ORACLE

SPC BENCHMARK 1™

EXECUTIVE SUMMARY

ORACLE CORPORATION

SUN STORAGE 6780 ARRAY *(8 GB)*

SPC-1 V1.12

Submitted for Review: June 1, 2010
Submission Identifier: A00094

EXECUTIVE SUMMARY

Test Sponsor and Contact Information

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Revision Information and Key Dates

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SPC-1 Specification revision number	V1.12
SPC-1 Workload Generator revision number	V2.1.0
Date Results were first used publicly	June 1, 2010
Date the FDR was submitted to the SPC	June 1, 2010
Date the priced storage configuration is available for shipment to customers	currently available
Date the TSC completed audit certification	June 1, 2010

Tested Storage Product (TSP) Description

The Sun Storage 6780 array is a modular, rack mounted and scalable array designed specifically to grow with your applications, lowering acquisition and expansion costs. and when requirements change, the The Sun Storage 6780 array consists of a minimum of one controller tray and up to 16 expansion trays (maximum of 28 expansion trays available Q2 CY2009). The Sun Storage 6780 controller tray (1 x 1) has three cache options — 8 GB, 16 GB or 32* GB (32 GB available Q3 CY2009) – and two host port options – 8 or 16 – 4 Gb per second fibre channel (8 Gb per second fibre channel available Q2CY2009). The Sun Storage 6780 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 and maintenance capabilities, the Sun Storage 6780 is designed to ensure your data is available 24x7x365.

Summary of Results

SPC-1 Results	
Tested Storage Configuration (TSC) Name: Sun Storage 6780 Array *(8 Gb)*	
Metric	**Reported Result**
SPC-1 IOPS™	62,261.80
SPC-1 Price-Performance	$6.89/SPC-1 IOPS™
Total ASU Capacity	13,742.218 GB
Data Protection Level	Protected *(Mirroring)*
Total TSC Price (including three-year maintenance)	$429,294

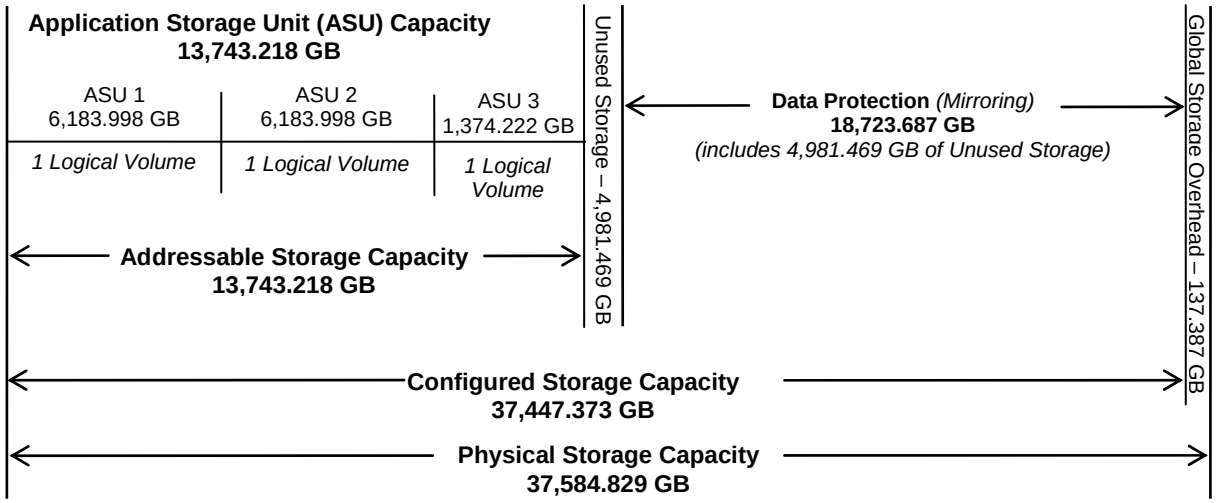
SPC-1 IOPS™ represents the maximum I/O Request Throughput at the 100% load point.

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	36.56%
Protected Application Utilization	73.13%
Unused Storage Ratio	26.51%

Application Utilization: Total ASU Capacity *(13,742.218 GB)* divided by Physical Storage Capacity *(37,854.829 GB)*

Protected Application Utilization: (Total ASU Capacity *(13,742.218 GB)* plus total Data Protection Capacity *(18,723.687 GB)* minus unused Data Protection Capacity *(4,981.469 GB)* divided by Physical Storage Capacity *(37,854.829 GB)*

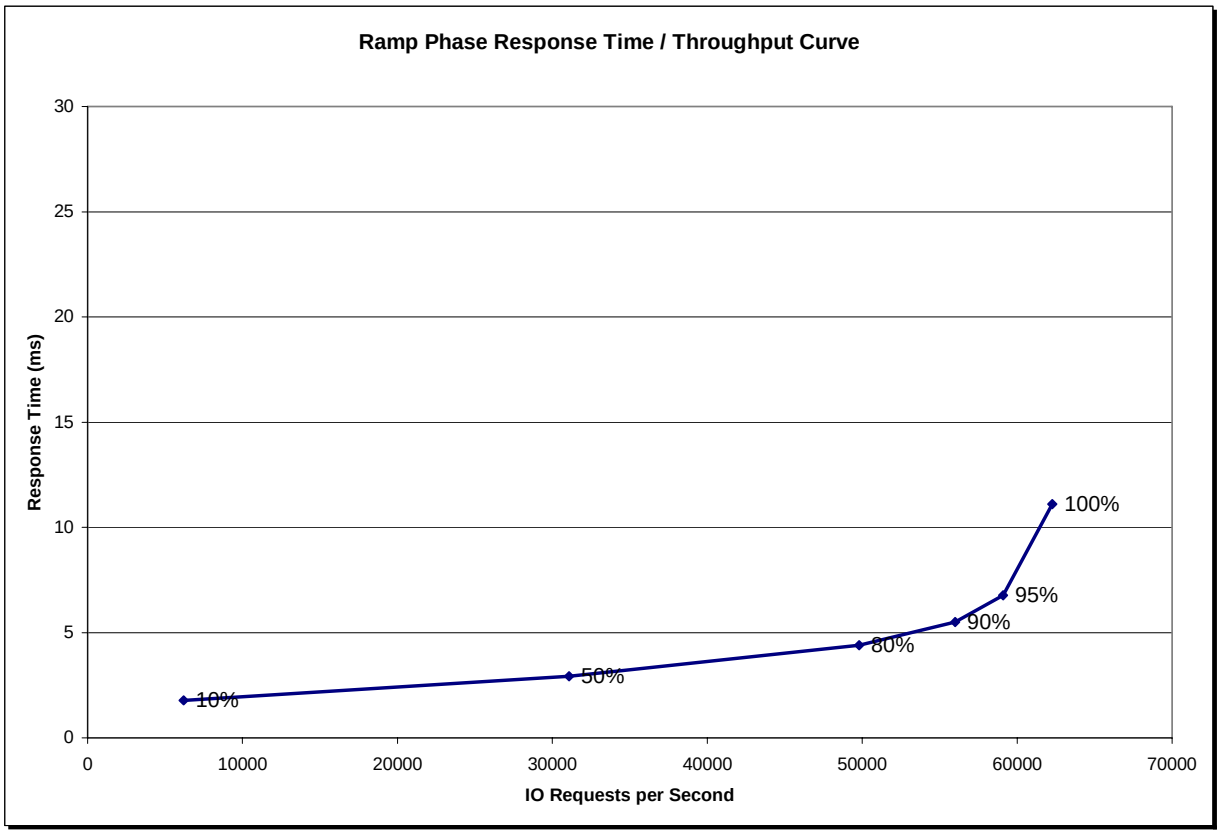
Unused Storage Ratio: Total Unused Capacity *(9,962.938 GB)* divided by Physical Storage Capacity *(37,854.829 GB)* and may not exceed 45%.

Detailed information for the various storage capacities and utilizations is available on pages 20-21 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
I/O Request Throughput	6,202.06	31,086.00	49,802.32	55,997.68	59,100.81	62,261.80
Average Response Time (ms):						
All ASUs	1.78	2.93	4.39	5.50	6.77	11.11
ASU-1	2.43	3.97	5.66	6.79	8.02	12.07
ASU-2	2.23	3.76	6.37	8.20	9.84	14.42
ASU-3	0.18	0.34	0.82	1.56	2.78	7.65
Reads	4.25	6.93	9.91	11.60	13.02	16.80
Writes	0.16	0.32	0.79	1.52	2.70	7.41

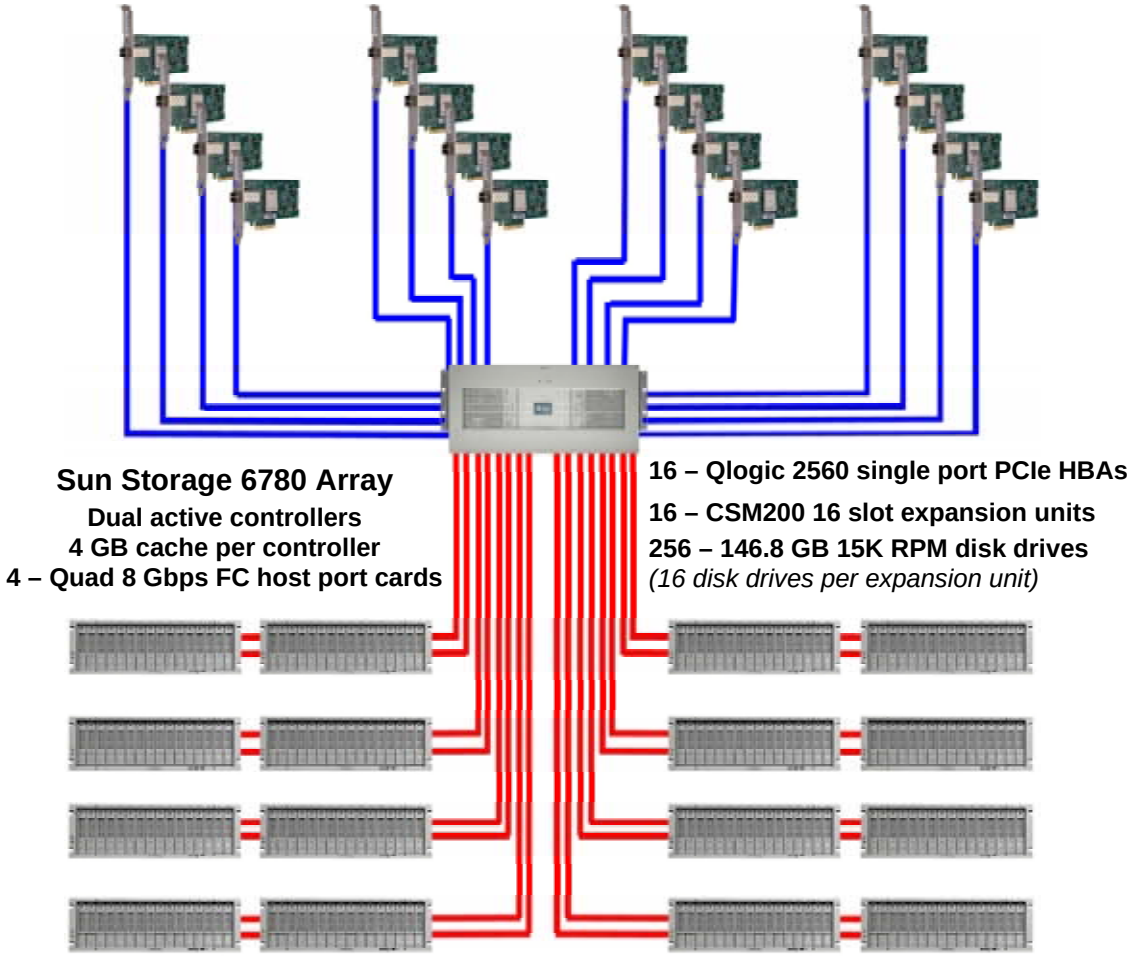
Priced Storage Configuration Pricing

Part Number	Description	Quantity	US List	Total	discount	Ave. Price
XTA6780R11D8EA2-08	Sun Storage 6780 Array, 1x1, 8 GB, 8x8Gb/s FC Host ports	1	$107,495	$107,495	38%	$66,647
	- 2 Controllers w/ 4GB cache each					
	- 2 Quad 8 Gbps FC host ports cards					
	- 8 x 8Gb/s FC SFPs included					
	- 2 x 5M LC-LC Fiber Optic cables included					
	- CAM Management Software included					
XTA6780HIC-D8F-UPG	2 Quad 8 Gbps FC host port cards	1	$37,895	$37,895	38%	$23,495
	- 8 x 8Gb/s FC SFPs included					
X9733A-Z	5M LC-LC Fiber Optic cable	14	$80	$1,120	38%	$694
XTCCSM2R01A0C2336Z	STK CSM200 RM 0x1x16x146G15k	16	$29,915	$478,640	38%	$296,757
	- 16 x 146GB 15k rpm 4Gb drives					
	- 2 x 5M LC-LC Fiber Optic cables included					
	- 4 x 4Gb/s FC SFPs included					
SG-XPCIE1FC-QF8-Z	8Gb PCIe single port FC Host Based Adapter	16	$1,249	$19,984	38%	$12,390
XTCTIER2-BASE16	16 Storage Domains	1	$7,495	$7,495	38%	$4,647
IWU-ST6780-6-24-3G	3-yr Gold Service Maintainance for controller tray	1	$9,700	$9,700	38%	$6,014
	- 7/24 coverage					
	- 4 hour resonse time					
	- 4 hour resolution					
IWU-STCSM2-24-3G	3-yr Gold Service Maintainance for CSM200 expansion tray	16	$1,880	$30,080	38%	$18,650
	- 7/24 coverage					
	- 4 hr response time					
	- 4 hour resolution					
				$692,409		**$429,294**

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

The only difference was between the number of 4 Gbps SFPs configured in the TSC and the number included in the Priced Storage Configuration. The TSC was configured with 77 of the 4 Gbps SFPs of which 64 were used. The Priced Storage Configuration included only the required 64 SFPs.

Priced Storage Configuration Diagram



Priced Storage Configuration Components

Priced Storage Configuration:
16 – 8Gb PCIe single port FC HBAs
SC-1/SC-2: Sun Storage 6780 Array **2 – dual-active controllers with:** 8 GB cache total, 4 GB per controller 4 –Quad 8 Gbps FC Host Port Cards *2 pair, includes 16 SFPs (8 Gbps))* 16 – 8 Gb Fibre Channel front-end connections 16 – 4 Gb Fibre Channel backend connection
16 – CSM200 16 slot expansion units *(each expansion unit includes 4 SFPs (4 Gbps))*
256 – 146.8 GB 15K RPM disk drives