



**SPC BENCHMARK 1™  
EXECUTIVE SUMMARY**

**SUN MICROSYSTEMS, INC.  
SUN STORAGE 6180 ARRAY**

**SPC-1 V1.11**

**Submitted for Review: October 9, 2009  
Submission Identifier: A00084**

## **EXECUTIVE SUMMARY**

### **Test Sponsor and Contact Information**

| <b>Test Sponsor and Contact Information</b> |  |
|---|--|
| <b>Test Sponsor<br/>Primary Contact</b>     | Sun Microsystems, Inc. – <a href="http://www.sun.com">http://www.sun.com</a><br>Leah Schoeb – <a href="mailto:leah.schoeb@sun.com">leah.schoeb@sun.com</a><br>5300 Riata Park Court AUS08<br>Austin, TX 78721<br>Phone: (877) 319-0457<br>FAX: (512) 266-2523  |
| <b>Test Sponsor<br/>Alternate Contact</b>   | Sun Microsystems, Inc. – <a href="http://www.sun.com">http://www.sun.com</a><br>Jason Schaffer – <a href="mailto:jason.schaffer@sun.com">jason.schaffer@sun.com</a><br>500 Eldorado Blvd.<br>Broomfield, CO 80021<br>Phone: (303) 272-4743<br>FAX: (303) 272-9704  |
| <b>Auditor</b>                              | Storage Performance Council – <a href="http://www.storageperformance.org">http://www.storageperformance.org</a><br>Walter E. Baker – <a href="mailto:AuditService@StoragePerformance.org">AuditService@StoragePerformance.org</a><br>643 Bair Island Road, Suite 103<br>Redwood City, CA 94063<br>Phone: (650) 556-9384<br>FAX: (650) 556-9385 |

### **Revision Information and Key Dates**

| <b>Revision Information and Key Dates</b>   |                     |
|---|---------------------|
| <b>SPC-1 Specification revision number</b>  | V1.11               |
| <b>SPC-1 Workload Generator revision number</b>                                     | V2.1.0              |
| <b>Date Results were first used publicly</b>  | October 9, 2009     |
| <b>Date the FDR was submitted to the SPC</b>  | October 9, 2009     |
| <b>Date the priced storage configuration is available for shipment to customers</b> | currently available |
| <b>Date the TSC completed audit certification</b>                                   | 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.

## Summary of Results

| SPC-1 Results   |                                |
|---|--------------------------------|
| Tested Storage Configuration (TSC) Name: Sun Storage 6180 Array |                                |
| Metric  | Reported Result                |
| SPC-1 IOPS™   | 26,090.03                      |
| SPC-1 Price-Performance   | \$4.70/SPC-1 IOPS™             |
| Total ASU Capacity  | 5,145.060 GB                   |
| Data Protection Level   | Protected ( <i>Mirroring</i> ) |
| Total TSC Price (including three-year maintenance)              | \$122,623                      |

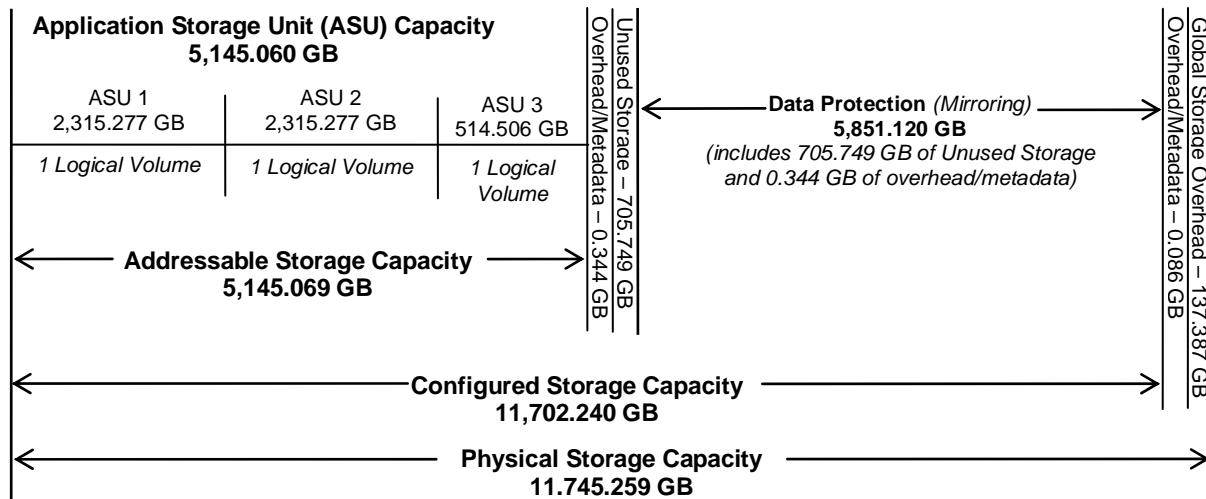
**SPC-1 IOPS™** represents the maximum I/O Request Throughput at the 100% load point.

**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 Protected** using *Mirroring* configures two or more identical copies of user data.

### Storage Capacities and Relationships

The following diagram and table document the various storage capacities, used in this benchmark, and their relationships, as well as the storage utilization values required to be reported.



| SPC-1 Storage Capacity Utilization |        |
|------------------------------------|--------|
| Application Utilization            | 43.81% |
| Protected Application Utilization  | 87.61% |
| Unused Storage Ratio               | 12.02% |

**Application Utilization:** Total ASU Capacity (5,145.060 GB) divided by Physical Storage Capacity (11,745.259 GB)

**Protected Application Utilization:** (Total ASU Capacity (5,145.060 GB) plus total Data Protection Capacity (5,851.120GB) minus unused Data Protection Capacity (705.749 GB)) divided by Physical Storage Capacity (GB)

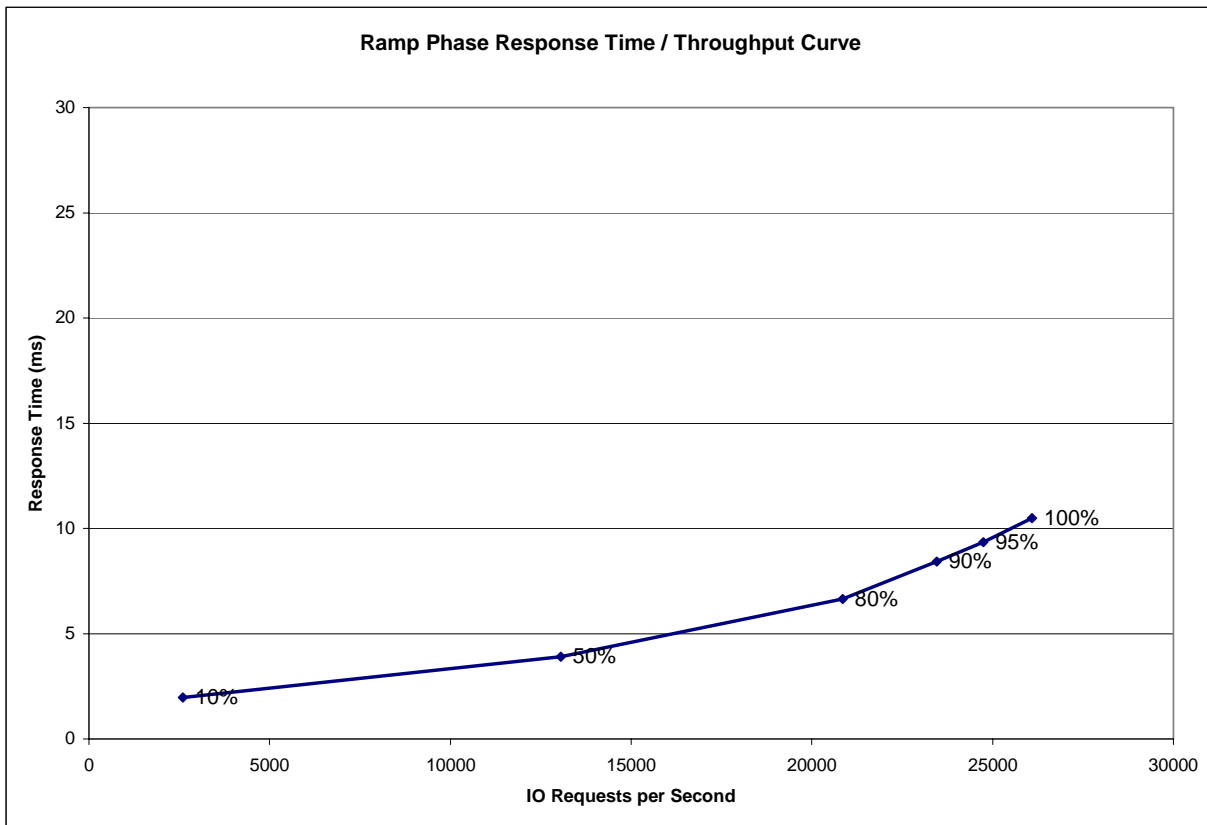
**Unused Storage Ratio:** Total Unused Capacity (1,411.507 GB) divided by Physical Storage Capacity (11,745.259 GB) and may not exceed 45%.

Detailed information for the various storage capacities and utilizations is available on pages **Error! Bookmark not defined.-Error! Bookmark not defined.** in the Full Disclosure Report.

### 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 |
|------------------------------------|----------|-----------|-----------|-----------|-----------|-----------|
| <b>I/O Request Throughput</b>      | 2,602.65 | 13,053.24 | 20,850.35 | 23,457.23 | 24,747.16 | 26,090.03 |
| <b>Average Response Time (ms):</b> |          |           |           |           |           |           |
| All ASUs                           | 1.97     | 3.91      | 6.64      | 8.44      | 9.35      | 10.49     |
| ASU-1                              | 2.63     | 5.09      | 8.13      | 9.95      | 10.82     | 11.91     |
| ASU-2                              | 2.40     | 5.20      | 11.59     | 16.58     | 19.09     | 21.99     |
| ASU-3                              | 0.38     | 0.83      | 1.32      | 1.65      | 1.98      | 2.45      |
| Reads                              | 4.47     | 8.71      | 14.92     | 18.97     | 20.82     | 23.02     |
| Writes                             | 0.34     | 0.78      | 1.26      | 1.57      | 1.89      | 2.33      |

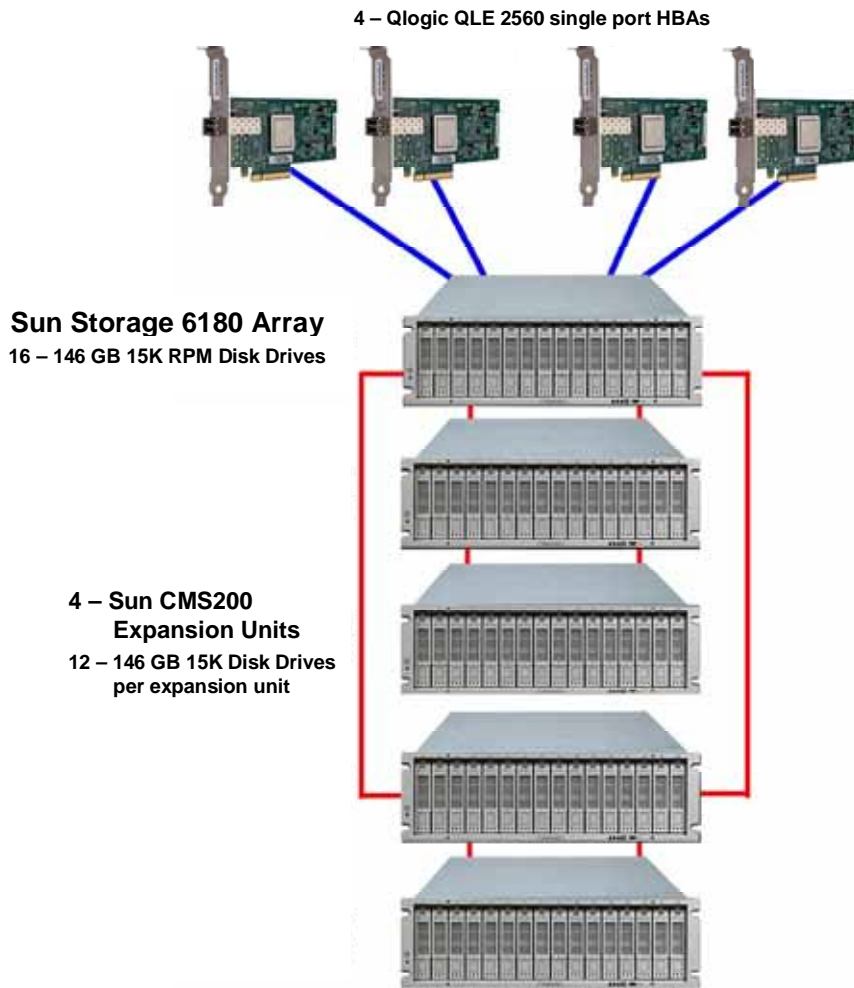
**Tested Storage Configuration Pricing (Priced Storage Configuration)**

| Part Number        | Description   | Quantity | US List  | Total            | discount | Ave. Price       |
|--------------------|---|----------|----------|------------------|----------|------------------|
| TA6180R11A2-0      | Sun Storage 6180 Array, 1x1, 4GB, 8 Host ports                                    | 1        | \$37,995 | \$37,995         | 38%      | \$23,557         |
|                    | 8x 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              |
| XTCCSM2R01A0C2336  | STK CSM200 RM 0x1x16x146G15k  | 4        | \$29,915 | \$119,660        | 38%      | \$74,189         |
|                    | - 16 146GB 15k rpm 4Gb drives   | 16       | \$1,495  | \$23,920         | 38%      | \$14,830         |
|                    | - All required cables included (5M LC-LC Fiber Optic Cable)                       |          | \$0      | \$0              | 38%      | \$0              |
|                    |   | 0        | \$0      | \$0              | 38%      | \$0              |
| SG-XPCIE1FC-QF8-Z  | Qlogic single port QLE25620   | 4        | \$1,249  | \$4,996          | 38%      | \$3,098          |
| Included in CU     | CAM Management Software   | 1        | \$0      | \$0              | 38%      | \$0              |
| IWU-61804G4P-24-3G | 3-yr Gold Service Maintenance for controller tray                                 | 1        | \$3,689  | \$3,689          | 38%      | \$2,287          |
|                    | - 7/24 coverage   |          |          |                  |          |                  |
|                    | - 4 hour response time  |          |          |                  |          |                  |
| IWU-STCSM2-24-3G   | - 4 hour resolution   |          |          |                  |          |                  |
|                    | 3-yr Gold Service Maintenance for CSM200 expansion tray                           | 4        | \$1,880  | \$7,520          | 38%      | \$4,662          |
|                    | - 7/24 coverage   |          |          |                  |          |                  |
|                    | - 4 hr response time  |          |          |                  |          |                  |
|                    | - 4 hour resolution   |          |          |                  |          |                  |
|                    |   |          |          | <b>\$197,779</b> |          | <b>\$122,623</b> |

**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

|  |
|--|
| <b>Priced Storage Configuration:</b>   |
| 4 – Qlogic QLE2560 single port HBAs  |
| <b>SC-1/SC-2: Sun Storage 6180 Array</b><br>2 – dual-active controllers with:<br>2 GB cache per controller<br>4 – 8 Gb Fibre Channel front-end connections<br>per controller (8 total, 4 used – 2 per controller)<br>4 – 4 Gb Fibre Channel backend connection<br>(4 used) |
| 4 – Sun CSM200 expansion enclosures  |
| 80 – 146 GB 15K RPM 15K.6 disk drives  |