SPC BENCHMARK 1™
EXECUTIVE SUMMARY

FUJITSU LIMITED
FUJITSU STORAGE SYSTEMS
ETERNUS6000 MODEL 1100

SPC-1 V1.10

Submitted for Review: February 27, 2006
Submission Identifier: A00045
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EXECUTIVE SUMMARY

Test Sponsor and Contact Information

Test Sponsor and Contact Information	
Test Sponsor Primary Contact	Fujitsu Limited – http://www.fujitsu.com/services/computing/storage/ Fujitsu Computer Systems Corp. C.A. (Sandy) Wilson Sandy_Wilson@us.fujitsu.com 1250 East Arques Ave PO Box 3470 Sunnyvale, CA 94088-3470 Phone: (916) 434-8593
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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
SPC-1 Workload Generator revision number	V2.00.04a
Date Results were first used publicly	February 27, 2006
Date the FDR was submitted to the SPC	February 27, 2006
Date the TSC is available for shipment to customers	May 31, 2006
Date the TSC completed audit certification	February 27, 2006

Summary of Results

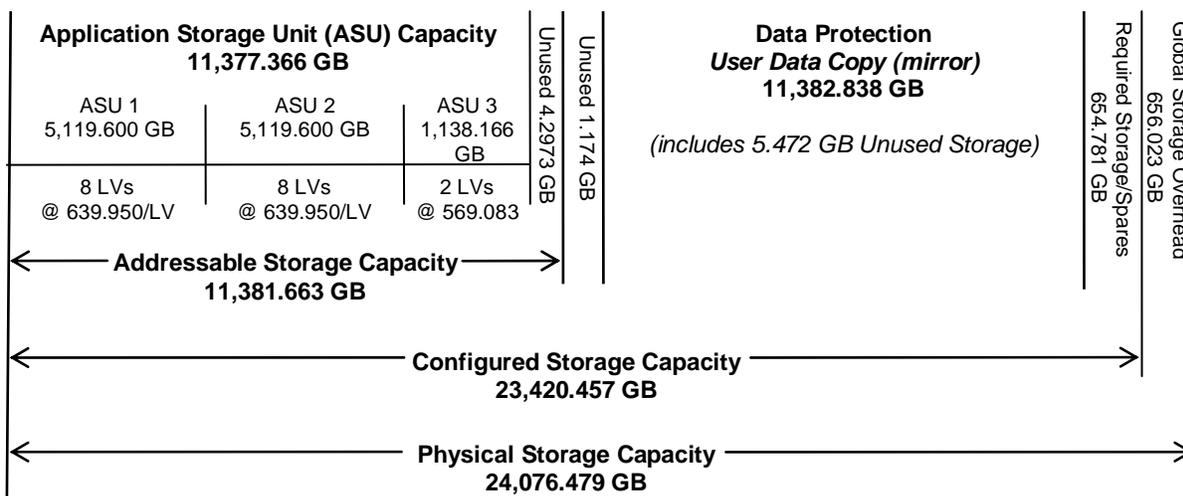| SPC-1 Results	
Tested Storage Configuration (TSC) Name: Fujitsu Storage Systems ETERNUS6000 Model 1100	
Metric	**Reported Result**
SPC-1 IOPS™	108,745.34
SPC-1 Price-Performance	$12.21/SPC-1 IOPS™
Total ASU Capacity	11,377.366 GB
Data Protection Level	Mirroring
Total TSC Price (including three-year maintenance)	$1,327,787

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.
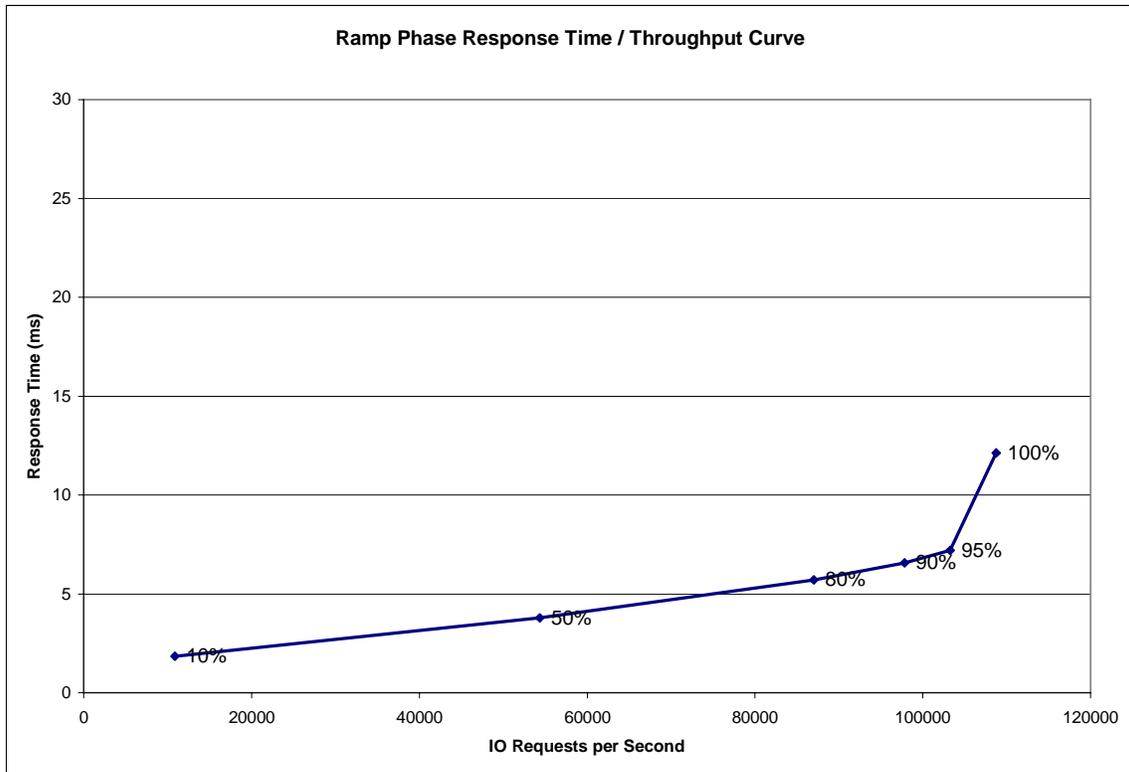
Storage Capacities and Relationships

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.
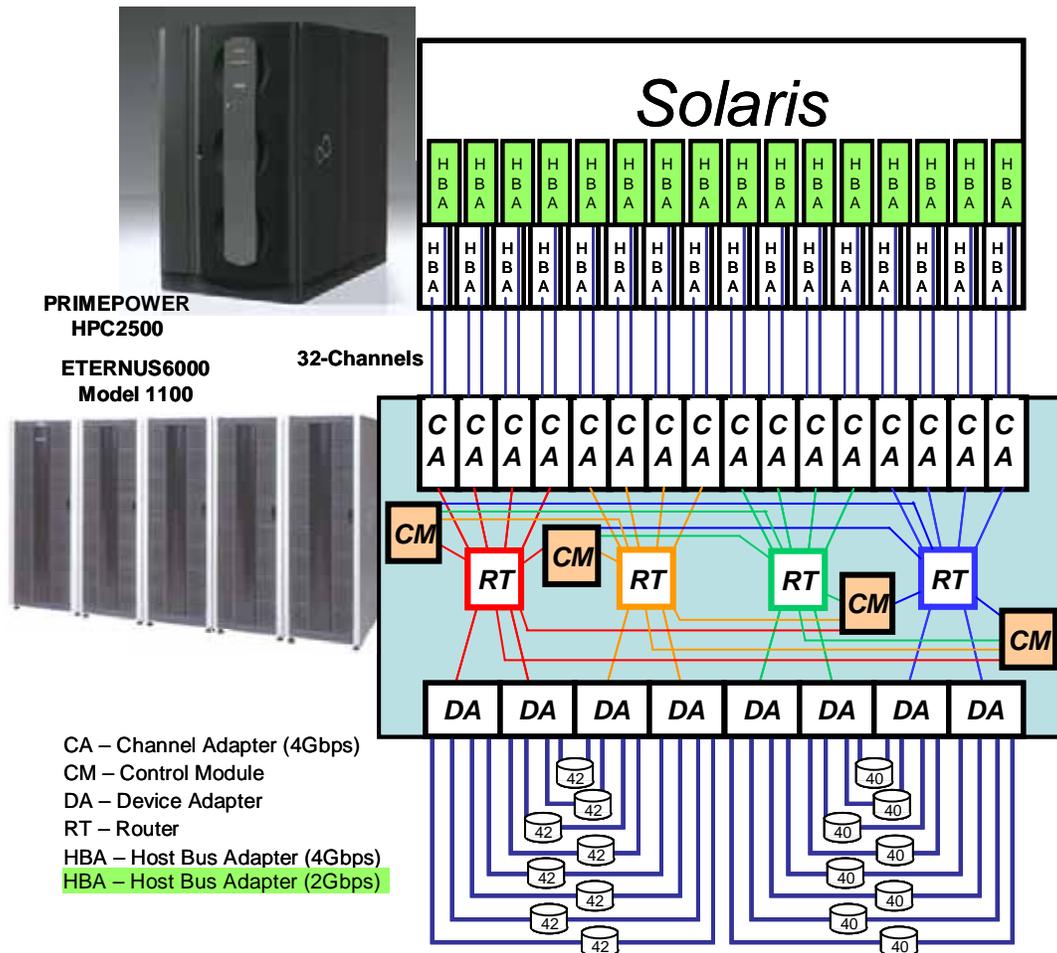

Response Time – Throughput Data

	10% Load	50% Load	80% Load	90% Load	95% Load	100% Load
I/O Request Throughput	10,850.59	54,328.07	86,993.69	97,849.79	103,272.14	108,745.34
Average Response Time (ms):						
All ASUs	1.85	3.79	5.70	6.56	7.20	12.13
ASU-1	2.35	4.46	6.57	7.55	8.26	14.16
ASU-2	1.79	3.70	5.86	6.87	7.53	10.07
ASU-3	0.81	2.41	3.78	4.34	4.79	8.73
Reads	3.54	6.03	8.77	10.12	11.04	16.43
Writes	0.74	2.33	3.69	4.24	4.69	9.33

Tested Storage Configuration Pricing *(Priced Storage Configuration)*

Item	Product Id	Description	Qty	Unit $	Extd $
1	E6B0S01AU	ETERNUS6000 Model 1100 Base Unit (with door)	1	$452,110	$452,110
		including Controller Enclosure, 4x Controllers (CM),			
		4x Interface Units (RT), 8x Drive Interface (DA),			
		4x power supplie units, 6x battery units,			
		24x drive enclosures (DE), 8x 36GB System disk drives,			
		1x Base 1800mm (36U) rack,			
		2x Expansion 1800mm (36U) rack,			
		8x power distribution (200VAC),			
		rack mount kit, ETERNUSmgr & drivers			
		slots for up to 360 disk drives			
2	E600CR3U	ETERNUS6000 Expansion Rack (with door)	2	$8,000	$16,000
		including Expansion 1800mm (36U) rack			
		2x power distribution (200 VAC)			
3	E600CE21U	Drive Enclosure (4x DE)	6	$31,000	$186,000
		with slots for up to 60 disk drives			
4	E600CM45	Additional cache memory (4x 8GB)	1	$130,500	$130,500
5	E600CM47	Additional cache memory (4x 16GB)	1	$163,800	$163,800
6	E600CH14	Fibre Channel Host Interface (dual port) x2	8	$12,800	$102,400
7	E600CC2L	36GB/15krpm Disk Drives RAID(4+4)	80	$8,000	$640,000
8	E600CA2L	36GB/15krpm Disk Drive (Hot Spare)	16	$1,000	$16,000
9	CBL-MLLB15	Fibre Channel Cable	32	$181	$5,792
10	LP10000	Emulex LP10000 HBA (per quote from Micro2nds)	16	$850	$13,600
11	LP11000-M4	Emulex 4Gb PCI-X Single HBA (per quote from InfoX)	16	$861	$13,776
12		Enhanced Plus ETERNUS6000 Model 1100 System	1	$145,128	$145,128
		Phone 24x7, On-site 24x7, maintenance service			
		with 4 hour response - 2 year Warranty Included			
		with 4 hour response - 1 year Extended Service			

Total Product List Price		$1,712,602
Product Discount	30%	
Net Product Price		$1,198,821
Total Service List Price		$145,128
Service Discount	30%	
Net Service Price		$101,590
Outside Quoted Product Price		$27,376
Total Sell Price, including 3 years Service		$1,327,787

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.

Solaris

PRIMEPOWER HPC2500

ETERNUS6000 Model 1100

32-Channels

CA – Channel Adapter (4Gbps)
CM – Control Module
DA – Device Adapter
RT – Router
HBA – Host Bus Adapter (4Gbps)
HBA – Host Bus Adapter (2Gbps)

Benchmark Configuration/Tested Storage Configuration Diagram

Host System:	Tested Storage Configuration (TSC):
UID=HS-1 Fujitsu PRIMEPOWER 2500	16 – Emulex LP10000 Fibre Channel HBAs (2 Gbps) 16 – Emulex LP11000 Fibre Channel HBAs (4 Gbps)

128 - SPARC64 V (1.3 GHz) CPUs, each with:
    128 KB L1 instruction cache,
    128 KB L1 data cache, and 2 MB L2 cache
	UID=SC-1:
	
	Fujitsu ETERNUS6000 Model 1100

512 GB main memory	4 – Controller Modules (CM) each with 24 GB cache 16 – Channel Adapter (CA) Modules 8 – Device Adapter (DA) Modules 4 – Router (RT) Modules 32 – Front side fibre channels (4 Gbps each) 32 – Drive side fibre channel switched FC-AL loops (2 Gbps each)
Solaris 9	
PCI	
WG	

	48 – Drive enclosure modules, each with
	    dual switched FC-AL interfaces
	    15 hot swap drive slots

664 – 36 GB 15K RPM disk drives