



**SPC BENCHMARK 1C™
EXECUTIVE SUMMARY**

**SEAGATE TECHNOLOGY LLC
SEAGATE PULSAR® XT.2/ST400FX0002**

SPC-1C™ V1.3

**Submitted for Review: May 9, 2011
Submission Identifier: C00012**

EXECUTIVE SUMMARY

Test Sponsor and Contact Information

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Test Sponsor Primary Contact	Seagate Technology LLC – http://www.seagate.com Craig Parris – craig.parris@seagate.com 1280 Disc Drive Shakopee, MN 55379 Phone: (952) 402-2418
Test Sponsor Alternate Contact	Seagate Technology LLC – http://www.seagate.com Teresa Maria Worth – teresa.m.worth@seagate.com 1280 Disc Drive Shakopee, MN 55379 Phone: (952) 402-3704
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

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SPC-1C Specification revision number	V1.3
SPC-1C Workload Generator revision number	V1.0
Date Results were first used publicly	May 9, 2011
Date the FDR was submitted to the SPC	May 9, 2011
Date the TSC is available for shipment to customers	July 11, 2011
Date the TSC completed audit certification	May 9, 2011

Tested Storage Product (TSP) Description

Pulsar XT.2 is a 2.5-inch, SLC-based, 6Gb/s SAS, up to 400GB enterprise solid state drive from Seagate. Pulsar XT.2 delivers the highest levels of performance, data integrity, and drive endurance for the most demanding enterprise environments. Unlike other SSDs that claim to be enterprise class, Pulsar XT.2 was designed from the ground up for the real world, complex, mixed workloads typical of enterprise environments to optimize customer experience. This drive increases system scalability and flexibility, is hot pluggable and provides a common storage foundation to reduce system complexity and operating overhead for OEMs, system builders, and datacenters.

Summary of Results

SPC-1C Results	
Tested Storage Product: Seagate Pulsar® XT.2/ST400FX0002	
Metric	Reported Result
SPC-1C IOPS™	20,008.82
Total ASU Capacity	399.931 GB
Data Protection Level	Unprotected
Total Price – Priced Storage Configuration	\$6,312.60

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.

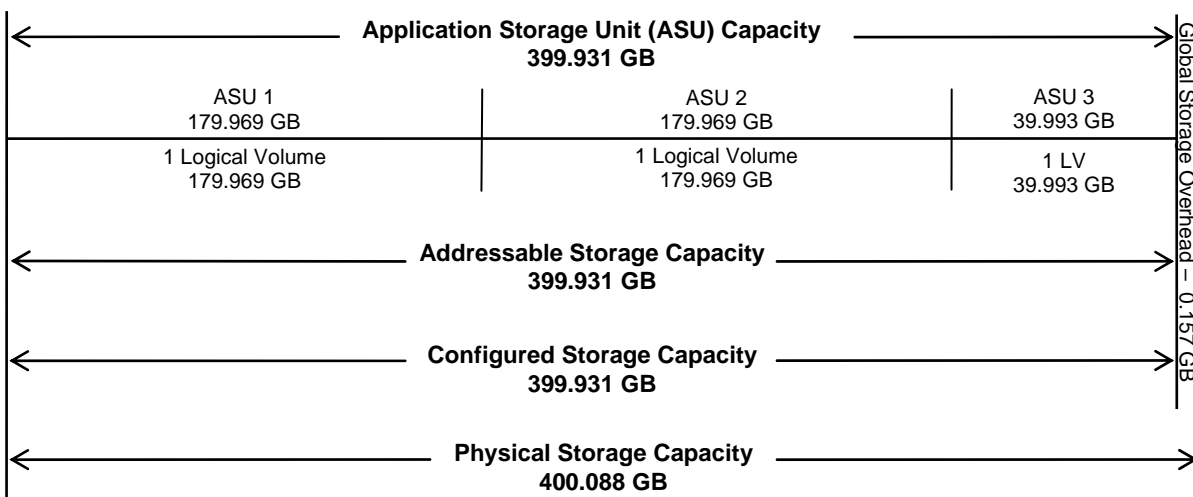
Storage Capacities and Relationships

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.

The TSC meets the “no Unused Storage” requirement as documented below:

$$400.088 \text{ GB (Physical Storage Capacity)} \\ 399.931 \text{ GB (Total ASU Capacity)} + 0.157 \text{ (Global Storage Overhead)} = 400.088 \text{ GB}$$

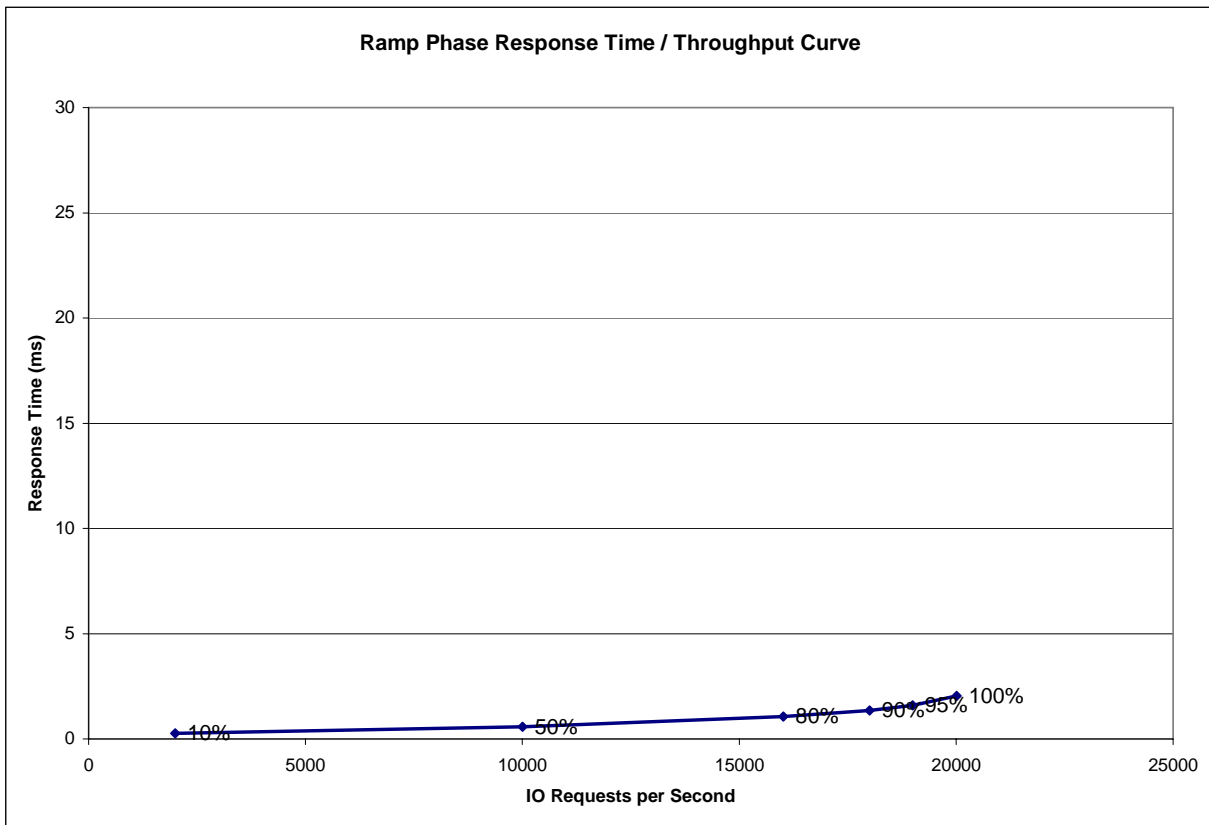
The following diagram documents the various storage capacities, used in this benchmark, and their relationships.



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
I/O Request Throughput	1,998.96	10,004.20	16,013.98	18,001.66	18,999.39	20,008.82
Average Response Time (ms):						
All ASUs	0.26	0.57	1.06	1.35	1.59	2.05
ASU-1	0.26	0.55	1.03	1.31	1.55	2.00
ASU-2	0.27	0.57	1.06	1.34	1.59	2.04
ASU-3	0.25	0.61	1.13	1.42	1.67	2.14
Reads	0.31	0.57	1.05	1.33	1.57	2.01
Writes	0.22	0.57	1.07	1.36	1.60	2.07

Tested Storage Configuration Pricing (*Priced Storage Configuration*)

Description	Part Numbers	Qty	Price	Extended Price
400GB SAS 2.5" SSD	ST400FX0002	1	\$5,900.00	\$5,900.00
6Gb SAS Controller	<i>Third-Party</i>	1	\$345.68	\$345.68
SAS 2.0 1M Cable	<i>Third-Party</i>	1	\$59.99	\$59.99
SAS Adaptor	<i>Third-Party</i>	1	\$6.93	\$6.93
included 5 year warranty			Total	\$6,312.60

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

**Seagate Pulsar®
XT.2 / ST400FX0002
(400 GB)**



“Generic” Windows 2008 Server
 ASUS P6T6 WS Revolution motherboard
 1 – Intel® Xeon® Processor X5570
 Windows Server 2008 R2

Benchmark Configuration/Tested Storage Configuration Components

Host System:	Tested Storage Configuration (TSC):
“Generic” Windows 2008 Server ASUS P6T6 WS Revolution motherboard 1 – Intel® Xeon® Processor X5570 4 Cores, 2.93 GHz, 8 MB Intel® Smart Cache	1 – LSI SAS 9200-8e 6Gb SAS Controller
	1 – Seagate Pulsar® XT.2 / ST400FX0002 400 GB SSD
	1 – PCIe 2.0 x8 front-end connection
6 GB main memory	2 – 6Gb SAS backend connections (1 used)
Windows Server 2008 R2	1 – X4 SAS 2.0 cable
PCIe 2.0	