



**SPC BENCHMARK 2™
EXECUTIVE SUMMARY**

**SUN MICROSYSTEMS, INC.
SUN STORAGE 6180 ARRAY (*RAID-5*)**

SPC-2™ V1.3

**Submitted for Review: October 9, 2009
Submission Identifier: B00043**

EXECUTIVE SUMMARY

Test Sponsor and Contact Information

Test Sponsor and Contact Information	
Test Sponsor Primary Contact	Sun Microsystems, Inc. – http://www.sun.com Leah Schoeb – leah.schoeb@sun.com 5300 Riata Park Court AUS08 Austin, TX 78721 Phone: (877) 319-0457 FAX: (512) 266-2523
Test Sponsor Alternate Contact	Sun Microsystems, Inc. – http://www.sun.com Jason Schaffer – jason.schaffer@sun.com 500 Eldorado Blvd. Broomfield, CO 80021 Phone: (303) 272-4743 FAX: (303) 272-9704
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

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SPC-2 Specification revision number	V1.3
SPC-2 Workload Generator revision number	V1.0
Date Results were first used publicly	October 9, 2009
Date FDR was submitted to the SPC	October 9, 2009
Date the TSC will be available for shipment to customers	currently available
Date the TSC completed audit certification	October 9, 2009

Tested Storage Product (TSP) Description

The Sun Storage 6180 Array is a modular, rack mountable and scalable array designed specifically to grow with your applications, lowering acquisition and expansion costs. The NEBS Level-3 certified Sun Storage 6180 Array offers 8 gigabits-per-second (Gb/sec) Fibre Channel (FC) host interfaces designed for both direct attached and SAN attached storage. The system features a fully redundant architecture with drive intermixing (FC or SATA-II disk drives) in the same drive enclosure, 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, dynamic expansion and maintenance capabilities, the Sun Storage 6180 Array is designed to ensure your data is available 24x7x365.

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				
Sun Storage 6180 Array (RAID-5)				
SPC-2 MBPS™	SPC-2 Price-Performance	ASU Capacity (GB)	Total Price	Data Protection Level
1,244.89	\$42.53	3,504.693	\$52,951	RAID-5
<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	988.44			\$53.57
Write Only:				
1024 KiB Transfer	880.85	32	27.53	
256 KiB Transfer	407.34	32	12.73	
Read-Write:				
1024 KiB Transfer	1,100.74	32	34.40	
256 KiB Transfer	592.66	32	18.52	
Read Only:				
1024 KiB Transfer	1,472.81	32	46.03	
256 KiB Transfer	1,476.23	32	46.13	
<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	1,362.11			\$38.87
1024 KiB Transfer Size				
4 I/Os Outstanding	1,451.65	32	45.36	
1 I/O Outstanding	1,421.96	32	44.44	
64 KiB Transfer Size				
4 I/Os Outstanding	1,293.55	32	40.42	
1 I/O Outstanding	1,281.28	32	40.04	
<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
	1,384.13	1,760	0.79	\$38.26

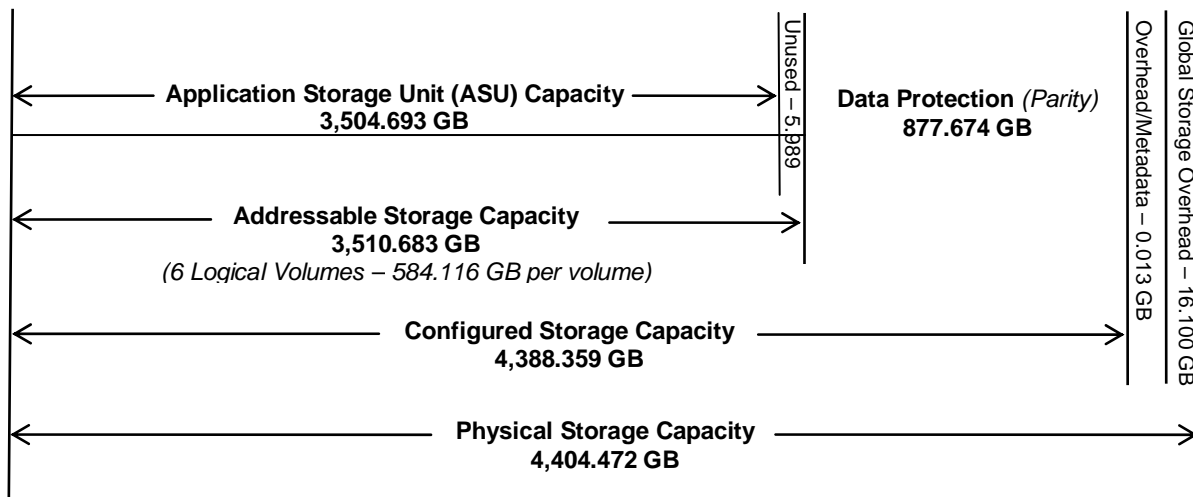
SPC-2 MBPS™ represents the aggregate data rate, in megabytes per second, of all three SPC-2 workloads: Large File Processing (LFP), Large Database Query (LDQ), and Video on Demand (VOD).

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 Protected** using **RAID-5** provides data protection by distributing check data corresponding to user data across multiple disks in the form of bit-by-bit parity.

Storage Capacities and Relationships

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



SPC-1 Storage Capacity Utilization	
Application Utilization	79.57%
Protected Application Utilization	99.50%
Unused Storage Ratio	0.11%

Application Utilization: Total ASU Capacity (*3,504.693 GB*) divided by Physical Storage Capacity (*4,404.472 GB*)

Protected Application Utilization: (Total ASU Capacity (*3,504.693 GB*) plus total Data Protection Capacity (*877.674 GB*) minus unused Data Protection Capacity (*0.000 GB*)) divided by Physical Storage Capacity (*4,404.472 GB*)

Unused Storage Ratio: Total Unused Capacity (*5.989 GB*) divided by Physical Storage Capacity (*4,404.472 GB*) and may not exceed 45%.

Detailed information for the various storage capacities and utilizations is available on pages 21-22 in the Full Disclosure Report.

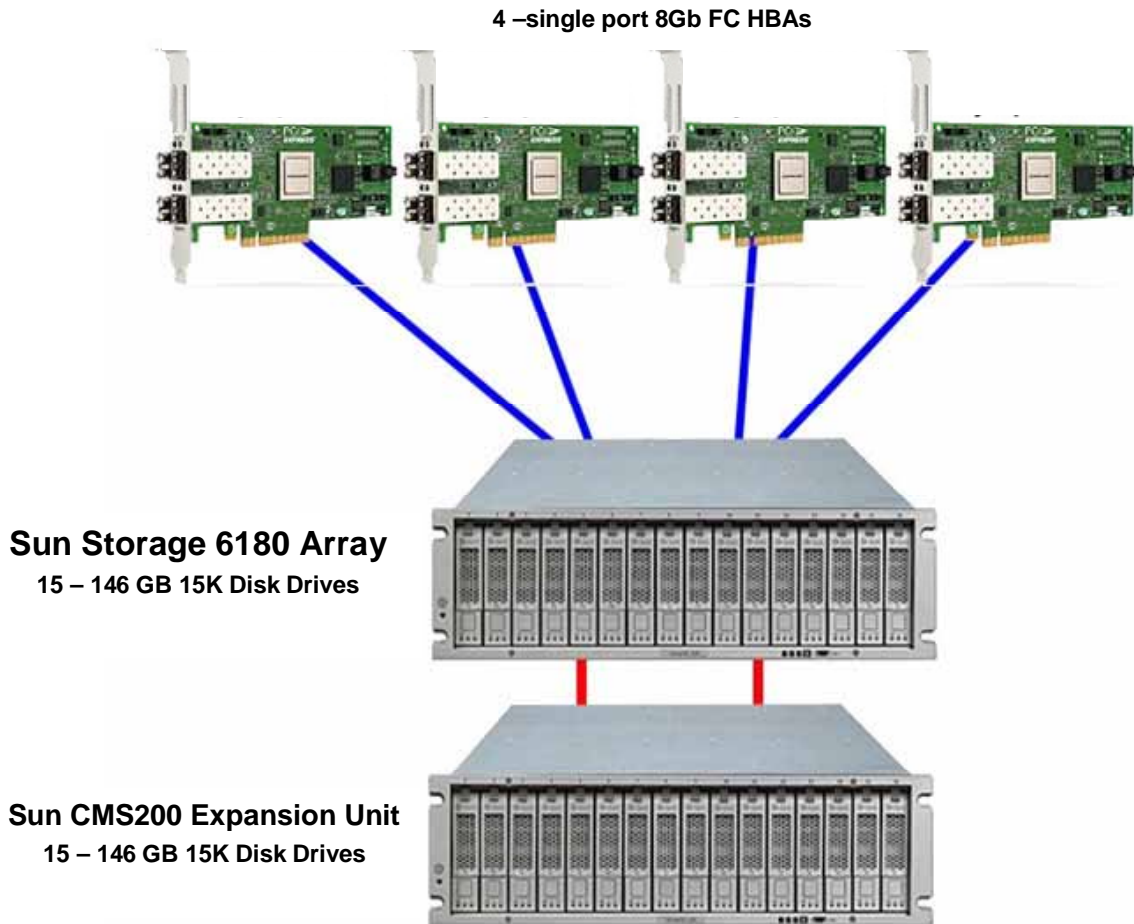
Tested Storage Configuration Pricing (Priced Storage Configuration)

Part Number	Description	Quantity	US List	Total	discount	Ave. Price
TB6180R11A2-0	Sun Storage 6180 Array, 1x1, 4GB,4 Host ports	1	\$23,995	\$23,995	38%	\$14,877
	4x 8Gb Fibre Channel host connections (4 used), and four 4Gb FC drive connections					
	- 2 Controllers w/ 2GB cache each		\$0	\$0	38%	\$0
	- All required cables included		\$0	\$0	38%	\$0
		0	\$0	\$0	38%	\$0
		0	\$0	\$0	38%	\$0
TCCSM2R01A0-0Z	STK CSM200 RR Diskless	1	\$5,995	\$5,995	38%	\$3,717
	- 16 146GB 15k rpm 4Gb drives	30	\$1,495	\$44,850	38%	\$27,807
	- All required cables included (5M LC-LC Fiber Optic Cable)		\$0	\$0	38%	\$0
		0	\$1,995	\$0	38%	\$0
SG-XPCIE1FC-QF8-Z	single port 8Gb HBA	4	\$1,249	\$4,996	38%	\$3,098
Included in CU	CAM Management Software	1	\$0	\$0	38%	\$0
IWU-61804G4P-6-24-3G	3-yr Gold Service Maintainance for controller tray	1	\$3,689	\$3,689	38%	\$2,287
	- 7/24 coverage					
	- 4 hour resonse time					
IWU-STCSM2-24-3G	- 4 hour resolution					
	3-yr Gold Service Maintainance for CSM200 expansion tray	1	\$1,880	\$1,880	38%	\$1,166
	- 7/24 coverage					
	- 4 hr response time					
	- 4 hour resolution					
				\$85,405		\$52,951

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 Diagram



Priced Storage Configuration Components

Priced Storage Configuration:
4 – single port 8Gb FC HBAs
SC-1/SC-2: Sun Storage 6180 Array
2 – dual-active controllers with:
2 GB cache per controller
4 – 8 Gb Fibre Channel front-end connections per controller (8 total, 4 used – 2 per controller)
4 – 4 Gb Fibre Channel backend connection (4 used)
1 – Sun CMS200 expansion unit
30 – 146.8 GB 15K RPM disk drives