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HP StorageWorks XP12000 Takes
Consolidation and Tiered Storage to Another Level

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Management Summary

Some enterprises have huge requirements for information storage.   Their business activities run on a large scale, and their storage must follow suit. These enterprises need plenty of disk capacity – tens or hundreds of terabytes. Performance must be high and consistent across a variety of workloads due to many different servers and applications. The servers probably run a variety of operating systems, even *z/OS* (mainframe). Information availability is a must, and recovery very fast. Data replication, movement, and mirroring are a part of life. With all the scale and complexity, centralized management and simplification are also a must to avoid spending too much on an army of storage administrators. For enterprises in this class, HP offers the *StorageWorks XP* family.

HP just pushed its high end higher with the introduction of the *StorageWorks XP12000*. As you would expect, this newest member of the family features a step up in scalability, performance, and connectivity over existing models. The system tops out at 1,152 drives, 165 TB of internal capacity (330 TB with upcoming new drives), and 128 Fibre Channel ports. Performance hits to 1.9 million IOPS of cached reads and 8 GB/s of sequential reads. By all measures, the XP12000 is a huge system.

Perhaps more interesting are its software features. The XP12000 has the ability to incorporate external storage into its internal virtualization layer. This means other, even third-party storage arrays can connect to the back of it and becomes part of a unified, centrally-managed pool that scales to a practically limitless 14 PB. In a future release, HP will offer software for partitioning the pool into secure, virtual tiers with dedicated cache, ports, and capacity. It will also be able to replicate remotely any data in the pool for business continuity. One can sense the possibilities for creating a large tiered storage infrastructure in support of multiple customers (internal or external) as well as information lifecycle management (ILM).

Other new or upcoming software features include online firmware upgrades for continuous availability, integration with server clusters for mirroring over distance, support for NonStop Server, and disk-based journaling for asynchronous mirroring. It also supports existing XP family software. **The XP12000 is a powerful system for enterprises with serious requirements for storage consolidation and the ensuing benefits of management simplicity, improved capacity utilization, and cost-effectiveness at scale.** Read on for details.

Consolidation and Right-Sized Solutions

Consolidation and right-sized solutions are themes that run through the HP disk storage line. It includes the *StorageWorks MSA* family at the entry level, the *StorageWorks EVA* family in the midrange, and the *StorageWorks XP* family at the high end. Together, they cover a wide spectrum of requirements – from basic to premium, small to large – measured in terms of capacity, performance, availability, complexity of environment, and cost. The reason is that HP's enterprise customers come in vastly different sizes and degrees of complexity. A small business might have a single server with dedicated storage and periodic tape backup, while a large, global enterprise might have thousands of servers distributed around the world with advanced capabilities like geographically-dispersed clusters and mirrors. When it comes to storage products, one size cannot possibly fit all. Thus, HP offers a set of storage solutions that are right-sized for different enterprises and environments.

At the same time, all enterprises want some form of storage consolidation. The idea behind consolidation is to meet storage requirements with as few systems as possible. Through centralization and sharing, a consolidated platform offers management simplicity, better asset utilization, and significantly lower total cost of ownership. HP's storage line is designed for consolidation, and many of its products support the important enabling technologies of storage networking (SAN and NAS)[1] and virtualization[2]. But once again, even a consolidated solution needs to be the right size for a given environment.

For enterprises at the top of the scale – those with the greatest, most demanding requirements for storage and consolidation – HP has introduced an impressive new platform called the *StorageWorks XP12000*.

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[1] See *Networked Storage – A Buyers Guide to Pain Relief* in **The Clipper Group Explorer** dated April 25, 2003, at http://www.clipper.com/research/TCG2003017.pdf.

[2] See *Storage Virtualization in 2001: A Space Odyssey* in **The Clipper Group Explorer** dated April 9, 2001, at http://www.clipper.com/research/TCG2001002.pdf.

HP StorageWorks XP12000

The Hardware

The XP12000 is the new high-end system in HP's storage line. As one would expect, it does everything on a large scale. The XP12000 contains up to 1,152 internal disks (or 165 TB of raw capacity[3]), 68 GB/s of cache bandwidth, and 128 Fibre Channel or 64 FICON or ESCON host connections. It supports 20+ host operating systems, including *Windows*, *HP-UX*, *Linux*, and *zOS*. In other words, the XP12000 is designed to store a tremendous amount of data for a plethora of servers that are connected either directly or through a SAN. It also delivers nearly 2 million IOPS cache reads and 8 GB/s sequential reads, putting it in the front of the pack for the storage performance race.

Like other XP arrays, the internal architecture is based on a crossbar switch that interconnects cache, disk drives, and external connections. This is the foundation of the platform's ability to deliver high overall performance and across a variety of different workloads. The new XP12000 has 64 switched data paths that deliver a 641% increase in cached bandwidth over the previous generation XP array. *See table on next page for more details.*

The Software

If that describes what the XP12000 has under the hood, so to speak, now consider what it can tow behind. The XP12000 has a new feature that allows it to incorporate other storage arrays into its internal virtualization layer and presents them to host servers as a unified pool. Conceptually, virtualization is the ability to aggregate physical disks into larger, abstracted units in order to mask complexity, simplify management, and maintain uptime. While the XP family was previously able to virtualize its internal capacity, the XP12000 now extends it to external, even heterogeneous storage arrays. These arrays connect to external ports on the system, and the XP12000 can configure, manage, access, and present them to hosts as regular volumes. It can also apply advanced software services like point-in-time copy, non-disruptive volume migration, and, in the future, remote mirroring. **One can**

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[3] 330 TB when larger 300 GB disks become available in 2005.

HP StorageWorks XP Family – At A Glance

	XP12000	**XP1024**	**XP128**
Max internal capacity	165 TB*	149 TB	18 TB
Max internal + external capacity	14 PB	N/A	N/A
Max drives	1,152	1,024	128
Max cache reads	1,900,000 IOPS	500,000 IOPS	375,000 IOPS
Max sequential reads	8 GB/s	3.2 GB/s	2.4 GB/s
Max cache	128 GB + 6 GB control	128 GB + 4 GB control	64 GB + 4 GB control
Max FC host connections	128	64	48
FC drive options	73 GB @ 15k 146 GB @ 10k	73 GB @ 15k 73 GB @ 10k 146 GB @ 10k	73 GB @ 15k 73 GB @ 10k 146 GB @ 10k

* Capacities will double when 300 GB drives become available in 2005.
Source: HP

think of the XP12000 as a high-end array and heterogeneous virtualization platform combined into one.

External capacity can scale to a virtually limitless 14 PB and, eventually, to 30 PB. It supports previous-generation XP platforms and the *MSA1000* with SCSI drives.[4] Future support will include the *MSA1500* with low-cost SATA drives.

This virtualization capability lays the foundation for creating a tiered storage infrastructure[5] with the XP12000 that enables information lifecycle management (ILM)[6]. Different applications and data sets have different service-level requirements for storage in terms of performance, availability, and cost. Some need the highest performance, others can take advantage of low-cost disks, and so forth. The requirements of a single data set can even change through its lifecycle from creation to deletion. ILM seeks to optimize the relationship between data and storage as values and requirements change over time. It helps minimize costs and ensure appropriate data

accessibility. The virtualization capabilities of the XP12000 allow it to provision volumes with different price/performance character-istics, even from external arrays and low-cost disks – delivering tiered storage in support of ILM.

Furthermore, an upcoming feature called *Storage Partition XP* and *Cache Partition XP* will create up to 32 independently-managed and secure partitions within the XP12000. The partitions will have specific allocations of cache, external ports, and internal or external capacity. They enhance the system's ability to deliver storage tiers with specified service levels. They are also a means for asset tracking and chargeback for departments and appli-cations. This feature is scheduled for release in Q1 2005.

Additional XP12000 software features include:

- *Online, remote firmware upgrades* – Maintains data availability for all hosts during upgrades.

- *NonStop Server support* – The XP 128 and 1024 support the highly available HP NonStop Server, and the XP12000 will follow in 1H 2005.

- *Cluster Extension XP* – Integrates the XP's remote mirroring software (*Contin-uous Access XP*) with local server cluster solutions for fast application recovery

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[4] HP OEM's the XP series from Hitachi and collaborates technically to develop capabilities unique to HP.
[5] See *Tiered Storage Classes Save Money – Getting The Most Out Of Your Storage Infrastructure* in **The Clipper Group Explorer** dated August 29, 2002, at http://www.clipper.com/research/TCG2002030.pdf.
[6] See *Top 10 Things You Should Know About Information Lifecycle Management* in **The Clipper Group Explorer** dated May 11, 2004, at http://www.clipper.com/research/TCG2004041R.pdf.

between metro- and regional-area data centers.

- *Continuous Access XP journal capability* (Q1 2005 availability) – This is a technique for asynchronous replication that journals updates to disk and periodically sends them as a batch. It uses less cache memory and is more efficient with network bandwidth, saving costs in both areas. It also uses a "pull" technique where the target system controls the process and improves the performance at the mission-critical source. The journal capability enables multi-hop and multi-target configurations.

- *Continuous Access XP external storage capability* (2005 availability) – Supports external volumes for synchronous and asynchronous replication over distance between XP12000 systems. For instance, enterprises could use low-cost storage arrays as replication targets.

Finally, the XP12000 supports the array of advanced software currently available for the XP family. Features include centralized management, replication, mirroring, performance tuning, and data migration. List price starts around $450,000 for hardware, software, support, and installation.

Conclusion

The HP StorageWorks XP12000 takes consolidation and tiered storage to another level. It massively scales internal capacity and performance, but it also extends virtualization beyond the system to encompass potentially many storage arrays in a unified pool. The greater the scope of virtualization, the greater is the benefit, in terms of management simplicity, higher utilization, and lower total cost of ownership. The XP12000 takes the concept of tiered storage beyond one array to encompass multiple arrays, multiple drive types, and (in the future) partitions with dedicated cache, ports, and capacity. This provides a multiplicity of options for placing data at an optimized service level tier. Add in the XP family's wide array of software functionality, and the XP12000 becomes a formidable storage platform.

If your enterprise has significant storage requirements, consider the Storage-Works XP12000.
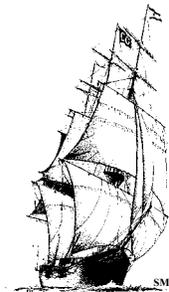
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About the Author

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