



**SPC BENCHMARK 1™
EXECUTIVE SUMMARY**

**IBM CORPORATION
IBM SYSTEM STORAGE DCS3700
(WITH PERFORMANCE MODULES)**

SPC-1 V1.13

**Submitted for Review: January 17, 2013
Submission Identifier: A00125**

EXECUTIVE SUMMARY**Test Sponsor and Contact Information**

Test Sponsor and Contact Information	
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Auditor	Storage Performance Council – http://www.storageperformance.org Walter E. Baker – AuditService@StoragePerformance.org 643 Bair Island Road, Suite 103 Redwood City, CA 94063 Phone: (650) 556-9384 FAX: (650) 556-9385

Revision Information and Key Dates

Revision Information and Key Dates	
SPC-1 Specification revision number	V1.13
SPC-1 Workload Generator revision number	V2.2.0
Date Results were first used publicly	January 17, 2013
Date the FDR was submitted to the SPC	January 17, 2013
Date the Priced Storage Configuration is available for shipment to customers	currently available
Date the TSC completed audit certification	January 14, 2013

Tested Storage Product (TSP) Description

The new IBM Performance Module feature provides new controller canisters for the DCS3700 with increased processor speeds, larger cache memory capacities, and double the scalability of the original offering. Designed for use with HPC computing environments, the DCS3700 with Performance Modules increases the processing capability and storage capacity for HPC uses in the oil and gas industries, media applications, and life sciences with installation in large corporate data centers and government labs.

Each performance module brings four 8Gb Fibre Channel (FC) host ports, dual gigabit Ethernet ports, and a 6Gb SAS expansion connection to the DCS3700. A slot is available for additional host interface cards, such as a new 4 port 8Gb FC host interface card (HIC). There are three slots for DDR3 memory DIMMs in 2, 4, and 8 GB capacities, for a total of up to 6, 12, or 24 GB of memory for the canister, for a total of up to 12, 24, or 48 GB for the DCS3700 system with Performance Modules.

In addition to the increased memory scalability, the DCS37000 outfitted with performance modules will have increased scalability in drive capacity, with two 6Gb SAS ports to redundantly connect to up to five EXP3700 expansion enclosures, doubling the current number of attached disks to 360. Using the 3 TB NL SAS drive options yields over 1 PB of raw disk capacity.

Summary of Results

SPC-1 Reported Data	
Tested Storage Product (TSP) Name: IBM System Storage DCS3700 <i>(with Performance Modules)</i>	
Metric	Reported Result
SPC-1 IOPS™	82,496.08
SPC-1 Price-Performance™	\$4.38/SPC-1 IOPS™
Total ASU Capacity	29,609.710 GB
Data Protection Level	Protected 2 <i>(Mirroring)</i>
Total Price	\$361,416.00
Currency Used	U.S. Dollars
Target Country for availability, sales and support	USA

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

SPC-1 Price-Performance™ is the ratio of **Total Price** to SPC-1 IOPS™.

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

A **Data Protection Level** of **Protected 2** using **Mirroring** configures two or more identical copies of user data.

***Protected 2:** The single point of failure of any **component** in the configuration will not result in permanent loss of access to or integrity of the SPC-1 Data Repository.*

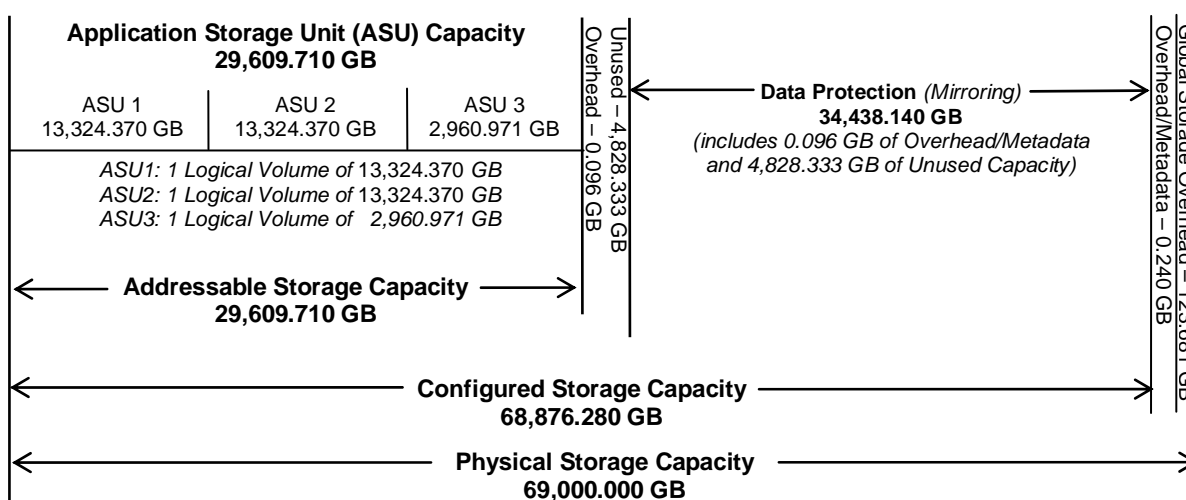
Total Price includes the cost of the Priced Storage Configuration plus three years of hardware maintenance and software support as detailed on page 7.

Currency Used is formal name for the currency used in calculating the **Total Price** and **SPC-1 Price-Performance™**. That currency may be the local currency of the **Target Country** or the currency of a difference country (*non-local currency*).

The **Target Country** is the country in which the Priced Storage Configuration is available for sale and in which the required hardware maintenance and software support is provided either directly from the Test Sponsor or indirectly via a third-party supplier.

Storage Capacities, Relationships, and Utilization

The following diagram and table document the various storage capacities, used in this benchmark, and their relationships, as well as the storage utilization values required to be reported.



SPC-1 Storage Capacity Utilization	
Application Utilization	42.91%
Protected Application Utilization	85.83%
Unused Storage Ratio	14.00%

Application Utilization: Total ASU Capacity (29,609.710 GB) divided by Physical Storage Capacity (69,000.000 GB)

Protected Application Utilization: Total ASU Capacity (29,609.710 GB) plus total Data Protection Capacity (34,438.140 GB) minus unused Data Protection Capacity (4,828.333 GB) divided by Physical Storage Capacity (69,000.000 GB)

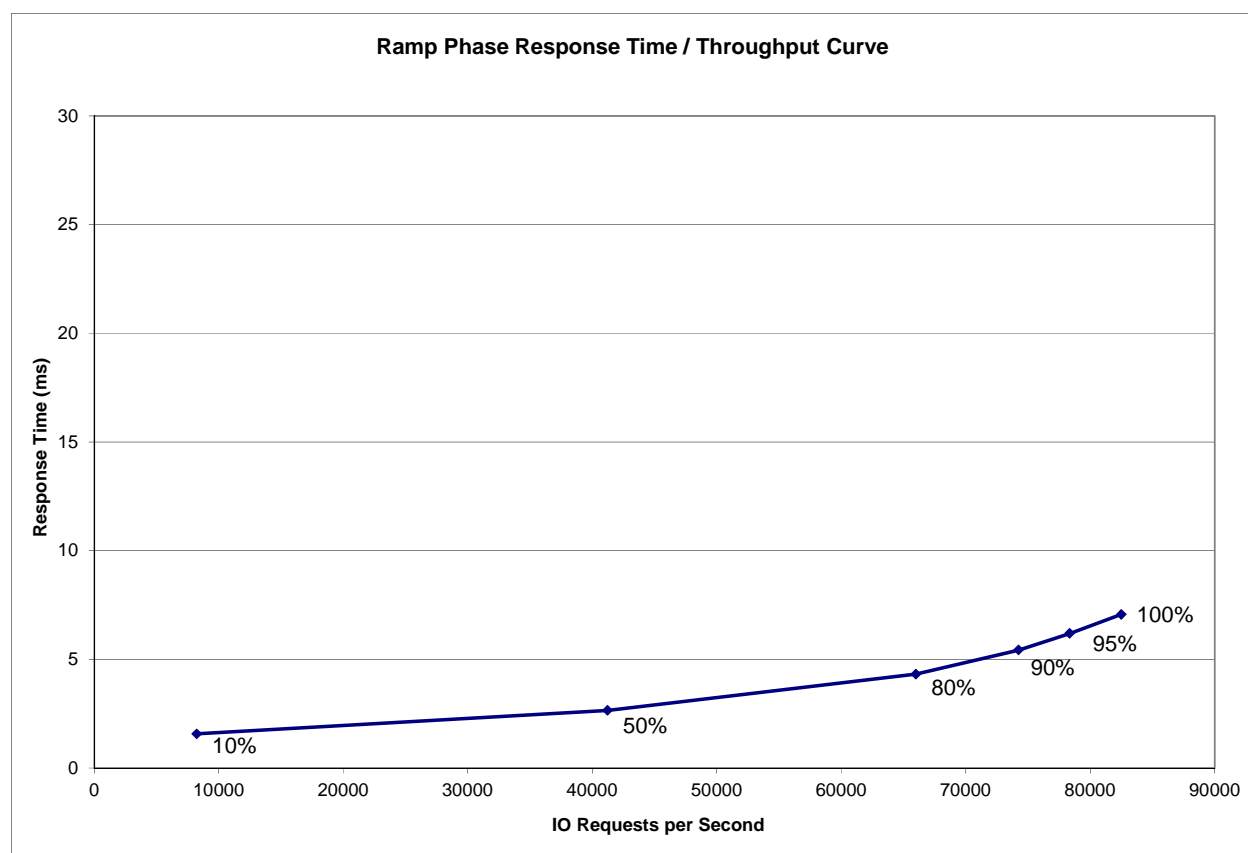
Unused Storage Ratio: Total Unused Capacity (9,656.666 GB) divided by Physical Storage Capacity (69,000.000 GB) and may not exceed 45%.

Detailed information for the various storage capacities and utilizations is available on pages 23-24 in the Full Disclosure Report.

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	8,244.73	41,245.11	65,997.43	74,258.09	78,354.81	82,496.08
Average Response Time (ms):						
All ASUs	1.56	2.65	4.31	5.42	6.18	7.06
ASU-1	2.17	3.55	5.60	6.87	7.70	8.62
ASU-2	1.80	3.56	6.83	9.55	11.59	14.21
ASU-3	0.17	0.33	0.48	0.54	0.60	0.64
Reads	3.74	6.25	10.25	12.97	14.82	16.98
Writes	0.15	0.30	0.44	0.51	0.56	0.60

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

There were no differences between the TSC and Priced Storage Configuration.

Priced Storage Configuration Pricing

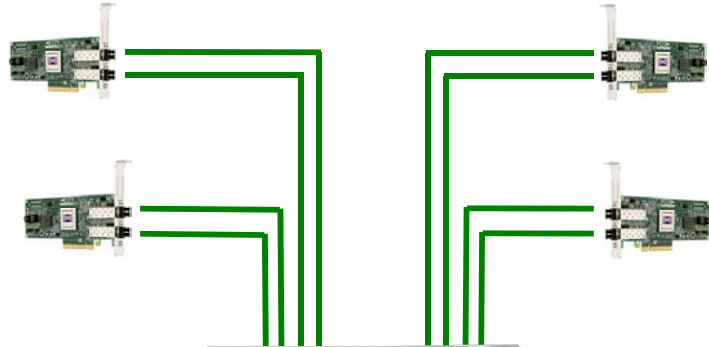
Product	Description	Qty	Unit Price	Ext. Price
1818-80C	DCS3700 Storage System	1	\$ 41,990.00	\$ 41,990.00
3100	Performance Module Controller pair	1	\$ 34,000.00	\$ 34,000.00
3110	12GB Cache each PM Controller	1	incl.	
5601	1m Fiber Cable (LC-LC)	8	\$ 79.00	\$ 632.00
1818-80E	DCS3700 Expansion Unit	3	\$ 19,900.00	\$ 59,700.00
3400	300GB 15K SAS HDD 10 Pack	23	\$ 7,760.00	\$ 178,480.00
3707	3m SAS Cable	6	\$ 135.00	\$ 810.00
42D0494	xSeries Dual Port 8 Gbps FC HBA	4	\$ 1,623.00	\$ 6,492.00
	1 year warranty 24x7x4hr		incl.	
	monthly maint 24x7x4hr	24	\$ 1,638.00	\$ 39,312.00
	Total price			\$ 361,416.00

The above pricing includes hardware maintenance and software support for three years, 7 days per week, 24 hours per day. The hardware maintenance and software support provides the following:

- Acknowledgement of new and existing problems with four (4) hours.
- Onsite presence of a qualified maintenance engineer or provision of a customer replaceable part within four (4) hours of the above acknowledgement for any hardware failure that results in an inoperative Priced Storage Configuration that can be remedied by the repair or replacement of a Priced Storage Configuration component.

Priced Storage Configuration Diagram

4 – xSeries dual-port 8 Gb/s FC HBAs



IBM System Storage DCS3700

(with Performance Modules)

Dual-Active Controllers with:
 24 GB cache, 12 GB per controller
 60 – 300 GB, 2.5", 15K RPM SAS disk drives
 5 Drawers each with 12 disk drives



DCS3700 Expansion Unit

60 – 300 GB, 2.5", 15K RPM SAS disk drives
 5 Drawers each with 12 disk drives



DSC3700 Expansion Unit

60 – 300 GB, 2.5", 15K RPM SAS disk drives
 5 Drawers each with 12 disk drives



DCS3700 Expansion Unit

50 – 300 GB, 2.5", 15K RPM SAS disk drives
 5 Drawers each with 12 disk drives



Priced Storage Configuration Components

Priced Storage Configuration:
4 – xSeries dual-port FC HBAs
DS Storage Manager
IBM System Storage DCS3700 <i>(with Performance Modules)</i> Dual-Active Controllers with: 24 GB cache , 12 GB per controller 8 – 8 Gb FC host ports, 4 ports per controller 4 – 6 Gb SAS connections, 2 per controller
3 – DCS3700 Expansion Units
230 – 300 GB, 2.5", 15K RPM SAS disk drives 60 disk drives in the controller module 60 disk drives in two Expansion Enclosures 50 disk drives in one Expansion Enclosure