



**SPC BENCHMARK 1™
EXECUTIVE SUMMARY**

**SUN MICROSYSTEMS, INC.
SUN STOREEDGE™ 6320 (22 TRAY)**

SPC-1 V1.6

Submitted for Review: June 4, 2003

Accepted: August 3, 2003



EXECUTIVE SUMMARY

Test Sponsor and Contact Information

| Test Sponsor and Contact Information | |
|---|--|
| Test Sponsor Primary Contact | Sun Microsystems, Inc. – www.sun.com Leah Schoeb – leah.schoeb@sun.com 500 Eldorado Blvd. UBRM5-194 Broomfield, CO 80021 Phone: (303) 272-3034 FAX: (303) 272-5392 |
| Test Sponsor Alternate Contact | Sun Microsystems, Inc. – www.sun.com Jason Schaffer – jason.schaffer@sun.com 7777 Gate way Blvd. 7 UNWK16 Newark, CA 94560 Phone: (510) 936-2979 FAX: (510) 936-2323 |
| Auditor | Storage Performance Council www.storageperformance.org Walter E. Baker AuditService@storageperformance.org 1060 El Camino Real, Suite F 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 | V1.6 |
| SPC-1 Workload Generator revision number | V2.1 |
| Date Results were first used publicly | June 4, 2003 |
| Date FDR was submitted to the SPC | June 4, 2003 |
| Date the TSC is/was available for shipment to customers | April 7, 2003 |
| Date the TSC completed audit certification | May 27, 2003 |

Summary of Results

| SPC-1 Results | |
|---|---------------------|
| Tested Storage Configuration (TSC) Name: Sun StorEdge™ 6320 (22 tray) | |
| Metric | Reported Result |
| SPC-1 IOPS™ | 44,805.74 |
| SPC-1 Price-Performance | \$15.56/SPC-1 IOPS™ |
| Total ASU Capacity | 3,275.980 GB |
| Data Protection Level | Mirroring |
| SPC-1 LRT™ | 3.83 ms |
| Total TSC Price (including three-year maintenance) | \$697,297 |

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. The Addressable Storage Capacity, which contains the Total ASU Capacity, was 3,275.980 GB. The Total ASU Capacity utilized 100% of the Addressable Storage Capacity. The actual Configured Storage Capacity was 6,694.600 GB, which included the multiple copies of user data required by a Data Protection Level of Mirroring. The Configured Storage Capacity utilized 59.71% of the priced Physical Storage Capacity of 11,211.200 GB.

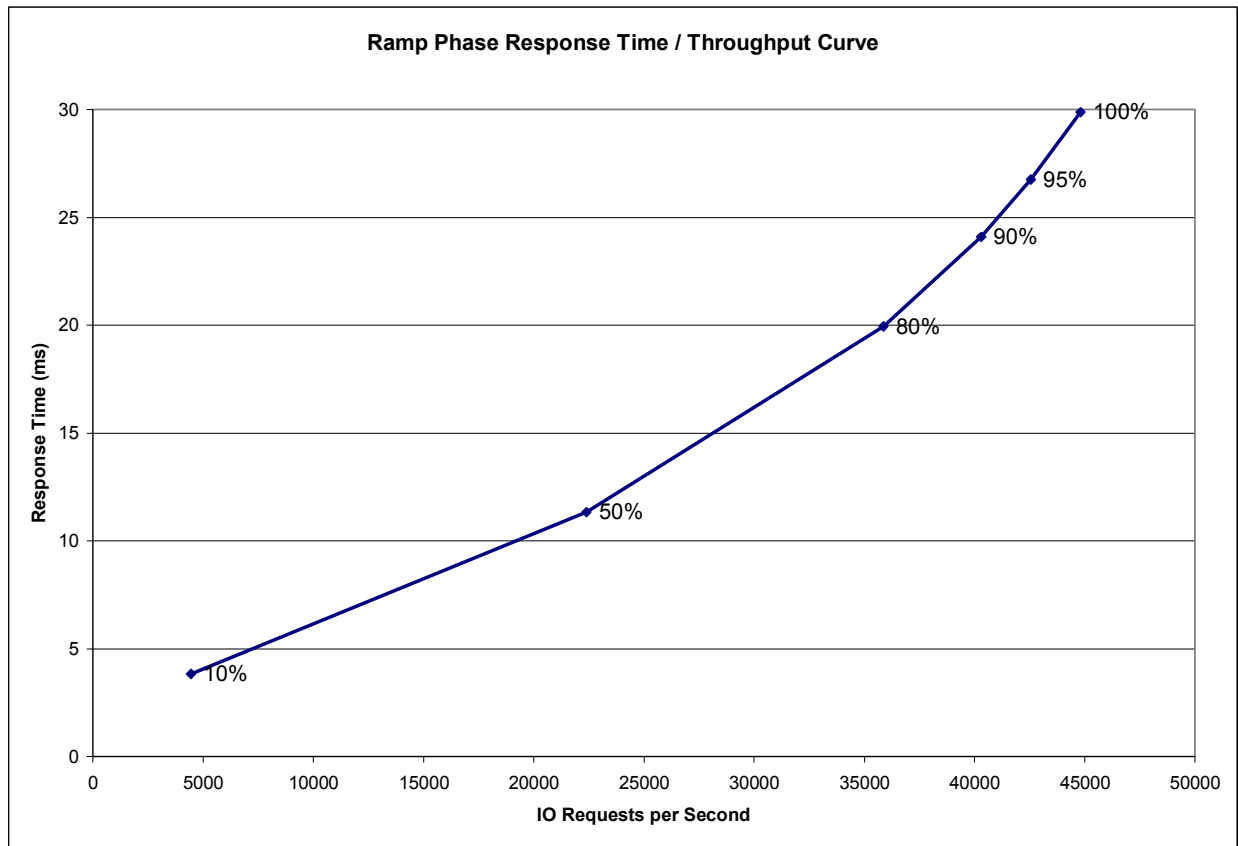
A **Data Protection Level** of Mirroring configures two or more identical copies of user data, maintained on separate disks.

The **SPC-1 LRT™** metric is the Average Response Time measured at the 10% load point, as illustrated on the next page. SPC-1 LRT™ represents the Average Response Time measured on a lightly loaded Tested Storage Configuration (TSC).

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 100% load point cannot exceed 30 milliseconds or the benchmark measurement is invalid.



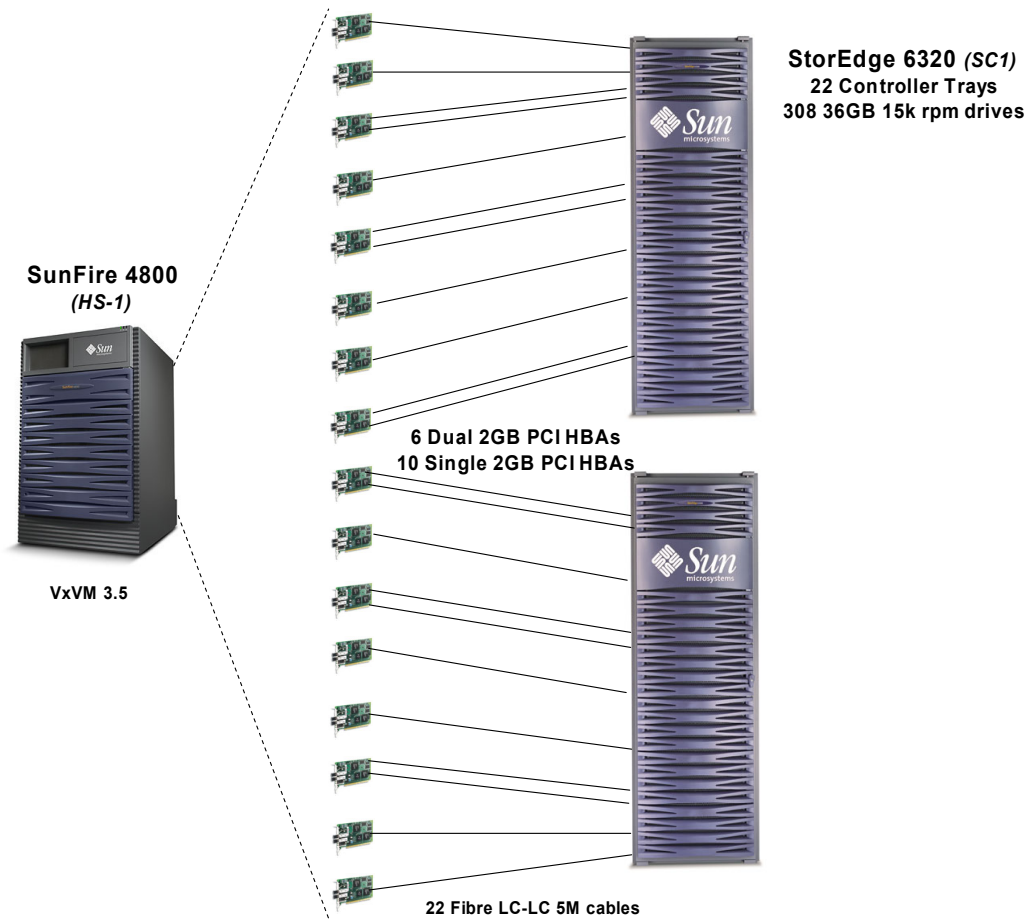
Response Time - Throughput Data

| | 10% Load | 50% Load | 80% Load | 90% Load | 95% Load | 100% Load |
|------------------------------------|----------|-----------|-----------|-----------|-----------|-----------|
| I/O Request Throughput | 4,451.55 | 22,392.63 | 35,876.23 | 40,297.64 | 42,551.46 | 44,805.74 |
| Average Response Time (ms): | | | | | | |
| All ASUs | 3.83 | 11.33 | 19.93 | 24.09 | 26.74 | 29.88 |
| ASU-1 | 4.24 | 11.30 | 19.53 | 23.54 | 26.10 | 29.12 |
| ASU-2 | 4.06 | 11.59 | 19.95 | 24.01 | 26.58 | 29.58 |
| ASU-3 | 2.85 | 11.29 | 20.78 | 25.28 | 28.19 | 31.61 |
| Reads | 5.67 | 12.40 | 20.12 | 23.87 | 26.27 | 29.11 |
| Writes | 2.62 | 10.64 | 19.81 | 24.23 | 27.06 | 30.38 |

Tested Storage Configuration Pricing

| Part Number | Description | Quantity | US List Prices | | Disc. | Final Price |
|--------------------|--|----------|----------------|------------------|-------|------------------|
| | | | Unit | Total | | |
| XTA6320-00-1226T06 | Sun StorEdge 6320 System | 1 | \$699,500 | \$699,500 | 15% | \$594,575 |
| | 2 cabinets | | | | | |
| | 12 Controller Trays | | | | | |
| | 12GB Cache Memory | | | | | |
| | 36GB/15K Drives | 168 | | | | |
| XTA6020R22A1S1008 | Sun StorEdge 6020 Array (expansion module) | 5 | | | | |
| | 2 controller trays | | | | | |
| | 36GB/15K Drives | 140 | | | | |
| NAVIS-310-1FNS | Sun StorEdge Availability Suite 3.1 (1TB Lic.) | 6 | | | | |
| NEMIS-120-3FN9 | Sun Enterprise Storage Manager 2.1 (6TB Lic.) | 2 | | | | |
| NCSSS-210-9FN9 | Sun StorEdge 6000 Family Host Installation CD | 1 | | | | |
| W9D-632N12-3G | 3-Year System Maintenance Agreement | 1 | \$93,204 | \$93,204 | 50% | \$46,602 |
| W9D-6020-2-3G | | 5 | | | | |
| VVMGS-999-3A99 | VxVM 3.5 License Tier 3A | 1 | \$14,895 | \$14,895 | 35% | \$9,682 |
| VVMGS-3A99-3FT | VxVM 3.5 Maintenance Agreement (3 years) | 1 | \$10,584 | \$10,584 | 0% | \$10,584 |
| X6767A | 2Gb PCI Single FC Network Adapter | 10 | \$2,400 | \$24,000 | 35% | \$15,600 |
| X6768A | 2Gb PCI Dual FC Network Adapter | 6 | \$4,900 | \$29,400 | 35% | \$19,110 |
| X9733A | 5M LC to LC FC Optical Cable | 22 | \$80 | \$1,760 | 35% | \$1,144 |
| Total | | | | \$873,343 | | \$697,297 |

Benchmark Configuration/Tested Storage Configuration Diagram



| Host System: | Storage System: |
|---|--|
| Sun Fire™ 4800 | Sun StorEdge™ 6320 |
| UID=HS-1 | UID=SC-1 |
| 12 UltraSPARC™ III 900MHz CPU each 8MB EEC external cache per CPU | 22 Controller Trays with 22 Controllers in 11 redundant pairs Each controller has: 1 GB of memory (22 GB total) 400MHZ PowerPC 750 with 1MB L2 cache 2 GB fibre channel interface – front-end 1GB fibre channel interface – back-end with 3 fibre channel loops |
| 12 GB Main Memory | 308 – 36.4 GB 15K RPM disk drives 14 disk drives per Controller Tray |
| Solaris™ 9 update 2 | |
| Veritas Volume Manager 3.5 | |
| 10 – 2Gb PCI Single FC Network Adapters 6 – 2Gb PCI Dual FC Network Adapters | |
| WG | |