



SPC BENCHMARK 2™
EXECUTIVE SUMMARY

HEWLETT-PACKARD COMPANY
HP STORAGEWORKS XP24000 DISK ARRAY

SPC-2™ V1.2.1

Submitted for Review: September 8, 2008
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EXECUTIVE SUMMARY**Test Sponsor and Contact Information**

Test Sponsor and Contact Information	
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Revision Information and Key Dates

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SPC-2 Specification revision number	V1.2.1
SPC-2 Workload Generator revision number	V1.0
Date Results were first used publicly	September 8, 2008
Date FDR was submitted to the SPC	September 8, 2008
Date the TSC will be available for shipment to customers	May 14, 2007
Date the TSC completed audit certification	September 4, 2008

Tested Storage Product (TSP) Description

The HP StorageWorks XP24000/XP20000 Disk Arrays are large enterprise-class storage systems designed for organizations that simply cannot afford any downtime or tolerate any data loss. The XP mitigates the risk of business downtime by providing a bulletproof platform with complete hardware redundancies, hot-swappable components, and nondisruptive online upgrades. Data replication and tightly integrated clustering solutions, along with disaster recovery support, enable a multi-site disaster tolerant design to achieve complete business continuity. And with enhanced data protection and security features, you can decrease exposure to data loss.

The XP24000 offers four gigabit per second connection to disk drives and hosts, and supports up to 1,152 disk drives and 1.15 petabytes of capacity. The new array features an unprecedented peak performance range of up to 3.5 million input output operations from cache. It comes with newly enhanced and cost-reduced HP StorageWorks XP Array Manager software, which allows customers to easily configure, manage, partition and secure their data using a web-based interface. In addition, HP Services professionals worldwide can help with site preparation to ensure a smooth installation and start-up of the system.

The XP24000 is the latest enterprise disk array product to come from HP's long-term, joint engineering and original equipment manufacturer relationship with Hitachi Limited of Japan.

SPC-2 Reported Data

SPC-2 Reported Data consists of three groups of information:

- The following SPC-2 Primary Metrics, which characterize the overall benchmark result:
 - SPC-2 MBPS™
 - SPC-2 Price Performance
 - Application Storage Unit (ASU) Capacity
- Supplemental data to the SPC-2 Primary Metrics.
 - Total Price
 - Data Protection Level
- Reported Data for each SPC Test: Large File Processing (LFP), Large Database Query (LDQ), and Video on Demand Delivery (VOD) Test.

SPC-2 Reported Data				
HP StorageWorks XP24000 Disk Array				
SPC-2 MBPS™	SPC-2 Price-Performance	ASU Capacity (GB)	Total Price	Data Protection Level
8,724.67	\$187.45	18,401.385	\$1,635,434	Mirroring
<i>The above SPC-2 MBPS™ value represents the aggregate data rate of all three SPC-2 workloads: Large File Processing (LFP), Large Database Query (LDQ), and Video On Demand (VOD)</i>				
SPC-2 Large File Processing (LFP) Reported Data				
	Data Rate (MB/second)	Number of Streams	Data Rate per Stream	Price-Performance
LFP Composite	7,656.90			\$213.59
Write Only:				
1024 KiB Transfer	5,267.71	200	26.34	
256 KiB Transfer	5,277.99	200	26.39	
Read-Write:				
1024 KiB Transfer	7,361.95	200	36.81	
256 KiB Transfer	7,318.51	200	36.59	
Read Only:				
1024 KiB Transfer	11,555.87	200	57.78	
256 KiB Transfer	9,159.40	200	45.80	
<i>The above SPC-2 Data Rate value for LFP Composite represents the aggregate performance of all three LFP Test Phases: (Write Only, Read-Write, and Read Only).</i>				
SPC-2 Large Database Query (LDQ) Reported Data				
	Data Rate (MB/second)	Number of Streams	Data Rate per Stream	Price-Performance
LDQ Composite	10,652.81			\$153.52
1024 KiB Transfer Size				
4 I/Os Outstanding	10,506.49	200	52.53	
1 I/O Outstanding	11,372.42	200	56.86	
64 KiB Transfer Size				
4 I/Os Outstanding	9,553.10	200	47.77	
1 I/O Outstanding	11,179.22	200	55.90	
<i>The above SPC-2 Data Rate value for LDQ Composite represents the aggregate performance of the two LDQ Test Phases: (1024 KiB and 64 KiB Transfer Sizes).</i>				
SPC-2 Video On Demand (VOD) Reported Data				
	Data Rate (MB/second)	Number of Streams	Data Rate per Stream	Price-Performance
	7,864.31	10,000	0.79	\$207.96

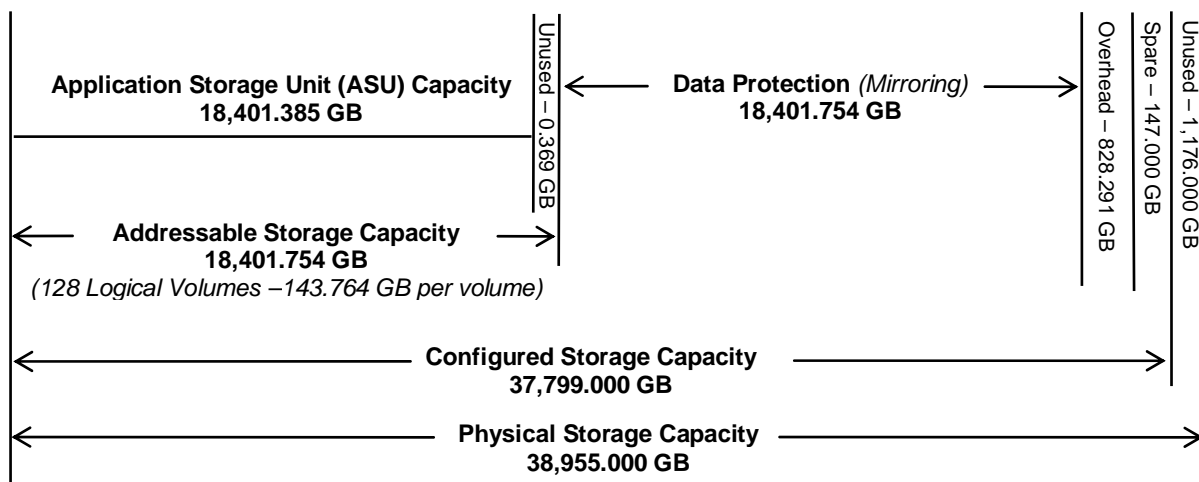
SPC-2 MBPS™ represents the aggregate data rate, in megabytes per second, of all three SPC-2 workloads: Large File Processing (LFP), Large Database Query (LDQ), and Video on Demand (VOD).

ASU (Application Storage Unit) Capacity represents the total storage capacity read and written in the course of executing the SPC-2 benchmark.

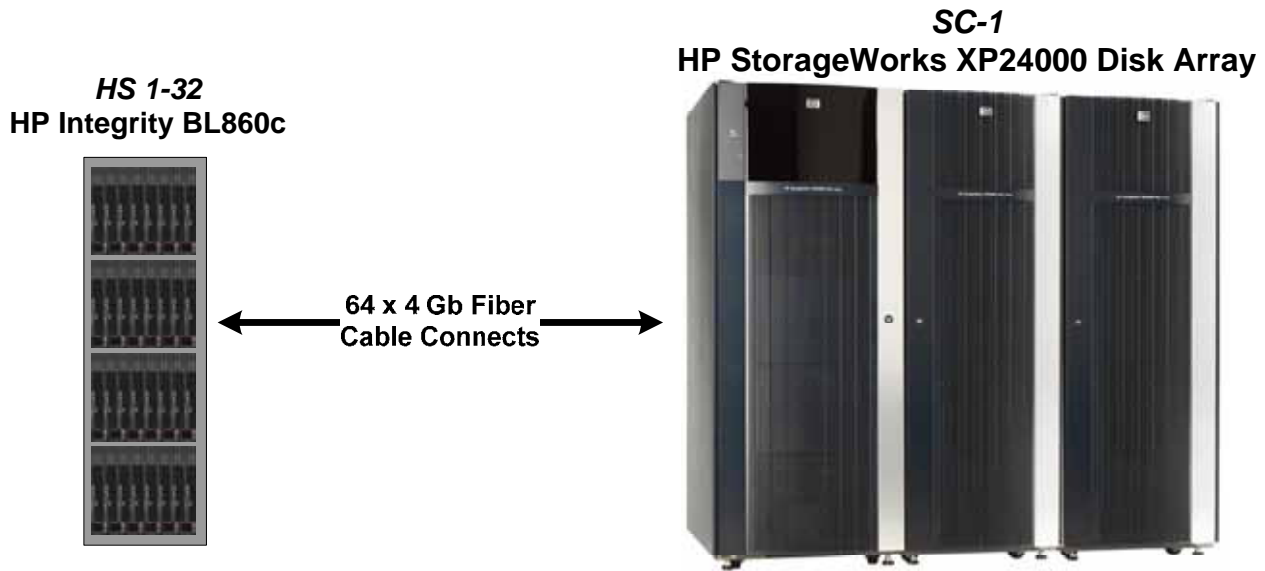
A **Data Protection Level** of “Mirroring” configures two or more identical copies of user data.

Storage Capacities and Relationships

The following diagram (*not to scale*) documents the various storage capacities, used in this benchmark, and their relationships.



Benchmark Configuration/Tested Storage Configuration Diagram



Host System(s) and Tested Storage Configuration Components

Host Systems:	Tested Storage Configuration (TSC):
UID=HS 1-32	32 – Qlogic QMH2462 4Gb FC HBAs
32 – HP Integrity BL860c Blade Servers Per server: 2 – Dual-Core Intel Itanium 2 Processors 1600 MHz, 12 MB cache per processor 8192 MiB main memor	UID=SC 1: HP StorageWorks XP24000 8 – 16 Port 4Gb FC CHAs 8 GB shared memory 128 GB cache 64 – 4Gb FC front-end physical connections (64 used)
Microsoft Windows Server 2003 Enterprise Edition, Service Pack 2	64 – 4Gb FC-over-Copper connections (64 used)
PCIe	8 – Cisco MDS 9124e 24-Port Fabric Switches
WG	265 – 146 GB, 15K RPM disk drives