



**SPC BENCHMARK 1™
EXECUTIVE SUMMARY**

**SUN MICROSYSTEMS, INC.
SUN STORAGE TEK®
FLEXLINE™ FLX380 STORAGE SYSTEM**

SPC-1 V1.9

Submitted for Review: May 10, 2005

Submission Identifier: A00041

Accepted: July 9, 2005

Revised: September 5, 2006



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: (512) 401-1227 FAX: (512) 266-2523
Test Sponsor Alternate Contact	Sun Microsystems, Inc. – http://www.sun.com Jason Scaffer – Jason.schaffer@sun.com 500 Eldorado Blvd., UBRM05-211 Broomfield, CO 80021 Phone: (303) 272-4743 FAX: (303) 272-3136
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-1 Specification revision number	V1.9
SPC-1 Workload Generator revision number	V2.00.04a
Date Results were first used publicly	May 10, 2005
Date FDR was submitted to the SPC	May 10, 2005
Date revised FDR was submitted to the SPC Revised Test Sponsor Name, product name, and primary/alternate contact information to reflect Sun/StorageTek merger	September 5, 2006
Revision History June 3, 2005 – Revised pricing (Total Price and SPC-1 Price-Performance)	
Date the TSC is/was available for shipment to customers	May 16, 2005
Date the TSC completed audit certification	May 9, 2005

Summary of Results

SPC-1 Results	
Tested Storage Configuration (TSC) Name: Sun StorageTek® FlexLine™ FLX380 Storage System	
Metric	Reported Result
SPC-1 IOPS™	42,254.07
SPC-1 Price-Performance	\$14.03/SPC-1 IOPS™
Total ASU Capacity	6,871.109GB
Data Protection Level	Mirroring
Total TSC Price (including three-year maintenance)	\$592,996

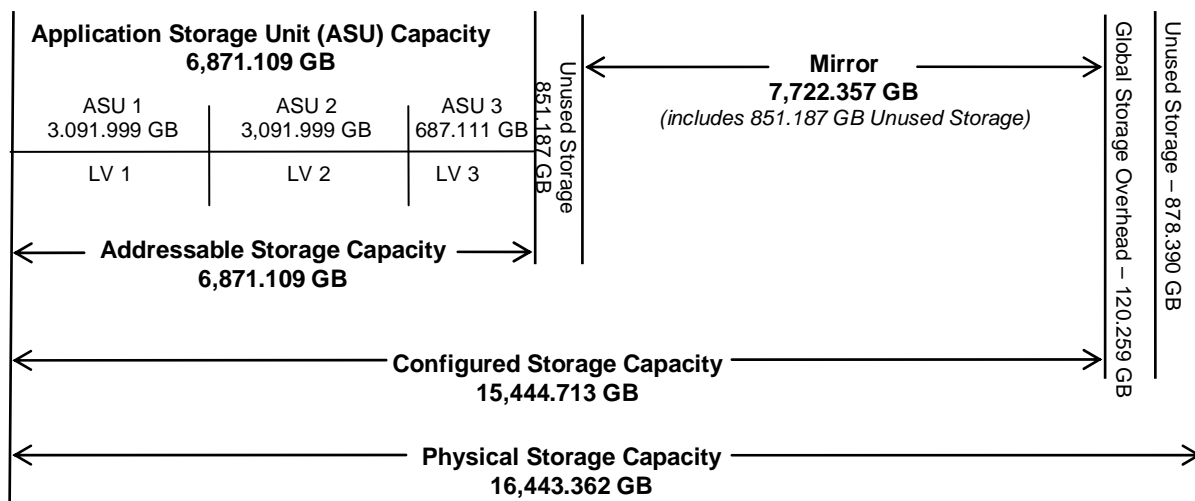
SPC-1 IOPS™ represents the maximum I/O Request Throughput at the 100% load point.

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

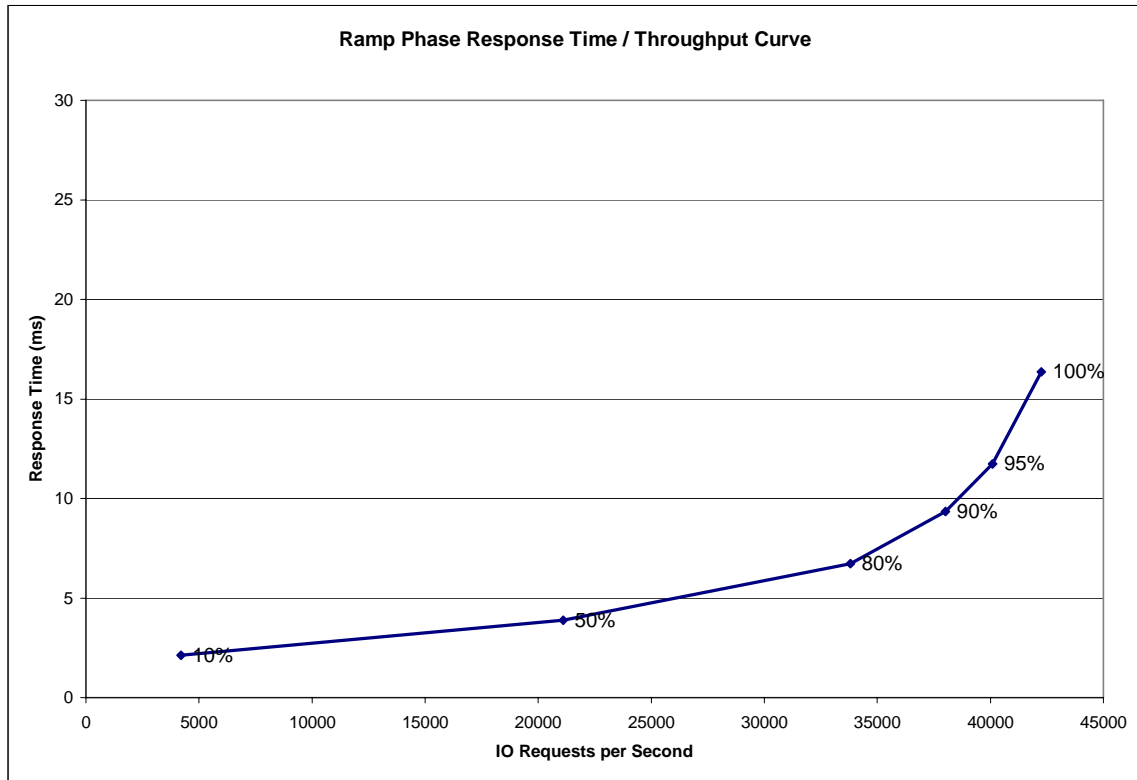
The following diagram documents the various storage capacities, used in this benchmark, and their relationships.



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	4,199.77	21,102.43	33,802.92	38,003.23	40,091.69	42,254.07
Average Response Time (ms):						
All ASUs	2.12	3.88	6.74	9.34	11.75	16.36
ASU-1	2.76	4.89	7.86	10.31	12.50	16.69
ASU-2	2.75	5.45	9.83	13.34	16.29	21.94
ASU-3	0.50	1.05	2.99	5.53	8.16	13.23
Reads	4.70	8.34	12.63	15.36	17.47	21.46
Writes	0.45	0.97	2.90	5.42	8.02	13.05

Tested Storage Configuration Pricing (*Priced Storage Configuration*)

StorageTek Model No.	Description	Unit Price	Qty	Aggregate Price
FLX3801	FLX380 4Gb Enterprise controller	\$ 80,000	1	\$ 80,000
FLSMGR1	SANtricity Storage Manager v9.14 for Windows 2003	\$ 12,000	1	\$ 12,000
FLA3001	FLA300 Access-Centric Switched array	\$ 7,000	16	\$ 112,000
G73	73 GB/15K Fibre Channel drive	\$ 1,400	224	\$ 313,600
SNFCS75	Brocade SilkWorm 4100 Switch, 16 Port, Includes 16 SFP	\$ 26,000	1	\$ 26,000
B4101	Brocade SilkWorm 4100 Switch, 8 port Upgrade with 8 SFP	\$ 7,500	1	\$ 7,500
HBAQ003	QLogic 2342 Host Bus Adapter	\$ 2,900	8	\$ 23,200
126544-01	25-meter fibre channel cables, optical, switch to controller, switch to host	\$ 145	24	\$ 3,480
FLX3801U	Service Uplift for an additional 1 Year Elite 24/7	\$ 1,776	1	\$ 1,776
FLX3001U	Service Uplift for an additional 1 Year Elite 24/7	\$ 684	16	\$ 10,944
SNFCS75U	Service Uplift for an additional 1 Year Elite 24/7	\$ 2,496	1	\$ 2,496
				\$ 592,996

The above price for each component, with the exception of the QLogic Host Bus Adapters, includes a 2-year Elite warranty. In addition, a third year of Elite warranty is priced for those components. The Elite warranty provides maintenance/support 24 hours per day, 7 days per week for three years with four hour acknowledgement and four hour subsequent response (support engineer onsite or customer replaceable part available).

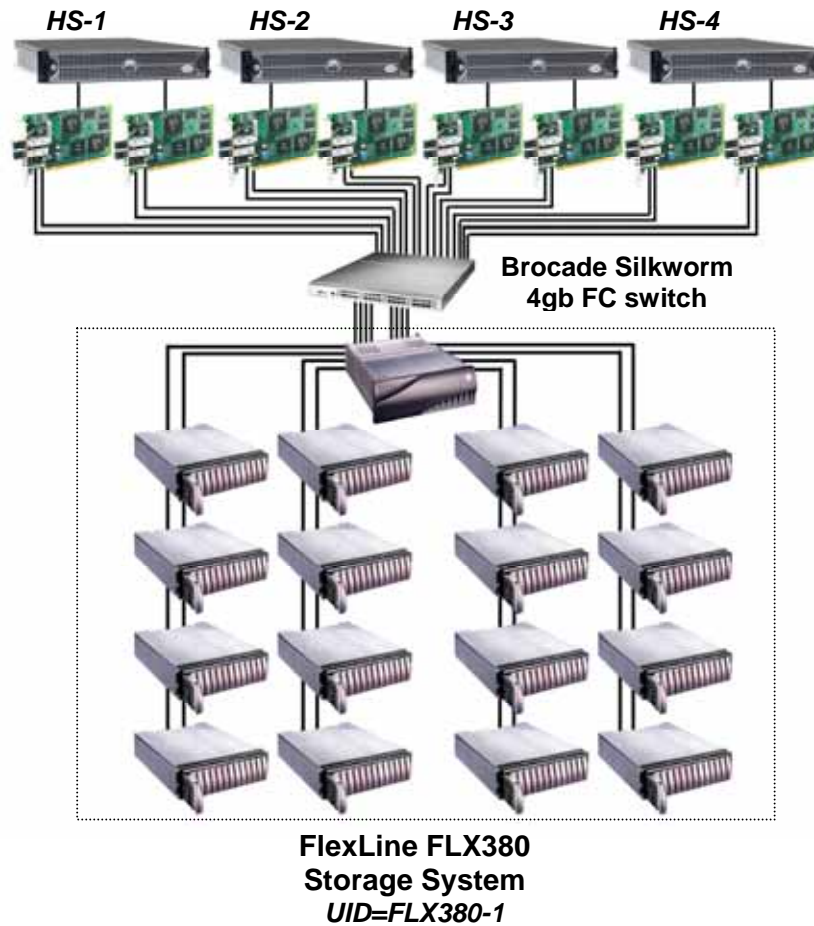
The price of each QLogic Host Bus Adapters (HBAQ003) includes a three year vendor warranty, which provides the required level of maintenance/support described above.

Pricing for the FLX380 Enterprise Controller and FLA300 Switched Arrays includes all required transceivers and cables.

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

The Brocade SilkWorm 4100 switch used in the TSC was configured with 32 ports and 32 SFP transceivers. The benchmark measurement only used 24 ports and corresponding transceivers. The Brocade SilkWorm 4100 switch in the Priced Storage Configuration is configured with 24 ports and 24 SFP transceivers. If the TSC had used the switch configured with only 24 ports and transceivers, there would have not been any negative impact on the reported SPC-1 measurements.

Benchmark Configuration/Tested Storage Configuration Diagram



Host Systems:	Tested Storage Configuration (TSC)
UID=HS-1, HS-2, HS-3, HS-4:	SANtricity Storage Manager v9.
4 – Dell 2650 Servers, each configured with: 2 – 3.2 GHz Pentium 4 Xeon CPUs 512 KB L2 and 2 MB L3 caches/CPU 3 GB main memory Windows 2003 Enterprise Edition	8 – Qlogic 2342 HBAs (2 per Host System) 1 – Brocade SilkWorm 4100 switch
WG	UID=FLX380-1: StorageTek FlexLine FLX380 Storage System 1 – FLX380 4Gb Enterprise Controller which includes: 2 – drive array controllers 2 GB of RAM per drive array controller 8 – 4 Gb Fibre Channel host connections 8 – 2 Gb Fibre Channel drive connections
	16 – FLA300 Access-Centric Switched array
	224 – 73 GB 15K RPM Disk Drives