs.
- System-wide striping provides uniform wear and avoids performance hot spots.
- Thin Deduplication, Adaptive Write, and fine-grained capacity allocations extend flash media lifespan without performance degradation.
- Proactive media management constantly monitors flash utilization and wear.

[1] "Assumes a 100 percent 4K random read workload with no cache hits and with node-specific volume layout."

[2] "As compared to not using data compaction technologies—based on a 4:1 data compaction ratio."

[3] "When configured with 3.84 TB cMLCs and used with HPE 3PAR compaction technologies, HPE 3PAR StoreServ 7450 Storage brings usable capacity to over a petabyte and cost to less than $1.50 USD per GB (usable)."

Accelerate performance to boost agility

HPE 3PAR StoreServ 7450 Storage is the only all-flash array in the industry that delivers the performance advantages of a purpose-built, flash-optimized architecture without compromising resiliency, efficiency, or data mobility. A flash-optimized architecture reduces the performance bottlenecks that can choke general-purpose disk arrays that have been retrofitted with solid-state disks (SSDs). However, unlike other purpose-built flash arrays, the HPE 3PAR StoreServ 7450 Storage doesn't require you to introduce an entirely new architecture into your environment to achieve flash-optimized performance. As a result, you don't have to sacrifice rich, Tier-1 data services, quad-node resiliency, advanced functionality, enterprise-class efficiency, or seamless data mobility between systems.

HPE 3PAR StoreServ 7450 Storage accelerates business agility by boosting application performance with over 900,000 IOPS at less than 0.7 milliseconds (ms) latency. And it does this while delivering all the enterprise-class, Tier-1 features and functionality you have come to expect. It's performance without compromise.

The last storage platform you will ever need

With HPE 3PAR StoreServ Storage, the same effortless, efficient, resilient, and future-proof storage platform gives you optimized performance with both flash-based and spinning media that also scales to address the needs of the entire midrange, Tier-1 enterprise, and high-end service providers. The same common OS, consolidated user interface, and rich set of data services are shared across the entire platform—regardless of model.

With the all-flash HPE 3PAR StoreServ 7450 Storage, you can accelerate applications where ms represent millions of dollars and make informed business decisions in hours or minutes instead of days or weeks. You can cut your system capacity requirements by 75 percent with HPE 3PAR Thin Deduplication and HPE 3PAR Thin Clones software combined with hardware-accelerated zero-block deduplication.[2] You can choose new high-density 3.84 TB commercial multilevel cell (cMLC) in combination with HPE 3PAR compaction technologies to lower the cost of all-flash storage than that of spinning media.[3] You can get more from your flash storage with features that extend flash-based media lifespan and a standard five-year warranty on all HPE 3PAR StoreServ SSDs, including new low-cost cMLC options.

Balance performance and cost with seamless migration, data mobility
- Painless, no-cost migration from EMC arrays.

- Online, non-disruptive data placement across all HPE 3PAR StoreServ Storage systems ensures efficient use of storage resources.

- Storage federation enables data mobility and load balancing at will.

- Polymorphic simplicity across Tier-1, midrange, and flash-based arrays.

HPE 3PAR Priority Optimization

Need to assure QoS for mission-critical applications?
HPE 3PAR Priority Optimization is optional software that enables you to manage service levels for applications and workloads as business requirements dictate to assure QoS. This means you can now provision storage performance as easily and efficiently as provisioning storage capacity. Reduce contention and certify that performance is delivered where you need it most in multitenant environments.

A highly automated approach allows you to assign a minimum goal quickly and easily for IOPS, bandwidth, and latency to protect mission-critical applications.

You can also assign performance thresholds to workloads with lower service-level requirements.

HPE 3PAR Priority Optimization allows you to consolidate more applications on less infrastructure while delivering predictable performance to meet even the most demanding service-level requirements.

You can unlock the native file and object access capabilities within your HPE 3PAR StoreServ Storage array, made possible by the HPE 3PAR OS and your array's Converged Controllers with HPE 3PAR File Persona Software Suite. The HPE 3PAR File Persona Software Suite enables home directory consolidation, group and departmental shares, corporate shares, and custom cloud applications—all from truly Converged Controllers, truly agile capacity, and truly unified management. And with the HPE 3PAR Get 6-Nines Guarantee Program, Hewlett Packard Enterprise stands behind the ability of all quad-node and larger HPE 3PAR StoreServ Storage systems, including the 7450 all-flash array, to deliver data high availability with 99.9999 percent uptime,[4] giving you the peace of mind that your mission-critical data will be available when you need it most.

The flash-optimized architecture behind the performance

HPE 3PAR StoreServ Storage removes the bottlenecks that prevent legacy storage from taking full advantage of flash-based media. This is the driving force that allows the HPE 3PAR StoreServ 7450 all-flash array to deliver accelerated performance that is six times greater than traditional platforms using hard disk drives (HDDs) while also delivering extremely low latency.[5] This flash-optimized architecture relies on several new and unique HPE 3PAR StoreServ innovations:

- Unique, clustered, Mesh-Active architecture: Fine-grained virtualization and system-wide striping shared by HPE 3PAR StoreServ Storage delivers capacity and performance that scale automatically, even at extremely high capacity utilization levels.

- Purpose-built HPE 3PAR Gen5 Thin Express ASIC: Supports mixed workloads and enables Thin Deduplication with extremely high performance levels to alleviate legacy storage performance concerns.

- HPE 3PAR Adaptive Read and Write: Matches host I/O size reads and writes to flash media at a granular level to avoid unnecessary data reads and writes to reduce latency, enhance back-end performance, and extend flash medial lifespan to lower storage total cost of ownership (TCO).

- Autonomic cache offload: Reduces cache bottlenecks by automatically changing the frequency at which data is offloaded from cache to flash media based on utilization rate. This helps achieve consistently high performance levels as you scale the workload to hundreds of thousands of IOPS.

- Multitenant I/O processing: Enables performance improvement for mixed workloads or virtual desktop infrastructure (VDI) deployments by breaking large I/O into smaller chunks so that small read requests don't get held up or stuck behind larger I/O requests, which helps ensure reduced latency.

- HPE 3PAR Express Writes: Write acceleration that optimizes CPU utilization, and depending on workload, delivers greater throughput, up to 30 percent more IOPS, and up to 20 percent reduced latency.[6]

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[4] "Subject to qualification and compliance with the HPE 3PAR Get 6-Nines Guarantee Program Terms and Conditions, which will be provided by your HPE sales or channel partner representative."

[5] "**Hewlett Packard Enterprise and SanDisk Partner for the HPE 3PAR StoreServ 7450 all-flash array white paper**, June 2014."
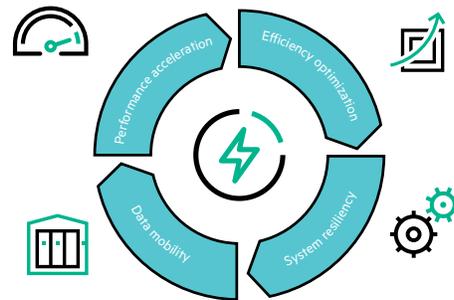
[6] "Based on a random, 100 percent write workload with an 8K block size."

Performance acceleration
Eliminate system bottlenecks

Optimize cache handling and pool all resources for high I/O and low latency

Efficiency optimization
Extend life and utilization of media

Hardware acceleration and fine-grained virtualization to optimize compaction

Data mobility
Federate across systems and sites

Seamless data movement between peer systems for SLA management

System resiliency
Provide constant application access

Bulletproof Tier-1 resiliency for business continuity locally and over distance

Figure 1. The benefits of the HPE 3PAR StoreServ flash-optimized architecture

Flash-based storage you can afford

HPE 3PAR StoreServ 7450 Storage helps you radically improve efficiency, making an all-flash storage array more affordable for a wider range of applications than ever before. Unlike bolt-on thin storage solutions on legacy arrays, HPE 3PAR StoreServ 7450 all-flash arrays feature hardware-enabled HPE 3PAR Thin Technologies that allow systems to run in a state of consistent high capacity utilization without any performance tradeoffs. In fact, the HPE 3PAR Get Thin Guarantee Program promises new HPE 3PAR StoreServ customers at least 50 percent reduction in capacity requirements by simply replacing legacy storage with HPE 3PAR StoreServ Storage—guaranteed.[7]

Unlike mechanical HDDs, SSDs leverage flash-based storage composed of electronic media that wears down with each write. Innovations to the

HPE 3PAR StoreServ Storage platform deliver additional media endurance that enables you to extend the life of your SSDs to get the most out of every dollar and I/O for increased storage return on investment (ROI).

The following features help maximize the efficiency of HPE 3PAR StoreServ 7450 Storage to drive down the overall cost of flash performance and protect your critical investments:

• New cMLC drives: Hewlett Packard Enterprise offers a new high-density 3.84 TB cMLC drive that when combined with HPE 3PAR compaction technologies, lowers the cost of storage to below $1.50 USD per usable GB. This is less than the cost of many systems using performance-oriented spinning disk drives. New 480 GB cMLCs are also available that dramatically lower the entry cost of choosing all-flash array.

• HPE 3PAR Thin Deduplication with Express Indexing: ASIC-assisted block-level

deduplication on the array happens **in line**—upon ingest—which carries multiple benefits, including increasing capacity efficiency, protecting system performance, and extending flash media lifespan. Thin Deduplication utilizes the patented Express Indexing feature that accelerates hash signature comparison, detecting duplicate write requests and preventing duplicate data from being written.

• Standard five-year SSD warranty: New 1.92 TB, 3.84 TB, and 480 GB cMLC SSDs as well as 480 GB and 920 GB SSDs carry a standard five-year warranty to protect your flash storage investments.

• Fine-grained allocation unit: With its 16 KB write allocation unit, the HPE 3PAR StoreServ Storage platform 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, avoiding waste due to unused allocated capacity.

[7] "Subject to qualification and compliance with the HPE 3PAR Get Thin Guarantee Program Terms and Conditions, which will be provided by your HPE sales or channel partner representative."

- System-wide striping: The HPE 3PAR StoreServ Storage architecture stripes data across all system resources (controllers, ports, cache, and drives). This system-wide striping enables the array to deliver uniquely high capacity utilization (no silos of any kind) and performance levels simultaneously (all resources supporting each volume). This drives uniform I/O patterns across all system components and spread wear evenly across all drives. Because the system automatically manages this system-wide load balancing, no extra time or complexity is required to create or maintain optimally better configured system.

- System-wide sparing: The HPE 3PAR StoreServ Architecture reserves spare chunklets in all-flash media. Unlike many competitive arrays that need to reserve dedicated spares, which sit idle, the HPE 3PAR StoreServ Architecture uses every single flash device, reserving spare chunklets in each of them. This ensures a balanced load and wearing across all-flash media. Should there be a media failure, system-wide sparing also helps protect against performance degradation by enabling many-to-many rebuild, resulting in faster rebuilds.

- Adaptive Sparing: HPE 3PAR StoreServ Storage extends useable capacity per drive by up to 20 percent by releasing the spare chunklets present in each SSD to the drive itself, allowing SSDs to use that spare capacity as additional over-provisioned

capacity.[8] This increase in over-provisioned capacity significantly enhances SSD media endurance for HPE 3PAR StoreServ Storage.

- Highly virtualized storage OS: To enable performance and to help maximize the utilization of physical resources, the HPE 3PAR OS employs a trilevel mapping methodology similar to virtual memory architectures. The first level of mapping virtualizes physical drives of any size into granular allocation units or chunklets. Complete access to every chunklet reduces large pockets of inaccessible storage. The second level of mapping associates chunklets with logical disks (LDs). It is at this second level that RAID characteristics are implemented. The third level of mapping associates virtual volumes (VVs) with all or portions of an underlying LD or of multiple LDs. The fine-grained, trilevel mapping approach to virtualization enables a single flash media device to support hundreds of volumes and up to a dozen RAID definitions at the same time, allowing the system to make the most efficient use of flash.

- Zero-block deduplication: The HPE 3PAR StoreServ ASIC features an efficient, silicon-based zero-detection mechanism that gives HPE 3PAR StoreServ Storage the power to remove allocated but unused space without impacting performance. On top of powering HPE 3PAR Thin Technologies and Thin Deduplication, this capability also removes streams of zeroes present in write I/O prior to writing that data to

flash-based media. In the world of flash-based storage, where there is a penalty for every single write (in terms of media endurance), this write elimination helps to extend media lifespan considerably.

- Proactive media management: HPE 3PAR OS constantly monitors flash-based media utilization and wear to enable proactive reporting of possible media failures for effortless management. You can stay informed on the expected life of your flash-based media by monitoring the wear levels of each flash device at any given time. Never be caught off guard by planning for future upgrades before your flash-based media is worn out.

Tier-1 resiliency for mission-critical workloads

A unique suite of persistent technologies power HPE 3PAR StoreServ 7450 Storage in delivering high availability and Tier-1 resiliency to performance-critical applications:

- HPE 3PAR Persistent Cache: Preserves service levels, so they are not impacted by unplanned component failures—a key requirement for the virtual data center.

- HPE 3PAR Persistent Ports: Allows non-disruptive upgrades to HPE 3PAR StoreServ 7450 Storage systems without relying on multipathing software and without initiating failover.

- HPE 3PAR Peer Persistence: Software delivers effortless resilience that comes with VMware vSphere® Metro Storage Cluster (vMSC) certification and support for Microsoft® Windows Server® and Microsoft Windows® Hyper-V environments as well as Red Hat® Enterprise Linux® (RHEL). With Peer Persistence, you'll also be able to federate storage across data centers without being constrained by physical boundaries. Automated failover and failback between two sites or data centers is transparent to hosts, which keeps your virtualized deployments seamlessly running even in the event of a disaster.

- HPE 3PAR StoreServ Data-at-Rest Encryption: Protects your data from both internal and external security breaches. If your application or environment requires protection from unauthorized access of the data, then consider the HPE 3PAR StoreServ Data-at-Rest Encryption solution. HPE 3PAR StoreServ models are fully Federal Information Processing Standard (FIPS) 140-2 compliant, support intelligent key management, and available with self-encrypting drives (SEDs), where data is encrypted as it is written to the drive. This means that all user data contained on these drives is protected against unauthorized access, regardless of hardware theft, drive failure, or drive retirement. HPE 3PAR StoreServ Data-at-Rest Encryption supports all of the advanced data services on HPE 3PAR StoreServ Storage.

- Flash-based media failure reconstruction: In order to protect flash performance, media failure reconstruction with HPE 3PAR StoreServ Storage is different from reconstruction of spinning media. In the case of a flash-based media failure, instead of doing large, sequential reads or writes as is done with HDDs, the HPE 3PAR StoreServ performs 32 KB read or write I/O for flash media. This enables the system to provide consistent performance levels even under situations of flash media failure, since large sequential writes can typically cause flash media performance to degrade.

Affordable, flexible disaster recovery

In order to meet service-level demands for performance-critical applications, uncompromising data protection is a must-have. With HPE 3PAR StoreServ 7450 Storage, you can decrease downtime while dramatically reducing the cost of remote data replication and disaster recovery (DR) with highly efficient, multimode replication across all HPE 3PAR StoreServ models. HPE 3PAR Remote Copy software allows you to achieve low recovery-time objectives (RTOs) and zero data loss recovery-point objectives (RPOs) with complete distance flexibility. And since HPE 3PAR Remote Copy configuration is autonomic, setup only requires one step, so you can protect your data from the start. Refer to the **HPE 3PAR Replication Software Suite data sheet** for additional details on Remote Copy and related functionality.

Converged data protection with HPE StoreOnce

If you are looking for virtually instant, application-consistent backups for your VMware® environment, look no further than rapid and granular backup and recovery with HPE StoreOnce Backup and HPE StoreOnce Recovery Manager Central for fast, efficient, reliable, and simple backup and recovery with your HPE 3PAR StoreServ Storage system. This solution transforms traditional approaches to backup and recovery, giving you application-aware, storage-integrated data protection that bypasses traditional backup server-based processes.

By connecting HPE 3PAR StoreServ Storage directly to HPE StoreOnce Backup, you can maintain business productivity by expediting the backup and recovery process and eliminating application performance impact. This streamlined backup process also reduces TCO for storage by leveraging HPE StoreOnce Backup Systems for cost-effective backup retention. The native movement of snapshots from HPE 3PAR StoreServ Storage to HPE StoreOnce Backup assures that any online storage threats are quickly mitigated with always-available, single-click data recovery. This is all made possible by HPE StoreOnce Recovery Manager Central, which allows VMware owners to seamlessly manage snapshots, and back up and recover directly from within VMware® vCenter™.

HPE 3PAR Online Import software

Painless migration to Tier-1 storage built for cloud and ITaaS
Storage federation on HPE 3PAR StoreServ Storage makes modernization simple by eliminating data migration as a pain point in refreshing your primary storage—including upgrading from HPE EVA Storage, EMC Storage, and Hitachi Data Systems (HDS) storage. HPE 3PAR Online Import software enables smooth data migration from a legacy array to your new HPE 3PAR StoreServ array in five simple steps.

Hassle-free data movement to balance performance and cost

For your business to consistently deliver high levels of application performance at an affordable cost, your storage architecture must allow easy data movement to keep up with the pace of change. For example, at times of peak demand on certain applications, you want the associated data placed on your fastest storage technology. You also need the flexibility to meet different service levels without having to manage multiple storage islands with incompatible management interfaces and data service technologies.

Meet the needs of today's dynamic applications with the ability to move data and workloads not just between tiers but also between arrays—without impact to applications, users, or services. With HPE 3PAR StoreServ Storage, you can simply and non-disruptively shift data between the HPE 3PAR StoreServ 7450 all-flash array and any other HPE 3PAR StoreServ array without additional management layers or appliances. Map workloads to the right resources and establish tiers of storage across the data center for different service-level agreements (SLAs). Lower costs and manage capacity at a data center level by thinly provisioning volumes with the freedom to move data between systems. Refresh technology effortlessly by streamlining the movement of volumes from older systems and non-disruptively update storage without application impact.

Software suites for HPE 3PAR StoreServ Storage

HPE 3PAR Operating System Software Suite	Required for all new HPE 3PAR StoreServ systems, this foundational software suite gives you everything you need to get up and running quickly and efficiently. Powered by HPE 3PAR Gen5 ASIC, HPE 3PAR Thin Technologies including—HPE 3PAR Thin Provisioning, HPE 3PAR Thin Persistence, HPE 3PAR Thin Conversion, and HPE 3PAR Thin Deduplication form the base of this software suite. Performance acceleration is assured by HPE 3PAR Adaptive Flash Cache, which reduces application response times.
	Network simplification and security are covered with iSCSI VLAN tagging. Simplified management is offered by the HPE 3PAR StoreServ Management Console, and HPE 3PAR Host Explorer software. HPE 3PAR System Reporter and HPE 3PARInfo software are designed to track performance and capacity utilization trends for multiple HPE 3PAR StoreServ systems. Other highlights of this suite include HPE 3PAR Full Copy, autonomic rebalancing capabilities that help you optimize the use of future capacity expansions, and support for standard multipathing software for high availability in clustered environments. A one-year license for HPE 3PAR Online Import is included to enable migration from HPE EVA, or EMC* or HDS** or IBM*** systems.
HPE 3PAR Replication Software Suite	This suite bundles HPE 3PAR Virtual Copy with HPE 3PAR Remote Copy software, both also sold separately for all HPE 3PAR StoreServ models. HPE 3PAR Virtual Copy software protects and shares data affordably with rapid recovery using reservationless, non-duplicative, copy-on-write snapshots. HPE 3PAR Remote Copy offers simple and cost-effective data protection for efficient multitenant disaster recovery.
	Also included in this bundle is HPE 3PAR Peer Persistence, which ensures transparent automatic failover over metropolitan distances Remote Copy Synchronous mode. For HPE 3PAR StoreServ 20000 and 8000, the suite also includes HPE 3PAR Cluster Extension software, which enables automatic failover across data centers using Remote Copy Asynchronous mode.
HPE 3PAR Data Optimization Software Suite	This software bundle combines HPE 3PAR Dynamic Optimization, HPE 3PAR Adaptive Optimization, HPE 3PAR Priority Optimization, and HPE 3PAR Peer Motion software together. HPE 3PAR Dynamic Optimization delivers the required service levels for the lowest possible cost throughout the data lifecycle. HPE 3PAR Adaptive Optimization improves storage utilization by enabling cost-optimized storage tiering.
	HPE 3PAR Priority Optimization assures service levels with QoS controls for mission-critical applications. HPE 3PAR Peer Motion enables load balancing at will wherein movement of data and workloads between arrays are not initiated without impact applications, users, or services. The four software titles bundled in this suite are also sold separately for all HPE 3PAR StoreServ models. Depending on purchase date, titles included in this suite may vary. Check the **HPE 3PAR software QuickSpecs** for complete details.
HPE 3PAR File Persona Software Suite	This software suite enables a rich set of file protocols and an Object Access application program interface (API) (REST) to extend the spectrum of primary storage workloads natively addressed by HPE 3PAR StoreServ Storage systems with Converged Controllers. With this solution, the architectural benefits of HPE 3PAR StoreServ Storage can be extended to the following use cases: enterprise file sync and share; home directory consolidation, group, and corporate shares; and custom cloud applications. This licensed feature of the HPE 3PAR Operating System enables rich file protocols from SMB/CIFS to NFS and FTP, file data services from quota management to file snapshots and retention/immutability, and a RESTful Object Access API for programmatic access to files. It extends the spectrum of workloads natively addressed by HPE 3PAR StoreServ Storage to include home directories and user shares, content management and collaboration, data preservation/governance, and custom cloud applications. Management is truly unified through the HPE 3PAR StoreServ Management Console and the powerful, scriptable HPE 3PAR CLI.

* HPE 3PAR Online Import support for EMC Storage extends to EMC VMAX, EMC VNX, and EMC CLARiiON CX4 storage systems.

** HPE 3PAR Online Import support for Hitachi Storage system extends to HDS TagmaStore Network Storage Controller (NSC), Universal Storage Platforms (USPs), and Virtual Storage Platforms (VSPs) Storage systems.

*** HPE 3PAR Online Import support for IBM Storage extends to IBM XIV Gen 2 and IBM XIV Gen 3 systems.

Software suites for HPE 3PAR StoreServ Storage (continued)

HPE 3PAR Security Suite	This software suite bundles HPE 3PAR Virtual Domains and HPE 3PAR Virtual Lock software. With this suite, you can segregate access and deliver robust storage services for different applications and user groups with additional security attached to the retention of storage volumes.
HPE 3PAR Application Software Suite for Hyper-V	Protect your Microsoft Hyper-V environment with HPE 3PAR Recovery Manager for Microsoft Hyper-V and the HPE 3PAR VSS Provider software, included in this software.
HPE 3PAR Application Software Suite for Exchange	This bundle gives you the essentials for use with Microsoft Exchange, including HPE 3PAR Recovery Manager for Exchange and the HPE 3PAR VSS Provider software.
HPE StoreOnce Recovery Manager Central	This suite bundles everything you need to protect your critical applications running on HPE 3PAR StoreServ Storage. RMC software allows you to create, manage, and automate crash-consistent snapshots for any application and app-consistent snapshots for VMware vSphere, Microsoft SQL Server, and Oracle.**** In addition, RMC allows you to perform flat backup to HPE StoreOnce systems for converged data protection.

**** Recovery Manager Central for Oracle (RMC-O) supports RHEL and OEL environments. For Solaris SPARC, IBM AIX, and HP-UX environments, use the HPE 3PAR Applications Suite for Oracle.

HPE Technology Services

Expert HPE Storage consultants and service professionals sit down with you and your team to map your storage needs. Not only can we help you accelerate implementation and reduce deployment risk, but we can also help you realize the full value of your storage purchases as you transform storage for the New Style of IT.

Advise, transform, and integrate
Navigate through the complexities of storage, backup, archive, DR, and Big Data with advisory, transformation, and integration consulting.

Deploy and implement
Access expertise to support deployment, operations, relocation, sanitization, and disposal, plus improvement-focused education.

Operate and support
Find the level of personalized, proactive, and simplified support right for your business.

Note
Specific service availability varies by product.

HPE Foundation Care
System-level IT hardware and software support delivers flexible coverage window and response time for more choice and simplicity.

HPE Proactive Care
Combined reactive and proactive services provide easy-to-purchase, cost-efficient, system-level support coupled with personalized expert advice and products connected to Hewlett Packard Enterprise to help prevent problems and reduce downtime.

HPE Datacenter Care
Get the support you need to deploy, operate, and evolve your data center environment to be hybrid-cloud-ready with single point of accountability for HPE and others' products.

Get connected and get back to business—HPE Storage Technology Services provide the path to get your HPE Storage solutions and your business connected to Hewlett Packard Enterprise. Once connected, our experts can scan your system and run health checks, then use that data to create personalized reports and recommendations for actions to take to prevent problems and downtime.

To learn more, visit **www8.hp.com/us/en/ business-services/it-services/storage-services.html**.

Optimize your IT investment strategy with new ways to acquire, pay for, and use technology, in lock-step with your business and transformation goals. **hpe.com/solutions/hpefinancialservices**

Free ROI calculator
Take five minutes to calculate the potential three-year cost savings and ROI you can expect by migrating from your current storage to an HPE 3PAR StoreServ solution. **Click here** to go on the HPE Storage Quick ROI tool.

HPE Factory Express

HPE Factory Express provides customization and deployment services along with your storage and server purchases. You can customize hardware to your exact specifications in the factory—helping speed deployment. **hpe.com/info/factoryexpress**

ExpertOne

Gain the skills you need with ExpertOne training and certification from Hewlett Packard Enterprise. With

HPE Converged Storage training, you will accelerate your technology transition, improve operational performance, and get the best return on your HPE investment. Our training is available when and where you need it, through flexible delivery options and a global training capability. **hpe.com/storage/learn**

Learn more at
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