SPC BENCHMARK 1™
FULL DISCLOSURE REPORT

FUJITSU LIMITED
FUJITSU STORAGE SYSTEMS
ETERNUS6000 MODEL 800

SPC-1 V1.8

Submitted for Review: March 4, 2004
Submission Identifier: A00026
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Revised: August 9, 2004

First Edition – March 2004

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Notes

The following terms, used in this document, are defined as:

- Kilobyte (KB) is equal to 1,000 (10^3) bytes.
- Megabyte (MB) is equal to 1,000,000 (10^6) bytes.
- Gigabyte (GB) is equal to 1,000,000,000 (10^9) bytes.
- Terabyte (TB) is equal to 1,000,000,000,000 (10^{12}) bytes.

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AUDIT CERTIFICATION

Fujitsu Limited
Fujitsu Computer Systems Corp.
C. A. Wilson
1250 East Arques Ave.
P.O. Box 3470
Sunnyvale, CA 94088-3470

March 3, 2004

The SPC Benchmark 1™ results listed below for the Fujitsu Storage Systems ETERNUS6000 Model 800 were produced in compliance with the SPC Benchmark 1™ V1.8 Remote Audit requirements.

SPC Benchmark 1™ V1.8 Results	
Tested Storage Configuration (TSC) Name: Fujitsu Storage Systems ETERNUS6000 Model 800	
Metric	**Reported Result**
SPC-1 IOPS™	69,241.73
SPC-1 Price-Performance	$11.99/SPC-1 IOPS™
Total ASU Capacity	7,967.078 GB
Data Protection Level	Mirroring
Total TSC Price (including three-year maintenance)	$830,678.56

The following SPC Benchmark 1™ Remote Audit requirements were reviewed and found compliant with V1.8 of the SPC Benchmark 1™ specification:

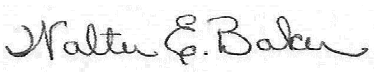
- A Letter of Good Faith, signed by a senior executive.
- The following Data Repository storage items were verified using information supplied by Fujitsu Limited:
  - ✓ Physical Storage Capacity and requirements.
  - ✓ Configured Storage Capacity and requirements.
  - ✓ Addressable Storage Capacity and requirements.
  - ✓ Capacity of each Logical Volume and requirements.
  - ✓ Capacity of each Application Storage Unit (ASU) and requirements.

- An appropriate diagram of the Benchmark Configuration (BC)/Tested Storage Configuration (TSC).
- Listings and commands to configure the Benchmark Configuration/Tested Storage Configuration, including customer tunable parameters.
- Commands and parameters used to configure the SPC-1 Workload Generator.
- The following Host System requirements were reviewed using documentation supplied by Fujitsu Limited:
  - ✓ The type of Host System including the number of processors and main memory.
  - ✓ The presence and version number of the Workload Generator on the Host System.
  - ✓ The TSC boundary within the Host System.
- The Test Results Files and resultant Summary Results Files received for each of following were authentic, accurate, and compliant with all of the requirements and constraints of Clauses 4 and 5 of the SPC-1 Benchmark Specification:
  - ✓ Data Persistence Test
  - ✓ Sustainability Test Phase
  - ✓ IOPS Test Phase
  - ✓ Response Time Ramp Test Phase
  - ✓ Repeatability Test
- There were no differences between the Tested Storage Configuration (TSC) used for the benchmark and Priced Storage Configuration.
- The final version of the pricing spreadsheet met all of the requirements and constraints of Clause 8 of the SPC-1 Benchmark Specification.
- The Full Disclosure Report (FDR) met all of the requirements in Clause 9 of the SPC-1 Benchmark Specification.

Audit Notes:

There were no additional audit notes or exceptions.

Respectfully,



Walter E. Baker
SPC Auditor

LETTER OF GOOD FAITH

FUJITSU LIMITED
Kawasaki-shi, Nakahara-ku, Kamikodanaka 4-1-1, JAPAN 211-8588
TEL : 044-754-3605, FAX : 044-754-3609

FUJITSU

From: Fujitsu Limited, Test Sponsor

Submitted by: Norihiko Kondo
Senior Director, Storage Systems division
Kanagawa-ken, Kanagawa-ken, Kawasaki-shi, Nakahara-ku, Kamikodanaka 4-1-1
Japan 211-8588

Contact Information: Carrel A. (Sandy) Wilson
Fujitsu Computer Systems Corp.
1250 East Arques Ave PO Box 3470
Sunnyvale, CA 94088, U.S.A.

To: Walter E. Baker, SPC Auditor
Gradient Systems, Inc.
643 Bair Island Road, Suite 103
Redwood City, CA 94063-2755, U.S.A.

Subject: SPC-1 Letter of Good Faith for the ETERNUS6000 Model 800

Fujitsu Limited is the SPC-1 Test Sponsor for the above listed product. To the best of our knowledge and belief, the required SPC-1 benchmark results and materials we have submitted for that product are complete, accurate, and in full compliance with V1.80 of the SPC-1 benchmark specification.

In addition, we have reported any items in the Benchmark Configuration and execution of the benchmark that affected the reported results even if the items are not explicitly required to be disclosed by the SPC-1 benchmark specification.

Signed: Norihiko Kondo Date: Feb. 16, 2004

EXECUTIVE SUMMARY

Test Sponsor and Contact Information

Test Sponsor and Contact Information	
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Test Sponsor Alternate Contact	Fujitsu Limited – http://www.fujitsu.com/services/computing/storage/ Norihiko Kondo kondo.n@jp.fujitsu.com Kanagawa-ken, Kanagawa-ken, Kawasaki-shi, Nakahara-ku, Kamikodanaka 4-1-1 Japan 211-8588 Phone: 044- 754-3605
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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	March 4, 2004
Date FDR was submitted to the SPC	March 4, 2004
Date revised FDR was submitted to the SPC Pricing and Price/Performance revised.	August 9, 2004
Date the TSC is/was available for shipment to customers	May 31, 2004
Date the TSC completed audit certification	March 3, 2004

Summary of Results

SPC-1 Results	
Tested Storage Configuration (TSC) Name: Fujitsu Storage Systems ETERNUS6000 Model 800	
Metric	**Reported Result**
SPC-1 IOPS™	69,241.73
SPC-1 Price-Performance	$13.56/SPC-1 IOPS™
Total ASU Capacity	7,967.078 GB
Data Protection Level	Mirroring
Total TSC Price (including three-year maintenance)	$939,183

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

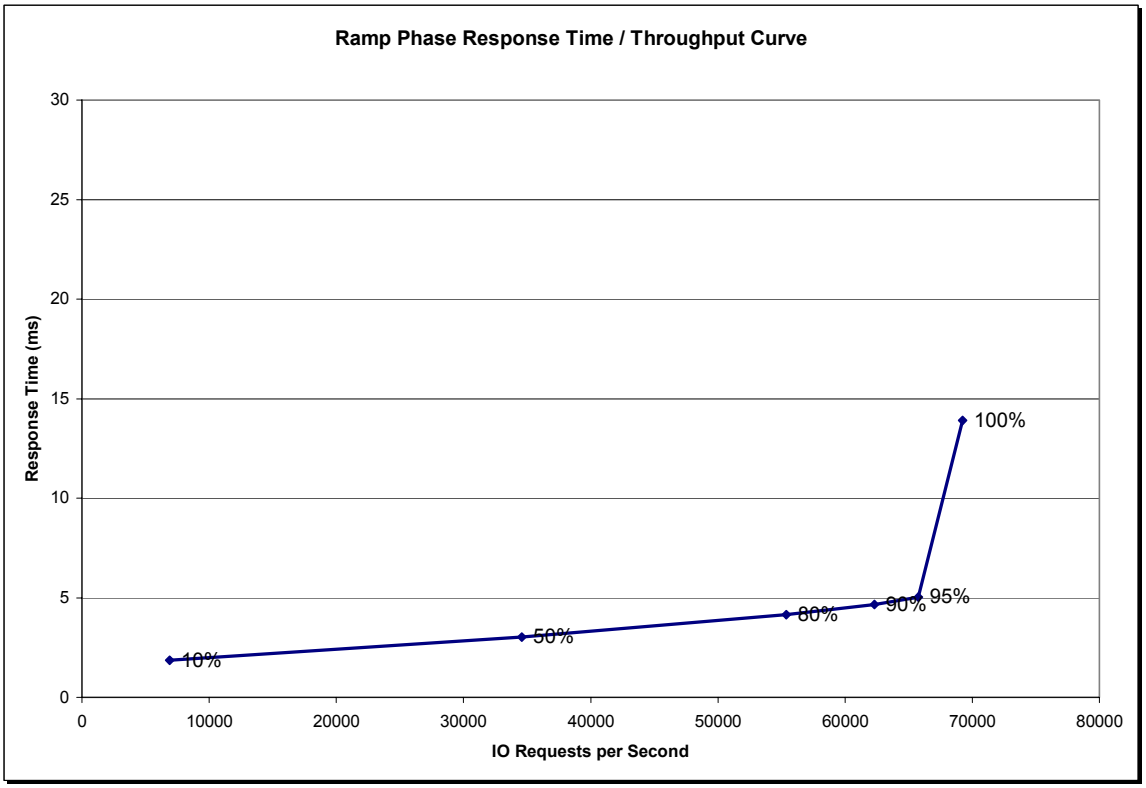
The following diagram documents the various storage capacities, used in this benchmark, and their relationships.

<table>
<tr><td colspan="7">Physical Capacity (GB)
16,534.450</td></tr>
<tr><td colspan="5">Configured Capacity (GB)
15,992.814</td><td>Global
Ovrhd</td><td>Unused</td></tr>
<tr><td colspan="3">Addressable Capacity (GB)
7,967.148</td><td colspan="2">Addressable (Mirror, GB)
7,967.148</td><td>Required
Storage</td><td rowspan="3">539.991</td><td rowspan="3">1.644</td></tr>
<tr><td colspan="2">ASU Capacity (GB)
7,419.920</td><td rowspan="2">Unused</td><td rowspan="2">ASU Mirror (GB)
7,419.920</td><td rowspan="2">Unused</td><td rowspan="2">58.518</td></tr>
<tr><td>ASU1
3,338.960
8 LVs @
448.152/LV</td><td>ASU2
3,338.960
8 LVs @
448.152/LV</td><td>ASU3
742.000
2 LVs @
398.35/LV</td><td>547.228</td><td>547.228</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	6,900.42	34,598.85	55,385.55	62,306.34	65,753.66	69,241.73
Average Response Time (ms):						
All ASUs	1.85	3.03	4.15	4.65	5.04	13.90
ASU-1	2.36	3.76	5.13	5.80	6.33	18.87
ASU-2	1.80	2.95	4.34	4.97	5.45	14.54
ASU-3	0.79	1.52	1.98	2.08	2.12	3.08
Reads	3.58	5.48	7.62	8.74	9.65	30.63
Writes	0.73	1.44	1.89	1.99	2.03	3.00

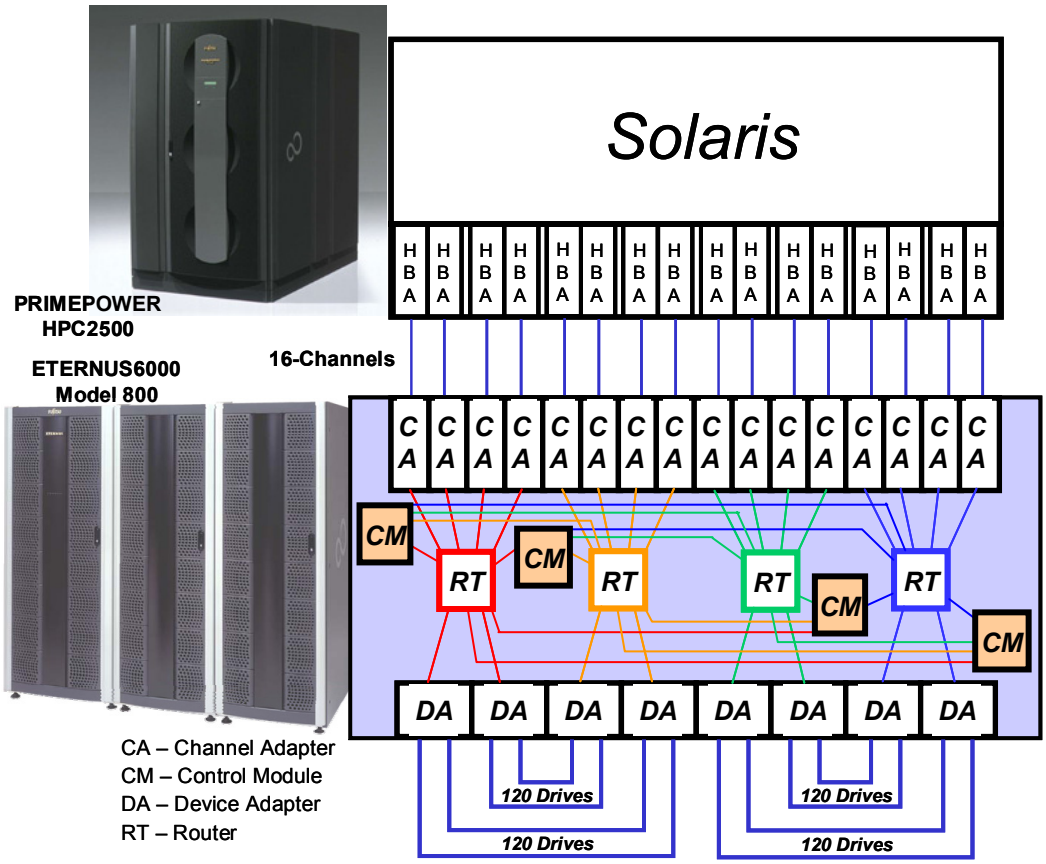
Tested Storage Configuration Pricing *(Priced Storage Configuration)*

Item	Product Id	Description	Qty	Unit $	Extd $
1	E680S01AU	ETERNUS6000 Model 800 Base Unit (with door) including Controller Enclosure, 2x Controllers (CM), 2x Interface Units (RT), 4x Drive Interface (DA), 2x power supplie units, 4x battery units, 8x drive enclosures (DE), 4x 36GB System disk drives 1800mm (36U) rack, 4x power distribution (200VAC) 4x FC cables (5m), 2x LAN cables (5m) rack mount kit, ETERNUSmgr & drivers slots for up to 120 disk drives	1	$147,047	$147,047
2	E600CR2U	ETERNUS6000 Expansion Rack (with door) including Expansion 1800mm (36U) rack 2x power distribution (200 VAC)	2	$7,450	$14,900
3	E680SE12U	Drive Enclosure (4x DE), with 2x Drive Interface (DA) with slots for up to 60 disk drives	2	$37,944	$75,888
4	E600CE11U	Drive Enclosure (4x DE) with slots for up to 60 disk drives	4	$37,944	$151,775
5	E600CJ1U	Third Controller (CM) with 2x 36GB System disk drives	1	$11,194	$11,194
6	E600CF2U	Fourth Controller (CM) with 2x 36GB System disk drives	1	$11,194	$11,194
7	E600CM45	Additional cache memory (4x 8GB)	2	$123,520	$247,040
8	E600CH14	Fibre Channel Host Interface (dual port) x2	8	$7,180	$57,437
9	E600CC2L	36GB/15krpm Disk Drives RAID(4+4)	56	$7,782	$435,779
10	CBL-MLLB15	Fibre Channel Cable	16	$290	$4,632
11	LP9002L	Emulex LP9802 HBA	16	$1,862	$29,799
12		Enhanced Plus ETERNUS6000 Model 800 Base Unit Phone 24x7, On-site 24x7, maintenance service with 4 hour response - 3 year Warranty Uplift w/ 8 DEs	1	$55,440	$55,440
13		Enhanced Plus ETERNUS6000 Model 800 additional DE Set Phone 24x7, On-site 24x7, maintenance service with 4 hour response - 3 year Warranty Uplift per DE set	6	$26,928	$161,568
		Total Product List Price			$1,186,684
		Product Discount		30%	
		Net Product Price			$830,679
		Total Service List Price			$217,008
		Service Discount		50%	
		Net Service Price			$108,504
		Total Sell Price, including 3 years Service			$939,183

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



Host System:	Tested Storage Configuration (TSC):
UID=HS1 Fujitsu PRIMEPOWER HPC2500	16 – Emulex LP9802 Fibre Channel Host Bus Adapters *(2 Gbit)*
32 – 1.3 GHz SPARC64 V CPUs each with 128KB L1 Instruction cache 128KB L1 Data Cache, 2 MB L2 Cache	UID=SC-1 Fujitsu ETERNUS6000 Model 800
64 GB Main Memory	4 – Controller Modules (CM) each with 2.8 GHz Intel Xeon CPU 16 GB Cache
Solaris 9	4 – Router Modules (RT)
WG	16 – Front side Fibre Channels (CA) – *2 Gbit each*
	8 – Drive side Fibre Channel Switched Loops (DA) *2 Gbit each*
	32 – Drive Enclosure Modules each with dual FC-AL interfaces 15 Hot Swap drive slots
	456 – 36 GB 15k RPM disks *(including 8 reserved for system use)*

CONFIGURATION INFORMATION

Benchmark Configuration (BC)/Tested Storage Configuration (TSC) Diagram

Clause 9.2.4.4.1

A one page Benchmark Configuration (BC)/Tested Storage Configuration (TSC) diagram shall be included in the Executive Summary…

The Benchmark Configuration (BC)/Tested Storage Configuration (TSC) is illustrated on page 13 *(Benchmark Configuration/Tested Storage Configuration Diagram).*

Storage Network Configuration

Clause 9.2.4.4.2

If a storage network is employed in the BC/TSC, the FDR shall contain a topology diagram… . This diagram should include, but is not limited to the following components:

1. *Storage Controller and Domain Controllers (see Clause 9.2.4.4.1)*
2. *Host Systems (see Clause 9.2.4.4.1)*
3. *Routers and Bridges*
4. *Hubs and Switches*
5. *HBAs to Host Systems and Front End Port to Storage Controllers*

Additionally the diagram shall:

- *Illustrate the physical connection between components.*
- *Describe the type of each physical connection.*
- *Describe the network protocol used over each physical connection.*
- *The maximum theoretical transfer rate of each class of interconnect used in the configuration.*
- *Correlate with the BC Configuration Diagram in Clause 9.2.4.4.1.*

The Test Sponsor shall additionally supply (referenced in an appendix) a wiring diagram of the physical connections and physical port assignments used in the storage network. The diagram should allow anyone to exactly replicate the physical configuration of the storage network.

The Benchmark Configuration (BC)/Tested Storage Configuration (TSC) was configured with local storage and, as such, did not employ a storage network.

Host System Configuration

Clause 9.2.4.4.3

The FDR shall minimally contain, for each Host System running the Workload Generator, a listing of the following:

1. *Number and type of CPUs.*
2. *Main memory capacity.*
3. *Cache memory capacity.*
4. *Number and type of disk controllers or Host Bus Adapters.*

The details of the Host System configuration may be found on 13 *(Benchmark Configuration/Tested Storage Configuration Diagram).*

Customer Tuning Parameters and Options

Clause 9.2.4.5.1

All Benchmark Configuration (BC) components with customer tunable parameter and options that have been altered from their default values must be listed in the FDR. The FDR entry for each of those components must include both the name of the component and the altered value of the parameter or option.

Operating System Configuration

"Appendix A: Operating System Configuration" on Page 51, lists the contents of the Solaris "/etc/system" control file information that was used for the execution of the SPC-1 Workload Generator on PRIMEPOWER2500.

Host Bus Adapter (HBA) Configuration

"Appendix B: Host Bus Adapter (HBA) Configuration" on Page 53, lists the entries in the "sd.conf" file to enable HBA access to the configured storage and HBA parameters changed from their default values for this benchmark.

Tested Storage Configuration (TSC) Description

Clause 9.2.4.5.2

The FDR must include sufficient information to recreate the logical representation of the TSC. In addition to customer tunable parameters and options (Clause 4.2.4.5.3), that information must include, at a minimum, a diagram and/or description of the following:

- *All physical components that comprise the TSC. Those components are also illustrated in the Benchmark Configuration (BC) diagram in Clause 9.2.4.4.1 and, if applicable, the Storage Network Configuration Diagram in Clause 9.2.4.4.2.*
- *The logical representation of the TSC, configured from the above components that will be presented to the Workload Generator.*

In addition the FDR may include listings of scripts and/or commands used to configure the physical components that comprise the TSC.

The Tested Storage Configuration was created and configured using the script and commands that appears in "Appendix C: Tested Storage Configuration (TSC) Creation" on Page 55.

SPC-1 Workload Generator Storage Configuration

Clause 9.2.4.5.3

The FDR must include all SPC-1 Workload Generator storage configuration commands and parameters.

The SPC-1 Workload Generator storage configuration commands and parameters for this measurement appear in "Appendix D: SPC-1 Workload Generator Storage Parameters" on Page 80.

DATA REPOSITORY

Definitions

Total ASU Capacity: The total storage capacity read and written in the course of executing the SPC-1 benchmark.

Application Storage Unit (ASU): The logical interface between the storage and SPC-1 Workload Generator. The three ASUs (Data, User, and Log) are typically implemented on one or more Logical Volume.

Logical Volume: The division of Addressable Storage Capacity into individually addressable logical units of storage used in the SPC-1 benchmark. Each Logical Volume is implemented as a single, contiguous address space.

Addressable Storage Capacity: The total storage (sum of Logical Volumes) that can be read and written by application programs such as the SPC-1 Workload Generator.

Configured Storage Capacity: This capacity includes the Addressable Storage Capacity and any other storage (parity disks, hot spares, etc.) necessary to implement the Addressable Storage Capacity.

Physical Storage Capacity: The formatted capacity of all storage devices physically present in the Tested Storage Configuration (TSC).

User Data Copy: An identical copy of user data maintained on separate disks.

Required Storage: The amount of Configured Storage Capacity required to implement the Addressable Storage Configuration, excluding the storage required for the three ASUs.

Global Storage Overhead: The amount of Physical Storage Capacity that is required for storage subsystem use and unavailable for use by application programs.

Total Unused Storage: The amount of storage capacity available for use by application programs but not included in the Total ASU Capacity.

Storage Capacities and Relationships

Two tables and an illustration documenting the storage capacities and relationships of the SPC-1 Storage Hierarchy (Clause 2.1) shall be included in the FDR.

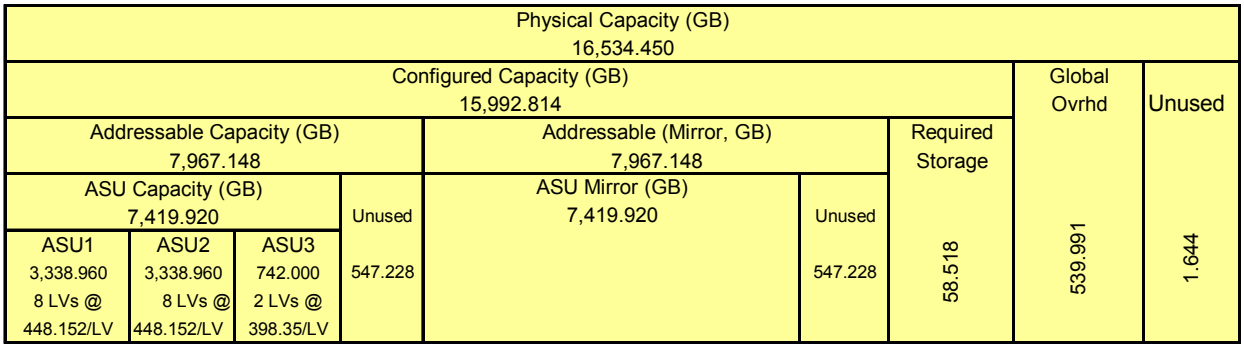
SPC-1 Storage Capacities

SPC-1 Storage Capacities		
Storage Hierarchy Component	**Units**	**Capacity**
Total ASU Capacity	Gigabytes (GB)	7,419.920
Addressable Storage Capacity	Gigabytes (GB)	7,967.164
Configured Storage Capacity	Gigabytes (GB)	15,992.814
Physical Storage Capacity	Gigabytes (GB)	16,534.450
User Data Copy (Mirroring)	Gigabytes (GB)	7,967.164
Required Storage	Gigabytes (GB)	58.518
Global Storage Overhead	Gigabytes (GB)	539.991
Total Unused Storage	Gigabytes (GB)	1,096.100

The Physical Storage Capacity consisted of 456 disk drives with a formatted capacity of 36.260 GB each.

SPC-1 Storage Capacities and Relationships Illustration

The various storage capacities configured in the benchmark result are illustrated below (not to scale).



SPC-1 Storage Hierarchy Ratios

	Addressable Storage Capacity	Configured Storage Capacity	Physical Storage Capacity
Total ASU Capacity	93.13%	46.40%	44.88%
User Data Copy (Mirror)		49.82%	48.19%
Addressable Storage Capacity		49.82%	48.19%
Required Storage		0.37%	0.35%
Configured Storage Capacity			96.72%
Global Storage Overhead			1.75%
Unused Storage	6.87%	6.84%	6.63%

The Addressable Storage Capacity contained 547.228 GB (6.87%) of Unused Storage. The Configured Storage Capacity contained 1,094.456 GB (6.84%) of Unused Storage. Global Storage Overhead includes two components: 8 disk drives dedicated to system use and a block check code factor applied to each data sector (8 bytes per sector) of all data disk drives to enhance data security.

Logical Volume Capacity and ASU Mapping

Clause 9.2.4.6.2

A table illustrating the capacity of each ASU and the mapping of Logical Volumes to ASUs shall be provided in the FDR. Logical Volumes shall be sequenced in the table from top to bottom per its position in the contiguous address space of each ASU. The capacity of each Logical Volume shall be stated. … In conjunction with this table, the Test Sponsor shall provide a complete description of the type of data protection (see Clause 2.4.5) used on each Logical Volume.

Logical Volume Capacity and Mapping		
ASU-1 (3,338.960 GB)	**ASU-2 (3,338.960 GB)**	**ASU-3 (741.992 GB)**
8 Logical Volumes 448.1529 GB per Logical Volume (417.3700 GB used/Logical Volume)	8 Logical Volumes 448.1529 GB per Logical Volume (417.3700 GB used/Logical Volume)	2 Logical Volumes 398.3582 GB per Logical Volume (371.000 GB used/Logical Volume)

The Data Protection Level used for all Logical Volumes was Mirroring as described on page 10. See "ASU Configuration" in the **IOPS Test Results File** for more detailed configuration information.

Assignment of RAID Groups and LUNs

The 56 RAID Group Assignments are RAID0+1(4+4) sets, each divided into 18 Logical Volumes, for a total of 1008 LVs. These are grouped into sixteen separate sets of LUNs, using Host Affinity grouping, eight with 72 LUNs and eight with 54 LUNs.

The RAID Group assignments to drives in the array are illustrated by the following chart.

E-2a-1 Configuration using 448 of 456 drives, in 56 RAID0+1(4+4) groups, with high activity portions in the middle of the drives.

Drive:	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	DA-Lp
DE:																
00	SY	SY	RG01	RG02	RG03	RG04	RG05	RG06	RG07	RG08	RG09	RG10	RG11	RG12		DA0-0
01	SY	SY														DA0-1
02	SY	SY														DA0-2
03	SY	SY														DA0-3
04	RG00															DA1-0
05																DA1-1
06																DA1-2
07																DA1-3
08	RG13	RG14	RG15	RG16	RG17	RG18	RG19	RG20	RG21	RG22	RG23	RG24	RG25	RG26		DA2-0
09																DA2-1
0a																DA2-2
0b																DA2-3
0c																DA3-0
0d																DA3-1
0e																DA3-2
0f																DA3-3
10	RG27	RG28	RG29	RG30	RG31	RG32	RG33	RG34	RG35	RG36	RG37	RG38	RG39	RG40	RG55	DA0-0
11																DA0-1
12																DA0-2
13																DA0-3
14																DA1-0
15																DA1-1
16																DA1-2
17																DA1-3
18	RG41	RG42	RG43	RG44	RG45	RG46	RG47	RG48	RG49	RG50	RG51	RG52	RG53	RG54		DA2-0
19																DA2-1
1a																DA2-2
1b																DA2-3
1c																DA3-0
1d																DA3-1
1e																DA3-2
1f																DA3-3

The RAID Groups and LUN assignments are set up through a series of actions on the GUI Management Interface (ETERNUSmgr). The task of setting up the configuration for each customer is provided as part of the base system price by Fujitsu. Different techniques are applied, depending upon the needs of the customer. This configuration reflects the customary techniques that are applied when a high performance requirement dominates the customer environment. Other techniques are applied when the primary requirement is for maximum capacity. In the case of high performance, it is customary to define RAID Groups arranged in RAID0+1 configurations. In this configuration, all of the RAID Groups are 4+4 arrangements.

There are 24 empty slots that are not equipped with disk drives, and which are available for future expansion, with this configuration. Two optional facilities in the ETERNUS6000, which may used for collecting information during operation, were turned off during this benchmark run.

The LUNs, seen through the sixteen HBAs by Solaris, are grouped into Solaris Volume Groups, and used with 8 MB stripe unit depths across the sets. Eight Logical Volumes, each with 56 LUNs are used for ASU1 and another eight for ASU2, while two Volumes, also each with 56 LUNs are used for ASU3. The sizes are reflected in the ASU Logical Volume Mapping chart.

SPC-1 BENCHMARK EXECUTION RESULTS

Definitions

Average Response Time: *The sum of the Response Times for all Measured I/O Requests divided by the total number of Measured I/O Requests.*

I/O Request Throughput: *The total number of Measured I/O requests in an SPC-1 Test Run divided by the duration of the Measurement Interval in seconds.*

Measurement Interval: *The finite and contiguous time period, after the Tested Storage Configuration (TSC) has reached Steady State, when data is collected by a Test Sponsor to generate an SPC-1 test result or support an SPC-1 test result.*

Steady State: *The consistent and sustainable throughput of the TSC. During this period the load presented to the TSC by the Workload Generator is constant. Comment: Steady Stated is achieved only after caches in the TSC have filled and as a result the I/O Request throughput of the TSC has stabilized.*

Test: *A collection of Test Phases or Test Runs sharing a common objective.*

Test Phase: *A collection of one or more SPC-1 Test Runs sharing a common objective and intended to be run in a specific sequence.*

Test Run: *The execution of SPC-1 for the purpose of producing or supporting an SPC-1 test result. SPC-1 Test Runs may have a finite and measured Ramp-Up period, Start-Up period, Shut-Down period, and Ramp-Down period as illustrated in the Figure 5-1 below. All SPC-1 Test Runs shall have a Steady State period and a Measurement Interval.*

Sustainability Test Phase

Clause 5.4.2.1

The Sustainability Test Phase consists of one Test Run at the 100% load point with a Measurement Interval of three (3) hours. The intent is to demonstrate a sustained maximum I/O Request Throughput as well as insuring the Tested Storage Configuration (TSC) has reached steady state prior to measuring the maximum I/O Request Throughput (SPC-1™ IOPS).

The reported I/O Request Throughput of the Sustainability Test Run must be within 5% of the reported SPC-1™ IOPS primary metric. The Average Response Time measured in Sustainability Test Run cannot exceed thirty (30) milliseconds.

Clause 9.2.4.7.1

For the Sustainability Test Phase the FDR shall contain:

1. *A Data Rate Distribution (data table and graph).*
2. *I/O Request Throughput Distribution (data table and graph).*
3. *The human readable Test Run Results File produced by the Workload Generator.*
4. *A listing or screen image of all input parameters supplied to the Workload Generator.*
5. *The Measured Intensity Multiplier for each I/O stream.*
6. *The variability of the Measured Intensity Multiplier, as defined in Clause 5.3.13.3.*

SPC-1 Workload Generator Input Parameters

The SPC-1 Workload Generator input parameters for the Sustainability, IOPS, and Response Time Ramp Test Runs are documented in "Appendix E: SPC-1 Workload Generator Input Parameters" on Page 81.

Sustainability Test Results File

A link to the test results file generated from the Sustainability Test Run is listed below.

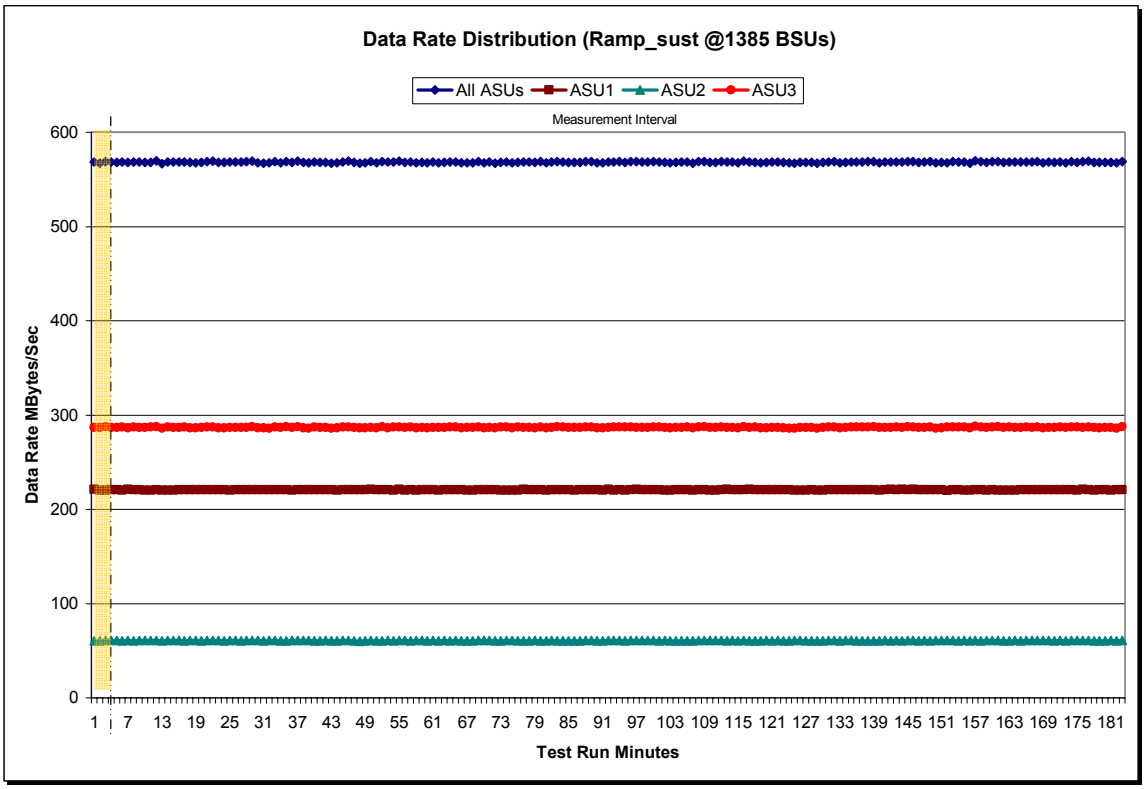
Sustainability Test Results File

Sustainability – Data Rate Distribution Data *(MB/second)*

	Start	Stop	Interval	Duration
Ramp-Up/Start-Up	0:09:38	0:12:38	0-2	0:03:00
Measurement Interval	0:12:38	3:12:38	3-182	3:00:00

Interval	All ASUs	ASU1	ASU2	ASU3	Interval	All ASUs	ASU1	ASU2	ASU3	Interval	All ASUs	ASU1	ASU2	ASU3
0	568.61	221.01	60.69	286.91	63	568.43	220.69	60.57	287.17	126	567.82	220.39	60.56	286.86
1	567.34	220.22	60.38	286.74	64	568.46	220.70	60.70	287.06	127	568.05	220.56	60.63	286.86
2	568.85	220.44	60.76	287.65	65	567.52	220.75	60.52	286.25	128	566.97	220.34	60.68	285.95
3	568.31	220.67	60.92	286.71	66	567.75	220.43	60.50	286.83	129	567.97	220.47	60.47	287.03
4	567.90	220.56	60.71	286.63	67	567.39	220.18	60.53	286.67	130	568.64	220.53	60.94	287.17
5	568.43	220.49	60.51	287.43	68	568.85	220.86	60.85	287.14	131	568.68	220.58	60.96	287.15
6	568.03	220.96	60.75	286.32	69	567.65	220.53	60.81	286.31	132	567.80	220.67	60.67	286.45
7	568.33	220.70	60.44	287.20	70	568.49	220.78	60.78	286.93	133	568.22	220.58	60.77	286.88
8	568.33	220.77	60.94	286.61	71	567.35	220.56	60.43	286.36	134	568.49	220.66	60.70	287.13
9	568.24	220.51	60.87	286.86	72	568.01	220.35	60.54	287.12	135	568.46	220.65	60.68	287.13
10	568.14	220.20	60.84	287.10	73	568.45	220.42	60.82	287.20	136	568.45	220.80	60.57	287.07
11	569.56	220.79	60.89	287.88	74	567.69	220.43	60.81	286.45	137	568.79	220.71	60.62	287.46
12	566.75	220.09	60.54	286.12	75	568.23	220.50	60.48	287.25	138	568.98	220.67	60.64	287.68
13	568.50	220.42	60.77	287.31	76	568.48	220.98	60.54	286.96	139	567.69	220.41	60.49	286.78
14	568.37	220.51	61.07	286.79	77	568.34	220.80	60.69	286.85	140	568.43	220.70	60.75	286.98
15	568.45	220.59	60.87	286.99	78	567.88	220.53	60.74	286.60	141	568.40	221.00	60.58	286.82
16	568.29	220.63	60.57	287.08	79	568.81	220.78	60.61	287.42	142	568.66	220.67	60.90	287.09
17	567.99	220.93	60.76	286.29	80	567.50	220.29	60.62	286.59	143	568.41	221.06	60.53	286.82
18	567.75	220.66	60.77	286.31	81	568.30	220.53	60.98	286.78	144	569.06	220.61	60.95	287.50
19	568.02	220.61	60.41	287.00	82	569.03	220.86	60.67	287.50	145	569.01	220.97	60.83	287.21
20	569.00	220.80	60.73	287.47	83	568.26	220.58	60.44	287.24	146	568.07	220.71	60.58	286.78
21	569.18	220.74	61.04	287.39	84	568.14	220.74	60.60	286.79	147	568.43	220.68	60.80	286.94
22	567.95	220.58	60.91	286.46	85	567.98	220.49	60.64	286.84	148	568.75	220.64	60.66	287.45
23	568.13	220.84	60.68	286.61	86	567.85	220.73	60.41	286.71	149	567.65	220.59	60.90	286.15
24	568.32	220.51	60.80	287.01	87	568.84	220.89	60.76	287.18	150	567.90	220.72	60.83	286.36
25	568.35	220.66	60.77	286.93	88	568.78	220.89	60.84	287.05	151	567.81	219.95	60.75	287.11
26	568.31	220.81	60.65	286.84	89	567.72	220.56	60.68	286.47	152	568.82	220.72	60.72	287.38
27	568.69	220.73	60.98	286.98	90	567.46	220.38	60.50	286.58	153	568.30	220.64	60.52	287.13
28	569.50	220.92	60.92	287.66	91	568.47	220.96	60.73	286.79	154	568.32	220.36	60.80	287.15
29	567.73	220.55	60.71	286.47	92	568.67	220.40	60.85	287.42	155	567.37	220.42	60.63	286.32
30	567.24	220.61	60.33	286.30	93	568.69	220.70	60.87	287.13	156	569.64	220.62	61.04	287.97
31	567.52	220.66	60.80	286.06	94	568.13	220.46	60.53	287.14	157	568.87	220.90	60.57	287.40
32	568.81	220.77	60.81	287.23	95	568.92	220.92	60.77	287.23	158	568.14	220.48	60.73	286.92
33	567.67	220.58	60.42	286.67	96	568.86	221.02	60.88	286.96	159	568.71	220.81	60.75	287.16
34	568.97	220.77	60.62	287.58	97	568.28	220.53	60.84	286.92	160	569.07	220.42	60.86	287.79
35	568.06	220.29	60.79	286.98	98	568.28	220.70	60.69	286.88	161	567.92	220.29	60.60	287.03
36	569.29	220.87	60.73	287.69	99	568.83	220.82	60.93	287.08	162	568.48	220.49	60.65	287.34
37	567.99	220.76	60.75	286.48	100	568.63	220.83	60.69	287.11	163	568.27	220.49	60.75	287.04
38	567.64	220.64	60.91	286.09	101	568.07	220.44	60.72	286.91	164	568.26	220.95	60.64	286.67
39	568.30	220.75	60.48	287.07	102	567.67	220.48	60.64	286.55	165	568.65	220.68	60.82	287.15
40	568.13	220.76	60.63	286.74	103	568.20	220.81	60.69	286.70	166	568.67	220.85	60.81	287.00
41	568.20	220.77	60.78	286.66	104	568.33	220.78	60.53	287.02	167	569.04	220.78	61.04	287.23
42	567.27	220.76	60.48	286.03	105	568.54	220.67	60.69	287.19	168	567.61	220.70	60.71	286.20
43	567.69	220.51	60.58	286.60	106	567.38	220.47	60.41	286.50	169	568.50	220.75	60.79	286.95
44	568.45	220.54	60.83	287.08	107	568.75	220.61	60.82	287.32	170	568.13	220.82	60.44	286.86
45	569.15	220.85	60.86	287.44	108	569.01	220.72	60.77	287.52	171	568.48	220.68	60.72	287.07
46	568.14	220.85	60.64	286.65	109	568.07	220.48	60.75	286.84	172	567.73	220.59	60.50	286.64
47	567.35	220.56	60.22	286.57	110	567.90	220.51	60.73	286.66	173	568.73	220.91	60.77	287.05
48	567.70	220.53	60.64	286.53	111	568.84	220.67	61.12	287.05	174	568.14	220.26	60.75	287.13
49	569.04	221.20	60.84	287.01	112	568.39	221.04	60.47	286.89	175	568.94	221.22	60.82	286.91
50	567.78	220.82	60.57	286.39	113	568.39	220.67	61.07	286.65	176	569.17	220.91	60.86	287.40
51	568.98	220.78	60.65	287.55	114	567.66	220.82	60.59	286.25	177	567.88	220.48	60.69	286.72
52	568.26	220.88	60.86	286.52	115	569.33	220.88	60.73	287.72	178	567.84	220.90	60.48	286.46
53	568.34	220.44	60.58	287.32	116	568.58	221.04	60.51	287.04	179	567.96	220.59	60.63	286.74
54	569.14	221.20	60.75	287.19	117	568.23	220.56	60.52	287.15	180	568.15	220.38	60.88	286.90
55	568.13	220.48	60.85	286.80	118	567.76	220.89	60.61	286.26	181	567.57	220.77	60.64	286.16
56	568.47	220.72	60.52	287.22	119	568.01	220.66	60.80	286.54	182	568.92	220.71	60.73	287.48
57	567.61	220.51	60.80	286.31	120	568.26	220.68	60.57	287.01					
58	568.00	220.58	60.74	286.69	121	568.57	220.63	60.92	287.02					
59	567.76	220.73	60.62	286.41	122	567.91	220.69	60.62	286.60					
60	568.42	220.81	60.70	286.90	123	567.52	220.81	60.54	286.16					
61	567.77	220.39	60.49	286.89	124	567.33	220.51	60.73	286.08					
62	568.23	220.67	60.90	286.65	125	567.99	220.36	60.86	286.76					

Sustainability – Data Rate Distribution Graph

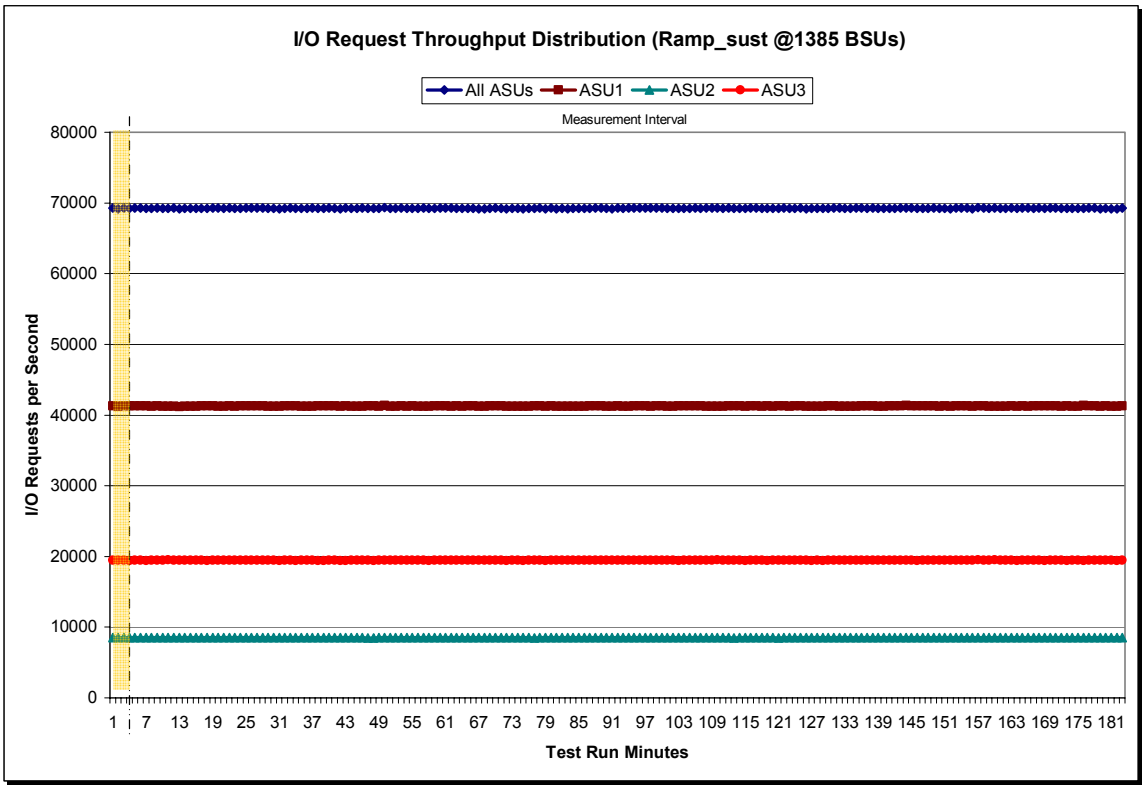


Sustainability – I/O Request Throughput Distribution Data

	Start	Stop	Interval	Duration
Ramp-Up/Start-Up	0:09:38	0:12:38	0-2	0:03:00
Measurement Interval	0:12:38	3:12:38	3-182	3:00:00

Interval	All ASUs	ASU1	ASU2	ASU3	Interval	All ASUs	ASU1	ASU2	ASU3	Interval	All ASUs	ASU1	ASU2	ASU3
0	69,277.57	41,279.30	8,519.32	19,478.95	63	69,224.30	41,239.98	8,517.65	19,466.67	126	69,216.00	41,265.80	8,514.10	19,436.10
1	69,198.42	41,251.47	8,504.12	19,442.83	64	69,250.38	41,293.25	8,497.53	19,459.60	127	69,256.95	41,261.97	8,522.87	19,472.12
2	69,285.72	41,274.70	8,530.45	19,480.57	65	69,239.58	41,290.50	8,506.25	19,442.83	128	69,204.60	41,262.83	8,519.63	19,422.13
3	69,237.55	41,279.88	8,527.10	19,430.57	66	69,199.78	41,244.50	8,502.15	19,453.13	129	69,235.43	41,288.68	8,502.17	19,444.58
4	69,268.13	41,282.78	8,523.35	19,462.00	67	69,196.53	41,215.80	8,519.23	19,461.50	130	69,294.80	41,295.38	8,538.08	19,461.33
5	69,271.42	41,272.40	8,520.90	19,478.12	68	69,239.07	41,271.18	8,513.32	19,454.57	131	69,290.45	41,262.07	8,548.77	19,479.62
6	69,244.35	41,293.73	8,514.43	19,436.18	69	69,264.30	41,280.15	8,515.37	19,468.78	132	69,237.98	41,245.17	8,532.63	19,460.18
7	69,231.27	41,253.82	8,515.80	19,461.65	70	69,235.38	41,268.98	8,506.27	19,460.13	133	69,232.40	41,257.25	8,499.18	19,475.97
8	69,289.52	41,293.83	8,526.48	19,469.20	71	69,184.15	41,244.45	8,507.88	19,431.82	134	69,281.97	41,266.80	8,527.85	19,487.32
9	69,208.18	41,234.85	8,510.42	19,462.92	72	69,249.83	41,254.37	8,528.87	19,466.60	135	69,274.43	41,302.48	8,520.28	19,451.67
10	69,257.20	41,230.10	8,522.17	19,504.93	73	69,229.43	41,252.02	8,515.77	19,461.65	136	69,251.62	41,283.57	8,504.53	19,463.52
11	69,263.30	41,242.57	8,530.75	19,489.98	74	69,189.35	41,223.60	8,532.33	19,433.42	137	69,294.45	41,274.85	8,530.20	19,489.40
12	69,158.93	41,208.92	8,507.90	19,442.12	75	69,230.98	41,255.10	8,516.73	19,459.15	138	69,250.75	41,262.72	8,522.72	19,465.32
13	69,221.75	41,228.23	8,503.88	19,489.63	76	69,243.77	41,276.47	8,493.93	19,473.37	139	69,211.03	41,232.48	8,513.67	19,464.88
14	69,227.62	41,252.65	8,531.87	19,443.10	77	69,279.53	41,295.57	8,518.83	19,465.13	140	69,225.45	41,267.13	8,516.58	19,441.73
15	69,225.67	41,237.95	8,530.75	19,456.97	78	69,181.47	41,233.05	8,520.43	19,427.98	141	69,222.87	41,268.00	8,502.12	19,452.75
16	69,242.00	41,275.77	8,503.05	19,463.18	79	69,289.45	41,290.77	8,505.58	19,493.10	142	69,267.65	41,276.23	8,527.23	19,464.18
17	69,252.13	41,293.32	8,524.65	19,434.17	80	69,184.73	41,221.25	8,518.30	19,445.18	143	69,306.85	41,327.30	8,519.48	19,460.07
18	69,264.52	41,317.80	8,508.23	19,438.48	81	69,249.23	41,259.22	8,533.25	19,456.77	144	69,259.72	41,289.83	8,499.08	19,470.80
19	69,267.48	41,261.87	8,531.22	19,474.40	82	69,199.30	41,244.72	8,514.27	19,440.32	145	69,251.63	41,293.03	8,523.00	19,435.60
20	69,237.25	41,257.53	8,516.87	19,462.85	83	69,243.60	41,254.93	8,518.77	19,469.90	146	69,217.25	41,267.38	8,508.30	19,441.57
21	69,279.63	41,269.73	8,534.98	19,474.92	84	69,208.32	41,243.53	8,520.05	19,444.73	147	69,242.53	41,269.05	8,518.17	19,455.32
22	69,230.48	41,257.13	8,522.63	19,450.72	85	69,236.35	41,263.37	8,513.42	19,459.57	148	69,280.35	41,289.05	8,521.90	19,469.40
23	69,230.18	41,283.75	8,502.88	19,443.55	86	69,239.38	41,282.57	8,513.22	19,443.60	149	69,201.68	41,245.03	8,512.10	19,444.55
24	69,258.98	41,277.47	8,540.62	19,440.90	87	69,288.60	41,298.53	8,526.22	19,463.85	150	69,254.92	41,269.38	8,525.00	19,460.53
25	69,291.60	41,270.13	8,531.02	19,490.45	88	69,307.78	41,316.57	8,518.25	19,472.97	151	69,173.58	41,219.18	8,513.67	19,440.73
26	69,307.87	41,313.80	8,521.85	19,472.22	89	69,243.43	41,263.48	8,531.02	19,448.93	152	69,263.12	41,267.22	8,510.53	19,485.37
27	69,277.93	41,284.62	8,527.20	19,466.12	90	69,171.73	41,215.05	8,503.22	19,453.47	153	69,274.23	41,299.27	8,507.80	19,467.17
28	69,243.67	41,256.85	8,513.25	19,473.57	91	69,305.72	41,306.22	8,528.67	19,470.83	154	69,280.50	41,285.12	8,530.07	19,465.32
29	69,212.63	41,244.43	8,519.62	19,448.58	92	69,243.10	41,248.73	8,519.88	19,474.48	155	69,193.73	41,246.78	8,502.15	19,444.80
30	69,170.95	41,235.50	8,497.25	19,438.20	93	69,279.17	41,259.75	8,536.93	19,482.48	156	69,320.08	41,283.83	8,535.93	19,500.32
31	69,238.93	41,270.15	8,521.37	19,447.42	94	69,268.07	41,284.37	8,519.28	19,464.42	157	69,295.87	41,290.10	8,519.30	19,486.47
32	69,300.50	41,284.38	8,530.25	19,485.87	95	69,265.02	41,279.67	8,503.45	19,481.90	158	69,247.97	41,264.38	8,533.57	19,450.02
33	69,233.25	41,279.47	8,518.30	19,435.48	96	69,274.87	41,284.80	8,506.77	19,483.30	159	69,265.77	41,251.33	8,517.38	19,497.05
34	69,237.62	41,244.25	8,509.37	19,484.00	97	69,265.70	41,266.12	8,545.63	19,453.95	160	69,247.02	41,257.13	8,524.82	19,465.07
35	69,213.43	41,256.22	8,516.15	19,441.07	98	69,276.77	41,279.92	8,528.17	19,468.68	161	69,242.30	41,265.12	8,508.37	19,468.82
36	69,299.78	41,263.52	8,544.43	19,491.83	99	69,262.83	41,287.30	8,520.12	19,455.42	162	69,263.02	41,275.95	8,514.48	19,472.58
37	69,234.72	41,289.22	8,515.35	19,430.15	100	69,210.15	41,264.05	8,506.77	19,439.33	163	69,217.22	41,245.95	8,535.40	19,435.87
38	69,225.98	41,287.47	8,521.35	19,417.17	101	69,215.93	41,240.43	8,525.83	19,449.67	164	69,267.38	41,290.32	8,522.68	19,454.38
39	69,265.40	41,283.33	8,505.80	19,476.27	102	69,247.38	41,304.98	8,508.55	19,433.85	165	69,281.97	41,256.68	8,529.28	19,496.00
40	69,249.57	41,268.05	8,530.58	19,450.93	103	69,245.40	41,280.28	8,519.70	19,445.42	166	69,256.52	41,280.87	8,506.92	19,468.73
41	69,197.53	41,247.48	8,520.20	19,429.85	104	69,257.72	41,294.43	8,513.77	19,449.52	167	69,275.22	41,270.10	8,538.07	19,467.05
42	69,268.57	41,315.13	8,516.45	19,436.98	105	69,264.97	41,288.12	8,506.53	19,470.32	168	69,256.02	41,291.15	8,528.08	19,436.78
43	69,216.98	41,261.75	8,516.50	19,438.73	106	69,237.03	41,291.20	8,502.40	19,443.43	169	69,295.25	41,299.17	8,528.43	19,467.65
44	69,251.98	41,245.32	8,531.08	19,475.58	107	69,271.00	41,266.60	8,536.35	19,468.05	170	69,295.48	41,315.15	8,511.75	19,468.58
45	69,273.92	41,265.07	8,517.98	19,490.87	108	69,266.62	41,254.65	8,534.40	19,477.57	171	69,251.65	41,252.87	8,529.35	19,469.43
46	69,247.88	41,288.38	8,494.25	19,465.25	109	69,299.07	41,258.92	8,537.13	19,503.02	172	69,203.85	41,274.28	8,498.50	19,431.07
47	69,212.58	41,284.30	8,492.13	19,436.15	110	69,218.65	41,257.32	8,515.07	19,446.27	173	69,235.87	41,253.47	8,520.27	19,462.13
48	69,247.93	41,258.80	8,525.88	19,463.25	111	69,275.08	41,297.63	8,531.05	19,446.40	174	69,238.67	41,250.97	8,521.63	19,466.07
49	69,361.72	41,339.10	8,530.23	19,492.38	112	69,244.93	41,296.58	8,493.95	19,454.40	175	69,244.83	41,327.77	8,497.22	19,419.85
50	69,207.23	41,253.45	8,500.70	19,453.08	113	69,236.18	41,279.78	8,513.17	19,443.23	176	69,292.30	41,301.72	8,511.58	19,479.00
51	69,255.92	41,247.88	8,521.85	19,486.18	114	69,200.87	41,248.23	8,520.48	19,432.15	177	69,259.38	41,298.78	8,504.25	19,456.35
52	69,259.42	41,278.62	8,531.70	19,449.10	115	69,286.67	41,296.58	8,517.72	19,472.37	178	69,192.17	41,242.58	8,506.93	19,442.65
53	69,248.28	41,255.72	8,512.08	19,480.48	116	69,287.02	41,316.87	8,513.28	19,456.87	179	69,240.03	41,271.63	8,517.72	19,450.68
54	69,257.72	41,289.30	8,513.53	19,454.88	117	69,203.90	41,235.27	8,504.83	19,463.80	180	69,193.55	41,236.27	8,502.18	19,455.10
55	69,245.38	41,258.90	8,523.82	19,462.67	118	69,238.15	41,280.08	8,521.20	19,436.87	181	69,151.50	41,235.82	8,524.22	19,391.47
56	69,260.37	41,264.58	8,503.20	19,492.58	119	69,217.15	41,255.60	8,519.47	19,442.08	182	69,278.58	41,271.37	8,518.75	19,488.47
57	69,209.60	41,261.73	8,512.78	19,435.08	120	69,225.08	41,268.65	8,487.97	19,468.47	Average	69,246.63	41,269.44	8,517.92	19,459.26
58	69,248.65	41,269.30	8,519.12	19,460.23	121	69,266.38	41,269.83	8,530.72	19,465.83					
59	69,272.38	41,293.98	8,512.30	19,466.10	122	69,211.10	41,241.62	8,518.05	19,451.43					
60	69,261.25	41,288.18	8,523.15	19,449.92	123	69,240.45	41,284.90	8,502.32	19,453.23					
61	69,260.23	41,264.45	8,511.20	19,484.58	124	69,266.00	41,280.03	8,534.33	19,451.63					
62	69,239.80	41,277.38	8,502.70	19,459.72	125	69,184.52	41,215.38	8,526.38	19,442.75					

Sustainability – I/O Request Throughput Distribution Graph



Sustainability – Measured Intensity Multiplier and Coefficient of Variation

	ASU1-1	ASU1-2	ASU1-3	ASU1-4	ASU2-1	ASU2-2	ASU2-3	ASU3-1
IM	*0.0350*	*0.2810*	*0.0700*	*0.2100*	*0.0180*	*0.0700*	*0.0350*	*0.2810*
MIM	0.0350	0.2810	0.0700	0.2100	0.0180	0.0700	0.0350	0.2810
COV	0.003	0.001	0.002	0.001	0.004	0.002	0.003	0.001

IM – Intensity Multiplier: *The ratio of I/Os for each I/O stream relative to the total I/Os for all I/O streams (ASU1-1 – ASU3-1) as required by the benchmark specification.*

MIM – Measured Intensity Multiplier: *The Measured Intensity Multiplier represents the ratio of measured I/Os for each I/O stream relative to the total I/Os measured for all I/O streams (ASU1-1 – ASU3-1). This value may differ from the corresponding Expected Intensity Multiplier by no more than 5%.*

COV – Coefficient of Variation: *This measure of variation for the Measured Intensity Multiplier cannot exceed 0.2.*

IOPS Test Phase

Clause 5.4.2.2

The IOPS Test Phase consists of one Test Run at the 100% load point with a Measurement Interval of ten (10) minutes. The IOPS Test Phase immediately follows the Sustainability Test Phase without any interruption or manual intervention.

The IOPS Test Run generates the SPC-1 IOPS™ primary metric, which is computed as the I/O Request Throughput for the Measurement Interval of the IOPS Test Run.

The Average Response Time is computed for the IOPS Test Run and cannot exceed 30 milliseconds. If the Average Response Time exceeds the 30 millisecond constraint, the measurement is invalid.

Clause 9.2.4.7.2

For the IOPS Test Phase the FDR shall contain:

1. *I/O Request Throughput Distribution (data and graph).*
2. *A Response Time Frequency Distribution.*
3. *An Average Response Time Distribution.*
4. *The human readable Test Run Results File produced by the Workload Generator.*
5. *A listing or screen image of all input parameters supplied t the Workload Generator.*
6. *The total number of I/O Requests completed in the Measurement Interval as well as the number of I/O Requests with a Response Time less than or equal to 30 milliseconds and the number of I/O Requests with a Response Time greater than 30 milliseconds.*

SPC-1 Workload Generator Input Parameters

The SPC-1 Workload Generator input parameters for the Sustainability, IOPS, and Response Time Ramp Test Runs are documented in "Appendix E: SPC-1 Workload Generator Input Parameters" on Page 81.

IOPS Test Results File

A link to the test results file generated from the IOPS Test Run is listed below.

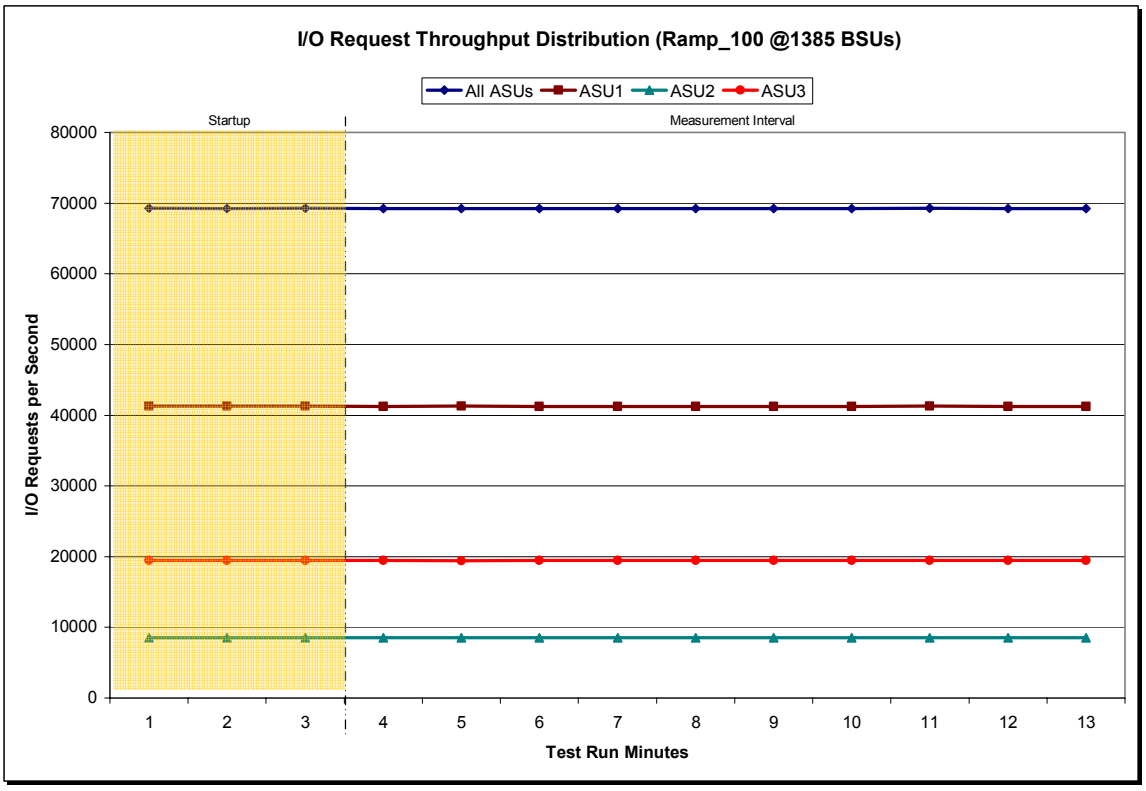
IOPS Test Results File

IOPS Test Run – I/O Request Throughput Distribution Data

1385 BSUs	Start	Stop	Interval	Duration
Start-Up/Ramp-Up	3:13:32	3:16:33	0-2	0:03:01
Measurement Interval	3:16:33	3:26:33	3-12	0:10:00

60 second intervals	All ASUs	ASU1	ASU2	ASU3
0	69,295.17	41,287.92	8,524.32	19,482.93
1	69,249.40	41,281.72	8,513.65	19,454.03
2	69,279.40	41,287.42	8,516.82	19,475.17
3	69,245.00	41,262.73	8,516.25	19,466.02
4	69,238.57	41,301.47	8,498.85	19,438.25
5	69,202.05	41,239.02	8,519.27	19,443.77
6	69,213.37	41,228.73	8,507.43	19,477.20
7	69,246.13	41,232.20	8,519.20	19,494.73
8	69,226.12	41,234.65	8,520.77	19,470.70
9	69,255.32	41,255.67	8,532.00	19,467.65
10	69,301.70	41,288.43	8,526.90	19,486.37
11	69,234.52	41,258.63	8,532.12	19,443.77
12	69,254.50	41,263.67	8,528.07	19,462.77
Average	69,241.73	41,256.52	8,520.09	19,465.12

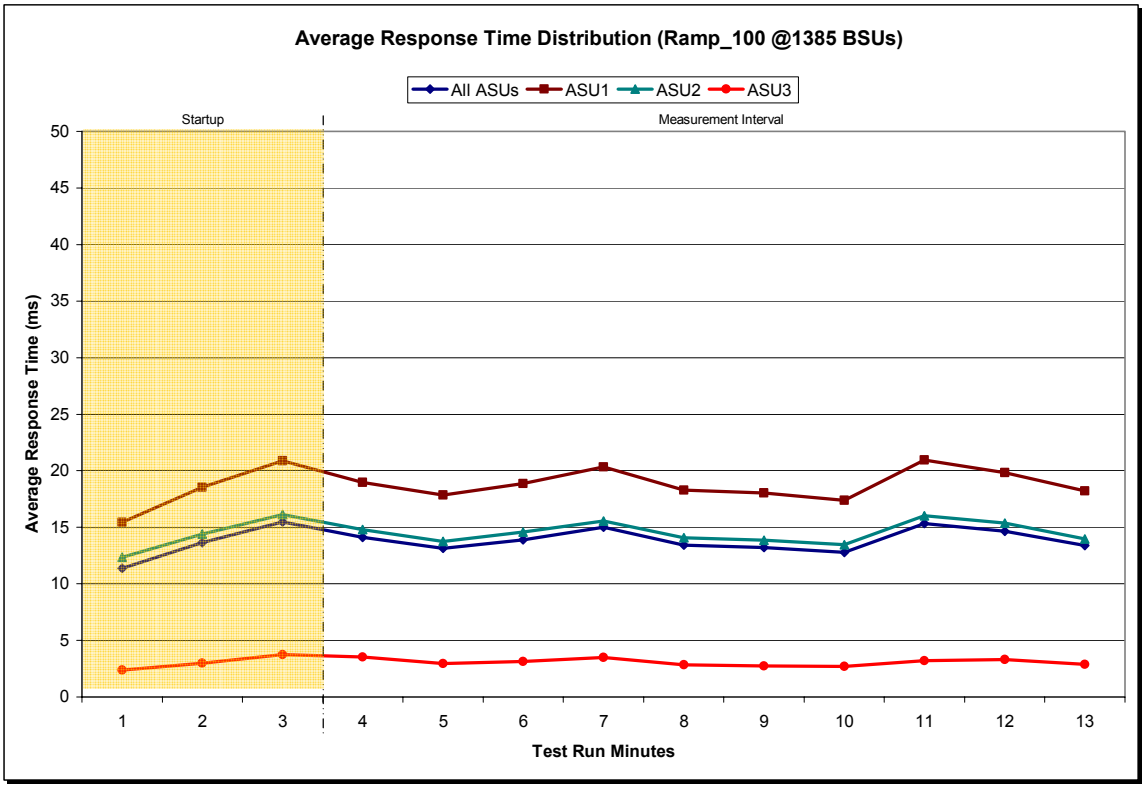
IOPS Test Run – I/O Request Throughput Distribution Graph



IOPS Test Run – Response Time Frequency Distribution Data

1385 BSUs	Start	Stop	Interval	Duration
Start-Up/Ramp-Up	3:13:32	3:16:33	0-2	0:03:01
Measurement Interval	3:16:33	3:26:33	3-12	0:10:00
60 second intervals	**All ASUs**	**ASU1**	**ASU2**	**ASU3**
0	11.38	15.43	12.33	2.39
1	13.66	18.53	14.42	2.99
2	15.47	20.87	16.13	3.73
3	14.12	18.99	14.78	3.53
4	13.15	17.84	13.74	2.94
5	13.91	18.85	14.57	3.12
6	15.01	20.34	15.56	3.50
7	13.41	18.27	14.09	2.83
8	13.21	18.02	13.87	2.74
9	12.78	17.39	13.47	2.71
10	15.35	20.94	16.02	3.19
11	14.65	19.85	15.36	3.30
12	13.39	18.22	13.98	2.89
Average	13.90	18.87	14.54	3.08

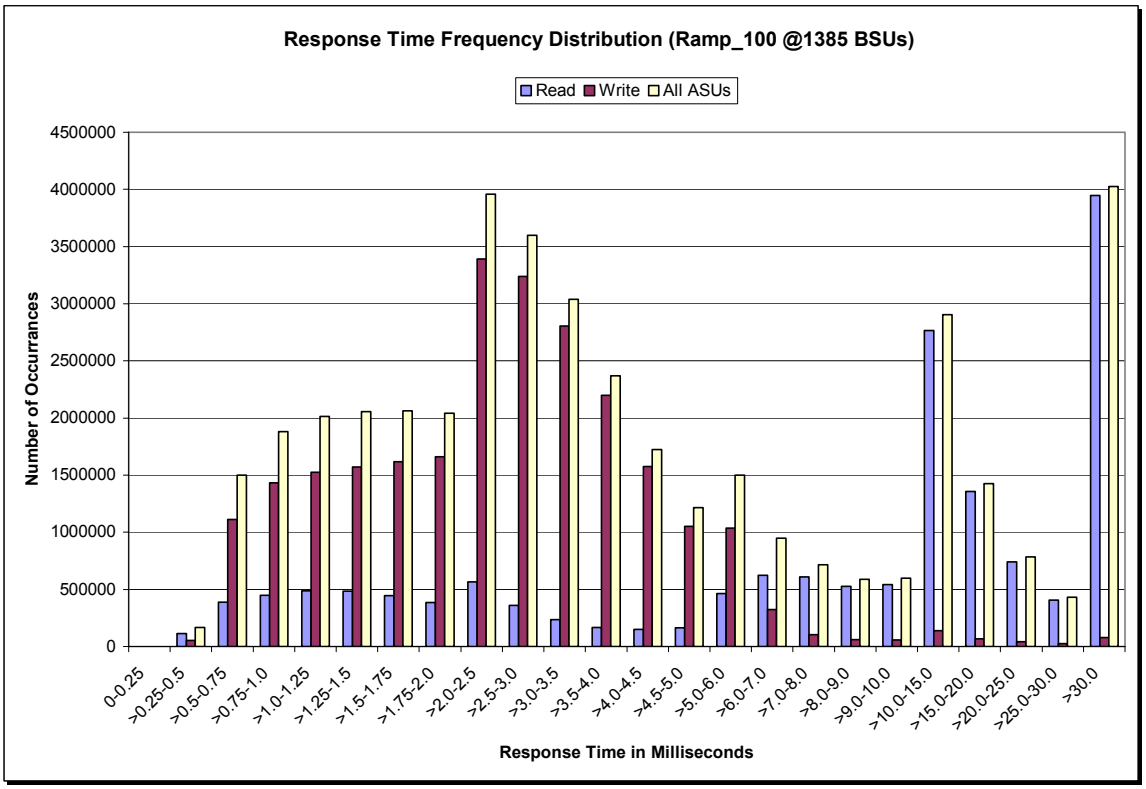
IOPS Test Run –Response Time Frequency Distribution Graph



IOPS Test Run – Average Response Time (ms) Distribution Data

Response Time (ms)	0-0.25	>0.25-0.5	>0.5-0.75	>0.75-1.0	>1.0-1.25	>1.25-1.5	>1.5-1.75	>1.75-2.0
Read	0	112,739	388,595	449,957	487,593	484,217	445,245	383,455
Write	0	53,029	1,113,173	1,431,616	1,524,241	1,570,634	1,616,550	1,659,874
All ASUs	0	165,768	1,501,768	1,881,573	2,011,834	2,054,851	2,061,795	2,043,329
ASU1	0	114,816	854,635	1,007,213	1,059,616	1,065,269	1,050,443	1,016,548
ASU2	0	33,983	235,185	277,736	290,679	293,281	287,063	273,530
ASU3	0	16,969	411,948	596,624	661,539	696,301	724,289	753,251
Response Time (ms)	**>2.0-2.5**	**>2.5-3.0**	**>3.0-3.5**	**>3.5-4.0**	**>4.0-4.5**	**>4.5-5.0**	**>5.0-6.0**	**>6.0-7.0**
Read	566,368	361,368	234,815	169,020	149,192	165,215	464,774	622,021
Write	3,391,278	3,238,444	2,803,793	2,199,003	1,575,108	1,050,842	1,036,271	325,663
All ASUs	3,957,646	3,599,812	3,038,608	2,368,023	1,724,300	1,216,057	1,501,045	947,684
ASU1	1,902,945	1,663,138	1,368,634	1,053,668	772,451	569,259	824,339	683,780
ASU2	497,728	419,413	333,783	246,773	167,985	111,420	124,701	79,066
ASU3	1,556,973	1,517,261	1,336,191	1,067,582	783,864	535,378	552,005	184,838
Response Time (ms)	**>7.0-8.0**	**>8.0-9.0**	**>9.0-10.0**	**>10.0-15.0**	**>15.0-20.0**	**>20.0-25.0**	**>25.0-30.0**	**>30.0**
Read	610,864	528,113	541,074	2,763,943	1,359,204	740,618	407,164	3,947,835
Write	105,072	59,939	55,787	139,378	66,194	41,931	23,931	78,880
All ASUs	715,936	588,052	596,861	2,903,321	1,425,398	782,549	431,095	4,026,715
ASU1	584,470	493,613	504,218	2,500,824	1,204,319	648,169	352,980	3,457,763
ASU2	71,565	62,787	64,142	336,270	189,261	113,276	66,296	535,990
ASU3	59,901	31,652	28,501	66,227	31,818	21,104	11,819	32,962

IOPS Test Run – Average Response Time (ms) Distribution Graph



IOPS Test Run – I/O Request Information

I/O Requests Completed in the Measurement Interval	I/O Requests Completed with Response Time = or < 30 ms	I/O Requests Completed with Response Time > 30 ms
41,544,020	37,517,305	4,026,715

IOPS Test Run – Measured Intensity Multiplier and Coefficient of Variation

	ASU1-1	ASU1-2	ASU1-3	ASU1-4	ASU2-1	ASU2-2	ASU2-3	ASU3-1
IM	*0.0350*	*0.2810*	*0.0700*	*0.2100*	*0.0180*	*0.0700*	*0.0350*	*0.2810*
MIM	0.0350	0.2810	0.0699	0.2100	0.0180	0.0700	0.0350	0.2811
COV	0.003	0.001	0.003	0.000	0.002	0.002	0.002	0.001

IM – Intensity Multiplier: *The ratio of I/Os for each I/O stream relative to the total I/Os for all I/O streams (ASU1-1 – ASU3-1) as required by the benchmark specification.*

MIM – Measured Intensity Multiplier: *The Measured Intensity Multiplier represents the ratio of measured I/Os for each I/O stream relative to the total I/Os measured for all I/O streams (ASU1-1 – ASU3-1). This value may differ from the corresponding Expected Intensity Multiplier by no more than 5%.*

COV – Coefficient of Variation: *This measure of variation for the Measured Intensity Multiplier cannot exceed 0.2.*

Response Time Ramp Test Phase

Clause 5.4.2.3

The Response Time Ramp Test Phase consists of five Test Runs, one each at 95%, 90%, 80%, 50%, and 10% of the load point (100%) used to generate the SPC-1 IOPS™ primary metric. Each of the five Test Runs has a Measurement Interval of ten (10) minutes. The Response Time Ramp Test Phase immediately follows the IOPS Test Phase without any interruption or manual intervention.

The five Response Time Ramp Test Runs, in conjunction with the IOPS Test Run (100%), demonstrate the relationship between Average Response Time and I/O Request Throughput for the Tested Storage Configuration (TSC) as illustrated in the response time/throughput curve on page 11.

In addition, the Average Response Time measured during the 10% Test Run is the value for the SPC-1 LRT™ primary metric. That value represents the Average Response Time of a lightly loaded TSC.

Clause 9.2.4.7.3

The following content shall appear in the FDR for the Response Time Ramp Phase:

1. *A Response Time Ramp Distribution.*
2. *The human readable Test Run Results File produced by the Workload Generator for each Test Run within the Response Time Ramp Test Phase.*
3. *For the 10% Load Level Test Run (SPC-1 LRT™ metric) an Average Response Time Distribution.*
4. *A listing or screen image of all input parameters supplied to the Workload Generator.*

SPC-1 Workload Generator Input Parameters

The SPC-1 Workload Generator input parameters for the Sustainability, IOPS, and Response Time Ramp Test Runs are documented in "Appendix E: SPC-1 Workload Generator Input Parameters" on Page 81.

Response Time Ramp Test Results File

A link to each test result file generated from each Response Time Ramp Test Run list listed below.

95% Load Level

90% Load Level

80% Load Level

50% Load Level

10% Load Level

Response Time Ramp Distribution (IOPS) Data

The five Test Runs that comprise the Response Time Ramp Phase are executed at 95%, 90%, 80%, 50%, and 10% of the Business Scaling Unit (BSU) load level used to produce the SPC-1 IOPS™ primary metric. The 100% BSU load level is included in the following Response Time Ramp data tables and graphs for completeness.

100% Load Level - 1385 BSUs	Start	Stop	Interval	Duration
Start-Up/Ramp-Up	3:13:32	3:16:33	0-2	0:03:01
Measurement Interval	3:16:33	3:26:33	3-12	0:10:00

(60 second intervals)	All ASUs	ASU-1	ASU-2	ASU-3
0	69,295.17	41,287.92	8,524.32	19,482.93
1	69,249.40	41,281.72	8,513.65	19,454.03
2	69,279.40	41,287.42	8,516.82	19,475.17
3	69,245.00	41,262.73	8,516.25	19,466.02
4	69,238.57	41,301.47	8,498.85	19,438.25
5	69,202.05	41,239.02	8,519.27	19,443.77
6	69,213.37	41,228.73	8,507.43	19,477.20
7	69,246.13	41,232.20	8,519.20	19,494.73
8	69,226.12	41,234.65	8,520.77	19,470.70
9	69,255.32	41,255.67	8,532.00	19,467.65
10	69,301.70	41,288.43	8,526.90	19,486.37
11	69,234.52	41,258.63	8,532.12	19,443.77
12	69,254.50	41,263.67	8,528.07	19,462.77
Average	69,241.73	41,256.52	8,520.09	19,465.12

95% Load Level - 1315 BSUs	Start	Stop	Interval	Duration
Start-Up/Ramp-Up	3:26:59	3:30:00	0-2	0:03:01
Measurement Interval	3:30:00	3:40:00	3-12	0:10:00

(60 second intervals)	All ASUs	ASU-1	ASU-2	ASU-3
0	65,874.08	39,238.70	8,120.70	18,514.68
1	65,717.28	39,159.00	8,089.22	18,469.07
2	65,762.73	39,195.30	8,101.83	18,465.60
3	65,743.27	39,210.42	8,079.30	18,453.55
4	65,810.13	39,188.43	8,114.07	18,507.63
5	65,690.23	39,157.47	8,084.33	18,448.43
6	65,804.18	39,234.38	8,103.20	18,466.60
7	65,704.25	39,178.33	8,083.40	18,442.52
8	65,795.68	39,215.78	8,071.07	18,508.83
9	65,754.80	39,207.38	8,090.25	18,457.17
10	65,755.32	39,197.97	8,095.15	18,462.20
11	65,724.07	39,165.97	8,086.17	18,471.93
12	65,754.63	39,216.73	8,080.95	18,456.95
Average	65,753.66	39,197.29	8,088.79	18,467.58

90% Load Level - 1246 BSUs	Start	Stop	Interval	Duration
Start-Up/Ramp-Up	3:40:25	3:43:26	0-2	0:03:01
Measurement Interval	3:43:26	3:53:26	3-12	0:10:00

(60 second intervals)	All ASUs	ASU-1	ASU-2	ASU-3
0	62,331.00	37,145.85	7,663.82	17,521.33
1	62,308.67	37,146.23	7,682.43	17,480.00
2	62,270.97	37,098.03	7,646.27	17,526.67
3	62,267.88	37,087.45	7,651.37	17,529.07
4	62,296.93	37,153.43	7,655.72	17,487.78
5	62,350.67	37,156.52	7,679.77	17,514.38
6	62,348.42	37,135.37	7,686.52	17,526.53
7	62,309.40	37,139.13	7,656.22	17,514.05
8	62,295.15	37,140.60	7,649.27	17,505.28
9	62,297.75	37,128.23	7,661.48	17,508.03
10	62,291.50	37,103.42	7,668.67	17,519.42
11	62,300.53	37,149.20	7,661.40	17,489.93
12	62,305.20	37,134.43	7,658.78	17,511.98
Average	62,306.34	37,132.78	7,662.92	17,510.65

80% Load Level - 1108 BSUs	Start	Stop	Interval	Duration
Start-Up/Ramp-Up	3:53:48	3:56:49	0-2	0:03:01
Measurement Interval	3:56:49	4:06:49	3-12	0:10:00

(60 second intervals)	All ASUs	ASU-1	ASU-2	ASU-3
0	55,388.65	33,003.37	6,819.17	15,566.12
1	55,401.00	33,002.40	6,820.72	15,577.88
2	55,373.75	33,010.82	6,813.63	15,549.30
3	55,380.37	33,013.33	6,815.88	15,551.15
4	55,427.28	33,033.93	6,803.70	15,589.65
5	55,355.83	33,002.38	6,809.50	15,543.95
6	55,389.27	33,014.97	6,807.10	15,567.20
7	55,424.53	33,003.68	6,826.97	15,593.88
8	55,389.95	33,010.52	6,814.92	15,564.52
9	55,367.63	33,002.22	6,819.68	15,545.73
10	55,352.23	33,000.03	6,787.53	15,564.67
11	55,378.58	33,009.95	6,808.68	15,559.95
12	55,389.82	33,025.63	6,812.72	15,551.47
Average	55,385.55	33,011.67	6,810.67	15,563.22

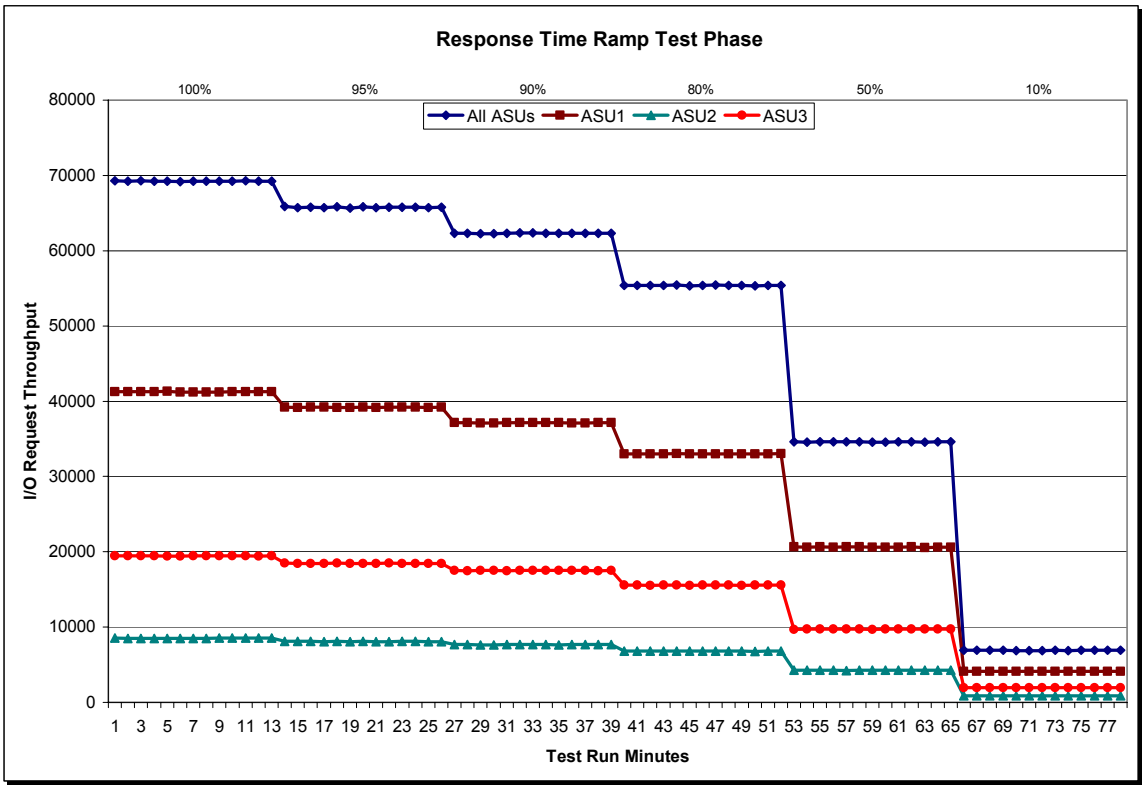
50% Load Level - 692 BSUs	Start	Stop	Interval	Duration
Start-Up/Ramp-Up	4:07:10	4:10:11	0-2	0:03:01
Measurement Interval	4:10:11	4:20:11	3-12	0:10:00

(60 second intervals)	All ASUs	ASU-1	ASU-2	ASU-3
0	34,595.08	20,646.37	4,247.47	9,701.25
1	34,582.63	20,606.08	4,262.17	9,714.38
2	34,623.97	20,637.37	4,257.28	9,729.32
3	34,599.78	20,605.22	4,251.18	9,743.38
4	34,616.17	20,643.08	4,243.72	9,729.37
5	34,607.30	20,638.47	4,253.55	9,715.28
6	34,580.48	20,626.15	4,255.83	9,698.50
7	34,586.42	20,615.22	4,254.50	9,716.70
8	34,606.05	20,613.73	4,256.40	9,735.92
9	34,624.62	20,638.17	4,262.93	9,723.52
10	34,555.93	20,578.30	4,250.23	9,727.40
11	34,608.52	20,628.22	4,259.95	9,720.35
12	34,603.23	20,611.93	4,248.65	9,742.65
Average	34,598.85	20,619.85	4,253.70	9,725.31

10% Load Level - 138 BSUs	Start	Stop	Interval	Duration
Start-Up/Ramp-Up	4:20:31	4:23:32	0-2	0:03:01
Measurement Interval	4:23:32	4:33:32	3-12	0:10:00

(60 second intervals)	All ASUs	ASU-1	ASU-2	ASU-3
0	6,911.13	4,120.53	848.12	1,942.48
1	6,904.68	4,120.20	843.33	1,941.15
2	6,901.10	4,112.98	848.45	1,939.67
3	6,907.73	4,121.57	845.48	1,940.68
4	6,895.43	4,115.35	846.63	1,933.45
5	6,887.52	4,105.87	845.40	1,936.25
6	6,891.65	4,117.02	843.17	1,931.47
7	6,905.67	4,116.67	850.62	1,938.38
8	6,891.65	4,108.88	850.28	1,932.48
9	6,910.73	4,112.57	851.88	1,946.28
10	6,901.10	4,113.73	853.90	1,933.47
11	6,915.30	4,115.37	851.85	1,948.08
12	6,897.42	4,119.98	843.63	1,933.80
Average	6,900.42	4,114.70	848.29	1,937.44

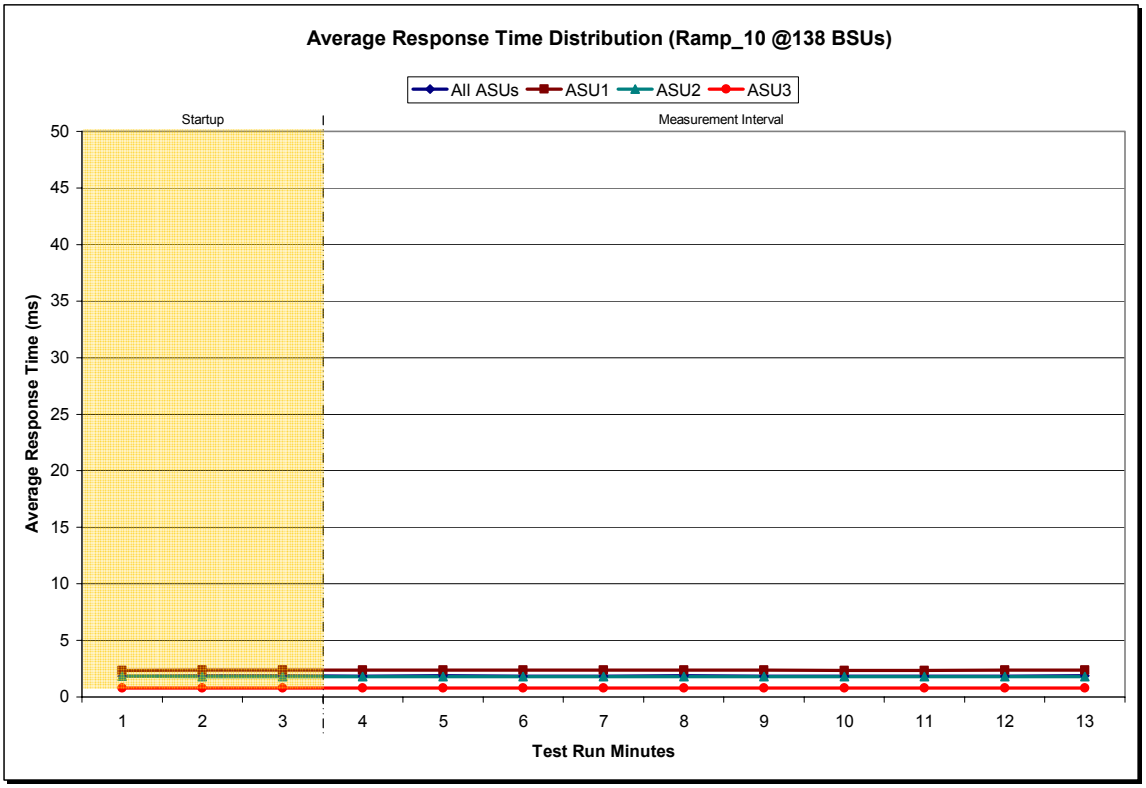
Response Time Ramp Distribution (IOPS) Graph



SPC-1 LRT™ Average Response Time (ms) Distribution Data

138 BSUs	Start	Stop	Interval	Duration
Start-Up/Ramp-Up	4:20:31	4:23:32	0-2	0:03:01
Measurement Interval	4:23:32	4:33:32	3-12	0:10:00
60 second intervals	**All ASUs**	**ASU1**	**ASU2**	**ASU3**
0	1.85	2.34	1.85	0.80
1	1.87	2.38	1.80	0.80
2	1.86	2.37	1.79	0.79
3	1.85	2.36	1.79	0.79
4	1.86	2.37	1.81	0.79
5	1.85	2.36	1.79	0.79
6	1.85	2.36	1.80	0.79
7	1.85	2.37	1.79	0.79
8	1.85	2.36	1.81	0.79
9	1.84	2.35	1.80	0.79
10	1.84	2.35	1.78	0.79
11	1.85	2.36	1.79	0.79
12	1.86	2.37	1.78	0.79
Average	1.85	2.36	1.80	0.79

SPC-1 LRT™ Average Response Time (ms) Distribution Graph



SPC-1 LRT™ (10%) – Measured Intensity Multiplier and Coefficient of Variation

	ASU1-1	ASU1-2	ASU1-3	ASU1-4	ASU2-1	ASU2-2	ASU2-3	ASU3-1
IM	*0.0350*	*0.2810*	*0.0700*	*0.2100*	*0.0180*	*0.0700*	*0.0350*	*0.2810*
MIM	0.0351	0.2813	0.0701	0.2099	0.0180	0.0699	0.0350	0.2808
COV	0.010	0.003	0.003	0.003	0.010	0.006	0.009	0.002

IM – Intensity Multiplier: *The ratio of I/Os for each I/O stream relative to the total I/Os for all I/O streams (ASU1-1 – ASU3-1) as required by the benchmark specification.*

MIM – Measured Intensity Multiplier: *The Measured Intensity Multiplier represents the ratio of measured I/Os for each I/O stream relative to the total I/Os measured for all I/O streams (ASU1-1 – ASU3-1). This value may differ from the corresponding Expected Intensity Multiplier by no more than 5%.*

COV – Coefficient of Variation: *This measure of variation for the Measured Intensity Multiplier cannot exceed 0.2.*

Repeatability Test

Clause 5.4.3

The Repeatability Test demonstrates the repeatability and reproducibility of the SPC-1 IOPS™ and SPC-1 LRT™ primary metrics generated in earlier Test Runs.

There are two identical Repeatability Test Phases. Each Test Phase contains two Test Runs. Each of the Test Runs will have a Measurement Interval of no less than ten (10) minutes. The two Test Runs in each Test Phase will be executed without interruption or any type of manual intervention.

The first Test Run in each Test Phase is executed at the 10% load point. The Average Response Time from each of the Test Runs is compared to the SPC-1 LRT™ primary metric. Each Average Response Time value must be less than the SPC-1 LRT™ primary metric plus 5%.

The second Test Run in each Test Phase is executed at the 100% load point. The I/O Request Throughput from the Test Runs is compared to the SPC-1 IOPS™ primary metric. Each I/O Request Throughput value must be greater than the SPC-1 IOPS™ primary metric minus 5%. In addition, the Average Response Time for each Test Run cannot exceed 30 milliseconds.

If any of the above constraints are not met, the benchmark measurement is invalid.

Clause 9.2.4.7.3

The following content shall appear in the FDR for each Test Run in the two Repeatability Test Phases:

1. *A table containing the results of the two Repeatability Test Phases. The content, appearance, and format of the table are specified in Table 9-11.*
2. *An I/O Request Throughput Distribution (data and graph).*
3. *An Average Response Time Distribution (data and graph).*
4. *The human readable Test Run Results File produced by the Workload Generator.*
5. *A listing or screen image of all input parameters supplied to the Workload Generator.*

SPC-1 Workload Generator Input Parameters

The SPC-1 Workload Generator input parameters for the Repeatability Test Runs documented in "Appendix E: SPC-1 Workload Generator Input Parameters" on Page 81.

Repeatability Test Results File

The values for the SPC-1 IOPS™, SPC-1 LRT™, and the Repeatability Test measurements are listed below.

	SPC-1 IOPS™	SPC-1 LRT™
Primary Metrics	*69,241.73*	*1.85*
Repeatability Test Phase 1	69,236.65	1.85
Repeatability Test Phase 2	69,263.35	1.87

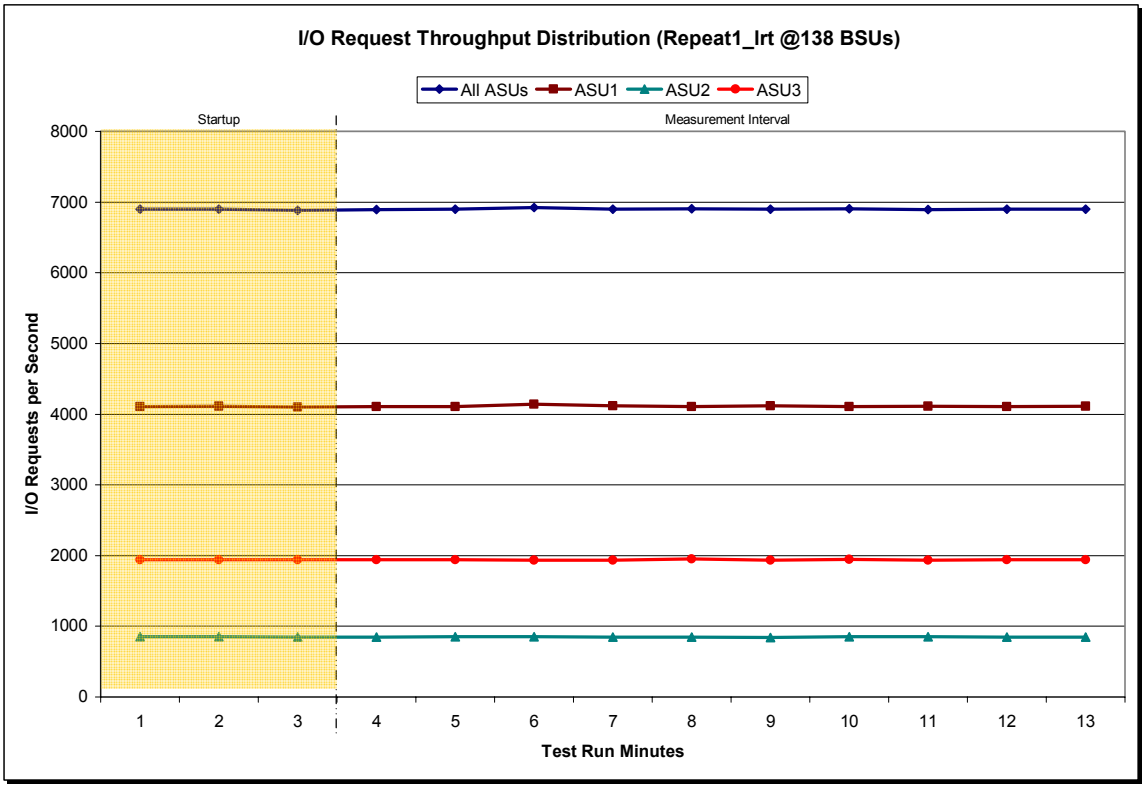
A link to the test result file generated from each Repeatability Test Run list is listed below.

Repeatability Test Phase 1, Test Run 1 (LRT)
Repeatability Test Phase 1, Test Run 2 (IOPS)
Repeatability Test Phase 2, Test Run 1 (LRT)
Repeatability Test Phase 2, Test Run 2 (IOPS)

Repeatability 1 LRT – I/O Request Throughput Distribution Data

138 BSUs	Start	Stop	Interval	Duration
Start-Up/Ramp-Up	4:34:09	4:37:09	0-2	0:03:00
Measurement Interval	4:37:09	4:47:09	3-13	0:10:00
60 second intervals	**All ASUs**	**ASU1**	**ASU2**	**ASU3**
0	6,899.15	4,109.25	850.12	1,939.78
1	6,900.50	4,111.22	850.45	1,938.83
2	6,885.27	4,098.13	846.80	1,940.33
3	6,892.52	4,106.65	846.32	1,939.55
4	6,899.98	4,107.42	850.20	1,942.37
5	6,925.37	4,138.43	850.07	1,936.87
6	6,898.50	4,115.90	844.77	1,937.83
7	6,905.63	4,106.87	848.67	1,950.10
8	6,897.60	4,116.98	842.70	1,937.92
9	6,903.85	4,106.67	850.22	1,946.97
10	6,896.97	4,110.50	851.97	1,934.50
11	6,897.45	4,108.53	849.07	1,939.85
12	6,901.43	4,114.68	847.43	1,939.32
Average	6,901.93	4,113.26	848.14	1,940.53

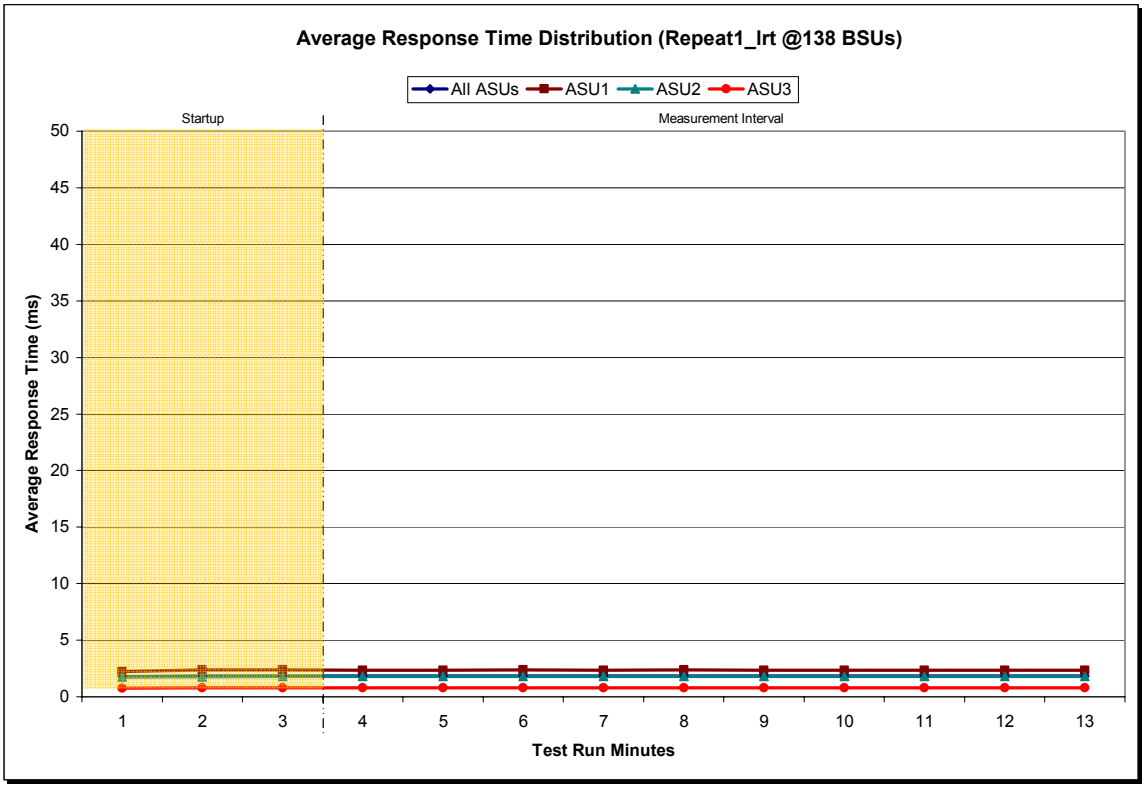
Repeatability 1 LRT – I/O Request Throughput Distribution Graph



Repeatability 1 LRT –Average Response Time (ms) Distribution Data

138 BSUs	Start	Stop	Interval	Duration
Start-Up/Ramp-Up	4:34:09	4:37:09	0-2	0:03:00
Measurement Interval	4:37:09	4:47:09	3-13	0:10:00
60 second intervals	**All ASUs**	**ASU1**	**ASU2**	**ASU3**
0	1.76	2.22	1.78	0.77
1	1.85	2.36	1.77	0.79
2	1.85	2.37	1.79	0.79
3	1.85	2.35	1.81	0.79
4	1.84	2.35	1.78	0.79
5	1.85	2.36	1.79	0.79
6	1.84	2.35	1.78	0.79
7	1.85	2.37	1.80	0.79
8	1.85	2.35	1.81	0.78
9	1.84	2.34	1.81	0.79
10	1.85	2.35	1.79	0.79
11	1.85	2.35	1.81	0.80
12	1.85	2.35	1.81	0.80
Average	1.85	2.35	1.80	0.79

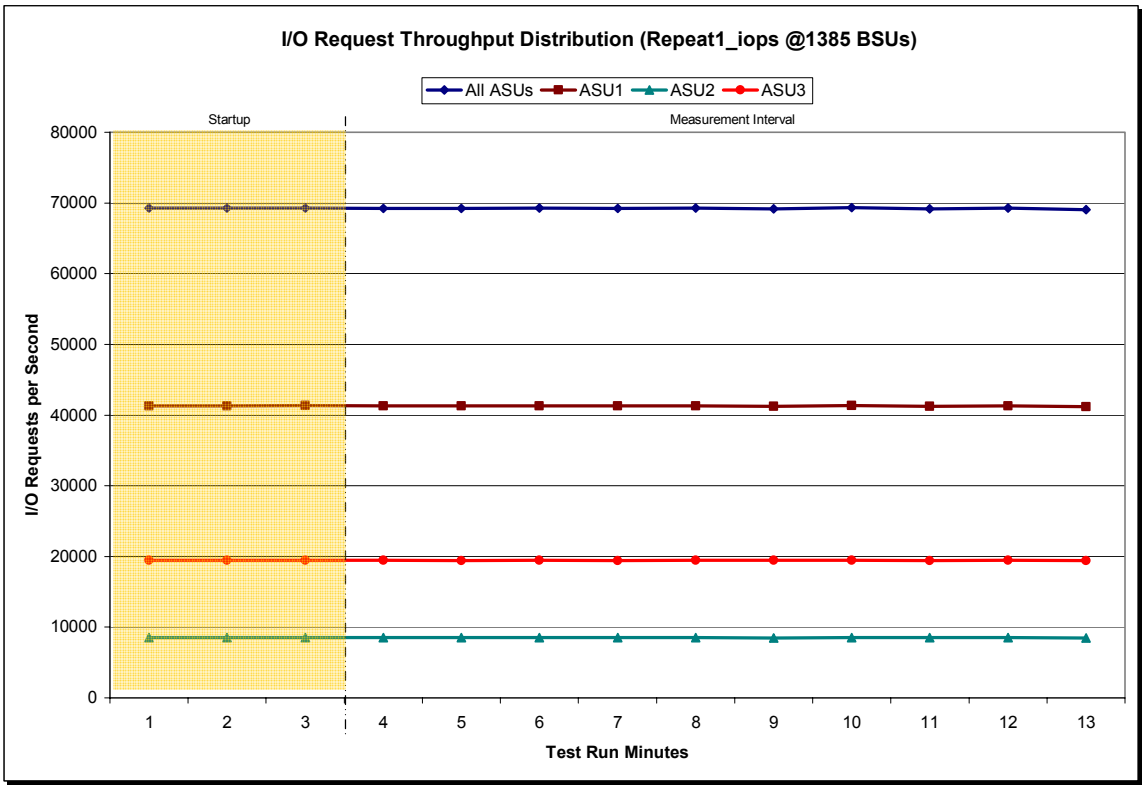
Repeatability 1 LRT –Average Response Time (ms) Distribution Graph



Repeatability 1 IOPS – I/O Request Throughput Distribution Data

1385 BSUs	Start	Stop	Interval	Duration
Start-Up/Ramp-Up	4:47:40	4:50:41	0-2	0:03:01
Measurement Interval	4:50:41	5:00:41	3-13	0:10:00
60 second intervals	**All ASUs**	**ASU1**	**ASU2**	**ASU3**
0	69,303.97	41,305.67	8,533.48	19,464.82
1	69,275.32	41,293.40	8,522.85	19,459.07
2	69,298.42	41,325.40	8,502.70	19,470.32
3	69,245.88	41,288.77	8,502.10	19,455.02
4	69,235.25	41,279.28	8,532.95	19,423.02
5	69,272.40	41,294.08	8,514.55	19,463.77
6	69,241.73	41,288.78	8,514.95	19,438.00
7	69,280.20	41,318.02	8,510.28	19,451.90
8	69,194.63	41,254.73	8,494.57	19,445.33
9	69,333.03	41,327.58	8,529.85	19,475.60
10	69,183.98	41,226.73	8,526.48	19,430.77
11	69,316.00	41,319.38	8,515.53	19,481.08
12	69,063.37	41,160.80	8,470.18	19,432.38
Average	69,236.65	41,275.82	8,511.15	19,449.69

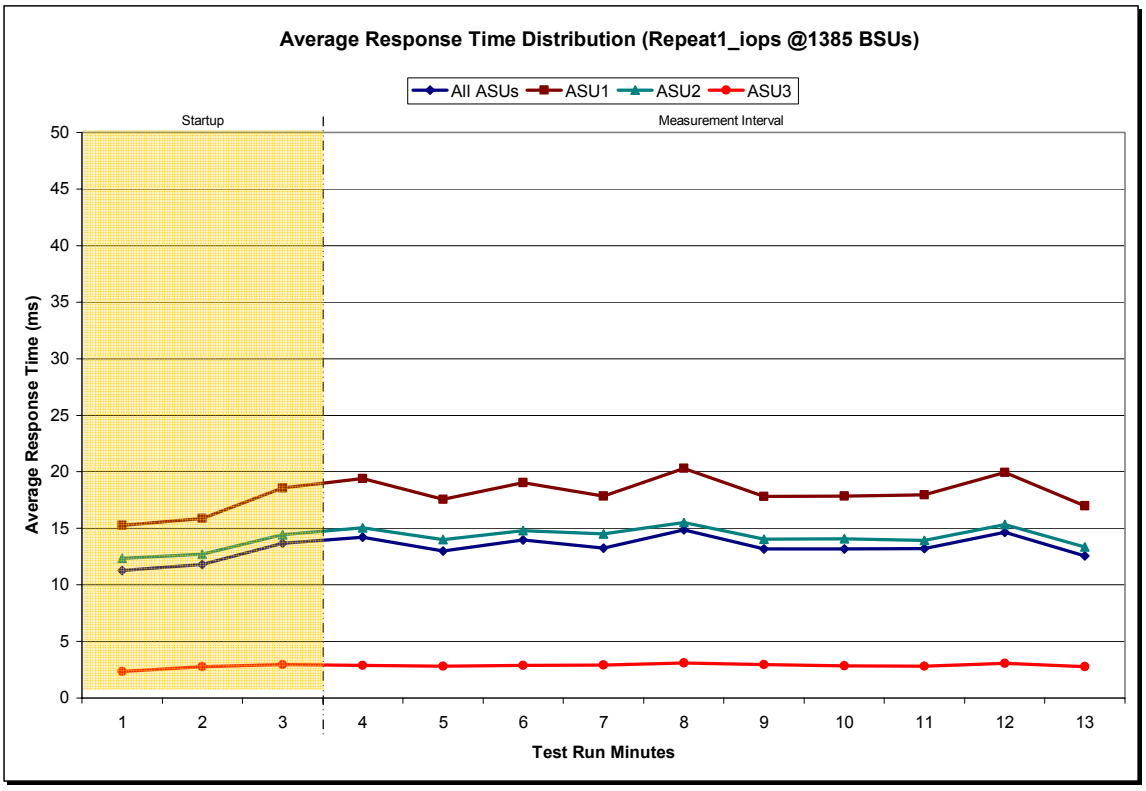
Repeatability 1 IOPS – I/O Request Throughput Distribution Graph



Repeatability 1 IOPS –Average Response Time (ms) Distribution Data

1385 BSUs	Start	Stop	Interval	Duration
Start-Up/Ramp-Up	4:47:40	4:50:41	0-2	0:03:01
Measurement Interval	4:50:41	5:00:41	3-13	0:10:00
60 second intervals	**All ASUs**	**ASU1**	**ASU2**	**ASU3**
0	11.27	15.26	12.36	2.33
1	11.80	15.87	12.70	2.75
2	13.68	18.58	14.45	2.95
3	14.23	19.42	15.04	2.88
4	12.98	17.55	14.00	2.81
5	13.98	19.04	14.81	2.88
6	13.25	17.85	14.51	2.92
7	14.88	20.30	15.50	3.09
8	13.18	17.83	14.05	2.94
9	13.16	17.84	14.09	2.83
10	13.21	17.97	13.92	2.80
11	14.64	19.95	15.35	3.06
12	12.55	16.99	13.37	2.79
Average	13.61	18.47	14.46	2.90

Repeatability 1 IOPS –Average Response Time (ms) Distribution Graph

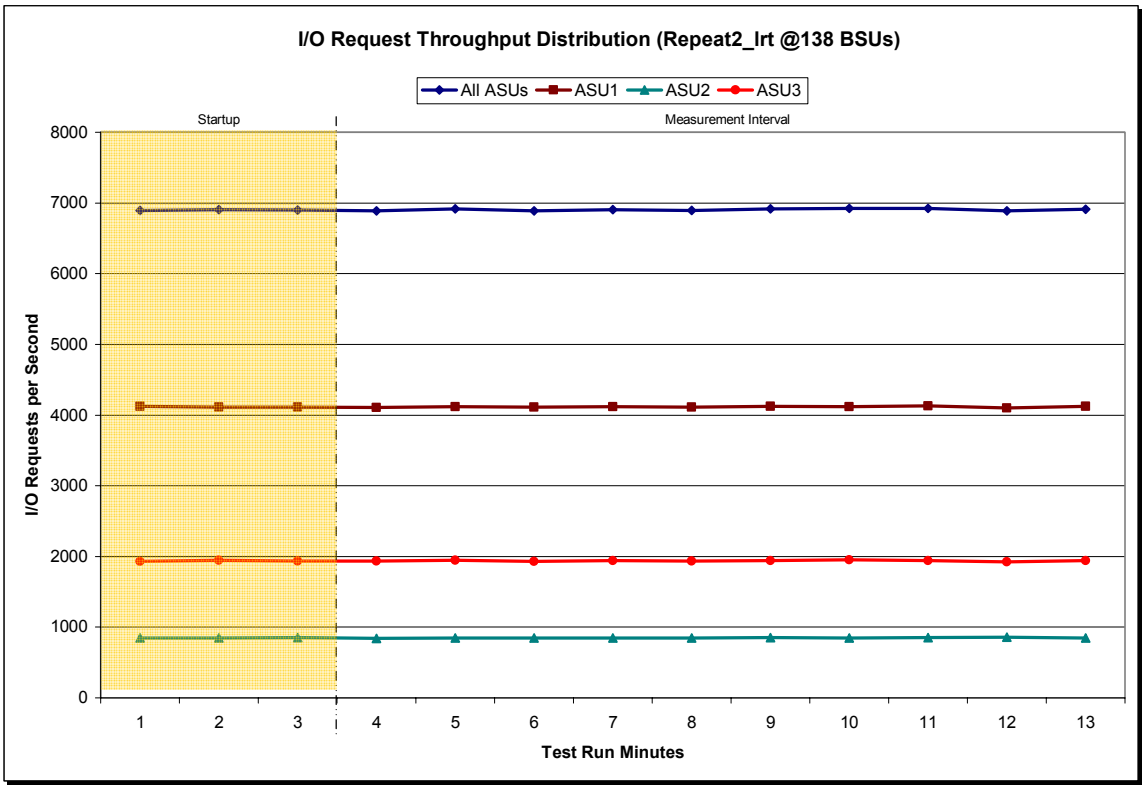


Repeatability 2 LRT – I/O Request Throughput Distribution Data

138 BSUs	Start	Stop	Interval	Duration
Start-Up/Ramp-Up	5:01:19	5:04:19	0-2	0:03:00
Measurement Interval	5:04:19	5:14:19	3-13	0:10:00

60 second intervals	All ASUs	ASU1	ASU2	ASU3
0	6,896.50	4,121.88	844.43	1,930.18
1	6,906.58	4,111.67	848.55	1,946.37
2	6,899.98	4,111.88	852.00	1,936.10
3	6,886.53	4,107.17	842.78	1,936.58
4	6,915.12	4,119.55	849.30	1,946.27
5	6,889.57	4,113.50	846.58	1,929.48
6	6,903.80	4,117.02	847.60	1,939.18
7	6,894.92	4,113.78	847.07	1,934.07
8	6,919.78	4,125.37	851.87	1,942.55
9	6,923.57	4,120.45	849.20	1,953.92
10	6,922.67	4,128.75	851.62	1,942.30
11	6,889.77	4,103.67	859.98	1,926.12
12	6,911.62	4,123.33	848.67	1,939.62
Average	6,905.73	4,117.26	849.47	1,939.01

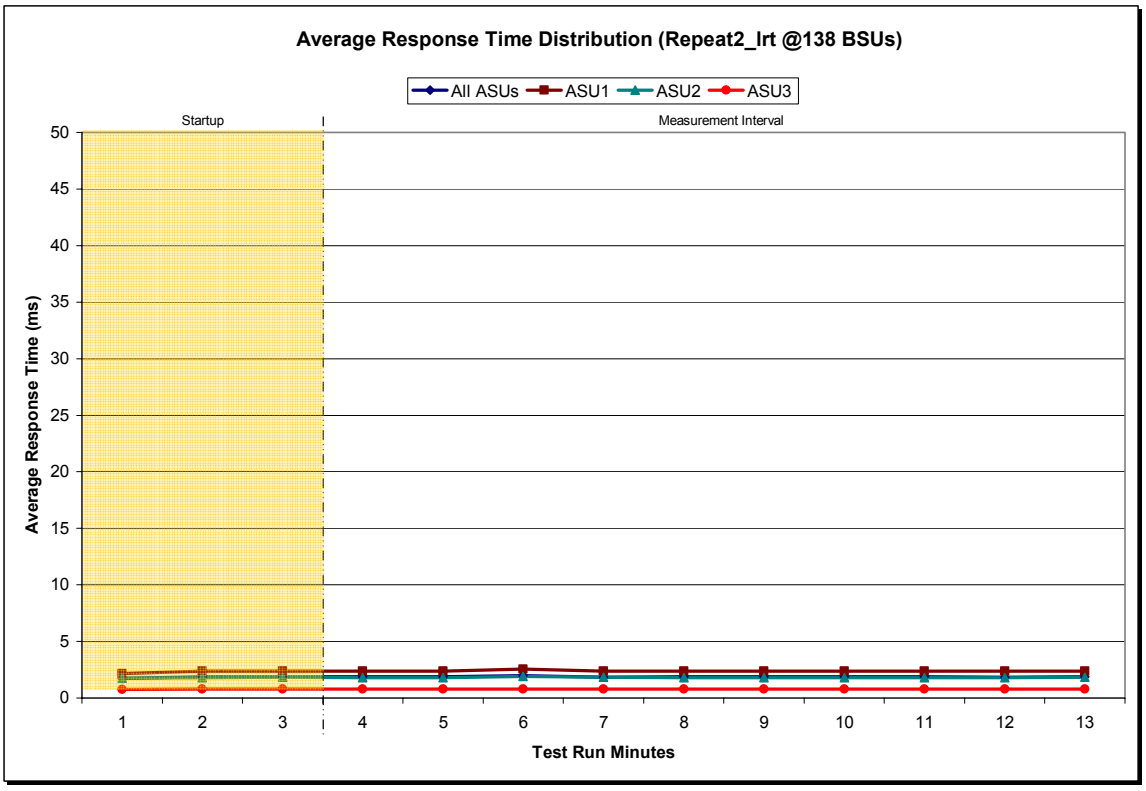
Repeatability 2 LRT – I/O Request Throughput Distribution Graph



Repeatability 2 LRT –Average Response Time (ms) Distribution Data

138 BSUs	Start	Stop	Interval	Duration
Start-Up/Ramp-Up	5:01:19	5:04:19	0-2	0:03:00
Measurement Interval	5:04:19	5:14:19	3-13	0:10:00
60 second intervals	**All ASUs**	**ASU1**	**ASU2**	**ASU3**
0	1.73	2.18	1.77	0.77
1	1.87	2.39	1.81	0.79
2	1.86	2.38	1.82	0.79
3	1.86	2.37	1.81	0.79
4	1.86	2.38	1.82	0.79
5	1.98	2.55	1.92	0.79
6	1.85	2.36	1.83	0.79
7	1.86	2.37	1.81	0.79
8	1.86	2.37	1.81	0.80
9	1.86	2.37	1.80	0.79
10	1.86	2.37	1.82	0.79
11	1.85	2.36	1.79	0.79
12	1.86	2.37	1.84	0.79
Average	1.87	2.39	1.83	0.79

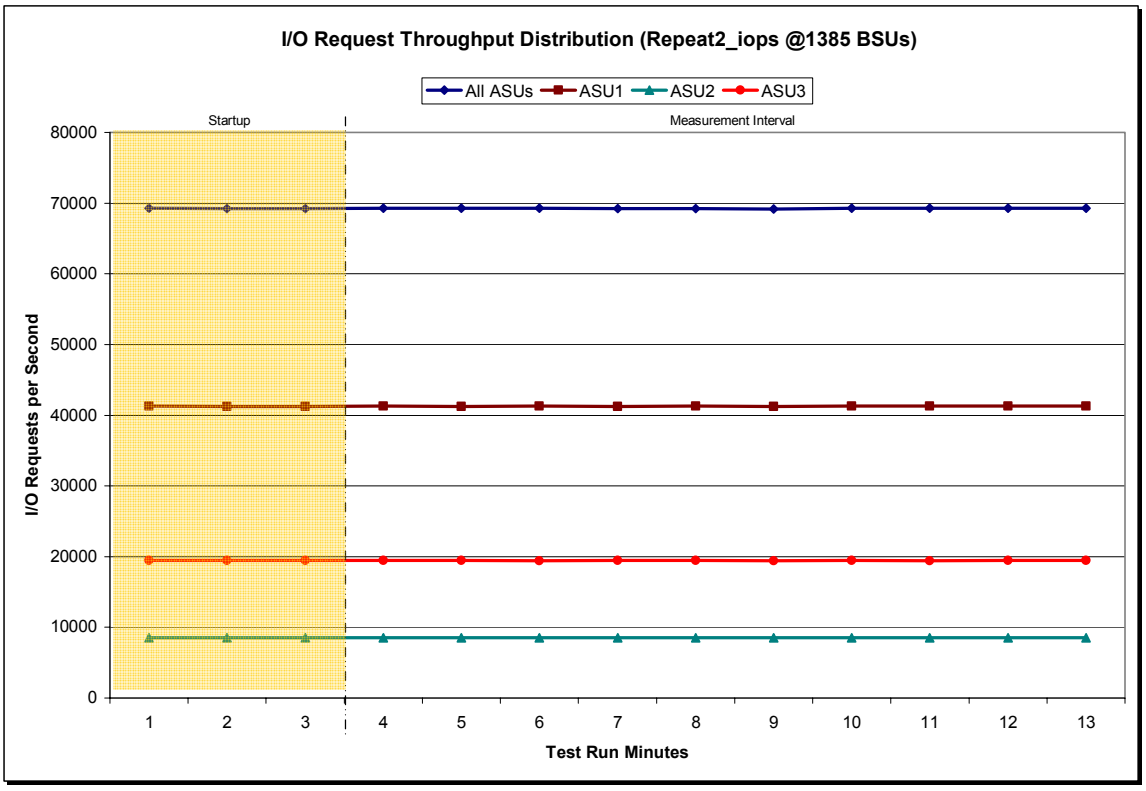
Repeatability 2 LRT –Average Response Time (ms) Distribution Graph



Repeatability 2 IOPS – I/O Request Throughput Distribution Data

1385 BSUs	Start	Stop	Interval	Duration
Start-Up/Ramp-Up	5:14:50	5:17:51	0-2	0:03:01
Measurement Interval	5:17:51	5:27:51	3-13	0:10:00
60 second intervals	**All ASUs**	**ASU1**	**ASU2**	**ASU3**
0	69,280.50	41,300.27	8,526.95	19,453.28
1	69,232.95	41,259.65	8,503.25	19,470.05
2	69,237.93	41,265.23	8,519.40	19,453.30
3	69,259.28	41,283.83	8,522.07	19,453.38
4	69,281.28	41,266.90	8,525.27	19,489.12
5	69,273.57	41,315.17	8,526.02	19,432.38
6	69,252.00	41,264.13	8,534.80	19,453.07
7	69,257.87	41,281.17	8,523.70	19,453.00
8	69,198.83	41,263.28	8,505.30	19,430.25
9	69,292.93	41,289.48	8,535.50	19,467.95
10	69,265.72	41,300.80	8,528.18	19,436.73
11	69,268.05	41,270.33	8,523.13	19,474.58
12	69,284.00	41,304.37	8,523.80	19,455.83
Average	69,263.35	41,283.95	8,524.78	19,454.63

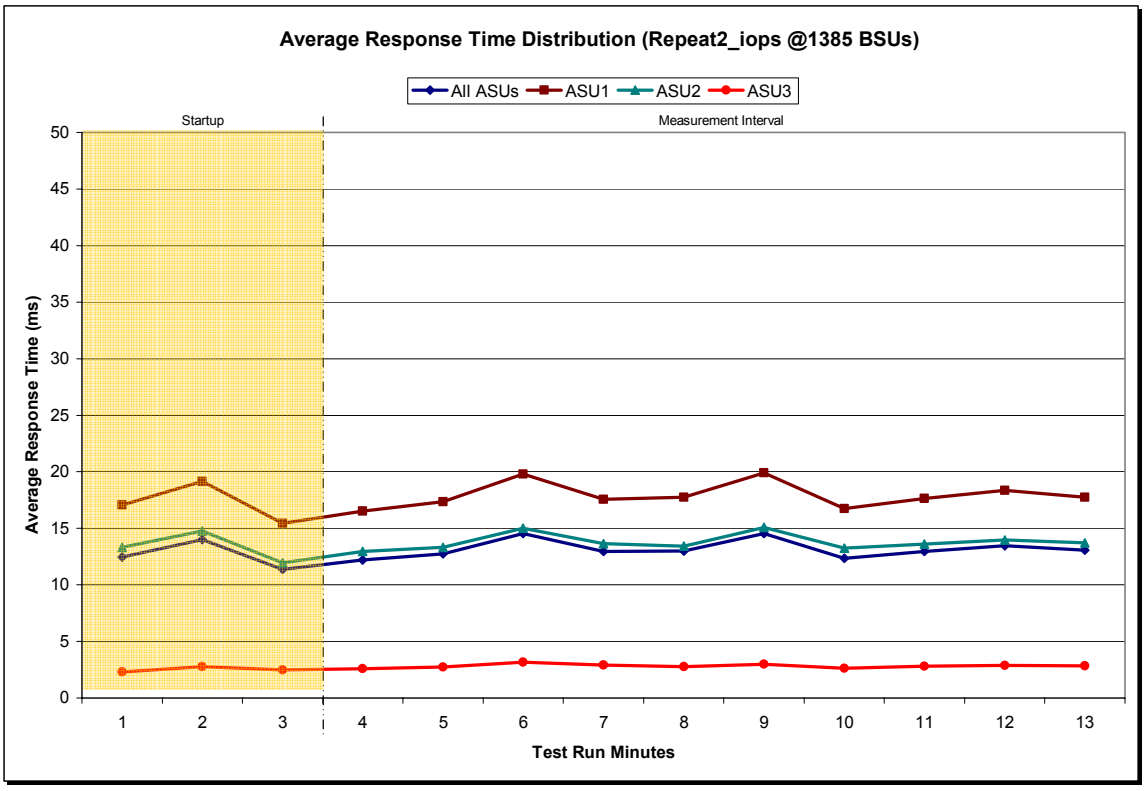
Repeatability 2 IOPS – I/O Request Throughput Distribution Graph



Repeatability 2 IOPS –Average Response Time (ms) Distribution Data

1385 BSUs	Start	Stop	Interval	Duration
Start-Up/Ramp-Up	5:14:50	5:17:51	0-2	0:03:01
Measurement Interval	5:17:51	5:27:51	3-13	0:10:00
60 second intervals	**All ASUs**	**ASU1**	**ASU2**	**ASU3**
0	12.45	17.05	13.31	2.32
1	14.00	19.14	14.76	2.79
2	11.37	15.45	11.96	2.47
3	12.19	16.54	12.95	2.61
4	12.75	17.35	13.33	2.74
5	14.56	19.81	15.02	3.18
6	12.97	17.58	13.63	2.91
7	13.00	17.73	13.44	2.77
8	14.56	19.90	15.07	2.99
9	12.34	16.73	13.26	2.64
10	12.98	17.63	13.59	2.81
11	13.47	18.36	13.96	2.89
12	13.07	17.76	13.73	2.84
Average	13.19	17.94	13.80	2.84

Repeatability 2 IOPS –Average Response Time (ms) Distribution Graph



Repeatability 1 (LRT)
Measured Intensity Multiplier and Coefficient of Variation

	ASU1-1	ASU1-2	ASU1-3	ASU1-4	ASU2-1	ASU2-2	ASU2-3	ASU3-1
IM	*0.0350*	*0.2810*	*0.0700*	*0.2100*	*0.0180*	*0.0700*	*0.0350*	*0.2810*
MIM	0.0350	0.2811	0.0699	0.2100	0.0180	0.0699	0.0350	0.2812
COV	0.008	0.002	0.009	0.004	0.007	0.005	0.012	0.003

IM – Intensity Multiplier: *The ratio of I/Os for each I/O stream relative to the total I/Os for all I/O streams (ASU1-1 – ASU3-1) as required by the benchmark specification.*

MIM – Measured Intensity Multiplier: *The Measured Intensity Multiplier represents the ratio of measured I/Os for each I/O stream relative to the total I/Os measured for all I/O streams (ASU1-1 – ASU3-1). This value may differ from the corresponding Expected Intensity Multiplier by no more than 5%.*

COV – Coefficient of Variation: *This measure of variation for the Measured Intensity Multiplier cannot exceed 0.2.*

Repeatability 1 (IOPS)
Measured Intensity Multiplier and Coefficient of Variation

	ASU1-1	ASU1-2	ASU1-3	ASU1-4	ASU2-1	ASU2-2	ASU2-3	ASU3-1
IM	*0.0350*	*0.2810*	*0.0700*	*0.2100*	*0.0180*	*0.0700*	*0.0350*	*0.2810*
MIM	0.0350	0.2811	0.0701	0.2100	0.0180	0.0700	0.0350	0.2809
COV	0.004	0.001	0.002	0.001	0.003	0.002	0.004	0.001

Repeatability 2 (LRT)
Measured Intensity Multiplier and Coefficient of Variation

	ASU1-1	ASU1-2	ASU1-3	ASU1-4	ASU2-1	ASU2-2	ASU2-3	ASU3-1
IM	*0.0350*	*0.2810*	*0.0700*	*0.2100*	*0.0180*	*0.0700*	*0.0350*	*0.2810*
MIM	0.0349	0.2812	0.0700	0.2101	0.0180	0.0699	0.0351	0.2808
COV	0.009	0.003	0.006	0.002	0.009	0.006	0.009	0.003

Repeatability 2 (IOPS)
Measured Intensity Multiplier and Coefficient of Variation

	ASU1-1	ASU1-2	ASU1-3	ASU1-4	ASU2-1	ASU2-2	ASU2-3	ASU3-1
IM	*0.0350*	*0.2810*	*0.0700*	*0.2100*	*0.0180*	*0.0700*	*0.0350*	*0.2810*
MIM	0.0351	0.2809	0.0701	0.2100	0.0180	0.0701	0.0350	0.2809
COV	0.003	0.001	0.001	0.001	0.003	0.001	0.002	0.001

Data Persistence Test

Clause 6

The Data Persistence Test demonstrates the Tested Storage Configuration (TSC):

- *Is capable of maintain data integrity across a power cycle.*
- *Ensures the transfer of data between Logical Volumes and host systems occurs without corruption or loss.*

The SPC-1 Workload Generator will write 16 block I/O requests at random over the total Addressable Storage Capacity of the TSC for ten (10) minutes at a minimum of 25% of the load used to generate the SPC-1 IOP™ primary metric. The bit pattern selected to be written to each block as well as the address of the block will be retained in a log file.

The Benchmark Configuration will be shutdown and restarted using a power off/power on cycle at the end of the above sequence of write operations. In addition, any caches employing battery backup must be flushed/emptied.

The SPC-1 Workload Generator will then use the above log file to verify each block written contains the correct bit pattern.

Clause 9.2.4.8

The following content shall appear in this section of the FDR:

1. *A listing or screen image of all input parameters supplied to the Workload Generator.*
2. *For the successful Data Persistence Test Run, able illustrating key results. The content, appearance, and format of this table are specified in Table 9-12. Information displayed in this table shall be obtained from the Test Run Results File referenced below in #3.*
3. *For the successful Data Persistence Test Run, the human readable Test Run Results File produced by the Workload Generator.*

SPC-1 Workload Generator Input Parameters

The SPC-1 Workload Generator input parameters for the Data Persistence Test are documented in "Appendix E: SPC-1 Workload Generator Input Parameters" on Page 81.

Data Persistence Test Results File

A link to each test result file generated from each Data Persistence Test is listed below.

Persistence 1 Test Results File

Persistence 2 Test Results File

Data Persistence Test Results

Data Persistence Test Results	
Data Persistence Test Run Number: 1	
Total Number of Logical Blocks Written	97,528,720
Total Number of Logical Blocks Verified	80,195,168
Total Number of Logical Blocks that Failed Verification	0
Time Duration for Writing Test Logical Blocks	10 minutes
Size in Bytes of each Logical Block	512
Number of Failed I/O Requests in the process of the Test	0

In some cases the same address was the target of multiple writes, which resulted in more Logical Blocks Written than Logical Blocks Verified. In the case of multiple writes to the same address, the pattern written and verified must be associated with the last write to that address.

PRICED STORAGE CONFIGURATION AVAILABILITY DATE

Clause 9.2.4.9

The committed delivery data for general availability (Availability Date) of all products that comprise the Priced Storage Configuration must be reported. When the Priced Storage Configuration includes products or components with different availability dates, the reported Availability Date must be the date at which all components are committed to be available.

The FDR shall state: "The Priced Storage Configuration, as documented in this Full Disclosure Report will be available for shipment to customers on MMMM DD, YYYY." Where Priced Storage Configuration is the TSC Configuration Name as described in Clause 9.2.4.3.3 and MMMM is the alphanumeric month, DD is the numeric day, and YYYY is the numeric year of the date that the Priced Storage Configuration, as documented, is available for shipment to customers as described above.

The Fujitsu Storage Systems ETERNUS6000 Model 800, as documented in this Full Disclosure Report will become available for customer purchase and shipment on May 31, 2004.

The ETERNUS6000 Model 800 is currently available, with units installed in Japan and Korea. Although the ETERNUS6000 Model 800 is not currently being actively marketed in the United States, the product is available through FCS to interested parties. The benchmark was executed using firmware that is currently under test and scheduled for general release on May 31, 2004.

PRICING INFORMATION

Clause 9.2.4.11

A statement of the respective calculations for pricing must be included.

Pricing information may found in the Tested Storage Configuration Pricing section on page 12.

ANOMALIES OR IRREGULARITIES

Clause 9.2.4.10

The FDR shall include a clear and complete description of any anomalies or irregularities encountered in the course of executing the SPC-1 benchmark that may in any way call into question the accuracy, verifiability, or authenticity of information published in this FDR.

There were no anomalies or irregularities encountered during the SPC-1 Remote Audit of the Fujitsu Storage Systems ETERNUS6000 Model 800.

APPENDIX A: OPERATING SYSTEM CONFIGURATION

The following settings were used in the Solaris "/etc/system" control file for the execution of the SPC-1 Workload Generator on the PRIMEPOWER2500.

```
*ident "@(#)system       1.18       97/06/27 SMI" /* SVR4 1.5 */
*
* SYSTEM SPECIFICATION FILE
*

* moddir:
*
*       Set the search path for modules.  This has a format similar to the
*       csh path variable. If the module isn't found in the first directory
*       it tries the second and so on. The default is /kernel /usr/kernel
*
*       Example:
*               moddir: /kernel /usr/kernel /other/modules



* root device and root filesystem configuration:
*
*       The following may be used to override the defaults provided by
*       the boot program:
*
*       rootfs:         Set the filesystem type of the root.
*
*       rootdev: Set the root device.  This should be a fully
*                       expanded physical pathname.  The default is the
*                       physical pathname of the device where the boot
*                       program resides.  The physical pathname is
*                       highly platform and configuration dependent.
*
*       Example:
*               rootfs:ufs
*               rootdev:/sbus@1,f8000000/esp@0,800000/sd@3,0:a
*
*       (Swap device configuration should be specified in /etc/vfstab.)



* exclude:
*
*       Modules appearing in the moddir path which are NOT to be loaded,
*       even if referenced. Note that `exclude' accepts either a module name,
*       or a filename which includes the directory.
*
*       Examples:
*               exclude: win
*               exclude: sys/shmsys



* forceload:
*
*       Cause these modules to be loaded at boot time, (just before mounting
*       the root filesystem) rather than at first reference. Note that
*       forceload expects a filename which includes the directory. Also
```

```
*       note that loading a module does not necessarily imply that it will
*       be installed.
*
*       Example:
*               forceload: drv/foo



* set:
*
*       Set an integer variable in the kernel or a module to a new value.
*       This facility should be used with caution.  See system(4).
*
*       Examples:
*
*       To set variables in 'unix':
*
*               set nautopush=32
*               set maxusers=40
*
*       To set a variable named 'debug' in the module named 'test_module'
*
*               set test_module:debug = 0x13


* The forceload of drv/clone is required for successful
* IP operation of EMULEX fibre channel drivers lpfc / lpfs
* and for the diagnostics (dfc) interface.
forceload: drv/clone

* Begin FJSVssf (do not edit)
set ftrace_atboot = 1
set kmem_flags = 0x100
set kmem_lite_maxalign = 8192
* End FJSVssf (do not edit)
* Begin FJSVpnl (do not edit)
forceload:      drv/FJSVpanel
* End FJSVpnl (do not edit)
forceload:      drv/se
forceload:      drv/fjmse
```

APPENDIX B: HOST BUS ADAPTER (HBA) CONFIGURATION

"sd.conf" Entries

The following entries in the "sd.conf" file were created to enable the Emulex HBAs for accessing the LUNs defined in the ETERNUS6000.

```
name="sd" parent="lpfc" target=0 lun=0;
name="sd" parent="lpfc" target=0 lun=1;
name="sd" parent="lpfc" target=0 lun=2;
name="sd" parent="lpfc" target=0 lun=3;
name="sd" parent="lpfc" target=0 lun=4;
name="sd" parent="lpfc" target=0 lun=5;
name="sd" parent="lpfc" target=0 lun=6;
name="sd" parent="lpfc" target=0 lun=7;
name="sd" parent="lpfc" target=0 lun=8;
name="sd" parent="lpfc" target=0 lun=9;
name="sd" parent="lpfc" target=0 lun=10;
name="sd" parent="lpfc" target=0 lun=11;
name="sd" parent="lpfc" target=0 lun=12;
name="sd" parent="lpfc" target=0 lun=13;
name="sd" parent="lpfc" target=0 lun=14;
name="sd" parent="lpfc" target=0 lun=15;
name="sd" parent="lpfc" target=0 lun=16;
name="sd" parent="lpfc" target=0 lun=17;
name="sd" parent="lpfc" target=0 lun=18;
name="sd" parent="lpfc" target=0 lun=19;
name="sd" parent="lpfc" target=0 lun=20;
name="sd" parent="lpfc" target=0 lun=21;
name="sd" parent="lpfc" target=0 lun=22;
name="sd" parent="lpfc" target=0 lun=23;
name="sd" parent="lpfc" target=0 lun=24;
name="sd" parent="lpfc" target=0 lun=25;
name="sd" parent="lpfc" target=0 lun=26;
name="sd" parent="lpfc" target=0 lun=27;
name="sd" parent="lpfc" target=0 lun=28;
name="sd" parent="lpfc" target=0 lun=29;
name="sd" parent="lpfc" target=0 lun=30;
name="sd" parent="lpfc" target=0 lun=31;
name="sd" parent="lpfc" target=0 lun=32;
name="sd" parent="lpfc" target=0 lun=33;
name="sd" parent="lpfc" target=0 lun=34;
name="sd" parent="lpfc" target=0 lun=35;
name="sd" parent="lpfc" target=0 lun=36;
name="sd" parent="lpfc" target=0 lun=37;
name="sd" parent="lpfc" target=0 lun=38;
name="sd" parent="lpfc" target=0 lun=39;
name="sd" parent="lpfc" target=0 lun=40;
name="sd" parent="lpfc" target=0 lun=41;
name="sd" parent="lpfc" target=0 lun=42;
name="sd" parent="lpfc" target=0 lun=43;
name="sd" parent="lpfc" target=0 lun=44;
name="sd" parent="lpfc" target=0 lun=45;
name="sd" parent="lpfc" target=0 lun=46;
name="sd" parent="lpfc" target=0 lun=47;
name="sd" parent="lpfc" target=0 lun=48;
name="sd" parent="lpfc" target=0 lun=49;
name="sd" parent="lpfc" target=0 lun=50;
name="sd" parent="lpfc" target=0 lun=51;
```

```
name="sd" parent="lpfc" target=0 lun=52;
name="sd" parent="lpfc" target=0 lun=53;
name="sd" parent="lpfc" target=0 lun=54;
name="sd" parent="lpfc" target=0 lun=55;
name="sd" parent="lpfc" target=0 lun=56;
name="sd" parent="lpfc" target=0 lun=57;
name="sd" parent="lpfc" target=0 lun=58;
name="sd" parent="lpfc" target=0 lun=59;
name="sd" parent="lpfc" target=0 lun=60;
name="sd" parent="lpfc" target=0 lun=61;
name="sd" parent="lpfc" target=0 lun=62;
name="sd" parent="lpfc" target=0 lun=63;
name="sd" parent="lpfc" target=0 lun=64;
name="sd" parent="lpfc" target=0 lun=65;
name="sd" parent="lpfc" target=0 lun=66;
name="sd" parent="lpfc" target=0 lun=67;
name="sd" parent="lpfc" target=0 lun=68;
name="sd" parent="lpfc" target=0 lun=69;
name="sd" parent="lpfc" target=0 lun=70;
name="sd" parent="lpfc" target=0 lun=71;
```

Emulex HBA Configuration Parameters

The following parameters were changed from their default values in the "lpfc.conf" file to control the operation of the Emulex Fibre Channel HBAs.

```
# If no bindings are specified above, a value of 1 will force WWNN
# binding, 2 for WWPN binding, and 3 for DID binding.
# If automap is 0, only devices with persistent bindings will be
# recognized by the system.
automap=2;

# fcp-on:  true (1) if FCP access is enabled, false (0) if not.
fcp-on=1;

# tgt-queue-depth:  the default value lpfc will use to limit
# the number of outstanding commands per FCP target.  This value is
# global, affecting each target recognized by the driver, but may be
# overridden on a per-target basis (see below). RAID arrays may want
# to be configured using the per-target tunable throttles. A value
# of 0 means don't throttle the target.
#tgt-queue-depth=0;
tgt-queue-depth=128;

# Set loop mode if you want to run as an NL_Port.
topology=4;
```

APPENDIX C: TESTED STORAGE CONFIGURATION (TSC) CREATION

The following script, "makesol", and commands were used to create the logical representation of the TSC used in the benchmark for the ETERNUS6000 Storage System.

1) makesol

This makesol script is used to create the Solaris Volume Manage (SVM) logical volumes based on a configuration description file, e6000_E11-2a-1_svmake.txt. This script is called by:

./makesol e6000_E11-2a-1_svmake.txt

2) e6000_E11-2a-1_svmake.txt

This file contains the list of the raw disks that are used to create the SVM logical volumes assigned to ASU1, ASU2, and ASU3. This script is called by the makesol script.

The detailed script contents follow:

---

makesol

```
#!/bin/ksh
# Usage: usage
#                   makesol configFile
#
LABELFILE="/tmp/makesollabel"
STATFILE="/tmp/makesolstat"
AWK=nawk
usage()
{
        echo "\nUsage: $0 configFile\n"
        exit 1
}

labelDisk()
{
         echo "l" > $LABELFILE
         echo "q" >> $LABELFILE
         format -s -f $LABELFILE $1
}

checkStat()
{
         typeset -i i=0
         del1=`grep $1 $STATFILE|$AWK '{ print $1 }'`
         if [ "$del1" != "" ] ; then
                  for del in $del1
                  do
                           i=0
                           while (( $i < $delete ))
                           do
                                    if [ ${DELETE[(($i+1))]} == $del ] ; then
```

```
                                        break
                                fi
                                i=$i+1
                        done
                        if (( $i == $delete )) ; then
                                delete=$delete+1
                                DELETE[$delete]=$del
                        fi
                done
        fi
}

getDiskSlice()
{
        vDisks=""
        for disk in ${DISKS[$1]}
        do
                ndisk=`echo $disk|$AWK 'BEGIN { FS="s"} ; { print $1 }'`
                vDisks=$vDisks$ndisk"s"$2" "
        done
}

makevol()
{
        typeset -i count=0
        typeset -i i=0
        typeset -i vcount
       tmp=`/usr/sbin/metastat -p|$AWK '{ print substr( $1, 2, length($1)-1 )}'`
        if [ "$tmp" == "" ] ; then
                i=0
        else
                for dgroup in $tmp
                do
                        if (( $dgroup > $i )) ; then
                                i=$dgroup
                        fi
                done
                i=$i+1
        fi
        while (( $count < $groups ))
        do
                count=$count+1
#echo "/usr/sbin/metainit d$i 1 ${DISK_COUNT[$count]} ${DISKS[$count]} ${STRIPE[$count]}"
                tmp=`/usr/sbin/metainit d$i 1 ${DISK_COUNT[$count]} ${DISKS[$count]} ${STRIPE[$count]}`
                i=$i+1
                if [ "${VCOUNT[$count]}" != "" ] ; then
                        vcount=1
                while (( $vcount < ${VCOUNT[$count]} ))
                        do
                                getSlice $vcount
                                getDiskSlice $count $num
                                tmp=`/usr/sbin/metainit d$i 1 ${DISK_COUNT[$count]} $vDisks
${STRIPE[$count]}`
                                i=$i+1
                                vcount=$vcount+1
                        done
                fi
        done
}

checkDisk()
{
```

```
        typeset -i i=0
        tmp=$1"s"
        test=`grep $tmp /etc/vfstab`
        if [ "$test" != "" ] ; then
                echo "Found disk $1 in /etc/vfstab, we really shouldn't use it here"
                exit 4
        fi
        while (( $i < $groups ))
        do
                i=$i+1
        for disk in ${DISKS[$i]}
        do
                        tmp=$1"s0"
                if [ "$disk" == $tmp ] ; then
                echo "disk $1 repeated at line $lineno"
                exit 4
                fi
                done
      done
      disks=$disks+1
        part=$1"s0"
        DISKS[$groups]=${DISKS[$groups]}$part" "
        tmp=`prtvtoc -h /dev/dsk/$part 2>/dev/null`
        if [ $? != 0 ] ; then
                labelDisk $part
                tmp=`prtvtoc -h /dev/dsk/$part 2>/dev/null`
                if [ $? != 0 ] ; then
                        echo "prtvtoc failed for $part"
                        exit 4
                fi
        fi
        checkStat $1"s"
}

getSlice()
{
        num=0
      case $1 in
      0)
                num=0
           ;;
      1)
           num=1
           ;;
      2|3|4|5|6)
           (( num=$1+1 ))
           ;;
      esac
}

setVtoc()
{
        typeset -i count=0
      typeset -i i=0
      while (( $i < $groups ))
      do
           i=$i+1
           for disk in ${DISKS[$i]}
           do
                        if [ "${VCOUNT[$i]}" != "" ] ; then
                                sectors=`prtvtoc /dev/dsk/$disk 2>/dev/null|grep "accessible cylinders"|$AWK '{
print $2 }'`
```

```
                                        seccyl=`prtvtoc /dev/dsk/$disk 2>/dev/null|grep "sectors/cylinder"|$AWK '{ print
$2 }'`
                                        (( sectors=$sectors-1 ))
                                fi
                        tmp=`prtvtoc -h /dev/dsk/$disk 2>/dev/null`
                        set $tmp
                        while (( $# > 5 ))
                        do
                                if (( $1 == 2 )) ; then
                                        if [ "${VCOUNT[$i]}" == "" ] ; then
                                        echo "0 4 $3 $4 $5 $6" > $LABELFILE
                                        else
                                                echo "* labelfile" > $LABELFILE
                                                (( secCount=$sectors/${VCOUNT[$i]} ))
                                                count=0
                                        (( sc=$secCount*$seccyl ))
                                        fs=$seccyl
                                                while (( $count < ${VCOUNT[$i]} ))
                                                do
                                                        (( ls=$fs+$sc ))
                                                        getSlice $count
                                                        echo "$num 4 $3 $fs $sc $ls" >> $LABELFILE
                                          count=$count+1
                                                        (( fs=$fs+$sc ))
                                                done
                                        fi
                                echo "$1 $2 $3 $4 $5 $6" >> $LABELFILE
                                tmp=`fmthard -s $LABELFILE /dev/rdsk/$disk`
                                break
                                fi
                                shift 6
                        done
                done
        done
}

delGroups()
{
        typeset -i i=0
        if [ $DELETE_ALL == "yes" ] ; then
                tmp=`/usr/sbin/metastat -p |$AWK '{ print $1 }'`
                for del in $tmp
                do
                tmp=`/usr/sbin/metaclear $del`
                if [ $? != 0 ] ; then
                echo "Failed to delete volume $del"
                exit 4
                fi
                done
                return
        fi
        while (( $i < $delete ))
        do
                i=$i+1
                tmp=`/usr/sbin/metaclear ${DELETE[$i]}`
                if [ $? != 0 ] ; then
                        echo "Failed to delete volume ${DELETE[$i]}"
                        exit 4
                fi
        done
}
```

```
addDisks()
{
        typeset -i diskNum=0
        typeset -i count=$name
        typeset -i jump=1
        diskNum=${label#*d}
        if (( $diskNum < 10 ))
        then
                diskPrefix=`echo $label|awk '{ print substr( $1, 0, length($1)-1 ) }'`
        elif (( $diskNum < 100 ))
        then
                diskPrefix=`echo $label|awk '{ print substr( $1, 0, length($1)-2 ) }'`
        else
                diskPrefix=`echo $label|awk '{ print substr( $1, 0, length($1)-3 ) }'`
        fi
        if [ "$skip" != "" ]
        then
                jump=$skip
        fi
        count=$count-1
        while [ $count != 0 ]
        do
                count=$count-1
                diskNum=$diskNum+$jump
                diskName=$diskPrefix$diskNum
                checkDisk $diskName
        done

}

checkConfig()
{
        typeset -i lineno=1
        invg="no"
          DELETE_ALL="no"
        while read -r label name skip
        do
                case $label in
                "VOLUME_GROUP:")
                        VGNAME=$VGNAME$name" "
                        invg="yes"
                        groups=$groups+1
                        getSize="yes"
                        ;;
                "#")
                        ;;
                "")
                        ;;
                 "VOLUME")
                        if [ "$invg" != "yes" ]
                        then
                                echo "invalid line in config file line=$lineno data=\"$label $name\""
                                        echo "VOLUME line must be in a volume_group definition"
                                exit 4
                        fi
                                tmp=`echo $name|grep ^[1-7]$`
                                if [ "$tmp" == "" ] ; then
                                        echo "invalid line in config file line=$lineno data=\"$label $name\""
                                        echo "VOLUME count must be from 1-7"
                                        exit 4
                                fi
                                VCOUNT[groups]=$name
```

```
                        ;;
        "STRIPE")
                if [ "$invg" != "yes" ]
                then
                        echo "invalid line in config file line=$lineno data=\"$label $name\""
                        echo "STRIPE line must be in a volume_group definition"
                        exit 4
                fi
                STRIPE[groups]="-i $name"
                ;;
                "DELETE_ALL")
                        DELETE_ALL="yes"
                        ;;
        "END")
                        DISK_COUNT[$groups]=$disks
                        disks=0
                invg="no"
                ;;
        *)
                if [ "$invg" != "yes" ]
                then
                        echo "invalid line in config file line=$lineno data=\"$label $name\""
                        exit 4
                fi
                diskName=$label
                checkDisk $diskName
                if [ "$name" != "" ]
                then
                        addDisks
                fi
        esac
        lineno=$lineno+1
    done < $CONFIG
}


# main()

    typeset -i delete=0
    typeset -i groups=0
    typeset -i disks=0
    test=`uname -a|grep "Linux"`
    if [ "$test" != "" ]
    then
        AWK=awk
    fi
     case $# in
     1)
     CONFIG=$1
     echo "Doing solvm config from $1"
     ;;
     *)
     usage
     ;;
     esac
     tmp=`/usr/sbin/metadb`
     if [ "$tmp" == "" ] ; then
                echo "No replica database is defined"
                exit 4
     fi
     tmp=`/usr/sbin/metastat -p > $STATFILE`
     checkConfig
```

```
delGroups
setVtoc
makevol
```

---

2) e6000_E11-2a-1_svmake.txt

```
DELETE_ALL
VOLUME_GROUP: asu1-1 (d0)
STRIPE 8m
VOLUME 1
c60t0d4
c61t0d4
c51t0d4
c52t0d4
c57t0d4
c47t0d4
c50t0d4
c59t0d4
c48t0d4
c55t0d4
c54t0d4
c56t0d4
c58t0d4
c49t0d4
c46t0d4
c53t0d4
c60t0d22
c61t0d22
c51t0d22
c52t0d22
c57t0d22
c47t0d22
c50t0d22
c59t0d22
c48t0d22
c55t0d22
c54t0d22
c56t0d22
c58t0d22
c49t0d22
c46t0d22
c53t0d22
c60t0d40
c61t0d40
c51t0d40
c52t0d40
c57t0d40
c47t0d40
c50t0d40
c59t0d40
c48t0d40
c55t0d40
c54t0d40
c56t0d40
c58t0d40
c49t0d40
c46t0d40
c53t0d40
c60t0d58
```

```
c61t0d58
c51t0d58
c52t0d58
c57t0d58
c47t0d58
c50t0d58
c59t0d58
END
VOLUME_GROUP: asu1-2 (d1)
STRIPE 8m
VOLUME 1
c60t0d5
c61t0d5
c51t0d5
c52t0d5
c57t0d5
c47t0d5
c50t0d5
c59t0d5
c48t0d5
c55t0d5
c54t0d5
c56t0d5
c58t0d5
c49t0d5
c46t0d5
c53t0d5
c60t0d23
c61t0d23
c51t0d23
c52t0d23
c57t0d23
c47t0d23
c50t0d23
c59t0d23
c48t0d23
c55t0d23
c54t0d23
c56t0d23
c58t0d23
c49t0d23
c46t0d23
c53t0d23
c60t0d41
c61t0d41
c51t0d41
c52t0d41
c57t0d41
c47t0d41
c50t0d41
c59t0d41
c48t0d41
c55t0d41
c54t0d41
c56t0d41
c58t0d41
c49t0d41
c46t0d41
c53t0d41
c60t0d59
c61t0d59
c51t0d59
```

```
c52t0d59
c57t0d59
c47t0d59
c50t0d59
c59t0d59
END
VOLUME_GROUP: asu1-3 (d2)
STRIPE 8m
VOLUME 1
c60t0d6
c61t0d6
c51t0d6
c52t0d6
c57t0d6
c47t0d6
c50t0d6
c59t0d6
c48t0d6
c55t0d6
c54t0d6
c56t0d6
c58t0d6
c49t0d6
c46t0d6
c53t0d6
c60t0d24
c61t0d24
c51t0d24
c52t0d24
c57t0d24
c47t0d24
c50t0d24
c59t0d24
c48t0d24
c55t0d24
c54t0d24
c56t0d24
c58t0d24
c49t0d24
c46t0d24
c53t0d24
c60t0d42
c61t0d42
c51t0d42
c52t0d42
c57t0d42
c47t0d42
c50t0d42
c59t0d42
c48t0d42
c55t0d42
c54t0d42
c56t0d42
c58t0d42
c49t0d42
c46t0d42
c53t0d42
c60t0d60
c61t0d60
c51t0d60
c52t0d60
c57t0d60
```

```
c47t0d60
c50t0d60
c59t0d60
END
VOLUME_GROUP: asu1-4 (d3)
STRIPE 8m
VOLUME 1
c60t0d7
c61t0d7
c51t0d7
c52t0d7
c57t0d7
c47t0d7
c50t0d7
c59t0d7
c48t0d7
c55t0d7
c54t0d7
c56t0d7
c58t0d7
c49t0d7
c46t0d7
c53t0d7
c60t0d25
c61t0d25
c51t0d25
c52t0d25
c57t0d25
c47t0d25
c50t0d25
c59t0d25
c48t0d25
c55t0d25
c54t0d25
c56t0d25
c58t0d25
c49t0d25
c46t0d25
c53t0d25
c60t0d43
c61t0d43
c51t0d43
c52t0d43
c57t0d43
c47t0d43
c50t0d43
c59t0d43
c48t0d43
c55t0d43
c54t0d43
c56t0d43
c58t0d43
c49t0d43
c46t0d43
c53t0d43
c60t0d61
c61t0d61
c51t0d61
c52t0d61
c57t0d61
c47t0d61
c50t0d61
```

```
c59t0d61
END
VOLUME_GROUP: asu1-5 (d4)
STRIPE 8m
VOLUME 1
c60t0d10
c61t0d10
c51t0d10
c52t0d10
c57t0d10
c47t0d10
c50t0d10
c59t0d10
c48t0d10
c55t0d10
c54t0d10
c56t0d10
c58t0d10
c49t0d10
c46t0d10
c53t0d10
c60t0d28
c61t0d28
c51t0d28
c52t0d28
c57t0d28
c47t0d28
c50t0d28
c59t0d28
c48t0d28
c55t0d28
c54t0d28
c56t0d28
c58t0d28
c49t0d28
c46t0d28
c53t0d28
c60t0d46
c61t0d46
c51t0d46
c52t0d46
c57t0d46
c47t0d46
c50t0d46
c59t0d46
c48t0d46
c55t0d46
c54t0d46
c56t0d46
c58t0d46
c49t0d46
c46t0d46
c53t0d46
c60t0d64
c61t0d64
c51t0d64
c52t0d64
c57t0d64
c47t0d64
c50t0d64
c59t0d64
END
```

```
VOLUME_GROUP: asu1-6 (d5)
STRIPE 8m
VOLUME 1
c60t0d11
c61t0d11
c51t0d11
c52t0d11
c57t0d11
c47t0d11
c50t0d11
c59t0d11
c48t0d11
c55t0d11
c54t0d11
c56t0d11
c58t0d11
c49t0d11
c46t0d11
c53t0d11
c60t0d29
c61t0d29
c51t0d29
c52t0d29
c57t0d29
c47t0d29
c50t0d29
c59t0d29
c48t0d29
c55t0d29
c54t0d29
c56t0d29
c58t0d29
c49t0d29
c46t0d29
c53t0d29
c60t0d47
c61t0d47
c51t0d47
c52t0d47
c57t0d47
c47t0d47
c50t0d47
c59t0d47
c48t0d47
c55t0d47
c54t0d47
c56t0d47
c58t0d47
c49t0d47
c46t0d47
c53t0d47
c60t0d65
c61t0d65
c51t0d65
c52t0d65
c57t0d65
c47t0d65
c50t0d65
c59t0d65
END
VOLUME_GROUP: asu1-7 (d6)
STRIPE 8m
```

```
VOLUME 1
c60t0d12
c61t0d12
c51t0d12
c52t0d12
c57t0d12
c47t0d12
c50t0d12
c59t0d12
c48t0d12
c55t0d12
c54t0d12
c56t0d12
c58t0d12
c49t0d12
c46t0d12
c53t0d12
c60t0d30
c61t0d30
c51t0d30
c52t0d30
c57t0d30
c47t0d30
c50t0d30
c59t0d30
c48t0d30
c55t0d30
c54t0d30
c56t0d30
c58t0d30
c49t0d30
c46t0d30
c53t0d30
c60t0d48
c61t0d48
c51t0d48
c52t0d48
c57t0d48
c47t0d48
c50t0d48
c59t0d48
c48t0d48
c55t0d48
c54t0d48
c56t0d48
c58t0d48
c49t0d48
c46t0d48
c53t0d48
c60t0d66
c61t0d66
c51t0d66
c52t0d66
c57t0d66
c47t0d66
c50t0d66
c59t0d66
END
VOLUME_GROUP: asu1-8 (d7)
STRIPE 8m
VOLUME 1
c60t0d13
```

```
c61t0d13
c51t0d13
c52t0d13
c57t0d13
c47t0d13
c50t0d13
c59t0d13
c48t0d13
c55t0d13
c54t0d13
c56t0d13
c58t0d13
c49t0d13
c46t0d13
c53t0d13
c60t0d31
c61t0d31
c51t0d31
c52t0d31
c57t0d31
c47t0d31
c50t0d31
c59t0d31
c48t0d31
c55t0d31
c54t0d31
c56t0d31
c58t0d31
c49t0d31
c46t0d31
c53t0d31
c60t0d49
c61t0d49
c51t0d49
c52t0d49
c57t0d49
c47t0d49
c50t0d49
c59t0d49
c48t0d49
c55t0d49
c54t0d49
c56t0d49
c58t0d49
c49t0d49
c46t0d49
c53t0d49
c60t0d67
c61t0d67
c51t0d67
c52t0d67
c57t0d67
c47t0d67
c50t0d67
c59t0d67
END
VOLUME_GROUP: asu2-1 (d8)
STRIPE 8m
VOLUME 1
c60t0d0
c61t0d0
c51t0d0
```

```
c52t0d0
c57t0d0
c47t0d0
c50t0d0
c59t0d0
c48t0d0
c55t0d0
c54t0d0
c56t0d0
c58t0d0
c49t0d0
c46t0d0
c53t0d0
c60t0d18
c61t0d18
c51t0d18
c52t0d18
c57t0d18
c47t0d18
c50t0d18
c59t0d18
c48t0d18
c55t0d18
c54t0d18
c56t0d18
c58t0d18
c49t0d18
c46t0d18
c53t0d18
c60t0d36
c61t0d36
c51t0d36
c52t0d36
c57t0d36
c47t0d36
c50t0d36
c59t0d36
c48t0d36
c55t0d36
c54t0d36
c56t0d36
c58t0d36
c49t0d36
c46t0d36
c53t0d36
c60t0d54
c61t0d54
c51t0d54
c52t0d54
c57t0d54
c47t0d54
c50t0d54
c59t0d54
END
VOLUME_GROUP: asu2-2 (d9)
STRIPE 8m
VOLUME 1
c60t0d1
c61t0d1
c51t0d1
c52t0d1
c57t0d1
```

```
c47t0d1
c50t0d1
c59t0d1
c48t0d1
c55t0d1
c54t0d1
c56t0d1
c58t0d1
c49t0d1
c46t0d1
c53t0d1
c60t0d19
c61t0d19
c51t0d19
c52t0d19
c57t0d19
c47t0d19
c50t0d19
c59t0d19
c48t0d19
c55t0d19
c54t0d19
c56t0d19
c58t0d19
c49t0d19
c46t0d19
c53t0d19
c60t0d37
c61t0d37
c51t0d37
c52t0d37
c57t0d37
c47t0d37
c50t0d37
c59t0d37
c48t0d37
c55t0d37
c54t0d37
c56t0d37
c58t0d37
c49t0d37
c46t0d37
c53t0d37
c60t0d55
c61t0d55
c51t0d55
c52t0d55
c57t0d55
c47t0d55
c50t0d55
c59t0d55
END
VOLUME_GROUP: asu2-3 (d10)
STRIPE 8m
VOLUME 1
c60t0d2
c61t0d2
c51t0d2
c52t0d2
c57t0d2
c47t0d2
c50t0d2
```

```
c59t0d2
c48t0d2
c55t0d2
c54t0d2
c56t0d2
c58t0d2
c49t0d2
c46t0d2
c53t0d2
c60t0d20
c61t0d20
c51t0d20
c52t0d20
c57t0d20
c47t0d20
c50t0d20
c59t0d20
c48t0d20
c55t0d20
c54t0d20
c56t0d20
c58t0d20
c49t0d20
c46t0d20
c53t0d20
c60t0d38
c61t0d38
c51t0d38
c52t0d38
c57t0d38
c47t0d38
c50t0d38
c59t0d38
c48t0d38
c55t0d38
c54t0d38
c56t0d38
c58t0d38
c49t0d38
c46t0d38
c53t0d38
c60t0d56
c61t0d56
c51t0d56
c52t0d56
c57t0d56
c47t0d56
c50t0d56
c59t0d56
END
VOLUME_GROUP: asu2-4 (d11)
STRIPE 8m
VOLUME 1
c60t0d3
c61t0d3
c51t0d3
c52t0d3
c57t0d3
c47t0d3
c50t0d3
c59t0d3
c48t0d3
```

```
c55t0d3
c54t0d3
c56t0d3
c58t0d3
c49t0d3
c46t0d3
c53t0d3
c60t0d21
c61t0d21
c51t0d21
c52t0d21
c57t0d21
c47t0d21
c50t0d21
c59t0d21
c48t0d21
c55t0d21
c54t0d21
c56t0d21
c58t0d21
c49t0d21
c46t0d21
c53t0d21
c60t0d39
c61t0d39
c51t0d39
c52t0d39
c57t0d39
c47t0d39
c50t0d39
c59t0d39
c48t0d39
c55t0d39
c54t0d39
c56t0d39
c58t0d39
c49t0d39
c46t0d39
c53t0d39
c60t0d57
c61t0d57
c51t0d57
c52t0d57
c57t0d57
c47t0d57
c50t0d57
c59t0d57
END
VOLUME_GROUP: asu2-5 (d12)
STRIPE 8m
VOLUME 1
c60t0d14
c61t0d14
c51t0d14
c52t0d14
c57t0d14
c47t0d14
c50t0d14
c59t0d14
c48t0d14
c55t0d14
c54t0d14
```

```
c56t0d14
c58t0d14
c49t0d14
c46t0d14
c53t0d14
c60t0d32
c61t0d32
c51t0d32
c52t0d32
c57t0d32
c47t0d32
c50t0d32
c59t0d32
c48t0d32
c55t0d32
c54t0d32
c56t0d32
c58t0d32
c49t0d32
c46t0d32
c53t0d32
c60t0d50
c61t0d50
c51t0d50
c52t0d50
c57t0d50
c47t0d50
c50t0d50
c59t0d50
c48t0d50
c55t0d50
c54t0d50
c56t0d50
c58t0d50
c49t0d50
c46t0d50
c53t0d50
c60t0d68
c61t0d68
c51t0d68
c52t0d68
c57t0d68
c47t0d68
c50t0d68
c59t0d68
END
VOLUME_GROUP: asu2-6 (d13)
STRIPE 8m
VOLUME 1
c60t0d15
c61t0d15
c51t0d15
c52t0d15
c57t0d15
c47t0d15
c50t0d15
c59t0d15
c48t0d15
c55t0d15
c54t0d15
c56t0d15
c58t0d15
```

c49t0d15
c46t0d15
c53t0d15
c60t0d33
c61t0d33
c51t0d33
c52t0d33
c57t0d33
c47t0d33
c50t0d33
c59t0d33
c48t0d33
c55t0d33
c54t0d33
c56t0d33
c58t0d33
c49t0d33
c46t0d33
c53t0d33
c60t0d51
c61t0d51
c51t0d51
c52t0d51
c57t0d51
c47t0d51
c50t0d51
c59t0d51
c48t0d51
c55t0d51
c54t0d51
c56t0d51
c58t0d51
c49t0d51
c46t0d51
c53t0d51
c60t0d69
c61t0d69
c51t0d69
c52t0d69
c57t0d69
c47t0d69
c50t0d69
c59t0d69
END
VOLUME_GROUP: asu2-7 (d14)
STRIPE 8m
VOLUME 1
c60t0d16
c61t0d16
c51t0d16
c52t0d16
c57t0d16
c47t0d16
c50t0d16
c59t0d16
c48t0d16
c55t0d16
c54t0d16
c56t0d16
c58t0d16
c49t0d16
c46t0d16

```
c53t0d16
c60t0d34
c61t0d34
c51t0d34
c52t0d34
c57t0d34
c47t0d34
c50t0d34
c59t0d34
c48t0d34
c55t0d34
c54t0d34
c56t0d34
c58t0d34
c49t0d34
c46t0d34
c53t0d34
c60t0d52
c61t0d52
c51t0d52
c52t0d52
c57t0d52
c47t0d52
c50t0d52
c59t0d52
c48t0d52
c55t0d52
c54t0d52
c56t0d52
c58t0d52
c49t0d52
c46t0d52
c53t0d52
c60t0d70
c61t0d70
c51t0d70
c52t0d70
c57t0d70
c47t0d70
c50t0d70
c59t0d70
END
VOLUME_GROUP: asu2-8 (d15)
STRIPE 8m
VOLUME 1
c60t0d17
c61t0d17
c51t0d17
c52t0d17
c57t0d17
c47t0d17
c50t0d17
c59t0d17
c48t0d17
c55t0d17
c54t0d17
c56t0d17
c58t0d17
c49t0d17
c46t0d17
c53t0d17
c60t0d35
```

```
c61t0d35
c51t0d35
c52t0d35
c57t0d35
c47t0d35
c50t0d35
c59t0d35
c48t0d35
c55t0d35
c54t0d35
c56t0d35
c58t0d35
c49t0d35
c46t0d35
c53t0d35
c60t0d53
c61t0d53
c51t0d53
c52t0d53
c57t0d53
c47t0d53
c50t0d53
c59t0d53
c48t0d53
c55t0d53
c54t0d53
c56t0d53
c58t0d53
c49t0d53
c46t0d53
c53t0d53
c60t0d71
c61t0d71
c51t0d71
c52t0d71
c57t0d71
c47t0d71
c50t0d71
c59t0d71
END
VOLUME_GROUP: asu3-1 (d16)
STRIPE 8m
VOLUME 1
c60t0d8
c61t0d8
c51t0d8
c52t0d8
c57t0d8
c47t0d8
c50t0d8
c59t0d8
c48t0d8
c55t0d8
c54t0d8
c56t0d8
c58t0d8
c49t0d8
c46t0d8
c53t0d8
c60t0d26
c61t0d26
c51t0d26
```

```
c52t0d26
c57t0d26
c47t0d26
c50t0d26
c59t0d26
c48t0d26
c55t0d26
c54t0d26
c56t0d26
c58t0d26
c49t0d26
c46t0d26
c53t0d26
c60t0d44
c61t0d44
c51t0d44
c52t0d44
c57t0d44
c47t0d44
c50t0d44
c59t0d44
c48t0d44
c55t0d44
c54t0d44
c56t0d44
c58t0d44
c49t0d44
c46t0d44
c53t0d44
c60t0d62
c61t0d62
c51t0d62
c52t0d62
c57t0d62
c47t0d62
c50t0d62
c59t0d62
END
VOLUME_GROUP: asu3-2 (d17)
STRIPE 8m
VOLUME 1
c60t0d9
c61t0d9
c51t0d9
c52t0d9
c57t0d9
c47t0d9
c50t0d9
c59t0d9
c48t0d9
c55t0d9
c54t0d9
c56t0d9
c58t0d9
c49t0d9
c46t0d9
c53t0d9
c60t0d27
c61t0d27
c51t0d27
c52t0d27
c57t0d27
```

```
c47t0d27
c50t0d27
c59t0d27
c48t0d27
c55t0d27
c54t0d27
c56t0d27
c58t0d27
c49t0d27
c46t0d27
c53t0d27
c60t0d45
c61t0d45
c51t0d45
c52t0d45
c57t0d45
c47t0d45
c50t0d45
c59t0d45
c48t0d45
c55t0d45
c54t0d45
c56t0d45
c58t0d45
c49t0d45
c46t0d45
c53t0d45
c60t0d63
c61t0d63
c51t0d63
c52t0d63
c57t0d63
c47t0d63
c50t0d63
c59t0d63
END
```

APPENDIX D: SPC-1 WORKLOAD GENERATOR STORAGE PARAMETERS

```
sd=asu1_1,lun=/dev/md/rdsk/d0,size=417.37g
sd=asu1_2,lun=/dev/md/rdsk/d1,size=417.37g
sd=asu1_3,lun=/dev/md/rdsk/d2,size=417.37g
sd=asu1_4,lun=/dev/md/rdsk/d3,size=417.37g
sd=asu1_5,lun=/dev/md/rdsk/d4,size=417.37g
sd=asu1_6,lun=/dev/md/rdsk/d5,size=417.37g
sd=asu1_7,lun=/dev/md/rdsk/d6,size=417.37g
sd=asu1_8,lun=/dev/md/rdsk/d7,size=417.37g
sd=asu2_1,lun=/dev/md/rdsk/d8,size=417.37g
sd=asu2_2,lun=/dev/md/rdsk/d9,size=417.37g
sd=asu2_3,lun=/dev/md/rdsk/d10,size=417.37g
sd=asu2_4,lun=/dev/md/rdsk/d11,size=417.37g
sd=asu2_5,lun=/dev/md/rdsk/d12,size=417.37g
sd=asu2_6,lun=/dev/md/rdsk/d13,size=417.37g
sd=asu2_7,lun=/dev/md/rdsk/d14,size=417.37g
sd=asu2_8,lun=/dev/md/rdsk/d15,size=417.37g
sd=asu3_1,lun=/dev/md/rdsk/d16,size=371g
sd=asu3_2,lun=/dev/md/rdsk/d17,size=371g
```

APPENDIX E: SPC-1 WORKLOAD GENERATOR INPUT PARAMETERS

Commands executed from the Command Line Interface:

```
java -Xmx512m persist1 -b 1385

java -Xmx512m persist2

./run_fdr.sh e6000_M800_E10-2a-1_022104_FDR 1385
```

The content of the "run_fdr.sh" script is:

```
#!/usr/bin/sh
#
# run_fdr

case $# in
0) echo "Usage: $0 CONFIG BSU " 1>&2; exit 2 ;;
1) echo "Usage: $0 CONFIG BSU " 1>&2; exit 2 ;;
esac

CONFIG=$1
BSU=$2

echo "`date +%Y.%m.%d:%H:%M:%S` > SPC FDR TEST FOR CONFIG=$CONFIG BSU=$BSU STARTED" >>
run_fdr.txt

echo "`date +%Y.%m.%d:%H:%M:%S` > METRICS TEST FOR CONFIG=$CONFIG BSU=$BSU STARTED" >>
run_fdr.txt
echo "`date +%Y.%m.%d:%H:%M:%S` > METRICS TEST FOR CONFIG=$CONFIG BSU=$BSU STARTED"

java -Xms512m -Xmx1024m -Xoptimize metrics -b $BSU

echo "`date +%Y.%m.%d:%H:%M:%S` > REPEAT1 TEST FOR CONFIG=$CONFIG BSU=$BSU STARTED" >>
run_fdr.txt
echo "`date +%Y.%m.%d:%H:%M:%S` > REPEAT1 TEST FOR CONFIG=$CONFIG BSU=$BSU STARTED"

java -Xms512m -Xmx1024m -Xoptimize repeat1 -b $BSU

echo "`date +%Y.%m.%d:%H:%M:%S` > REPEAT2 TEST FOR CONFIG=$CONFIG BSU=$BSU STARTED" >>
run_fdr.txt
echo "`date +%Y.%m.%d:%H:%M:%S` > REPEAT2 TEST FOR CONFIG=$CONFIG BSU=$BSU STARTED"

java -Xms512m -Xmx1024m -Xoptimize repeat2 -b $BSU

echo "`date +%Y.%m.%d:%H:%M:%S` > SPC FDR TEST FOR CONFIG=$CONFIG BSU=$BSU ENDED   " >>
run_fdr.txt
echo "`date +%Y.%m.%d:%H:%M:%S` > SPC FDR TEST FOR CONFIG=$CONFIG BSU=$BSU ENDED  "
```