



**SPC BENCHMARK 1™
EXECUTIVE SUMMARY**

**PILLAR DATA SYSTEMS, INC.
PILLAR AXIOM 600**

SPC-1 V1.10.1

**Submitted for Review: January 13, 2009
Submission Identifier: A00073**

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	V1.10.1
SPC-1 Workload Generator revision number	V2.00.04a
Date Results were first used publicly	January 13, 2009
Date the FDR was submitted to the SPC	January 13, 2009
Date the TSC is available for shipment to customers	currently available
Date the TSC completed audit certification	January 12, 2009

Tested Storage Product (TSP) Description

As the first and only true application-aware storage system it provides the highest storage utilization rates in storage industry, the most advanced hardware and software fault tolerance capabilities, and a robust software feature set. The Axiom 600 is an ideal Enterprise storage platform for virtual infrastructure projects, IT data center reconstruction projects, and bringing applications online with the highest levels of performance. The Axiom 600 is priced very competitively by \$/GB, \$/IOP, or any other metric.

Summary of Results

SPC-1 Results	
Tested Storage Configuration (TSC) Name: Pillar Axiom 600	
Metric	Reported Result
SPC-1 IOPS™	64,992.77
SPC-1 Price-Performance	\$8.79/SPC-1 IOPS™
Total ASU Capacity	10,000.000 GB
Data Protection Level	Mirroring
Total TSC Price (including three-year maintenance)	\$570,972.87

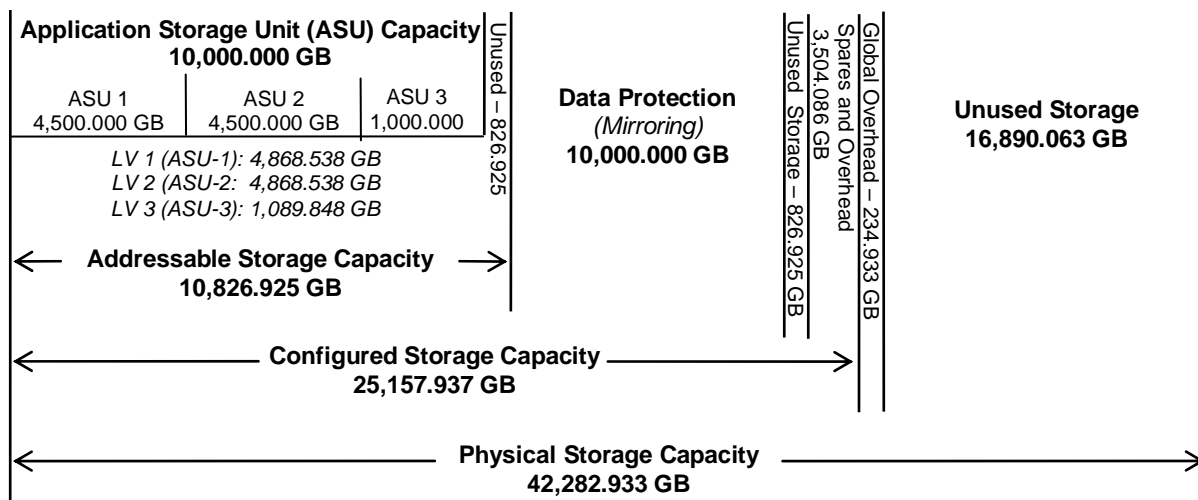
SPC-1 IOPS™ represents the maximum I/O Request Throughput at the 100% load point.

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 “Mirroring” configures two or more identical copies of user data.

Storage Capacities and Relationships

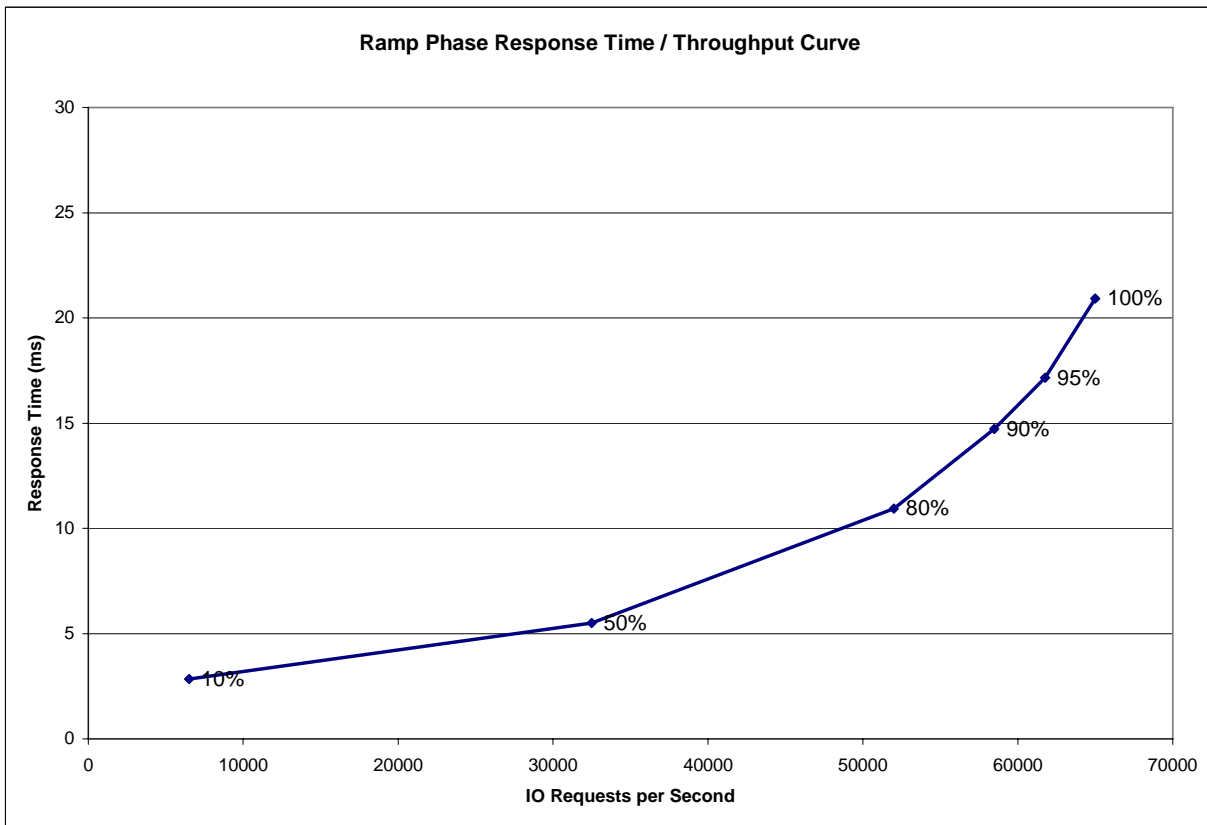
The following diagram documents the various storage capacities, used in this benchmark, and their relationships.



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	6,501.04	32,490.23	52,001.18	58,493.63	61,756.18	64,992.77
Average Response Time (ms):						
All ASUs	2.85	5.50	10.95	14.72	17.15	20.92
ASU-1	3.67	7.06	13.42	17.59	20.20	24.29
ASU-2	3.55	7.23	15.26	21.16	24.81	30.63
ASU-3	0.79	1.43	3.81	5.79	7.33	9.51
Reads	6.05	11.86	22.20	28.89	32.84	39.14
Writes	0.76	1.35	3.61	5.49	6.93	9.06

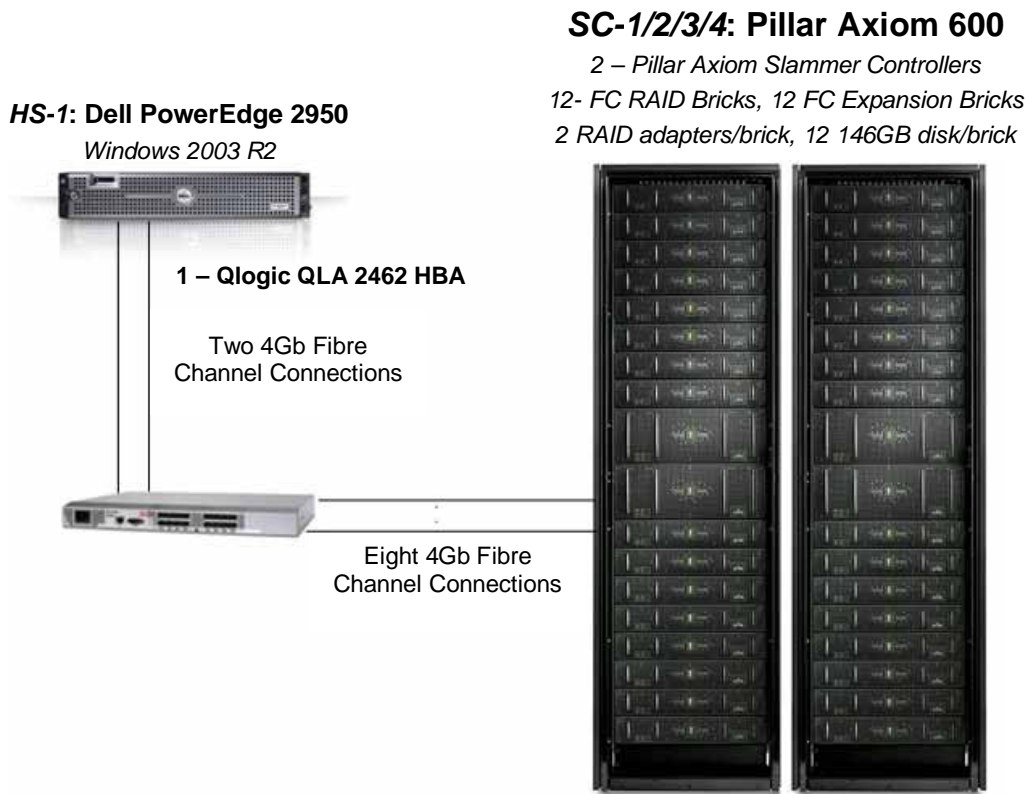
Tested Storage Configuration Pricing (*Priced Storage Configuration*)

	Hardware Part Number	Description	Quantity	Unit Price	Extended Price
Hardware					
	AXIOM-600-SYS	Axiom 600 Configuration			
	SLM-600-SAN	Axiom 600 SAN Slammer	2	\$35,750.00	\$71,500.00
	AXIOM PILOT	2U Pilot, DC, ROHS	1	\$5,070.00	\$5,070.00
	BRX-500-146F15R	Brick, FC RAID 146GB 15K	12	\$16,900.00	\$202,800.00
	BRX-500-146F15E	Brick, FC Expansion 146GB 15K	12	\$15,600.00	\$187,200.00
	1475-00066-30	Kit, Bayiong, ROHS	1	\$41.60	\$41.60
	RACK500-42U	Cabinet ASM, 42U	2	\$2,730.00	\$5,460.00
	PDU 500-1P30A	ASM, PDU, 30A, ROHS	4	\$677.30	\$2,709.20
	6050-00063-00	CBL, Power, 15FT, NEMA L6-30P	4	\$130.00	\$520.00
	6051-00032-00	CBL, Optical, Duplex LC	8	\$58.50	\$468.00
Software					
	AXONE-600-OS	AxiomONE Storage Manager	1	\$28,925.00	\$28,925.00
	AXONE-600-FCP	AxiomONE FCP Protocol	1	\$0.00	\$0.00
	AXONE-600-APM	AxiomONE Path Manager	1	\$0.00	\$0.00
Services					
	9010-00010-00	3 YR Software & Support	1	\$12,495.60	\$12,495.60
	9010-00080-00	3 YR - 4 Hour Parts Delivery	1	\$44,790.72	\$44,790.72
Brocade					
	BR-340-0008	Brocade 200	1	\$6,420.05	\$6,420.05
	XBR-R000070	Brocade Slide Rack Mount Kit	1	\$279.50	\$279.50
	200-SVC-RADV1	Brocade Advance Service	1	\$292.50	\$292.50
Qlogic HBA					
	2011-00010-00	QLE2462 Dual Port 4Gbps HBA	1	\$2,000.70	\$2,000.70
<i>This price reflects a 35% bottom line discount.</i>					\$570,972.87

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

The Tested Storage Configuration (TSC) utilized two Brocade switches due to the existing lab configuration, but did not exceed the capacity of the single Brocade 200 16-port switch included in the Priced Storage Configuration. There would be no performance impact if the TSC was configured using the single switch included in the Priced Storage Configuration.

Benchmark Configuration/Tested Storage Configuration Diagram



Benchmark Configuration/Tested Storage Configuration Components

Host System:	Tested Storage Configuration (TSC):
HS-1: Dell PowerEdge 2950	1 – QLA2462 2 port, 4Gbps Fibre Channel HBA
2 – 3.0 GHz Intel Xeon X5450 Processors with 12 MB L2 cache:	SC-1/2/3/4: Pillar Axiom 600 2 –Pillar Axiom Slammer Controllers each with: Dual active/active data mover and manager 24 GB cache (48 GB total) 4 –Fibre Channel front-end connections (8 total) 8 –Fibre Channel backend connections (16 total)
16 GB main memory	
Windows Server 2003 R2	
AxiomOne Storage Manager	
PCIe:	2 – 42U Cabinets
WG	12 – FC RAID Bricks, 12 – FC Expansion Bricks 2 RAID adapters per brick 12 – 146 GB disks per Brick (288 total)
	1 – Brocade 200 16-port switch