SPC BENCHMARK 1™
EXECUTIVE SUMMARY

3 PARDATA, INC.
3PAR INSERV™ S800 X-SERIES *(8-NODE)*

SPC-1 V1.8

Submitted for Review: March 8, 2004
Submission Identifier: A00027
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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	V1.8
SPC-1 Workload Generator revision number	V2.00.04a
Date Results were first used publicly	March 8, 2004
Date FDR was submitted to the SPC	March 8, 2004
Date the TSC is/was available for shipment to customers	March 8, 2004
Date the TSC completed audit certification	March 7, 2004

Summary of Results

SPC-1 Results	
Tested Storage Configuration (TSC) Name: 3PAR InServ™ S800 X-Series *(8-Node)*	
Metric	**Reported Result**
SPC-1 IOPS™	100,045.74
SPC-1 Price-Performance	$14.81/SPC-1 IOPS™
Total ASU Capacity	16,468.672 GB
Data Protection Level	Mirroring
Total TSC Price (including three-year maintenance)	$1,482,977

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, maintained on separate disks.

Storage Capacities and Relationships

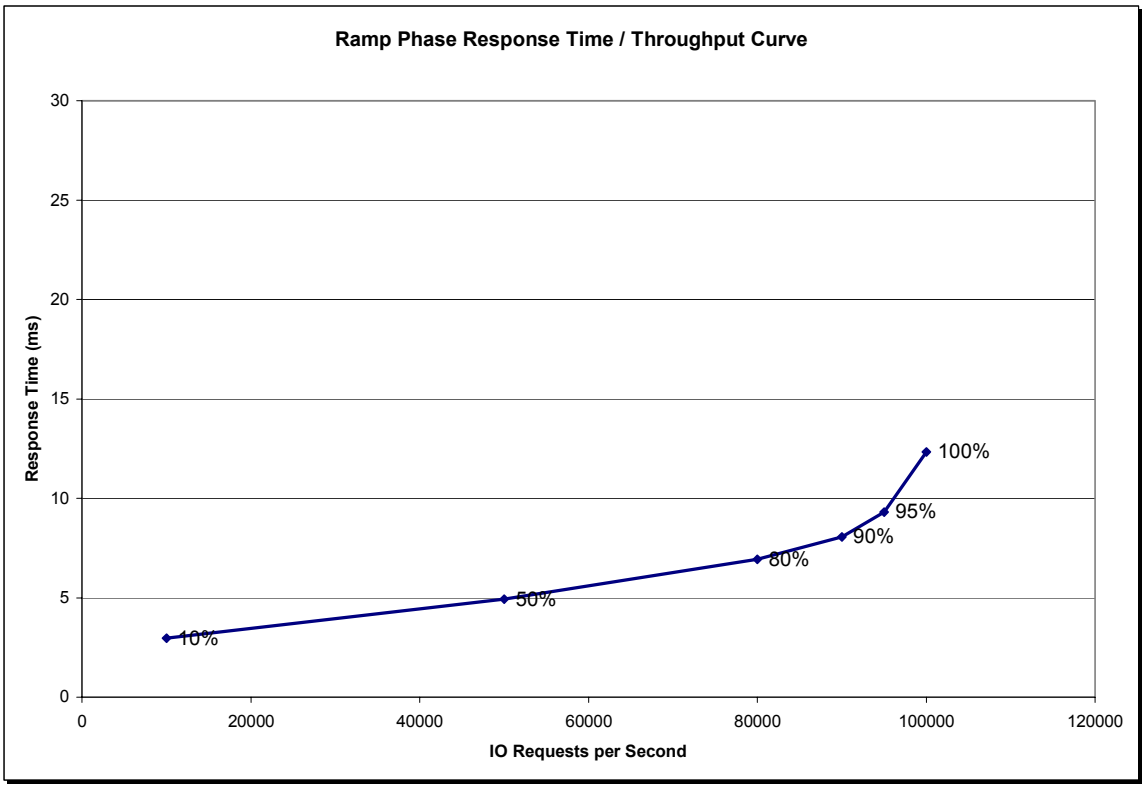
The following diagram documents the various storage capacities, used in this benchmark, and their relationships.

<table>
<tr><td colspan="5">Physical Capacity
35,415.571 GB</td></tr>
<tr><td colspan="3">Configured Capacity
32,985.348 GB</td><td>Unused Storage
1,033.97 GB</td><td>Required Storage
1,372.242 GB</td></tr>
<tr><td colspan="2">Addressable Capacity
16,492.674 GB</td><td>Addressable Mirror
16,492.674 GB</td><td rowspan="3"></td><td rowspan="3"></td></tr>
<tr><td colspan="2">ASU Capacity
16,468.672 GB</td><td>Unused</td></tr>
<tr><td>ASU 1
7,421.702 GB</td><td>ASU 2
7,421.702 GB</td><td>ASU 3
1,625.268 GB</td></tr>
</table>

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 100% load point 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	10,001.51	49,991.03	80,008.24	90,019.75	94,996.20	100,045.74
Average Response Time (ms):						
All ASUs	2.96	4.93	6.94	8.06	9.31	12.34
ASU-1	3.90	6.50	9.13	10.54	11.48	13.59
ASU-2	3.19	6.32	9.00	9.88	11.11	13.18
ASU-3	0.88	1.01	1.38	1.99	3.91	9.30
Reads	6.25	11.08	15.59	17.42	18.28	19.33
Writes	0.82	0.93	1.30	1.96	3.46	7.78

Tested Storage Configuration Pricing *(Priced Storage Configuration)*

Item	Description	Qty	Price
980-0021-01	2400-MHZ CONTROLLER NODE (X-SERIES)	6	
980-0005-01	2048MB DATA CACHE (2 X 1024 DIMMS)	32	
980-0006-01	2-PORT FIBRE CHANNEL ADAPTER	25	
980-0012-01	4-PORT FIBRE CHANNEL ADAPTER	16	
980-0020-01	INSERV S800 BASE MODEL (X-SERIES)	1	
981-0001-01	10-BAY DRIVE CHASSIS	23	
981-0009-01	4 X 36GB DRIVE MAGAZINE (10K RPM)	240	
982-0003-01	10-METER CABLE (LC-LC)	97	
982-0008-01	2M CABINET KIT (WITH REDUNDANT PDU PAIR)	3	
982-0009-01	2-METER CABLE (LC-LC)	8	
982-0010-01	4-METER CABLE (LC-LC)	48	
982-0014-01	REGIONAL KIT, NORTH AMERICA	4	
985-0001-01	SERVICE PROCESSOR	1	
987-0003-01	EXPRESS SUITE (S800)	8	
985-0005-01	INSTALLATION AND SET-UP 8-NODES	1	
985-0050-01	3PAR ADVANTAGE	8	
	3PAR InServ S800 Storage Server (X-Series) Package	**1**	**$ 1,413,798**
QLA2342	**Qlogic 2Gbit/s Fibre Channel to PCI-X Host Bus Adapters with 3 year-maintenance**	**29**	**$ 68,179**
	Total Cost (including 3-year maintenance)		**$ 1,481,977**

Third-party price quotations for the QLogic Host Bus Adapters and support for those adapters may be found on page 60,"Appendix E: Third-Party Price Quotations" of the Full Disclosure Report.

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

There were no differences between the Tested Storage Configuration (TSC) and the Priced Storage Configuration.

Benchmark Configuration/Tested Storage Configuration Diagram

HS-1 *(Master)*

HS-2/3/4 *(Slaves)*

HS-5/6/7/8 *(Slaves)*

SC-1
3PAR InServ™ S800 X-Series *(8-Node)*

Benchmark Configuration/Tested Storage Configuration Details

Host Systems:	Tested Storage Configuration (TSC):
HS-1: *Dell PowerEdge PE1750*	1 – Qlogic QLA242 dual port HBAs *(HS-1)*
2 – Intel Xeon 2.4 GHz CPUs – 512 KB L2/CPU	12 – Qlogic QLA242 dual port HBAs *(HS-2/3/4)*
4 GB Main Memory	16 – Qlogic QLA242 dual port HBAs *(HS-5/6/7/8)*
Microsoft ® Windows ® 2000 Advanced Server with Service Pack 4	**SC-S800: *3PAR InServ™ S800 X-Series*** *(8-Node)*
WG	8 – 3PAR X-Series Controller Nodes
HS-2/3/4: *Dell PowerEdge PE1600SC*	16 GB Control Cache *(2 GB/node)*
2 – Intel Xeon 2.4 GHz CPUs – 512 KB L2/CPU	64 GB Data Cache *(8 GB/node)*
4 GB Main Memory	64 – 2 Gbs Front-End FC Host Ports *(8 ports/node)*
Microsoft® Windows® 2003 Server, Enterprise Edition	48 – 1 Gbs Backend Disk Port *(6 ports/node)*
WG	24 – 10-bay Drive Chassis
HS-5/6/7/8: *HP Proliant DL580 G2*	240 – 4 x 36 GB Drive Magazines *(10K RPM, FC)*
4 – Intel Xeon 2.5 GHz CPUs – 512 KB L2/CPU	3PAR Express Suite (S800)
4 GB Main Memory	Fibre Channel
Microsoft® Windows® 2003 Server, Enterprise Edition	
WG	