SPC BENCHMARK 1™

EXECUTIVE SUMMARY

SUN MICROSYSTEMS, INC.

SUN STORAGE 6780 ARRAY

SPC-1 V1.10.1

Submitted for Review: February 3, 2009
Submission Identifier: A00074

EXECUTIVE SUMMARY

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	V1.10.1
SPC-1 Workload Generator revision number	V2.00.04a
Date Results were first used publicly	February 3, 2009
Date the FDR was submitted to the SPC	February 3, 2009
Date the TSC is available for shipment to customers	February 3, 2009
Date the TSC completed audit certification	February 3, 2009

Tested Storage Product (TSP) Description

The Sun Storage 6780 Array is a modular, rack mounted and scalable array designed specifically to grow with your applications, lowering acquisition and expansion costs. The Sun Storage 6780 Array consists of a minimum of one controller tray and up to 16 expansion trays. The Sun Storage 6780 controller tray (1 x 1) currently has two cache options — 8 GB and 16 GB – and two host port options – 8 or 16 – 4 Gb per second fibre channel.

The Sun Storage 6780 Array leverages the existing Common Storage Modules (CSM200) expansion trays for primary and secondary storage requirements. With redundant components, automated path failover and extensive online configuration, re-configuration and maintenance capabilities, the Sun Storage 6780 is designed to ensure your data is available 24x7x365.

Summary of Results

SPC-1 Results	
Tested Storage Configuration (TSC) Name: Sun Storage 6780 Array	
Metric	**Reported Result**
SPC-1 IOPS™	58,158.69
SPC-1 Price-Performance	$7.15/SPC-1 IOPS™
Total ASU Capacity	13,742.218 GB
Data Protection Level	Mirroring
Total TSC Price (including three-year maintenance)	$416,032

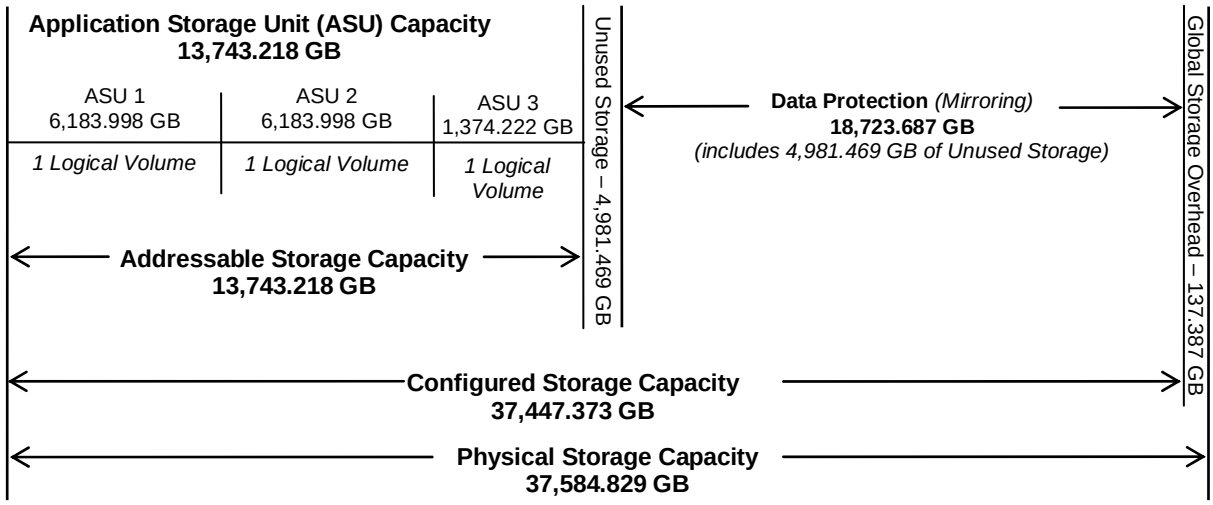
SPC-1 IOPS™ represents the maximum I/O Request Throughput at the 100% load point.

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

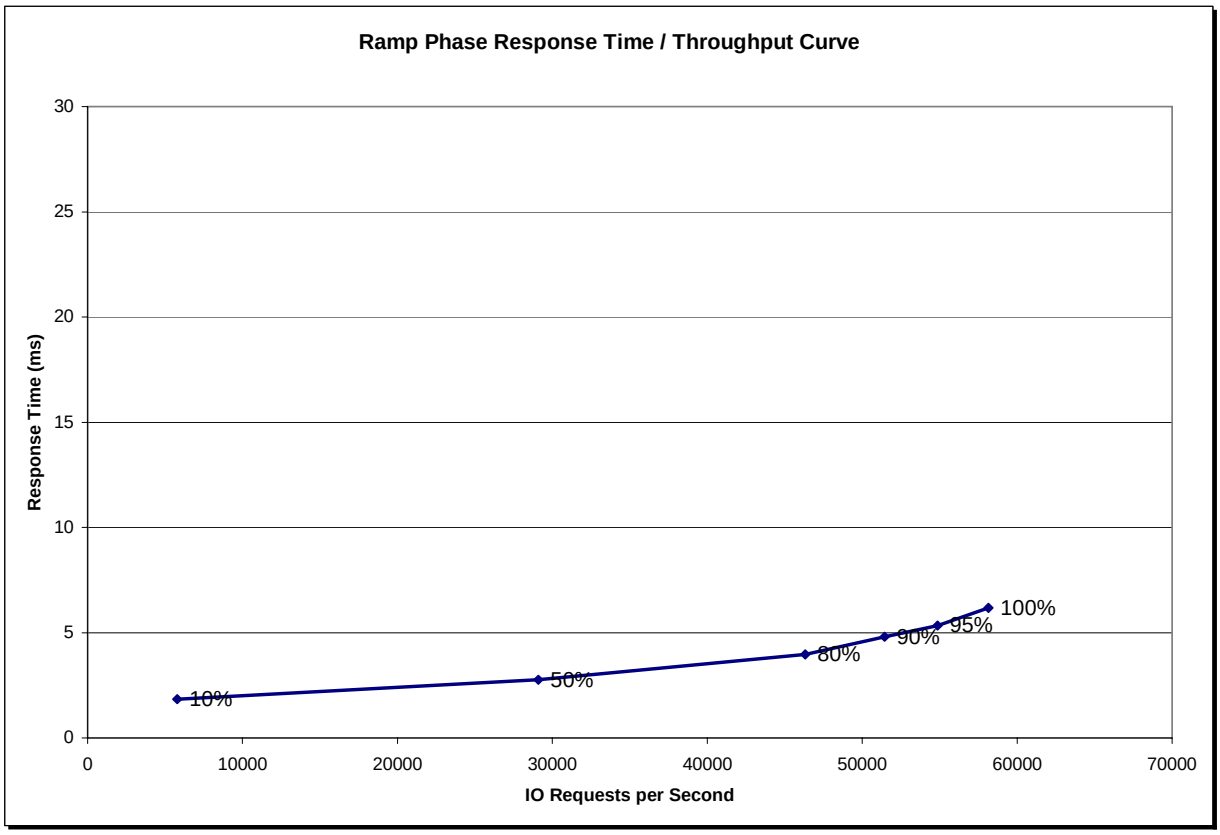
The following diagram documents the various storage capacities, used in this benchmark, and their relationships.



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

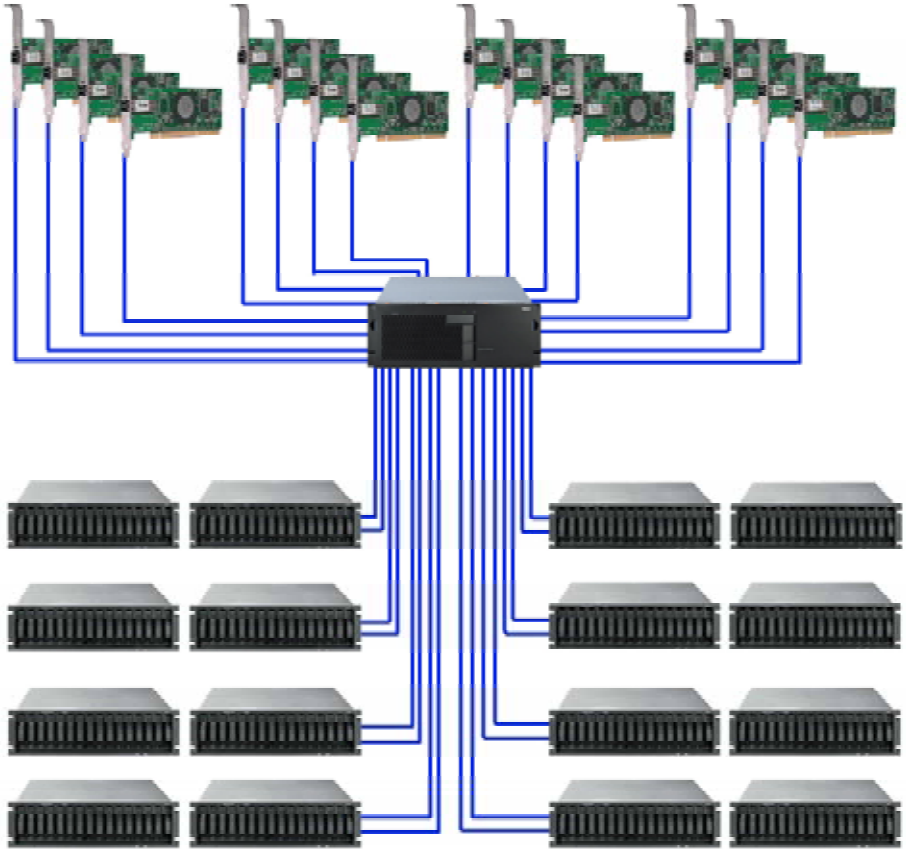
Tested Storage Configuration Pricing *(Priced Storage Configuration)*

Part Number	Description	Quantity	US List	Total	discount	Ave. Price
XTA6780R11Q4SA2-16	Sun Storage 6780 Array, 1x1, 16 GB, 16 Host ports	1	$124,999	$124,999	38%	$77,499
	- 2 Controllers w/ 8GB cache each		$0	$0	38%	$0
	- All required cables included		$0	$0	38%	$0
	Quad 4 Gbps FC Host Port cards	2	$0	$0	38%	$0
	Short wave 4Gbps SFP transeiver Pair	16	$0	$0	38%	$0
XTCCSM2R01A0C2336Z	STK CSM200 RM 0x1x16x146G15k	16	$29,915	$478,640	38%	$296,757
	- 16 146GB 15k rpm 4Gb drives		$0	$0	38%	$0
	- All required cables included (5M LC-LC Fiber Optic Cable	48	$0	$0	38%	$0
SN599-1030-99A9	CAM Management Software	1	$0	$0	38%	$0
SG-XPCI1FC-EM4	4Gb PCIe single port FC Host Based Adapter	16	$1,100	$17,600	38%	$10,912
XTC6x80-DOM8-ARY	8 Storage Domains	1	$10,000	$10,000	38%	$6,200
IWU-ST6780-6-24-3G	3-yr Gold Service Maintainance for controller tray	1	$9,700	$9,700	38%	$6,014
	- 7/24 coverage					
	- 4 hour resonse time					
	- 4 hour resolution					
IWU-STCSM2-24-3G	3-yr Gold Service Maintainance for CSM200 expansion tray	16	$1,880	$30,080	38%	$18,650
	- 7/24 coverage					
	- 4 hr response time					
	- 4 hour resolution					
				$671,019		**$416,032**

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

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

Priced Storage Configuration Diagram



Sun Storage 6780 Array
16 – 4Gb single port Qlogic PCIe HBAs
16 – STK CSM200 16 slot expansion units
256 – 146.8 GB 15K RPM disk drives

Priced Storage Configuration Components

Priced Storage Configuration:
16 – 4Gb single port Qlogic PCIe HBAs
SC-1/SC-2: Sun Storage 6780 Array **2 – dual-active controllers with:** 8 GB cache per controller 2 – Two Quad 4 Gbps FC Host Port Cards 16 – 4 Gb Fibre Channel front-end connections 16 – 4 Gb Fibre Channel backend connection
16 – STK CSM200 16 slot expansion units
256 – 146.8 GB 15K RPM disk drives