SPC BENCHMARK 1™

EXECUTIVE SUMMARY

IBM CORPORATION

IBM SYSTEM STORAGE DS5300

SPC-1 V1.10.1

Submitted for Review: September 25, 2008
Submission Identifier: A00070

EXECUTIVE SUMMARY

Test Sponsor and Contact Information

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Revision Information and Key Dates

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SPC-1 Specification revision number	V1.10.1
SPC-1 Workload Generator revision number	V2.00.04a
Date Results were first used publicly	September 25, 2008
Date the FDR was submitted to the SPC	September 25, 2008
Date the TSC is available for shipment to customers	September 5, 2008
Date the TSC completed audit certification	September 24, 2008

Tested Storage Product (TSP) Description

The System Storage DS5000 series disk system is IBM's midrange disk offering, specifically designed to meet the needs of midrange/departmental storage requirements, delivering high performance, advanced function, high availability, modular and scalable storage capacity, with SAN-attached 4 Gbps Fibre Channel (FC) connectivity, and support for RAID 0, 1, 3, 5, 6, and 10, with up to 256 TB physical storage capacity.

The DS5000 series represents the seventh-generation architecture within the midrange disk family.

Summary of Results

SPC-1 Results	
Tested Storage Configuration (TSC) Name: IBM System Storage DS5300	
Metric	**Reported Result**
SPC-1 IOPS™	58,158.69
SPC-1 Price-Performance	$12.42/SPC-1 IOPS™
Total ASU Capacity	13,742.218 GB
Data Protection Level	Mirroring
Total TSC Price (including three-year maintenance)	$722,450

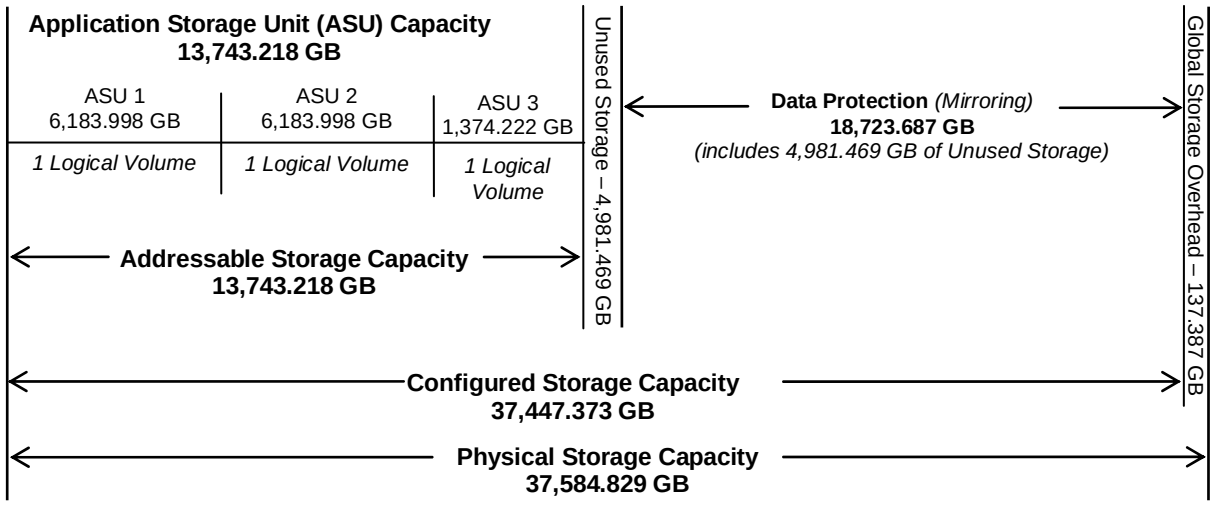
SPC-1 IOPS™ represents the maximum I/O Request Throughput at the 100% load point.

Total ASU (Application Storage Unit) **Capacity** represents the total storage capacity read and written in the course of executing the SPC-1 benchmark.

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

Storage Capacities and Relationships

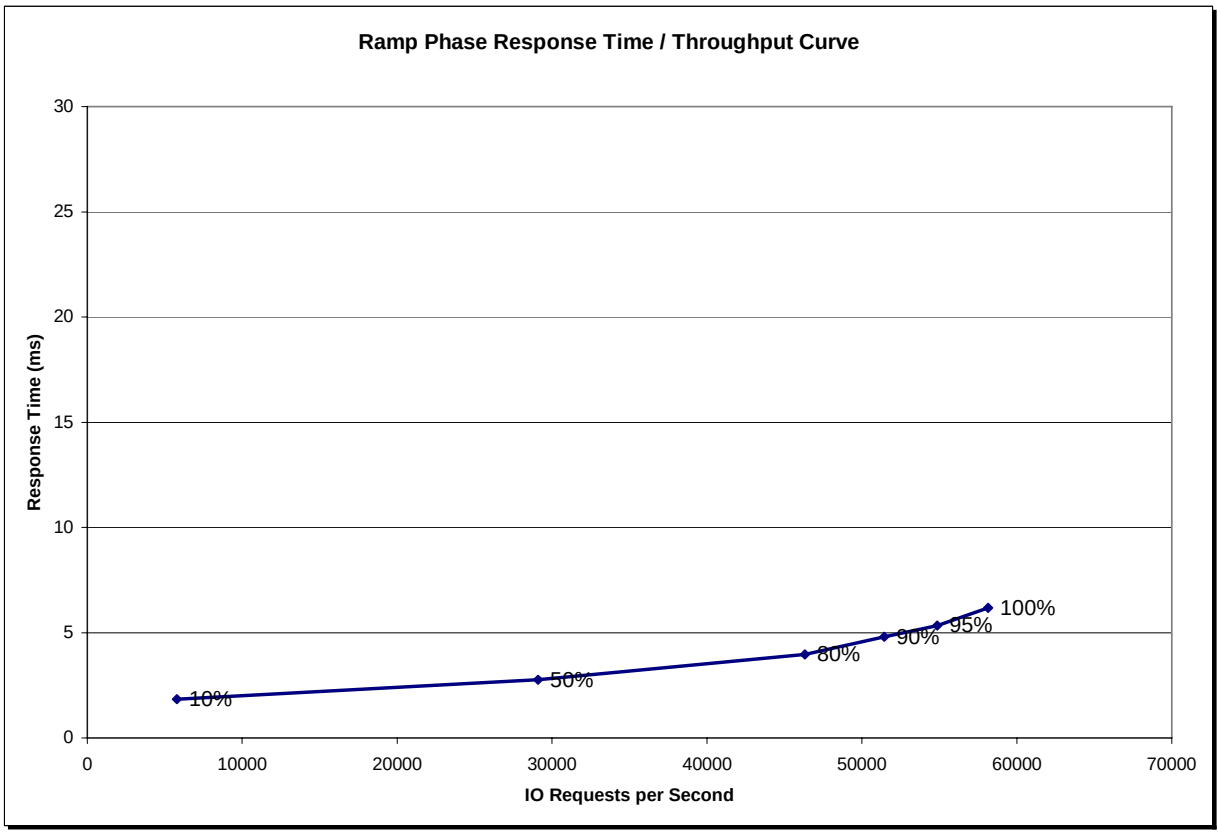
The following diagram documents the various storage capacities, used in this benchmark, and their relationships.



Response Time – Throughput Curve

The Response Time-Throughput Curve illustrates the Average Response Time (milliseconds) and I/O Request Throughput at 100%, 95%, 90%, 80%, 50%, and 10% of the workload level used to generate the SPC-1 IOPS™ metric.

The Average Response Time measured at the any of the above load points cannot exceed 30 milliseconds or the benchmark measurement is invalid.



Response Time – Throughput Data

	10% Load	50% Load	80% Load	90% Load	95% Load	100% Load
I/O Request Throughput	5,795.84	29,114.33	46,322.20	51,445.72	54,860.14	58,158.69
Average Response Time (ms):						
All ASUs	1.83	2.76	3.97	4.80	5.33	6.18
ASU-1	2.51	3.73	5.08	5.95	6.50	7.36
ASU-2	2.22	3.52	5.80	7.43	8.44	9.88
ASU-3	0.22	0.37	0.79	1.21	1.48	2.06
Reads	4.34	6.47	8.89	10.36	11.27	12.51
Writes	0.20	0.34	0.76	1.19	1.47	2.06

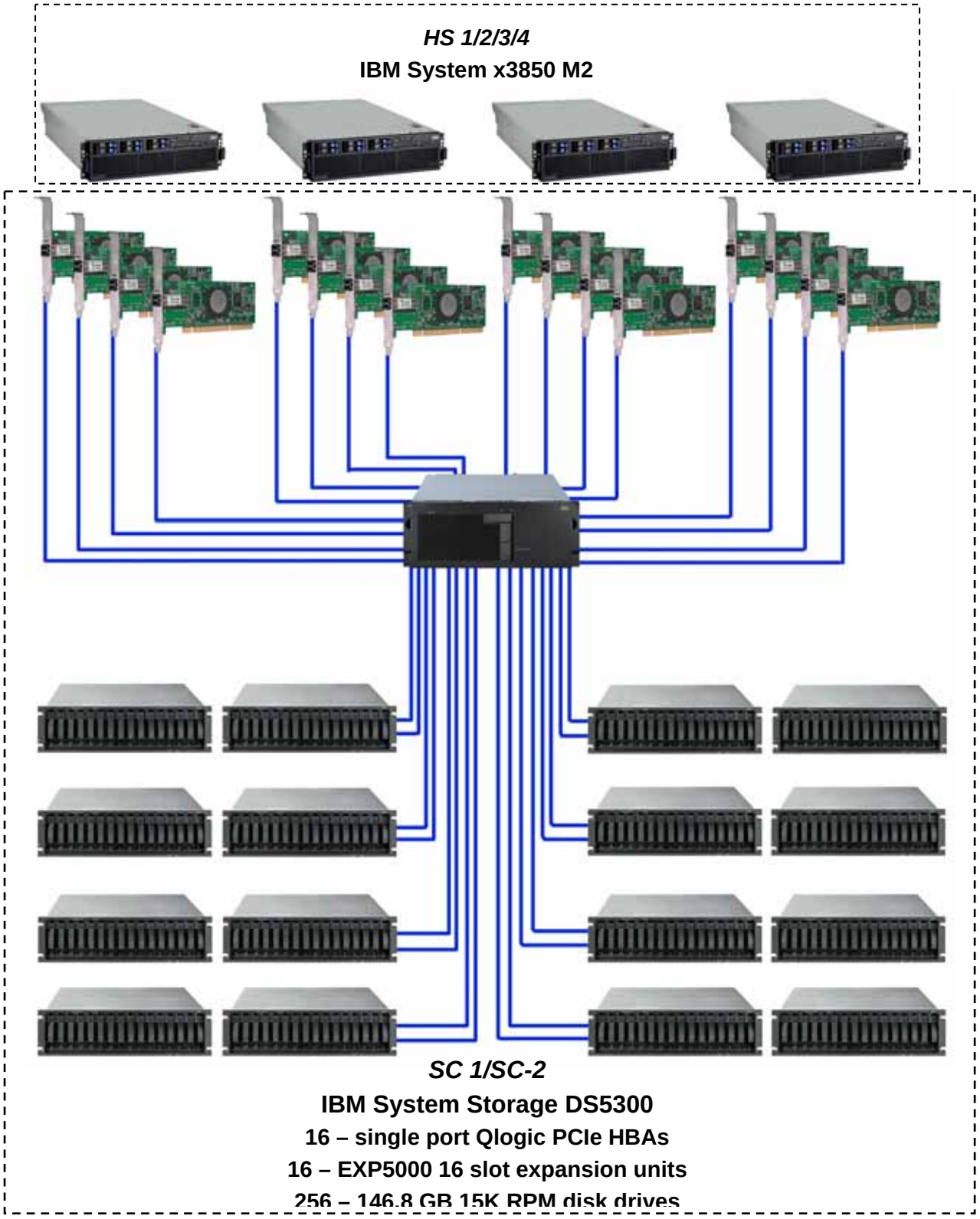
Tested Storage Configuration Pricing *(Priced Storage Configuration)*

Model Type / Feature	Description	List Price	QTY	Extended Price
1818-53A	DS5300 Dual Controller Disk System	$80,000.00	1	$80,000.00
1818-D1A	EXP5000 16 slot Expansion unit	$6,000.00	16	$96,000.00
2031	16GB Cache Memory	$32,000.00	1	$32,000.00
2050	Two Quad 4 Gbps FC Host Port Cards	$10,000.00	2	$20,000.00
2412	Short Wave 4Gbps SFP Transceiver Pair	$998.00	16	$15,968.00
5605	5M LC-LC FIBER OPTIC CABLE	$129.00	48	$6,192.00
7720	DS5000 WINDOWS HOST KIT	$1,250.00	1	$1,250.00
8900	DS5000 8 STG PARTITION-IP0	$10,000.00	1	$10,000.00
5530	16-Pak 146.8 GB/15K DDM	$22,544.00	16	$360,704.00
39R6525	single port Qlogic PCIe - 4GbFC	$1,225	16	$19,600.00
		Total List		$641,714.00
	Std warranty 1 year 24x7x4hr response		incl	
	addtl 2 years 24x7x4			$80,736
		Grand Total		**$722,450.00**

Differences between the Tested Storage Configuration (TSC) and Priced Storage Configuration

The only difference between the Tested Storage Configuration and Priced Storage Configuration is that the priced disk drives are mounted in an IBM drive carrier and each disk drive is configured to self-identify as a DS5000 brand. That difference, if applied to the TSC, would not have a negative impact on the reported SPC-1 performance.

Benchmark Configuration/Tested Storage Configuration Diagram



Benchmark Configuration/Tested Storage Configuration Components

Host System:	Tested Storage Configuration (TSC):
HS-1/2/3/4: IBM System x3850 M2	16 – single port Qlogic PCIe HBAs *(39R6525)*
Each Host System with:	**SC-1/SC-2: IBM System Storage DS5300**
2 – 2.93 GHz Quad Xeon Processors with 8 MB L2 cache	**2 – dual-active controllers with:**
8 GB main memory	16 GB cache
Windows Server 2003 Enterprise Edition 32-bit with SP2	2 – Two Quad 4 Gbps FC Host Port Cards
PCIe:	16 – 4 Gb Fibre Channel front-end connections
WG	16 – 4 Gb Fibre Channel backend connection
	16 – EXP5000 16 slot expansion units
	256 – 146.8 GB 15K RPM disk drives