



**SPC BENCHMARK 1™
EXECUTIVE SUMMARY**

**TEXAS MEMORY SYSTEMS, INC.
TEXAS MEMORY SYSTEMS RAMSAN-320 (8 PORT)**

SPC-1 V1.8

Submitted for Review: April 5, 2004

Submission Identifier: A00028

Accepted: June 4, 2004



EXECUTIVE SUMMARY**Test Sponsor and Contact Information**

Test Sponsor and Contact Information	
Test Sponsor Primary Contact	Texas Memory Systems, Inc. – www.texmemsys.com Aaron Martz – aaron.martz@texmemsys.com 11200 Westheimer Road, Suite 1000 Houston, TX 77042 Phone: (713) 266-3200 FAX: (713) 266-0332
Test Sponsor Alternate Contact	Texas Memory Systems, Inc. – www.texmemsys.com Michael Clonts – michael.clonts@texmemsys.com 11200 Westheimer Road, Suite 1000 Houston, TX 77042 Phone: (713) 266-3200 FAX: (713) 266-0332
Auditor	Storage Performance Council – 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

Revision Information and Key Dates	
SPC-1 Specification revision number	V1.8
SPC-1 Workload Generator revision number	V2.00.04a
Date Results were first used publicly	April 5, 2004
Date FDR was submitted to the SPC	April 5, 2004
Date the TSC is/was available for shipment to customers	July 1, 2003
Date the TSC completed audit certification	March 31, 2004

Summary of Results

SPC-1 Results	
Tested Storage Configuration (TSC) Name: Texas Memory Systems RamSan-320 (8 port)	
Metric	Reported Result
SPC-1 IOPS™	112,491.34
SPC-1 Price-Performance	\$1.50/SPC-1 IOPS™
Total ASU Capacity	68.719 GB
Data Protection Level	Other Protection Level
Total TSC Price (including three-year maintenance)	\$168,776

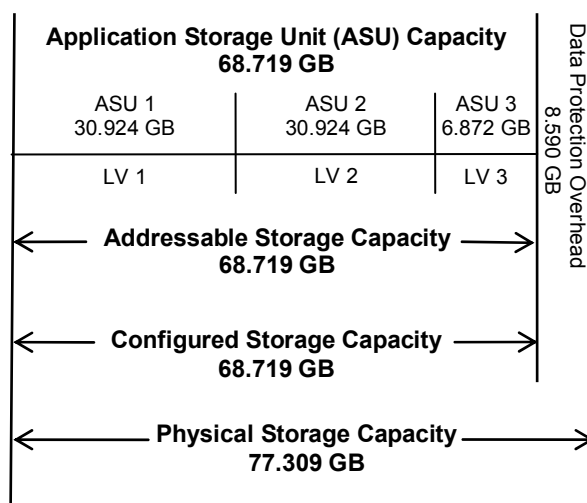
SPC-1 IOPS™ represents the maximum I/O Request Throughput at the 100% load point.

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 Other Protection Level was used. Data protection was accomplished with the use of Error Correction Code (ECC). The ECC hardware stored an additional eight bits of parity data for every 64-bit word. During read requests the hardware uses the parity data to detect data corruption. Any single bit error is immediately corrected. Multiple bit errors are detected but not corrected. In both cases, the system provides notification of the error.

Storage Capacities and Relationships

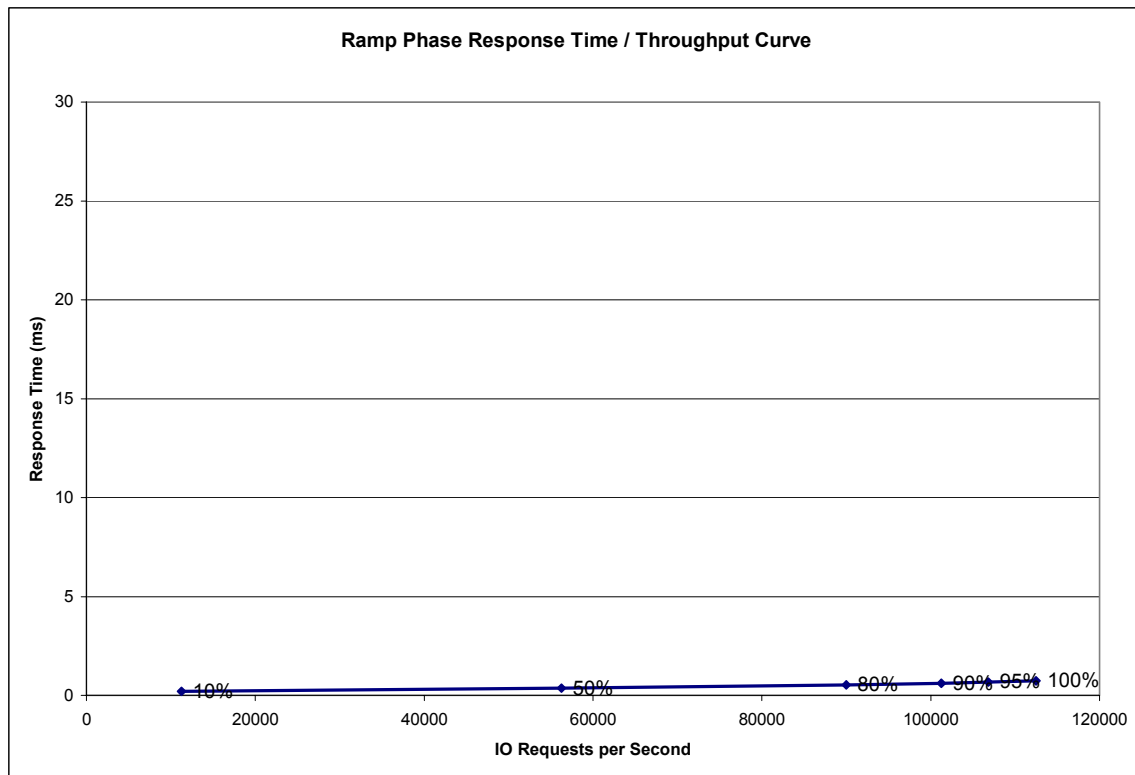
The following diagram documents the various storage capacities, used in this benchmark, and their relationships.



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 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	11,254.35	56,244.55	90,019.90	101,247.09	106,836.96	112,491.34
Average Response Time (ms):						
All ASUs	0.20	0.37	0.54	0.62	0.67	0.73
ASU-1	0.18	0.34	0.50	0.58	0.62	0.68
ASU-2	0.19	0.36	0.52	0.60	0.65	0.71
ASU-3	0.24	0.43	0.62	0.71	0.77	0.84
Reads	0.18	0.34	0.48	0.55	0.60	0.65
Writes	0.21	0.39	0.57	0.66	0.71	0.78

Tested Storage Configuration Pricing (*Priced Storage Configuration*)

1 RamSan unit(s), 3 extra 16GB memory card(s), 3 extra Fibre Channel controller(s)

Hardware Pricing				
Part	Qty.	Description	Price	Total
RamSan-320-16**	1	RamSan-320-16GB-1FC65*	\$36,000	\$36,000
Add'l Memory	3	Additional 16GB Memory	\$24,000	\$72,000
Add'l FC-65	3	Dual Ported Fibre Channel Controller	\$4,000	\$12,000
QLogic HBAs	4	SANblade 2342 2Gb PCI-X Dual Channel HBA	\$1,781	\$7,124
Emulex HBAs	4	LightPulse 10000DC 2Gb Dual Channel HBA	\$1,952	\$7,808
Fibre Channel Cables	8	LC-LC 1 and 2 meter 50/125 FC cables	\$47	\$376
Hardware List Price				\$135,308
HARDWARE TOTAL				\$135,308
Support Pricing				
Part	Qty.	Description	Price	Total
24x7x4 Maintenance Year 1	1	Platinum Warranty 1st Year (6.3% of list)	\$8,524	\$8,524
24x7x4 Maintenance Year 2	1	Platinum Warranty 2nd Year (8.7% of list)	\$11,772	\$11,772
24x7x4 Maintenance Year 3	1	Platinum Warranty 3rd Year (8.7% of list)	\$11,772	\$11,772
Spares Kit-320	1	Spares Kit (per unit ordered)	\$1,200	\$1,200
Support List Price				\$33,268
SUPPORT TOTAL				\$33,268
Shipping	1	Shipping	\$200	\$200
Total Purchase Price				\$168,776

**Includes: 1 dual ported Fibre Channel controller, hot swappable power supplies, management control port, redundant batteries, hot swappable RAID-3 protected backup hard disk drives.

Third-party price quotations for the QLogic and Emulex Host Bus Adapters, including support for those adapters may be found on page 54 of the Full Disclosure Report.

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

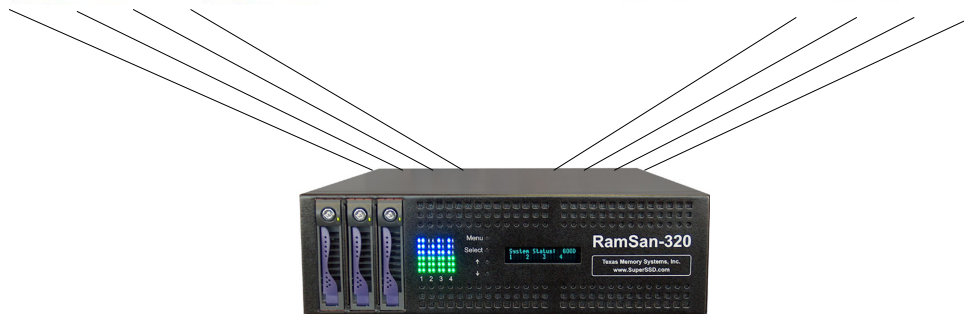
There were no differences between the Tested Storage Configuration (TSC) and the Priced Storage Configuration.

Benchmark Configuration/Tested Storage Configuration Diagram

HS 1-4
*SuperMicro
AMD Opteron
Servers*



HS 5-8
*SuperMicro
Intel Xeon
Servers*



SC-1
*Texas Memory Systems
RamSan 320 (8 port)*

Benchmark Configuration/Tested Storage Configuration Details

Host Systems:	Tested Storage Configuration (TSC):
HS-1/2/3/4: SuperMicro AMD Opteron Servers	4 – QLogic 2342 dual channel HBAs (<i>HS-1/2/3/4</i>)
2 – AMD 1.8 GHz Opteron CPUs per server	4 – Emulex LP10000DC-M2 dual channel HBAs (<i>HS-5/6/7/8</i>)
1024 KB L2 cache per CPU	SC-1: Texas Memory Systems RamSan 320 (8-Node)
4 GB Main Memory per server	4 – FC65 dual port fibre channel controllers
Microsoft ® Windows ® 2000 Advanced Server with Service Pack 4	8 – 2 Gbs fibre channel ports
WG	77.309 GB of solid state storage
HS-5/6/7/8: SuperMicro Intel Xeon Servers	Hot swappable RAID-3 protected backup disks
2 – Intel 2.4 GHz Xeon CPUs per server	Fibre Channel
512 KB L2 cache per CPU	
3 GB Main Memory per server	
Microsoft ® Windows ® 2000 Advanced Server with Service Pack 4	
WG	