



**ORACLE**

**SPC BENCHMARK 1C™  
EXECUTIVE SUMMARY**

**ORACLE CORPORATION  
SUN STORAGE F5100 FLASH ARRAY**

**SPC-1C™ V1.3**

**Submitted for Review: April 13, 2010  
Submission Identifier: C00010**

## **EXECUTIVE SUMMARY**

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

<b>Test Sponsor and Contact Information</b>	
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### **Revision Information and Key Dates**

<b>Revision Information and Key Dates</b>	
<b>SPC-1C Specification revision number</b>	V1.3
<b>SPC-1C Workload Generator revision number</b>	V1.0
<b>Date Results were first used publicly</b>	April 13, 2010
<b>Date the FDR was submitted to the SPC</b>	April 13, 2010
<b>Date the TSC is available for shipment to customers</b>	currently available
<b>Date the TSC completed audit certification</b>	April 12, 2010

### **Tested Storage Product (TSP) Description**

Oracle's Sun Storage F5100 Flash Array is a high performance, high density, solid state flash array with up to 1.92TB of capacity in a single 1RU (1.25 inches) rack enclosure.

The F5100 is designed to accelerate IO-intensive applications, such as databases, in a 1 U space. It's based on enterprise-class SLC flash technology, with advanced wear-leveling, integrated power loss protection for write persistence, solid state robustness and 3M MTBF hour reliability.

Each F5100 can be configured with up to 80 - 24GB SATA enterprise-class Flash Modules.

Additionally, each F5100 comes with

- Four hard SAS domains
- Sixteen 4-wide mini SAS-1 ports
- Two 720W hot swappable power supplies

- Hot swappable cooling fans.
- Four SuperCap based Energy Storage Modules
- Two 3M SAS mini cables
- Rack Rail kit
- Downloadable Common Array Management software

## Summary of Results

SPC-1C Results	
Tested Storage Product: Sun Storage F5100 Flash Array	
Metric	Reported Result
SPC-1C IOPS™	300,873.47
Total ASU Capacity	1,374.390 GB
Data Protection Level	Unprotected
Total Price – Priced Storage Configuration	\$151,381

**SPC-1C 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-1C benchmark.

A **Data Protection Level** of *Unprotected* provides no data protection in the event of a single point of failure.

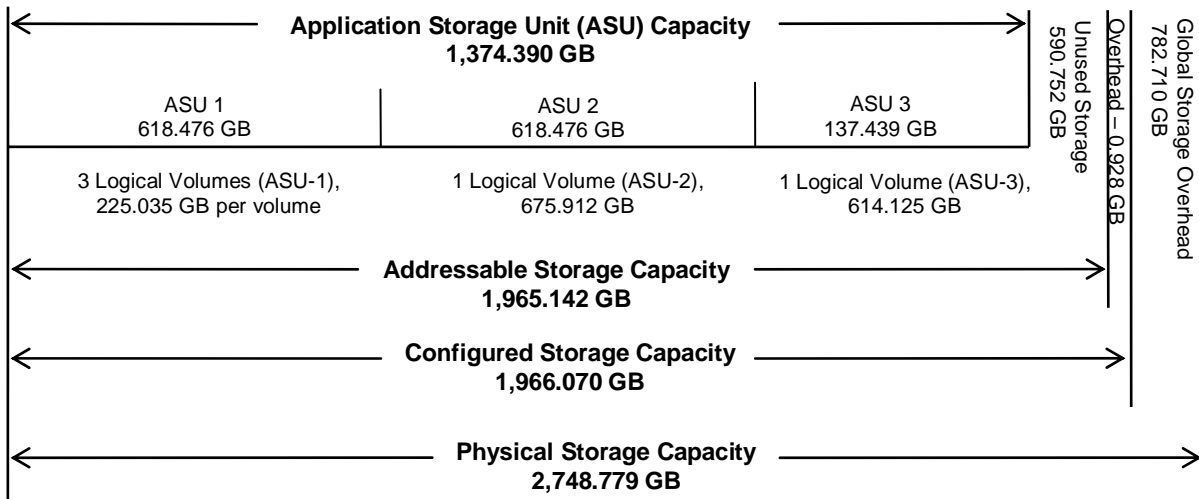
## Storage Capacities and Relationships

The Tested Storage Configuration (TSC) must be configured so that there is either no Unused Storage or that the sum of Total ASU Capacity and storage required for data protection equals 50% (+-1 GiB) of the Physical Storage Capacity. This configuration meets the 50% requirement as documented below:

$$2,743.779 \text{ GB (Physical Storage Capacity)} * 0.5 = 1,374.390 \text{ GB}$$

$$1,374.390 \text{ GB (Total ASU Capacity)} + 0.000 \text{ GB (data protection)} = 1,374.390 \text{ GB}$$

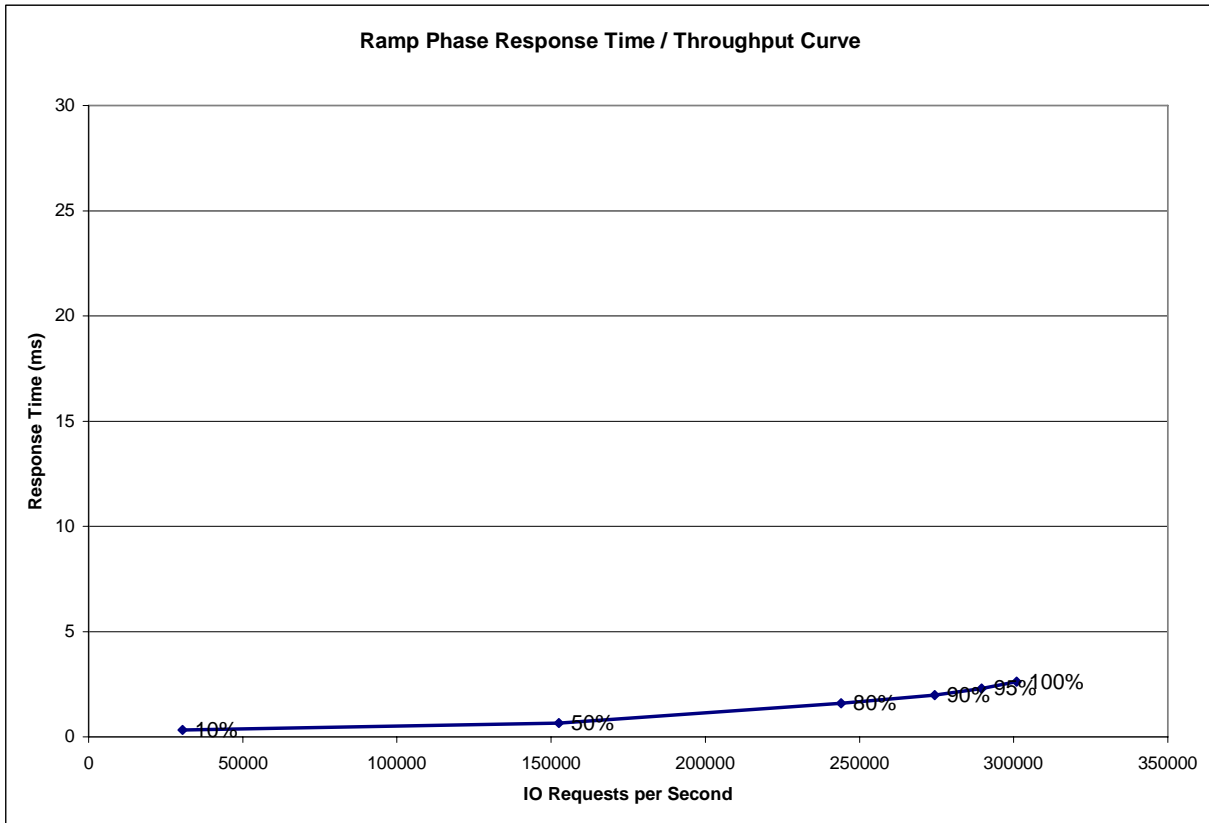
The following diagram documents the various storage capacities, used in this benchmark, and their relationships.



### 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
<b>I/O Request Throughput</b>	30,509.00	152,496.44	243,983.73	274,436.11	289,639.61	300,873.47
<b>Average Response Time (ms):</b>						
All ASUs	0.33	0.66	1.60	1.98	2.29	2.63
ASU-1	0.36	0.77	1.88	2.29	2.58	2.85
ASU-2	0.35	0.75	1.85	2.26	2.55	2.82
ASU-3	0.26	0.39	0.89	1.20	1.55	2.07
Reads	0.45	0.90	2.11	2.55	2.86	3.15
Writes	0.25	0.50	1.27	1.61	1.92	2.29

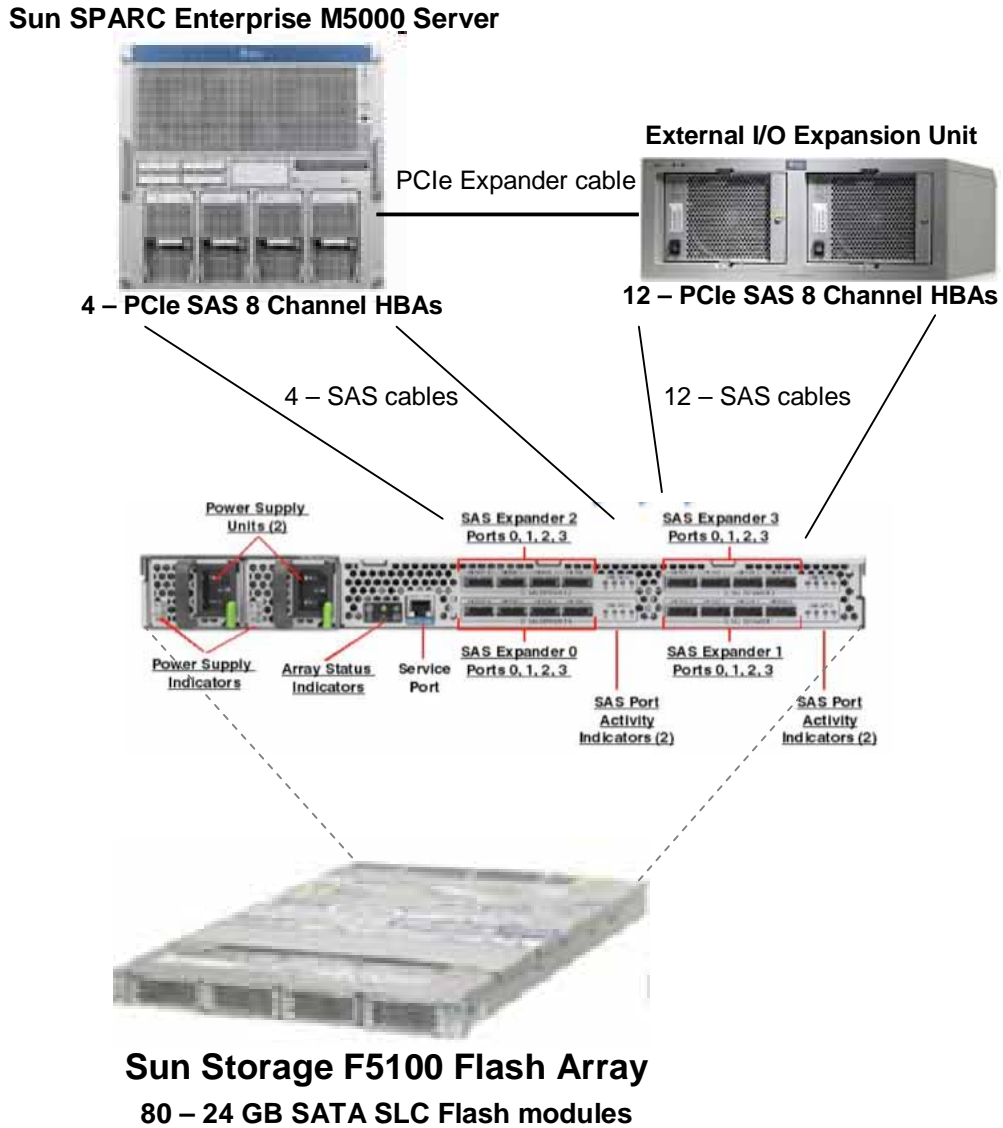
### Tested Storage Configuration Pricing (*Priced Storage Configuration*)

Part Number	Description	Quantity	US List	Total	discount	Ave. Price
TA5100RASA4-80AA-N	1.92TB solid state Flash array with 80 x 24GB SATA enterprise-class SLC Flash modules, 16 x 4-wide 3Gb/s SAS ports, 2 x 720W Power Supplies, rail kit, cable management arm, 2 x SAS cable (3m), 4 x Energy Storage Modules, Common Array Management software (download), ROHS-6 compliant	1	\$159,995	\$159,995	35%	\$103,997
SG-XPCIE8SAS-E-Z-N	Sun StorageTek (TM) 8-Port external SAS PCI-Express Host Bus Adapter. RoHS 6.	16	\$550	\$8,800	35%	\$5,720
XTA-3.0M-SAS-N	Sun Storage 3.0m, mini, shielded, SAS cable; For connection between array and host; RoHS-6	14	\$175	\$2,450	35%	\$1,593
	Oracle Premium Bumper-Bumper Service: 1-Year 7/24, 2 hour response time.	3	\$13,357.11	\$40,071	0%	\$40,071
				<b>\$211,316</b>		<b>\$151,381</b>

### 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.

### Benchmark Configuration/Tested Storage Configuration Diagram



**Benchmark Configuration/Tested Storage Configuration Components**

<b>Host System:</b>	<b>Tested Storage Configuration (TSC):</b>
<b>Sun SPARC Enterprise M5000 Server</b> 8 – 2.53 GHz SPARC64 VII Quad Core processors 4 – SPARC V9 cores per processor ECC protected 5 MB shared L2 on chip cache per processor 64 K I-Cache and 64 KB D-Cache L1 per core	16 – Sun StorageTek™ PCI Express SAS 8-Channel HBAs  <b>Sun Storage F5100 Flash Array</b> 16 – 4-wide mini SAS-1 ports 2 – 3m mini SAS cables 80 – 24 GB SATA enterprise-class SLC Flash modules
64 GB – main memory	14 – 3.0m mini SAS cables
Solaris 10 10/09 s101s_u8wos__08a SPARC	
PCIe	
External I/O Expansion Unit	