SPC BENCHMARK 2™

FULL DISCLOSURE REPORT

IBM CORPORATION
IBM SYSTEM STORAGE DS8700

SPC-2™ V1.3

Submitted for Review: November 30, 2009
Submission Identifier: B00049

First Edition – November 2009

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AUDIT CERTIFICATION

Bruce McNutt
IBM Corporation
650 Harry Road
San Jose, CA 95120

November 27, 2009

The SPC Benchmark 2™ results listed below for the IBM System Storage DS8700 produced in compliance with the SPC Benchmark 2™ V1.3 Remote Audit requirements.

SPC Benchmark 2™ V1.3 Results	
Tested Storage Product (TSP) Name:	
IBM System Storage DS8700	
Metric	**Reported Result**
SPC-2 MBPS™	7,247.02
SPC-2 Price-Performance	$277.22/SPC-2 MBPS™
ASU Capacity	32,641.751 GB
Data Protection Level	Protected (RAID-5)
Total Price (including three-year maintenance)	$2,009,007

The following SPC Benchmark 2™ Remote Audit requirements were reviewed and found compliant with V1.3 of the SPC Benchmark 2™ specification:

- A Letter of Good Faith, signed by a senior executive.

- The following Data Repository storage items were verified by documentation supplied by IBM Corporation:
    - ✓ Physical Storage Capacity and related requirements.
    - ✓ Configured Storage Capacity and related requirements.
    - ✓ Addressable Storage Capacity and related requirements.
    - ✓ Capacity of each Logical Volume and related requirements.
    - ✓ Capacity of the Application Storage Unit (ASU) and related requirements.

- An appropriate diagram of the Benchmark Configuration (BC)/Tested Storage Configuration (TSC).

- Listings and commands used to create and configure the Benchmark Configuration/Tested Storage Configuration.

- Documentation of each customer tunable parameter or option that was changed from its default value.

Storage Performance Council
643 Bair Island Road, Suite 103
Redwood City, CA 94062
AuditService@StoragePerformance.org
650.556.9384

AUDIT CERTIFICATION *(CONT.)*
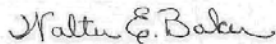
- The following Host System items were verified by documentation supplied by IBM Corporation:
  - ✓ Required Host System configuration information.
  - ✓ The TSC boundary within each Host System.

- The following SPC-2 Workload Generator information was verified by documentation supplied by IBM Corporation:
  - ✓ The presence and version number of the Workload Generator on each Host System.
  - ✓ Commands and parameters used to configure the SPC-2 Workload Generator.

- The Test Results Files and resultant Summary Results Files received for each of the following were authentic, accurate, and compliant with all of the requirements and constraints of Clauses 5 and 6 of the SPC-2 Benchmark Specification:
  - ✓ Data Persistence Test
  - ✓ Large File Processing Test
  - ✓ Large Database Query Test
  - ✓ Video on Demand Delivery Test

- There were no differences between the Tested Storage Configuration (TSC) used for the benchmark and Priced Storage Configuration.

- The submitted pricing information met all of the requirements and constraints of Clause 9 of the SPC-2 Benchmark Specification.

- The Full Disclosure Report (FDR) met all of the requirements in Clause 10 of the SPC-2 Benchmark Specification.

- This successfully audited SPC measurement is not subject to an SPC Confidential Review.

Audit Notes:

There were no audit notes or exceptions.

Respectfully,

Walter E. Baker

Walter E. Baker
SPC Auditor

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LETTER OF GOOD FAITH

IBM

Vice President and Disk Storage Business Line Executive

IBM Technology & Systems Group
3039 Cornwallis Road,
Research Triangle Park, NC 27709

Phone 1-919-543-5345
Fax: 1-919-543-2856

November 20, 2009

Mr. Walter E. Baker, SPC Auditor
Gradient Systems, Inc.
643 Bair Island Road, Suite 103
Redwood City, CA 94063

Subject: SPC-2 Letter of Good Faith for the IBM System Storage DS8700.

IBM Corporation is the SPC-2 Test Sponsor for the above listed product. To the best of
our knowledge and belief, the required SPC-2 benchmark results and materials we have
submitted for that product are complete, accurate, and in full compliance with Version
1.2.1 of the SPC-2 benchmark specification.

Our disclosure of the Benchmark configuration and execution of the benchmark includes
all items that, to the best of our knowledge and belief, materially affect the reported
results, regardless of whether such items are explicitly required to be disclosed by the
SPC-2 benchmark specification.

Sincerely,

Doug Balog

EXECUTIVE SUMMARY

Test Sponsor and Contact Information

Test Sponsor and Contact Information	
Test Sponsor Primary Contact	IBM Corporation – http://www.ibm.com Bruce McNutt – bmcnutt@us.ibm.com 650 Harry Road San Jose, CA 9120 Phone: (408) 927-2717 FAX: (408) 927-2050
Test Sponsor Alternate Contact	IBM Corporation – http://www.ibm.com Joe Hyde – joehyde@us.ibm.com KBV/9042-2 9000 South Rita Road Tucson, AZ 85744 Phone: (520) 799-4026 FAX: (520) 799-5550
Auditor	Storage Performance Council – http://www.storageperformance.org Walter E. Baker – AuditService@StoragePerformance.org 643 Bair Island Road, Suite 103 Redwood City, CA 94063 Phone: (650) 556-9384 FAX: (650) 556-9385

Revision Information and Key Dates

Revision Information and Key Dates	
SPC-2 Specification revision number	V1.3
SPC-2 Workload Generator revision number	V1.0
Date Results were first used publicly	November 30, 2009
Date FDR was submitted to the SPC	November 30, 2009
Date the TSC will be available for shipment to customers	currently available
Date the TSC completed audit certification	November 27, 2009

Tested Storage Product (TSP) Description

The IBM System Storage DS8000™ series encompasses the flagship disk enterprise storage products in the IBM System Storage portfolio. The DS8700 represents the latest in this series of enterprise disk storage systems designed for high-performance, high-capacity and resiliency. Major new capabilities include IBM POWER6 Processing technology and PCI-e I/O enclosures. This submission features the performance accelerator configuration option, which supports getting high I/O throughputs when deploying a limited number of disk drives.

SPC-2 Reported Data

SPC-2 Reported Data consists of three groups of information:

- The following SPC-2 Primary Metrics, which characterize the overall benchmark result:
  - SPC-2 MBPS™
  - SPC-2 Price Performance
  - Application Storage Unit (ASU) Capacity

- Supplemental data to the SPC-2 Primary Metrics.
  - Total Price
  - Data Protection Level

- Reported Data for each SPC Test: Large File Processing (LFP), Large Database Query (LDQ), and Video on Demand Delivery (VOD) Test.

SPC-2 Reported Data				
IBM System Storage DS8700				
SPC-2 MBPS™	**SPC-2 Price-Performance**	**ASU Capacity (GB)**	**Total Price**	**Data Protection Level**
7,247.02	$277.22	32,641.751	$2,009,007	RAID-5
The above SPC-2 MBPS™ value represents the aggregate data rate of all three SPC-2 workloads: Large File Processing (LFP), Large Database Query (LDQ), and Video On Demand (VOD)				
SPC-2 Large File Processing (LFP) Reported Data				
	Data Rate (MB/second)	**Number of Streams**	**Data Rate per Stream**	**Price-Performance**
LFP Composite	6,597.09			$304.53
Write Only:				
1024 KiB Transfer	4,317.47	192	22.49	
256 KiB Transfer	4,344.85	192	22.63	
Read-Write:				
1024 KiB Transfer	6,142.37	192	31.99	
256 KiB Transfer	6,134.44	192	31.95	
Read Only:				
1024 KiB Transfer	9,321.63	192	48.55	
256 KiB Transfer	9,321.80	192	48.55	
The above SPC-2 Data Rate value for LFP Composite represents the aggregate performance of all three LFP Test Phases: (Write Only, Read-Write, and Read Only).				
SPC-2 Large Database Query (LDQ) Reported Data				
	Data Rate (MB/second)	**Number of Streams**	**Data Rate per Stream**	**Price-Performance**
LDQ Composite	8,538.00			$235.30
1024 KiB Transfer Size				
4 I/Os Outstanding	8,735.95	192	45.50	
1 I/O Outstanding	8,968.88	192	46.71	
64 KiB Transfer Size				
4 I/Os Outstanding	8,035.59	192	41.85	
1 I/O Outstanding	8,411.57	192	43.81	
The above SPC-2 Data Rate value for LDQ Composite represents the aggregate performance of the two LDQ Test Phases: (1024 KiB and 64 KiB Transfer Sizes).				
SPC-2 Video On Demand (VOD) Reported Data				
	Data Rate (MB/second)	**Number of Streams**	**Data Rate per Stream**	**Price-Performance**
	6,605.98	8,400	0.79	$304.12

SPC-2 MBPS™ represents the aggregate data rate, in megabytes per second, of all three SPC-2 workloads: Large File Processing (LFP), Large Database Query (LDQ), and Video on Demand (VOD).

ASU (Application Storage Unit) **Capacity** represents the total storage capacity read and written in the course of executing the SPC-2 benchmark.

A **Data Protection Level** of **Protected** using *RAID-5* provides data protection by distributing check data corresponding to user data across multiple disks in the form of bit-by-bit parity.

Storage Capacities and Relationships

The following diagram *(not to scale)* and table document the various storage capacities, used in this benchmark, and their relationships, as well as the storage utilization values required to be reported.
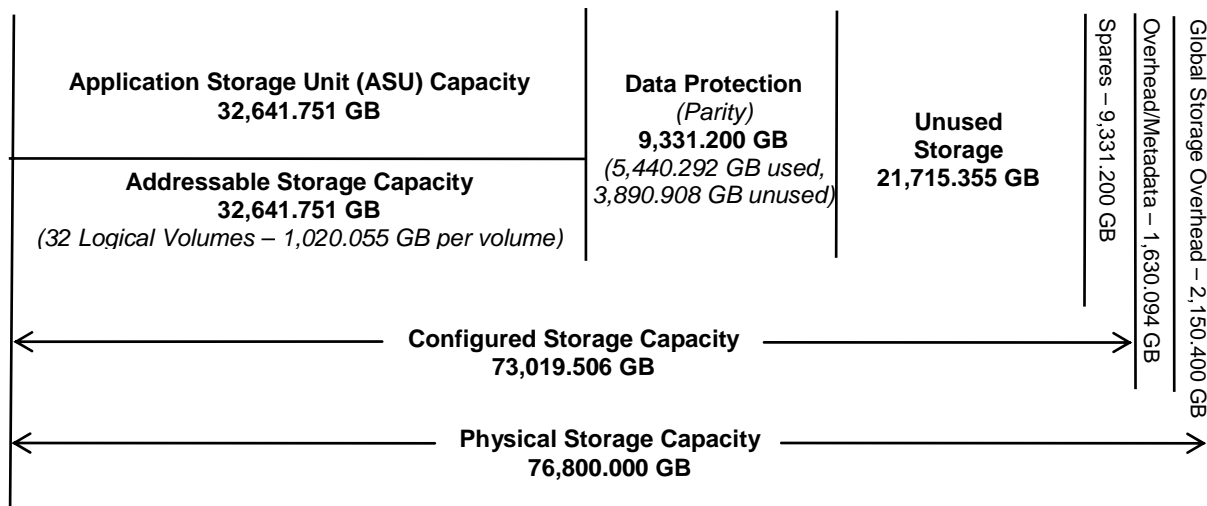
Application Storage Unit (ASU) Capacity **32,641.751 GB**	Data Protection *(Parity)* **9,331.200 GB** *(5,440.292 GB used,* *3,890.908 GB unused)*	Unused Storage **21,715.355 GB**	Spares – 9,331.200 GB	Overhead/Metadata – 1,630.094 GB	Global Storage Overhead – 2,150.400 GB
Addressable Storage Capacity **32,641.751 GB** *(32 Logical Volumes – 1,020.055 GB per volume)*					

Configured Storage Capacity
73,019.506 GB

Physical Storage Capacity
76,800.000 GB

SPC-1 Storage Capacity Utilization	
Application Utilization	42.50%
Protected Application Utilization	49.59%
Unused Storage Ratio	33.34%

Application Utilization: Total ASU Capacity *(32,641.751 GB)* divided by Physical Storage Capacity *(76,800.000 GB)*

Protected Application Utilization: (Total ASU Capacity *(32,641.751 GB)* plus total Data Protection Capacity *(9,331.200 GB)* minus unused Data Protection Capacity *(3,890.908 GB)*) divided by Physical Storage Capacity *(76,800.000 GB)*

Unused Storage Ratio: Total Unused Capacity *(25,606.263 GB)* divided by Physical Storage Capacity *(76,800.000 GB)* and may not exceed 45%.

Detailed information for the various storage capacities and utilizations is available on pages 20-21 in the Full Disclosure Report.

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

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

Priced Storage Configuration Pricing

The following pricing includes the following:

- Acknowledgement of new and existing hardware and/or software problems within four hours.

- Onsite presence of a qualified maintenance engineer or provision of a customer replaceable part within four hours of the above acknowledgement for any hardware failure that results in an inoperative Priced Storage Configuration component.

- Standard IBM field delegation discounts.

Product	Description	Qty	Price	Extended Price	Discount (%)	Disc. Price
2423-941	System Storage DS8700	1	$ 72,419.00	$ 72,419.00	50.00%	$ 36,209.50
	1 9xE factory merge	2	N/C			
	100 Eligible for EU Shipment	1	N/C			
	340 941 - 94E Position 1	1	N/C			
	341 941 - 92E/94E Position 2	1	N/C			
	700 OEL Indicator	1	N/C			
	825 75.1 to 100.0 TB capacity	1	N/C			
	900 Non-Standby CoD	1	N/C			
	1050 Battery Assembly	3	$ 1,700.00	$ 5,100.00	50.00%	$ 2,550.00
	1090 Line Cord (US/LA/AP/Canada)	1	$ 1,900.00	$ 1,900.00	50.00%	$ 950.00
	1120 Management Console - English Laptop Internal	1	$ 9,160.00	$ 9,160.00	50.00%	$ 4,580.00
	1210 Disk Enclosure Pair	2	$ 10,000.00	$ 20,000.00	50.00%	$ 10,000.00
	1211 Disk Drive Cable Group 1	1	$ 1,000.00	$ 1,000.00	50.00%	$ 500.00
	1301 I/O Enclosure Pair PCIE	2	$ 11,780.00	$ 23,560.00	50.00%	$ 11,780.00
	1321 PCI-E Cable Group 2	1	$ 4,100.00	$ 4,100.00	50.00%	$ 2,050.00
	1410 50 um Fibre Cable (LC)	48	$ 100.00	$ 4,800.00	50.00%	$ 2,400.00
	1711 Release 5 Bundle Family	1	$ 40,000.00	$ 40,000.00	50.00%	$ 20,000.00
	1980 Performance Accelerator	1	$ 4,750.00	$ 4,750.00	50.00%	$ 2,375.00
	2416 300 GB 15K Drive Set	4	$ 87,700.00	$ 350,800.00	50.00%	$ 175,400.00
	3043 Device Adapter Pair III	4	$ 10,000.00	$ 40,000.00	50.00%	$ 20,000.00
	3143 4Gb SW FCP/FICON Adapter PCIE w/ SFPs	12	$ 33,920.00	$ 407,040.00	50.00%	$ 203,520.00
	4225 256 GB Processor Memory (4-Way)	1	$ 784,640.00	$ 784,640.00	50.00%	$ 392,320.00
	4302 4 Way Processor Card	1	$ 80,893.00	$ 80,893.00	50.00%	$ 40,446.50
2398-LFA	DS8000 Function Authorization	1				
	7031 OEL - 1 TB	2	N/C			
	7034 OEL - 25 TB	1	N/C			
	7035 OEL - 50 TB	1	N/C			
	7051 OEL - 1 Value Unit	3	$ 6,666.00	$ 19,998.00	40.00%	$ 11,998.80
	7060 OEL - 100 Value Unit	1	$ 226,588.00	$ 226,588.00	40.00%	$ 135,952.80
2423-94E	System Storage DS8700 Expansion Unit	1	$ 73,500.00	$ 73,500.00	50.00%	$ 36,750.00
	1 9xE factory merge	1	N/C			
	100 Eligible for EU Shipment	1	N/C			
	341 941 - 92E/94E Position 2	1	N/C			
	1090 Line Cord (US/LA/AP/Canada)	1	$ 1,900.00	$ 1,900.00	50.00%	$ 950.00
	1210 Disk Enclosure Pair	2	$ 10,000.00	$ 20,000.00	50.00%	$ 10,000.00
	1214 Disk Drive Cable Group 4	1	$ 2,400.00	$ 2,400.00	50.00%	$ 1,200.00
	1980 Performance Accelerator	1	$ 4,750.00	$ 4,750.00	50.00%	$ 2,375.00
	2416 300 GB 15K Drive Set	4	$ 87,700.00	$ 350,800.00	50.00%	$ 175,400.00
2423-94E	System Storage DS8700 Expansion Unit	1	$ 73,500.00	$ 73,500.00	50.00%	$ 36,750.00
	1 9xE factory merge	1	N/C			
	100 Eligible for EU Shipment	1	N/C			
	340 941 - 94E Position 1	1	N/C			
	1050 Battery Assembly	2	$ 1,700.00	$ 3,400.00	50.00%	$ 1,700.00
	1090 Line Cord (US/LA/AP/Canada)	1	$ 1,900.00	$ 1,900.00	50.00%	$ 950.00
	1210 Disk Enclosure Pair	4	$ 10,000.00	$ 40,000.00	50.00%	$ 20,000.00
	1212 Disk Drive Cable Group 2	1	$ 1,900.00	$ 1,900.00	50.00%	$ 950.00
	1301 I/O Enclosure Pair PCIE	2	$ 11,780.00	$ 23,560.00	50.00%	$ 11,780.00
	1322 PCIE Cable Group 3	1	$ 5,000.00	$ 5,000.00	50.00%	$ 2,500.00
	1410 50 um Fibre Cable (LC)	48	$ 100.00	$ 4,800.00	50.00%	$ 2,400.00
	1980 Performance Accelerator	1	$ 4,750.00	$ 4,750.00	50.00%	$ 2,375.00
	2416 300 GB 15K Drive Set	8	$ 87,700.00	$ 701,600.00	50.00%	$ 350,800.00
	3043 Device Adapter Pair III	4	$ 10,000.00	$ 40,000.00	50.00%	$ 20,000.00
	3143 4Gb SW FCP/FICON Adapter PCIE w/ SFPs	12	$ 33,920.00	$ 407,040.00	50.00%	$ 203,520.00
9117-5759	4 Gb dual port FC	14	$ 3,308.00	$ 46,312.00	30.00%	$ 32,418.40
9117-5774	4 Gb PCI-e dual port FC	10	$ 3,308.00	$ 33,080.00	30.00%	$ 23,156.00
				$ 3,936,940.00		
	Total discounted price					**$ 2,009,007.00**

SPC BENCHMARK 2™ V1.3   FULL DISCLOSURE REPORT   Submitted for Review: NOVEMBER 30, 2009
IBM Corporation   Submission Identifier: B00049
IBM System Storage DS8700

Tested Storage Configuration (TSC)
/Priced Storage Configuration Diagram
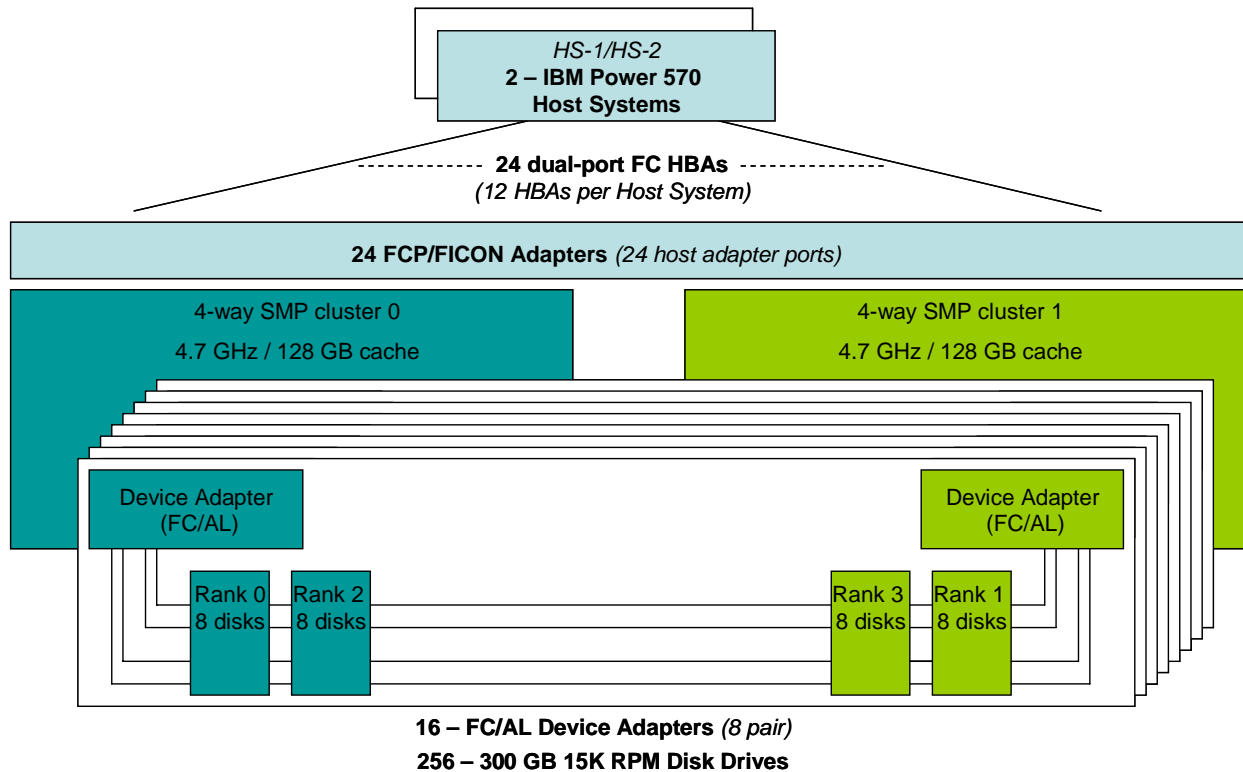
Tested Storage Configuration (TSC)/
Priced Configuration Components

Host System:	Tested Storage Configuration (TSC)/ Priced Storage Configuration:
HS-1/HS-2: IBM Power 570	14 – 4Gb dual port FC PCIe HBAs *(9117-5774)* *(7 HBAs per Host System)*
Two identically configured Host Systems each with:	10 – 4Gb dual port FC PCI-X HBAs *(9117-5759)* *(5 HBAs per Host System)*
16 – 4.4 GHz POWER6 processors *(2 processors per dual core module)* 8 MB L2 cache per dual core module 32 MB L3 cache per dual core module	**SC-1/SC-2: IBM System Storage DS8700**
	2 – processing clusters: 4-way POWER6 SMP per cluster *(dual core, 4.7 GHz)* 128 GB memory/cache per cluster *(256 GB total)*
96 GB main memory	24 – 4Gb SW FCP/FICON Adapters
AIX 6.1 TL 03	24 – 4 Gbps FC host connections
PCIe, PCI-X	16 – FC/AL Device Adapters *(8 pairs)*
	32 – 4 Gbps FC backend connections *(32 active, 32 available for failover)*
	2 – IBM System Storage DS8700 Expansion Units
	256 – 300 GB 15K RPM FC disk drives

CONFIGURATION INFORMATION

This portion of the Full Disclosure Report documents and illustrates the detailed information necessary to recreate the Benchmark Configuration (BC), including the Tested Storage Configuration (TSC), so that the SPC-2 benchmark result produced by the BC may be independently reproduced.

In each of the following sections of this document, the appropriate Full Disclosure Report requirement, from the SPC-2 benchmark specification, is stated in italics followed by the information to fulfill the stated requirement.

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

Clause 10.6.6

The FDR will contain a one page BC/TSC diagram that illustrates all major components of the BC/TSC.

The Benchmark Configuration (BC)/Tested Storage Configuration (TSC) is illustrated on page 17.

Storage Network Configuration

Clause 10.6.6.1

If a storage network was configured as a part of the Tested Storage Configuration and the Benchmark Configuration described in Clause 10.6.6 contains a high-level illustration of the network configuration, the Executive Summary will contain a one page topology diagram of the storage network as illustrated in Figure 10.11.

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

Host System and Tested Storage Configuration Table

Clause 10.6.6.2

The FDR will contain a table that lists the major components of each Host System and the Tested Storage Configuration.

The components that comprise each Host System and the Tested Storage Configuration are listed in the table that appears on page 17.

Customer Tunable Parameters and Options

Clause 10.6.6.1

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. If the parameter name is not self-explanatory to a knowledgeable practitioner, a brief description of the parameter's use must also be included in the FDR entry.

"Appendix B: Customer Tunable Parameters and Options" on page 95 contains the customer tunable parameters and options that have been altered from their default values for this benchmark.

Tested Storage Configuration (TSC) Description

Clause 10.6.6.2

The Full Disclosure Report must include sufficient information to recreate the logical representation of the Tested Storage Configuration (TSC). In addition to customer tunable parameters and options (Clause10.6.6.1), 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 BC Configuration Diagram in Clause 10.6.5.7 and the Storage Network Configuration Diagram in Clause 10.6.5.8.*
  - ➢ *The logical representation of the TSC, configured from the above components that will be presented to the SPC-2 Workload Generator.*
- *Listings of scripts used to create the logical representation of the TSC.*
- *If scripts were not used, a description of the process used with sufficient detail to recreate the logical representation of the TSC.*

"Appendix C: Tested Storage Configuration (TSC) Creation" on page 96 contains the detailed information that describes how to create and configure the logical TSC.

SPC-2 Workload Generator Storage Configuration

Clause 10.6.6.3

The Full Disclosure Report will include all SPC-2 Workload Generator storage configuration commands and parameters used in the SPC-2 benchmark measurement.

The SPC-2 Workload Generator storage configuration commands and parameters for this measurement appear in "Appendix D: SPC-2 Workload Generator Storage Commands and Parameters" on page 96.

SPC-2 DATA REPOSITORY

This portion of the Full Disclosure Report presents the detailed information that fully documents the various SPC-2 storage capacities and mappings used in the Tested Storage Configuration. "SPC-2 Data Repository Definitions" on page 90 contains definitions of terms specific to the SPC-2 Data Repository.

In each of the following sections of this document, the appropriate Full Disclosure Report requirement, from the SPC-2 benchmark specification, is stated in italics followed by the information to fulfill the stated requirement.

SPC-2 Storage Capacities and Relationships

Two tables and an illustration documenting the storage capacities and relationships of the SPC-2 Storage Hierarchy (Clause 2.1) shall be included in the FDR.

SPC-2 Storage Capacities

SPC-2 Storage Capacities		
Storage Hierarchy Component	**Units**	**Capacity**
Total ASU Capacity	Gigabytes (GB)	32,641.751
Addressable Storage Capacity	Gigabytes (GB)	32,641.751
Configured Storage Capacity	Gigabytes (GB)	73,019.506
Physical Storage Capacity	Gigabytes (GB)	76,800.000
Data Protection *(RAID-5 parity)*	Gigabytes (GB)	9,331.200
Required Storage *(spares/overhead/metatdata)*	Gigabytes (GB)	10,961.294
Global Storage Overhead	Gigabytes (GB)	2,150.400
Total Unused Storage	Gigabytes (GB)	25,606.263

SPC-2 Storage Hierarchy Ratios

	Addressable Storage Capacity	Configured Storage Capacity	Physical Storage Capacity
Total ASU Capacity	100.00%	44.70%	42.50%
Data Protection *(RAID-5 parity)*		12.78%	12.15%
Addressable Storage Capacity		44.70%	42.50%
Required Storage		15.01%	14.27%
Configured Storage Capacity			95.08%
Global Storage Overhead			2.80%
Unused Storage:			
Addressable	0.00%		
Configured		29.74%	
Physical			0.00%

The Physical Storage Capacity consisted of 76,800.00 GB distributed over 256 disk drives each with a formatted capacity of 300 GB. There was 0.000 GB (0.00%) of Unused Storage within the Physical Storage Capacity. Global Storage Overhead consisted of 2,150.400 GB (2.80%) of Physical Storage Capacity. There was 21,715.355 GB (29.74%) of Unused Storage within the Configured Storage Capacity. The Total ASU Capacity utilized 100% of the Addressable Storage Capacity resulting in 0.000 GB (0.00%) of Unused Storage within the Addressable Storage Capacity. The Data Protection *(RAID-5 parity)* capacity was 9,331.220 GB of which 5,440.292 GB was utilized. The total Unused Storage was 25,606.263 GB.

SPC-2 Storage Capacities and Relationships Illustration

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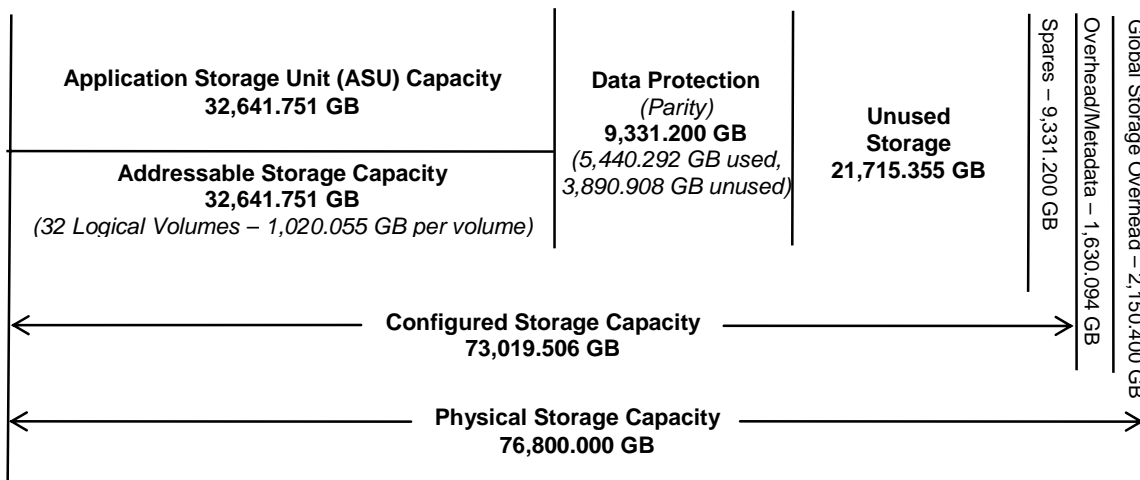
Storage Capacity Utilization

Clause 10.6.8.2

The FDR will include a table illustrating the storage capacity utilization values defined for Application Utilization (Clause 2.8.1), Protected Application Utilization (Clause 2.8.2), and Unused Storage Ratio (Clause 2.8.3).

Clause 2,8.1

Application Utilization *is defined as Total ASU Capacity divided by Physical Storage Capacity.*

Clause 2,8.2

Protected Application Utilization *is defined as (Total ASU Capacity plus total Data Protection Capacity minus unused Data Protection Capacity) divided by Physical Storage Capacity.*

Clause 2,8.3

Unused Storage Ratio *is defined as Total Unused Capacity divided by Physical Storage Capacity and may not exceed 45%.*

SPC-1 Storage Capacity Utilization	
Application Utilization	42.50%
Protected Application Utilization	49.59%
Unused Storage Ratio	33.34%

Logical Volume Capacity and ASU Mapping

Clause 10.6.7.2

A table illustrating the capacity of the Application Storage Unit (ASU) and the mapping of Logical Volumes to ASU will be provided in the FDR. Capacity must be stated in gigabytes (GB) as a value with a minimum of two digits to the right of the decimal point. Each Logical Volume will be sequenced in the table from top to bottom per its position in the contiguous address space of the ASU. Each Logical Volume entry will list its total capacity, the portion of that capacity used for the ASU, and any unused capacity.

Logical Volume (LV) Capacity and Mapping			
ASU (32,641.751 GB)			
	Total Capacity *(GB)*	Capacity Used *(GB)*	Capacity Unused *(GB)*
Logical Volumes 1-32	1,020.055 per LV	1,020.055 per LV	0.000 per LV

See the Storage Definition (sd) entries in "Appendix D: SPC-2 Workload Generator Storage Commands and Parameters" on page 96 for more detailed configuration information.

SPC-2 TEST EXECUTION RESULTS

This portion of the Full Disclosure Report documents the results of the various SPC-2 Test, Test Phases, Test Run Sequences, and Test Runs. "SPC-2 Test Execution Definitions" on page 91 contains definitions of terms specific to the SPC-2 Data Repository.

In each of the following sections of this document, the appropriate Full Disclosure Report requirement, from the SPC-2 benchmark specification, is stated in italics followed by the information to fulfill the stated requirement.

SPC-2 Tests, Test Phases, Test Run Sequences, and Test Runs

The SPC-2 benchmark consists of the following Tests, Test Phases, Test Run Sequences, and Test Runs:

- **Data Persistence Test**
  - Data Persistence Test Run 1
  - Data Persistence Test Run 2

- **Large File Processing Test**
  - WRITE ONLY Test Phase
    - Test Run Sequence 1
      - ✓ Test Run 1 – 1024 KiB Transfer – maximum number of Streams
      - ✓ Test Run 2 – 1024 KiB Transfer – 50% of Test Run 1's Streams value
      - ✓ Test Run 3 – 1024 KiB Transfer – 25% of Test Run 1's Streams value
      - ✓ Test Run 4 – 1024 KiB Transfer – 12.5% of Test Run 1's Streams value
      - ✓ Test Run 5 – 1024 KiB Transfer – single (1) Stream
    - Test Run Sequence 2
      - ✓ Test Run 6 – 256 KiB Transfer – maximum number of Streams
      - ✓ Test Run 7 – 256 KiB Transfer – 50% of Test Run 6's Streams value
      - ✓ Test Run 8 – 256 KiB Transfer – 25% of Test Run 6's Streams value
      - ✓ Test Run 9 – 256 KiB Transfer – 12.5% of Test Run 6's Streams value
      - ✓ Test Run 10 – 256 KiB Transfer – single (1) Stream
  - READ-WRITE Test Phase
    - Test Run Sequence 3
      - ✓ Test Run 11 – 1024 KiB Transfer – maximum number of Streams
      - ✓ Test Run 12 – 1024 KiB Transfer – 50% of Test Run 11's Streams value
      - ✓ Test Run 13 – 1024 KiB Transfer – 25% of Test Run 11's Streams value
      - ✓ Test Run 14 – 1024 KiB Transfer – 12.5% of Test Run 11's Streams value
      - ✓ Test Run 15 – 1024 KiB Transfer – single (1) Stream
    - Test Run Sequence 4
      - ✓ Test Run 16 – 256 KiB Transfer – maximum number of Streams
      - ✓ Test Run 17 – 256 KiB Transfer – 50% of Test Run 16's Streams value
      - ✓ Test Run 18 – 256 KiB Transfer – 25% of Test Run 16's Streams value
      - ✓ Test Run 19 – 256 KiB Transfer – 12.5% of Test Run 16's Streams value
      - ✓ Test Run 20 – 256 KiB Transfer – single (1) Stream

- **Large File Processing Test** *(continued)*

  - READ ONLY Test Phase
    - Test Run Sequence 5
      - ✓ Test Run 21 – 1024 KiB Transfer – maximum number of Streams
      - ✓ Test Run 22 – 1024 KiB Transfer – 50% of Test Run 21's Streams value
      - ✓ Test Run 23 – 1024 KiB Transfer – 25% of Test Run 21's Streams value
      - ✓ Test Run 24 – 1024 KiB Transfer – 12.5% of Test Run 21's Streams value
      - ✓ Test Run 25 – 1024 KiB Transfer – single (1) Stream

    - Test Run Sequence 6
      - ✓ Test Run 26 – 256 KiB Transfer – maximum number of Streams
      - ✓ Test Run 27 – 256 KiB Transfer – 50% of Test Run 26's Streams value
      - ✓ Test Run 28 – 256 KiB Transfer – 25% of Test Run 26's Streams value
      - ✓ Test Run 29 – 256 KiB Transfer – 12.5% of Test Run 26's Streams value
      - ✓ Test Run 30 – 256 KiB Transfer – single (1) Stream

- **Large Database Query Test**

  - 1024 KIB TRANSFER SIZE Test Phase
    - Test Run Sequence 1
      - ✓ Test Run 1 – 4 I/O Requests Outstanding – maximum number of Streams
      - ✓ Test Run 2 – 4 I/O Requests Outstanding – 50% of Test Run 1's Streams value
      - ✓ Test Run 3 – 4 I/O Requests Outstanding – 25% of Test Run 1's Streams value
      - ✓ Test Run 4 – 4 I/O Requests Outstanding – 12.5% of Test Run 1's Streams value
      - ✓ Test Run 5 – 4 I/O Requests Outstanding – single (1) Stream

    - Test Run Sequence 2
      - ✓ Test Run 6 – 1 I/O Request Outstanding – maximum number of Streams
      - ✓ Test Run 7 – 1 I/O Request Outstanding – 50% of Test Run 6's Streams value
      - ✓ Test Run 8 – 1 I/O Request Outstanding – 25% of Test Run 6's Streams value
      - ✓ Test Run 9 – 1 I/O Request Outstanding – 12.5% of Test Run 6's Streams value
      - ✓ Test Run 10 – 1 I/O Request Outstanding – single (1) Stream

  - 64 KIB TRANSFER SIZE Test Phase
    - Test Run Sequence 3
      - ✓ Test Run 11 – 4 I/O Requests Outstanding – maximum number of Streams
      - ✓ Test Run 12 – 4 I/O Requests Outstanding – 50% of Test Run 11's Streams value
      - ✓ Test Run 13 – 4 I/O Requests Outstanding – 25% of Test Run 11's Streams value
      - ✓ Test Run 14 – 4 I/O Requests Outstanding – 12.5% of Test Run 11's Streams value
      - ✓ Test Run 15 – 4 I/O Requests Outstanding – single (1) Stream

    - Test Run Sequence 4
      - ✓ Test Run 16 – 1 I/O Request Outstanding – maximum number of Streams
      - ✓ Test Run 17 – 1 I/O Request Outstanding – 50% of Test Run 16's Streams value
      - ✓ Test Run 18 – 1 I/O Request Outstanding – 25% of Test Run 16's Streams value
      - ✓ Test Run 19 – 1 I/O Request Outstanding – 12.5% of Test Run 16's Streams value
      - ✓ Test Run 20 – 1 I/O Request Outstanding – single (1) Stream

- **Video on Demand Delivery Test**

  - **Video on Demand Delivery Test Run**

Each Test is an atomic unit that must be executed from start to finish before any other Test, Test Phase, or Test Run may be executed. The Tests may be executed in any sequence.

The results from each Test, Test Phase, and Test Run are listed below along with a more detailed explanation of each component.

Large File Processing Test

Clause 6.4.2.1

The Large File Processing Test consists of the I/O operations associated with the type of applications, in a wide range of fields, which require simple sequential processing of one or more large files. Specific examples of those types of applications include scientific computing and large-scale financial processing

Clause 6.4.2.2

The Large File Processing Test has three Test Phases, which shall be executed in the following uninterrupted sequence:

1. *WRITE ONLY*

2. *READ-WRITE*

3. *READ ONLY*

The BC shall not be restarted or manually disturbed, altered, or adjusted during the execution of the Large File Processing Test. If power is lost to the BC during this Test all results shall be rendered invalid and the Test re-run in its entirety.

Clause 10.6.8.1

The Full Disclosure Report will contain the following content for the Large File Processing Test:

1. *A listing of the SPC-2 Workload Generator commands and parameters used to execute each of the Test Runs in the Large File Processing Test.*

2. *The human readable SPC-2 Test Results File for each of the Test Runs in the Large File Processing Test.*

3. *A table that contains the following information for each Test Run in all three Test Phases of the Large File Processing Test:*

   - *The number Streams specified.*

   - *The Ramp-Up duration in seconds.*

   - *The Measurement Interval duration in seconds.*

   - *The average data rate, in MB per second, for the Measurement Interval.*

   - *The average data rate, in MB per second, per Stream for the Measurement Interval.*

4. *Average Data Rate and Average Data Rate per Stream graphs as defined in Clauses 10.1.1 and 10.1.2.*

SPC-2 Workload Generator Commands and Parameters

The SPC-2 Workload Generator commands and parameters for the Large File Processing Test Runs are documented in "Appendix E: SPC-2 Workload Generator Execution Commands and Parameters" on Page 108.

SPC-2 Test Results File

A link to the SPC-2 Test Results file generated from the Large File Processing Test Runs is listed below.

SPC-2 Large File Processing Test Results File

SPC-2 Large File Processing Average Data Rates (MB/s)

The average Data Rate (MB/s) for each Test Run in the three Test Phases of the SPC-2 Large File Processing Test is listed in the table below as well as illustrated in the following graph.

Test Run Sequence	1 Stream	24 Streams	48 Streams	96 Streams	192 Streams
Write 1024KiB	286.46	4,378.08	4,306.69	4,275.60	4,317.47
Write 256KiB	226.82	4,539.81	4,401.78	4,317.83	4,344.85
Read/Write 1024KiB	298.59	4,196.49	5,070.12	5,633.10	6,142.37
Read/Write 256KiB	240.38	3,847.58	4,904.97	5,599.23	6,134.44
Read 1024KiB	309.59	5,530.45	7,618.81	8,942.08	9,321.63
Read 256KiB	253.87	4,910.37	7,224.02	8,886.10	9,321.80

SPC-2 Large File Processing Average Data Rates Graph

Large File Processing - Data Rate

1024KiB transfers with only Write operations
- 192 Streams, 4,317.47 MB/s
- 96 Streams, 4,275.60 MB/s
- 48 Streams, 4,306.69 MB/s
- 24 Streams, 4,378.08 MB/s
- 1 Stream, 286.46 MB/s

256KiB transfers with only Write operations
- 192 Streams, 4,344.85 MB/s
- 96 Streams, 4,317.83 MB/s
- 48 Streams, 4,401.78 MB/s
- 24 Streams, 4,539.81 MB/s
- 1 Stream, 226.82 MB/s

1024KiB transfers with 50% Read operations 50% Write operations
- 192 Streams, 6,142.37 MB/s
- 96 Streams, 5,633.10 MB/s
- 48 Streams, 5,070.12 MB/s
- 24 Streams, 4,196.49 MB/s
- 1 Stream, 298.59 MB/s

256KiB transfers with 50% Read operations 50% Write operations
- 192 Streams, 6,134.44 MB/s
- 96 Streams, 5,599.23 MB/s
- 48 Streams, 4,904.97 MB/s
- 24 Streams, 3,847.58 MB/s
- 1 Stream, 240.38 MB/s

1024KiB transfers with only Read operations
- 192 Streams, 9,321.63 MB/s
- 96 Streams, 8,942.08 MB/s
- 48 Streams, 7,618.81 MB/s
- 24 Streams, 5,530.45 MB/s
- 1 Stream, 309.59 MB/s

256KiB transfers with only Read operations
- 192 Streams, 9,321.80 MB/s
- 96 Streams, 8,886.10 MB/s
- 48 Streams, 7,224.02 MB/s
- 24 Streams, 4,910.37 MB/s
- 1 Stream, 253.87 MB/s

Data Rate, MB/sec (0 – 10,000)

SPC-2 Large File Processing Average Data Rate per Stream

The average Data Rate per Stream for each Test Run in the three Test Phases of the SPC-2 Large File Processing Test is listed in the table below as well as illustrated in the following graph.

Test Run Sequence	1 Stream	24 Streams	48 Streams	96 Streams	192 Streams
Write 1024KiB	286.46	182.42	89.72	44.54	22.49
Write 256KiB	226.82	189.16	91.70	44.98	22.63
Read/Write 1024KiB	298.59	174.85	105.63	58.68	31.99
Read/Write 256KiB	240.38	160.32	102.19	58.33	31.95
Read 1024KiB	309.59	230.44	158.73	93.15	48.55
Read 256KiB	253.87	204.60	150.50	92.56	48.55

SPC-2 Large File Processing Average Data Rate per Stream Graph

Large File Processing - Data Rate per Stream

1024KiB transfers with only Write operations
- 192 Streams, 22.49 MB/s
- 96 Streams, 44.54 MB/s
- 48 Streams, 89.72 MB/s
- 24 Streams, 182.42 MB/s
- 1 Stream, 286.46 MB/s

256KiB transfers with only Write operations
- 192 Streams, 22.63 MB/s
- 96 Streams, 44.98 MB/s
- 48 Streams, 91.70 MB/s
- 24 Streams, 189.16 MB/s
- 1 Stream, 226.82 MB/s

1024KiB transfers with 50%Read operations 50%Write operations
- 192 Streams, 31.99 MB/s
- 96 Streams, 58.68 MB/s
- 48 Streams, 105.63 MB/s
- 24 Streams, 174.85 MB/s
- 1 Stream, 298.59 MB/s

256KiB transfers with 50%Read operations 50%Write operations
- 192 Streams, 31.95 MB/s
- 96 Streams, 58.33 MB/s
- 48 Streams, 102.19 MB/s
- 24 Streams, 160.32 MB/s
- 1 Stream, 240.38 MB/s

1024KiB transfers with only Read operations
- 192 Streams, 48.55 MB/s
- 96 Streams, 93.15 MB/s
- 48 Streams, 158.73 MB/s
- 24 Streams, 230.44 MB/s
- 1 Stream, 309.59 MB/s

256KiB transfers with only Read operations
- 192 Streams, 48.55 MB/s
- 96 Streams, 92.56 MB/s
- 48 Streams, 150.50 MB/s
- 24 Streams, 204.60 MB/s
- 1 Stream, 253.87 MB/s

Data Rate, MB/sec
(axis: 0, 50, 100, 150, 200, 250, 300, 350)

SPC-2 Large File Processing Average Response Time

The average Response Time, milliseconds (ms), for each Test Run in the three Test Phases of the SPC-2 Large File Processing Test is listed in the table below as well as illustrated in the following graph.

Test Run Sequence	1 Stream	24 Streams	48 Streams	96 Streams	192 Streams
Write 1024KiB	3.65	5.74	11.68	23.54	46.63
Write 256KiB	1.15	1.38	2.85	5.82	11.57
Read/Write 1024KiB	3.50	5.99	9.92	17.87	32.77
Read/Write 256KiB	1.09	1.63	2.56	4.49	8.20
Read 1024KiB	3.38	4.56	6.60	11.26	21.60
Read 256KiB	1.03	1.28	1.74	2.83	5.40

SPC-2 Large File Processing Average Response Time Graph

Large File Processing - Average Response Time

- **1024KiB transfers with only Write operations**
  - 192 Streams, 46.63 ms
  - 96 Streams, 23.54 ms
  - 48 Streams, 11.68 ms
  - 24 Streams, 5.74 ms
  - 1 Stream, 3.65 ms

- **256KiB transfers with only Write operations**
  - 192 Streams, 11.57 ms
  - 96 Streams, 5.82 ms
  - 48 Streams, 2.85 ms
  - 24 Streams, 1.38 ms
  - 1 Stream, 1.15 ms

- **1024KiB transfers with 50% Read operations 50% Write operations**
  - 192 Streams, 32.77 ms
  - 96 Streams, 17.87 ms
  - 48 Streams, 9.92 ms
  - 24 Streams, 5.99 ms
  - 1 Stream, 3.50 ms

- **256KiB transfers with 50% Read operations 50% Write operations**
  - 192 Streams, 8.20 ms
  - 96 Streams, 4.49 ms
  - 48 Streams, 2.56 ms
  - 24 Streams, 1.63 ms
  - 1 Stream, 1.09 ms

- **1024KiB transfers with only Read operations**
  - 192 Streams, 21.60 ms
  - 96 Streams, 11.26 ms
  - 48 Streams, 6.60 ms
  - 24 Streams, 4.56 ms
  - 1 Stream, 3.38 ms

- **256KiB transfers with only Read operations**
  - 192 Streams, 5.40 ms
  - 96 Streams, 2.83 ms
  - 48 Streams, 1.74 ms
  - 24 Streams, 1.28 ms
  - 1 Stream, 1.03 ms

Response Time, ms

Large File Processing Test – WRITE ONLY Test Phase

Clause 10.6.8.1.1

1. *A table that will contain the following information for each "WRITE ONLY, 1024 KiB Transfer Size" Test Run:*

   - *The number of Streams specified.*

   - *The average data rate, average data rate per stream, and average Response Time reported at five second intervals.*

2. *Average Data Rate (intervals), Average Data Rate per Stream (intervals), and Average Response Time (intervals) graphs for the "WRITE ONLY, 1024 KiB Transfer Size" Test Runs as specified in Clauses 10.1.4 – 10.1.6.*

3. *A table that will contain the following information for each "WRITE ONLY, 256 KiB Transfer Size" Test Run:*

   - *The number of Streams specified.*

   - *The average data rate, average data rate per stream, and average Response Time reported at five second intervals.*

4. *Average Data Rate (intervals), Average Data Rate per Stream (intervals), and Average Response Time (intervals) graphs for the "WRITE ONLY, 256 KiB Transfer Size" Test Runs as specified in Clauses 10.1.4 – 10.1.6.*

The SPC-2 "Large File Processing/WRITE ONLY/1024 KiB Transfer Size" Test Run data is contained in the table that appears on the next page. That table is followed by graphs illustrating the average Data Rate, average Data Rate per Stream, and average Response Time produced by the same Test Runs. The table and graphs present the data at five-second intervals.

Immediately following the SPC-2 "Large File Processing/WRITE ONLY/1024 KiB Transfer Size" table and graphs will be the SPC-2 "Large File Processing/WRITE ONLY/64 KiB Transfer Size" table and graphs. The table contains the Test Run data and the graphs illustrate the average Data Rate, average Data Rate per Stream, and average Response Time produced by the Test Runs.

SPC-2 "Large File Processing/WRITE ONLY/1024 KiB Transfer Size" Test Run Data – Ramp-Up Period

TR1 Test Run Sequence Time	192 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR2 Test Run Sequence Time	96 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR3 Test Run Sequence Time	48 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR4 Test Run Sequence Time	24 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR5 Test Run Sequence Time	1 Stream Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms
0:00:00	1,001.60	38.52	9.52	0:06:55	0.00	0.00	0.00	0:13:55	0.00	0.00	0.00	0:20:55	0.00	0.00	0.00	0:28:00	260.26	260.26	3.65
0:00:05	1,202.51	27.33	31.73	0:07:00	602.09	86.01	5.78	0:14:00	1,072.48	153.21	4.15	0:21:00	259.21	259.21	3.65	0:28:05	286.26	286.26	3.65
0:00:10	1,400.06	25.93	35.85	0:07:05	1,067.24	82.10	9.42	0:14:05	1,385.80	98.99	7.83	0:21:05	654.10	163.53	3.67	0:28:10	286.47	286.47	3.65
0:00:15	1,873.18	24.02	37.16	0:07:10	1,095.13	42.12	18.29	0:14:10	1,797.47	105.73	8.93	0:21:10	1,564.48	260.75	3.68	0:28:15	286.47	286.47	3.65
0:00:20	2,311.90	26.88	37.58	0:07:15	1,688.63	54.47	18.28	0:14:15	2,119.80	105.99	9.19	0:21:15	1,555.88	259.31	4.04	0:28:20	286.26	286.26	3.65
0:00:25	2,852.13	28.24	35.10	0:07:20	1,905.68	54.45	18.33	0:14:20	2,377.33	103.36	9.35	0:21:20	1,593.21	227.60	4.36	0:28:25	286.47	286.47	3.65
0:00:30	3,371.59	29.32	33.81	0:07:25	2,733.22	52.56	17.99	0:14:25	2,751.88	105.84	9.17	0:21:25	1,956.43	217.38	4.31	0:28:30	286.89	286.89	3.65
0:00:35	3,407.87	25.82	38.51	0:07:30	3,106.30	56.48	18.19	0:14:30	3,218.08	110.97	8.79	0:21:30	2,411.72	200.98	4.84	0:28:35	286.47	286.47	3.65
0:00:40	3,512.10	24.73	41.26	0:07:35	3,461.35	56.74	17.50	0:14:35	3,527.41	110.23	8.87	0:21:35	2,779.57	198.54	4.96	0:28:40	286.05	286.05	3.66
0:00:45	3,679.87	24.53	41.95	0:07:40	3,322.10	48.15	20.35	0:14:40	3,523.22	103.62	9.69	0:21:40	2,950.27	210.73	4.97	0:28:45	286.47	286.47	3.65
0:00:50	3,747.19	24.33	42.27	0:07:45	3,557.19	49.41	20.88	0:14:45	3,600.60	105.90	9.89	0:21:45	2,939.37	195.96	5.13	0:28:50	286.89	286.89	3.65
0:00:55	3,867.57	23.87	43.16	0:07:50	3,636.88	49.82	20.89	0:14:50	3,614.86	103.28	9.87	0:21:50	3,505.18	194.73	4.87	0:28:55	286.68	286.68	3.65
0:01:00	3,952.08	23.25	43.76	0:07:55	3,694.76	48.62	21.15	0:14:55	3,662.05	98.97	10.18	0:21:55	3,776.76	198.78	5.00	0:29:00	286.47	286.47	3.65
0:01:05	4,041.63	23.36	44.51	0:08:00	3,779.70	47.84	21.58	0:15:00	3,767.74	96.61	10.48	0:22:00	3,953.76	208.09	5.03	0:29:05	286.68	286.68	3.65
0:01:10	4,094.90	23.27	44.77	0:08:05	3,861.28	47.09	21.75	0:15:05	3,879.31	92.36	10.67	0:22:05	4,069.73	184.99	5.02	0:29:10	286.68	286.68	3.65
0:01:15	4,190.32	22.53	45.60	0:08:10	3,982.49	45.26	22.16	0:15:10	4,069.73	92.49	11.24	0:22:10	3,901.33	169.62	6.05	0:29:15	286.47	286.47	3.65
0:01:20	4,261.41	22.31	46.20	0:08:15	4,112.93	45.70	22.65	0:15:15	4,123.42	91.63	11.22	0:22:15	4,197.24	182.49	5.74	0:29:20	286.68	286.68	3.65
0:01:25	4,309.44	22.44	46.56	0:08:20	4,172.49	44.39	23.03	0:15:20	4,173.12	92.74	11.29	0:22:20	4,417.86	184.08	5.61	0:29:25	286.47	286.47	3.65
0:01:30	4,306.71	22.43	46.70	0:08:25	4,279.45	44.58	23.45	0:15:25	4,289.51	89.36	11.51	0:22:25	4,423.52	184.31	5.68	0:29:30	286.47	286.47	3.65
0:01:35	4,313.63	22.47	46.68	0:08:30	4,278.19	44.56	23.52	0:15:30	4,329.78	90.20	11.62	0:22:30	4,352.85	181.37	5.77	0:29:35	286.47	286.47	3.65
0:01:40	4,318.67	22.49	46.63	0:08:35	4,283.01	44.61	23.50	0:15:35	4,314.26	89.88	11.66	0:22:35	4,356.83	181.53	5.77	0:29:40	286.47	286.47	3.65
0:01:45	4,308.18	22.44	46.71	0:08:40	4,275.46	44.54	23.54	0:15:40	4,319.92	90.00	11.64	0:22:40	4,363.96	181.83	5.76	0:29:45	286.47	286.47	3.65
0:01:50	4,319.92	22.50	46.64	0:08:45	4,270.85	44.49	23.56	0:15:45	4,290.98	89.40	11.73	0:22:45	4,212.97	175.54	5.97	0:29:50	286.26	286.26	3.66
0:01:55	4,325.17	22.53	46.53	0:08:50	4,270.85	44.49	23.55	0:15:50	4,274.62	89.05	11.77	0:22:50	4,333.35	180.56	5.80	0:29:55	286.47	286.47	3.65
0:02:00	4,316.57	22.48	46.65	0:08:55	4,281.34	44.60	23.51	0:15:55	4,287.42	89.32	11.73	0:22:55	4,443.66	185.15	5.66	0:30:00	286.68	286.68	3.65
0:02:05	4,305.24	22.42	46.72	0:09:00	4,293.92	44.73	23.45	0:16:00	4,283.64	89.24	11.75	0:23:00	4,325.17	180.22	5.81	0:30:05	286.47	286.47	3.65
0:02:10	4,322.44	22.51	46.57	0:09:05	4,278.19	44.56	23.52	0:16:05	4,284.06	89.25	11.74	0:23:05	4,311.74	179.66	5.83	0:30:10	286.26	286.26	3.66
0:02:15	4,324.33	22.52	46.54	0:09:10	4,294.76	44.74	23.42	0:16:10	4,322.86	90.06	11.64	0:23:10	4,340.06	180.84	5.79	0:30:15	286.26	286.26	3.66
0:02:20	4,316.15	22.48	46.66	0:09:15	4,277.14	44.55	23.53	0:16:15	4,338.17	90.38	11.60	0:23:15	4,196.40	174.85	5.99	0:30:20	286.47	286.47	3.65
0:02:25	4,310.28	22.45	46.71	0:09:20	4,276.51	44.55	23.55	0:16:20	4,276.51	89.09	11.76	0:23:20	4,382.42	182.60	5.74	0:30:25	286.47	286.47	3.65
0:02:30	4,320.76	22.50	46.60	0:09:25	4,277.35	44.56	23.52	0:16:25	4,300.21	89.59	11.70	0:23:25	4,284.69	178.53	5.87	0:30:30	286.68	286.68	3.65
0:02:35	4,319.29	22.50	46.57	0:09:30	4,296.65	44.76	23.42	0:16:30	4,291.19	89.40	11.72	0:23:30	4,422.68	184.28	5.69	0:30:35	285.63	285.63	3.66
0:02:40	4,328.31	22.54	46.53	0:09:35	4,276.72	44.55	23.53	0:16:35	4,353.27	90.69	11.56	0:23:35	4,442.19	185.09	5.66	0:30:40	286.68	286.68	3.65
0:02:45	4,320.76	22.50	46.55	0:09:40	4,286.16	44.65	23.48	0:16:40	4,339.85	90.41	11.59	0:23:40	4,180.04	174.17	6.02	0:30:45	286.26	286.26	3.65
0:02:50	4,319.50	22.50	46.61	0:09:45	4,281.13	44.60	23.51	0:16:45	4,251.35	88.57	11.83	0:23:45	4,236.46	176.52	5.93	0:30:50	286.26	286.26	3.66
0:02:55	4,326.42	22.53	46.56	0:09:50	4,291.19	44.70	23.45	0:16:50	4,316.57	89.93	11.65	0:23:50	4,250.72	177.11	5.91	0:30:55	286.47	286.47	3.65
				0:09:55	4,289.72	44.68	23.47	0:16:55	4,331.46	90.24	11.62	0:23:55	4,208.56	175.36	5.98				

SPC BENCHMARK 2™ V1.3

IBM Corporation
IBM System Storage DS8700

FULL DISCLOSURE REPORT

Submitted for Review: NOVEMBER 30, 2009
Submission Identifier: B00049

SPC-2 "Large File Processing/WRITE ONLY/1024 KiB Transfer Size" Test Run Data
Measurement Interval, Run-Out, and Ramp-Down Periods

TR1 Test Run Sequence Time	192 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR2 Test Run Sequence Time	96 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR3 Test Run Sequence Time	48 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR4 Test Run Sequence Time	24 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR5 Test Run Sequence Time	1 Stream Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms
0:03:00	4,320.76	22.50	46.56	0:10:00	4,277.77	44.56	23.52	0:17:00	4,330.83	90.23	11.62	0:24:00	4,295.60	178.98	5.85	0:31:00	286.68	286.68	3.65
0:03:05	4,327.68	22.54	46.48	0:10:05	4,275.46	44.54	23.53	0:17:05	4,318.67	89.97	11.64	0:24:05	4,180.67	174.19	6.01	0:31:05	286.26	286.26	3.65
0:03:10	4,330.41	22.55	46.56	0:10:10	4,281.96	44.60	23.51	0:17:10	4,314.68	89.89	11.66	0:24:10	4,318.87	179.95	5.82	0:31:10	286.89	286.89	3.65
0:03:15	4,314.26	22.47	46.66	0:10:15	4,283.01	44.61	23.50	0:17:15	4,278.40	89.13	11.76	0:24:15	4,429.60	184.57	5.68	0:31:15	286.26	286.26	3.66
0:03:20	4,318.04	22.49	46.64	0:10:20	4,282.80	44.61	23.49	0:17:20	4,236.46	88.26	11.88	0:24:20	4,382.84	182.62	5.74	0:31:20	286.26	286.26	3.65
0:03:25	4,328.94	22.55	46.51	0:10:25	4,274.00	44.52	23.55	0:17:25	4,268.12	88.92	11.78	0:24:25	4,254.70	177.28	5.91	0:31:25	286.68	286.68	3.65
0:03:30	4,315.31	22.48	46.60	0:10:30	4,266.24	44.44	23.60	0:17:30	4,272.32	89.01	11.78	0:24:30	4,418.28	184.09	5.69	0:31:30	286.26	286.26	3.65
0:03:35	4,324.12	22.52	46.60	0:10:35	4,275.04	44.53	23.53	0:17:35	4,330.41	90.22	11.62	0:24:35	4,417.23	184.05	5.69	0:31:35	286.68	286.68	3.65
0:03:40	4,319.92	22.50	46.60	0:10:40	4,271.27	44.49	23.56	0:17:40	4,268.33	88.92	11.70	0:24:40	4,441.14	185.05	5.66	0:31:40	286.26	286.26	3.65
0:03:45	4,310.70	22.45	46.68	0:10:45	4,264.56	44.42	23.59	0:17:45	4,254.91	88.64	11.67	0:24:45	4,164.52	173.52	6.04	0:31:45	286.05	286.05	3.66
0:03:50	4,318.25	22.49	46.61	0:10:50	4,261.83	44.39	23.62	0:17:50	4,305.66	89.70	11.69	0:24:50	4,414.71	183.95	5.70	0:31:50	286.26	286.26	3.65
0:03:55	4,322.23	22.51	46.58	0:10:55	4,276.51	44.55	23.56	0:17:55	4,335.65	90.33	11.60	0:24:55	4,501.12	187.55	5.58	0:31:55	286.47	286.47	3.65
0:04:00	4,321.39	22.51	46.62	0:11:00	4,263.51	44.41	23.61	0:18:00	4,282.80	89.23	11.75	0:25:00	4,380.74	182.53	5.74	0:32:00	286.05	286.05	3.66
0:04:05	4,311.53	22.46	46.67	0:11:05	4,255.75	44.33	23.63	0:18:05	4,296.65	89.51	11.71	0:25:05	4,434.64	184.78	5.67	0:32:05	286.47	286.47	3.65
0:04:10	4,324.33	22.52	46.57	0:11:10	4,274.83	44.53	23.55	0:18:10	4,261.20	88.78	11.80	0:25:10	4,359.98	181.67	5.77	0:32:10	286.68	286.68	3.65
0:04:15	4,328.73	22.55	46.51	0:11:15	4,277.98	44.56	23.52	0:18:15	4,265.19	88.86	11.80	0:25:15	4,353.48	181.39	5.77	0:32:15	286.47	286.47	3.65
0:04:20	4,305.24	22.42	46.73	0:11:20	4,271.90	44.50	23.56	0:18:20	4,314.89	89.89	11.66	0:25:20	4,282.38	178.43	5.87	0:32:20	286.26	286.26	3.66
0:04:25	4,307.76	22.44	46.70	0:11:25	4,281.13	44.60	23.50	0:18:25	4,295.81	89.50	11.71	0:25:25	4,399.62	183.32	5.71	0:32:25	286.47	286.47	3.65
0:04:30	4,314.05	22.47	46.69	0:11:30	4,278.61	44.57	23.52	0:18:30	4,337.54	90.37	11.60	0:25:30	4,495.66	187.32	5.59	0:32:30	286.68	286.68	3.65
0:04:35	4,318.04	22.49	46.62	0:11:35	4,284.27	44.63	23.50	0:18:35	4,327.26	90.15	11.62	0:25:35	4,485.60	186.90	5.60	0:32:35	286.68	286.68	3.65
0:04:40	4,317.41	22.49	46.65	0:11:40	4,288.26	44.67	23.46	0:18:40	4,347.19	90.57	11.57	0:25:40	4,374.24	182.26	5.75	0:32:40	286.47	286.47	3.65
0:04:45	4,312.37	22.46	46.65	0:11:45	4,286.16	44.65	23.48	0:18:45	4,311.95	89.83	11.67	0:25:45	4,253.65	177.24	5.91	0:32:45	286.47	286.47	3.65
0:04:50	4,324.75	22.52	46.53	0:11:50	4,272.11	44.50	23.55	0:18:50	4,363.12	90.90	11.53	0:25:50	4,374.87	182.29	5.75	0:32:50	286.47	286.47	3.65
0:04:55	4,338.17	22.59	46.46	0:11:55	4,279.45	44.58	23.53	0:18:55	4,382.21	91.30	11.48	0:25:55	4,380.11	182.50	5.74	0:32:55	286.68	286.68	3.65
0:05:00	4,311.12	22.45	46.67	0:12:00	4,277.77	44.56	23.52	0:19:00	4,348.44	90.59	11.57	0:26:00	4,418.28	184.09	5.69	0:33:00	286.68	286.68	3.65
0:05:05	4,318.67	22.49	46.60	0:12:05	4,273.58	44.52	23.54	0:19:05	4,301.05	89.61	11.70	0:26:05	4,456.03	185.67	5.64	0:33:05	286.47	286.47	3.65
0:05:10	4,319.29	22.50	46.59	0:12:10	4,283.43	44.62	23.49	0:19:10	4,294.34	89.47	11.71	0:26:10	4,539.08	189.13	5.54	0:33:10	286.47	286.47	3.65
0:05:15	4,307.34	22.43	46.75	0:12:15	4,275.04	44.53	23.54	0:19:15	4,273.37	89.03	11.77	0:26:15	4,395.63	183.15	5.72	0:33:15	286.26	286.26	3.65
0:05:20	4,310.49	22.45	46.67	0:12:20	4,272.74	44.63	23.54	0:19:20	4,291.40	89.40	11.72	0:26:20	4,189.06	174.54	6.00	0:33:20	286.47	286.47	3.65
0:05:25	4,316.15	22.48	46.64	0:12:25	4,272.74	44.51	23.55	0:19:25	4,276.93	89.10	11.76	0:26:25	4,378.43	182.43	5.74	0:33:25	286.47	286.47	3.65
0:05:30	4,312.37	22.46	46.76	0:12:30	4,264.98	44.43	23.58	0:19:30	4,355.99	90.75	11.55	0:26:30	4,486.44	186.93	5.60	0:33:30	286.05	286.05	3.66
0:05:35	4,304.40	22.42	46.76	0:12:35	4,282.17	44.61	23.52	0:19:35	4,256.17	88.67	11.82	0:26:35	4,276.93	178.21	5.88	0:33:35	286.68	286.68	3.65
0:05:40	4,311.95	22.46	46.65	0:12:40	4,281.13	44.60	23.51	0:19:40	4,267.91	88.91	11.79	0:26:40	4,431.91	184.66	5.67	0:33:40	286.68	286.68	3.65
0:05:45	4,313.84	22.47	46.68	0:12:45	4,271.06	44.49	23.55	0:19:45	4,367.74	90.99	11.52	0:26:45	4,389.34	182.89	5.73	0:33:45	286.68	286.68	3.65
0:05:50	4,310.70	22.45	46.65	0:12:50	4,279.03	44.57	23.52	0:19:50	4,359.98	90.83	11.54	0:26:50	4,339.85	180.83	5.79	0:33:50	286.26	286.26	3.65
0:05:55	4,318.25	22.49	46.65	0:12:55	4,271.69	44.50	23.56	0:19:55	4,347.40	90.57	11.57	0:26:55	4,515.80	188.16	5.57	0:33:55	286.47	286.47	3.65
0:06:00	4,313.00	22.46	46.68	0:13:00	4,264.14	44.42	23.59	0:20:00	4,310.70	89.81	11.67	0:27:00	4,445.54	185.23	5.65	0:34:00	286.05	286.05	3.66
0:06:05	4,295.60	22.37	46.81	0:13:05	4,279.24	44.58	23.52	0:20:05	4,297.27	89.53	11.72	0:27:05	4,345.51	181.06	5.79	0:34:05	286.68	286.68	3.65
0:06:10	4,314.47	22.47	46.69	0:13:10	4,281.76	44.60	23.53	0:20:10	4,315.31	89.90	11.66	0:27:10	4,232.47	176.35	5.94	0:34:10	286.68	286.68	3.65
0:06:15	4,311.74	22.46	46.74	0:13:15	4,275.88	44.54	23.52	0:20:15	4,247.99	88.50	11.84	0:27:15	4,291.19	178.80	5.86	0:34:15	285.84	285.84	3.66
0:06:20	4,300.63	22.40	46.75	0:13:20	4,275.88	44.54	23.54	0:20:20	4,283.22	89.23	11.75	0:27:20	4,315.73	179.82	5.82	0:34:20	286.68	286.68	3.66
0:06:25	4,307.97	22.44	46.73	0:13:25	4,276.93	44.55	23.53	0:20:25	4,327.47	90.16	11.62	0:27:25	4,049.81	168.74	6.21	0:34:25	286.05	286.05	3.65
0:06:30	4,321.18	22.51	46.57	0:13:30	4,292.45	44.71	23.45	0:20:30	4,332.51	90.26	11.62	0:27:30	4,333.35	180.56	5.80	0:34:30	287.52	287.52	3.65
0:06:35	4,329.57	22.55	46.55	0:13:35	4,274.21	44.52	23.55	0:20:35	4,353.69	90.70	11.55	0:27:35	4,423.94	184.33	5.68	0:34:35	286.68	286.68	3.65
0:06:40	4,317.83	22.49	46.61	0:13:40	4,288.47	44.67	23.46	0:20:40	4,343.41	90.49	11.58	0:27:40	4,444.07	185.17	5.66	0:34:40	286.47	286.47	3.65
0:06:45	599.58	0.00	24.06	0:13:45	416.91	0.00	13.65	0:20:45	407.06	0.00	8.35	0:27:45	343.30	0.00	4.86	0:34:45	24.33	0.00	3.66
0:06:50	0.00	0.00	0.00	0:13:50	0.00	0.00	0.00	0:20:50	0.00	0.00	0.00	0:27:50	0.00	0.00	0.00	0:34:50	0.00	0.00	0.00
												0:27:55	0.00	0.00	0.00				

SPC-2 "Large File Processing/WRITE ONLY/1024 KiB Transfer Size" Average Data Rate Graph – Complete Test Run

SPC-2 "Large File Processing/ WRITE ONLY /1024 KiB Transfer Size" Average Data Rate Graph – Measurement Interval (MI) Only

SPC-2 "Large File Processing/ WRITE ONLY /1024 KiB Transfer Size" Average Data Rate per Stream Graph

SPC-2 "Large File Processing/ WRITE ONLY /1024 KiB Transfer Size" Average Response Time Graph

SPC-2 "Large File Processing/ WRITE ONLY /256 KiB Transfer Size" Test Run Data – Ramp-Up Period

TR6 Test Run Sequence Time	192 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR7 Test Run Sequence Time	96 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR8 Test Run Sequence Time	48 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR9 Test Run Sequence Time	24 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR10 Test Run Sequence Time	1 Stream Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms
0:00:00	0.00	0.00	0.00	0:07:05	665.64	73.96	1.60	0:14:00	0.00	0.00	0.00	0:21:00	0.00	0.00	0.00	0:28:05	202.22	202.22	1.15
0:00:05	1,109.60	46.23	2.97	0:07:10	1,211.68	71.28	3.05	0:14:05	542.85	108.57	1.16	0:21:05	379.74	126.58	1.15	0:28:10	226.65	226.65	1.15
0:00:10	912.94	24.67	8.56	0:07:15	1,255.56	50.22	4.52	0:14:10	1,408.50	128.05	1.49	0:21:10	1,040.87	208.17	1.16	0:28:15	226.86	226.86	1.15
0:00:15	1,318.37	25.35	9.04	0:07:20	1,685.38	52.67	4.53	0:14:15	1,422.92	129.36	2.02	0:21:15	1,292.11	215.35	1.16	0:28:20	226.75	226.75	1.15
0:00:20	1,703.31	25.42	9.11	0:07:25	2,060.92	50.27	4.63	0:14:20	1,557.82	103.85	2.18	0:21:20	1,405.25	200.75	1.22	0:28:25	226.86	226.86	1.15
0:00:25	2,080.85	26.34	9.26	0:07:30	2,407.95	51.23	4.69	0:14:25	1,888.75	99.41	2.24	0:21:25	1,604.69	160.47	1.31	0:28:30	226.60	226.60	1.15
0:00:30	2,381.11	26.17	9.34	0:07:35	3,206.55	58.30	4.30	0:14:30	2,390.44	108.66	2.31	0:21:30	2,180.36	198.21	1.30	0:28:35	226.81	226.81	1.15
0:00:35	2,901.83	28.45	8.76	0:07:40	3,535.43	56.12	4.43	0:14:35	2,605.03	108.54	2.36	0:21:35	2,330.30	194.19	1.29	0:28:40	226.81	226.81	1.15
0:00:40	3,342.91	29.07	8.50	0:07:45	3,411.28	50.91	5.02	0:14:40	3,191.71	110.06	2.19	0:21:40	2,616.88	186.92	1.29	0:28:45	226.91	226.91	1.15
0:00:45	3,397.23	27.18	9.21	0:07:50	3,527.41	49.68	5.08	0:14:45	3,750.18	107.15	2.24	0:21:45	2,898.16	193.21	1.32	0:28:50	226.86	226.86	1.15
0:00:50	3,372.27	25.94	10.00	0:07:55	3,698.38	49.31	5.19	0:14:50	3,781.79	99.52	2.52	0:21:50	3,383.18	187.95	1.28	0:28:55	226.70	226.70	1.15
0:00:55	3,506.91	24.87	10.18	0:08:00	3,829.35	48.47	5.32	0:14:55	3,922.20	100.57	2.58	0:21:55	4,063.23	184.69	1.32	0:29:00	226.75	226.75	1.15
0:01:00	3,663.72	24.75	10.37	0:08:05	3,935.93	48.00	5.39	0:15:00	4,059.04	94.40	2.65	0:22:00	4,402.71	183.45	1.32	0:29:05	226.91	226.91	1.15
0:01:05	3,809.69	23.96	10.54	0:08:10	3,988.89	47.49	5.45	0:15:05	4,225.55	96.04	2.69	0:22:05	4,576.09	190.67	1.37	0:29:10	226.86	226.86	1.15
0:01:10	3,951.98	23.38	10.83	0:08:15	4,092.64	45.98	5.51	0:15:10	4,278.40	93.01	2.75	0:22:10	4,593.39	191.39	1.36	0:29:15	226.91	226.91	1.15
0:01:15	4,065.54	23.64	10.97	0:08:20	4,184.97	45.99	5.64	0:15:15	4,320.24	93.92	2.79	0:22:15	4,441.14	185.05	1.41	0:29:20	226.39	226.39	1.15
0:01:20	4,114.09	23.38	11.05	0:08:25	4,249.35	44.73	5.72	0:15:20	4,406.22	91.80	2.81	0:22:20	4,533.68	188.90	1.38	0:29:25	226.70	226.70	1.15
0:01:25	4,205.42	22.86	11.24	0:08:30	4,314.42	44.94	5.81	0:15:25	4,452.83	92.77	2.82	0:22:25	4,558.74	189.95	1.37	0:29:30	226.70	226.70	1.15
0:01:30	4,303.57	22.41	11.44	0:08:35	4,321.18	45.01	5.82	0:15:30	4,429.81	92.29	2.83	0:22:30	4,644.51	193.52	1.35	0:29:35	226.75	226.75	1.15
0:01:35	4,332.09	22.56	11.61	0:08:40	4,317.93	44.98	5.82	0:15:35	4,410.78	91.89	2.85	0:22:35	4,677.17	194.88	1.34	0:29:40	226.86	226.86	1.15
0:01:40	4,350.28	22.66	11.56	0:08:45	4,330.25	45.11	5.81	0:15:40	4,446.59	92.64	2.82	0:22:40	4,630.93	192.96	1.35	0:29:45	226.91	226.91	1.15
0:01:45	4,333.24	22.57	11.61	0:08:50	4,324.90	45.05	5.81	0:15:45	4,415.76	92.00	2.84	0:22:45	4,524.40	188.52	1.39	0:29:50	226.65	226.65	1.15
0:01:50	4,347.97	22.65	11.57	0:08:55	4,317.30	44.97	5.82	0:15:50	4,366.43	90.97	2.88	0:22:50	4,501.17	187.55	1.39	0:29:55	226.81	226.81	1.15
0:01:55	4,347.50	22.64	11.57	0:09:00	4,322.02	45.02	5.82	0:15:55	4,352.48	90.68	2.89	0:22:55	4,502.32	187.60	1.39	0:30:00	226.60	226.60	1.15
0:02:00	4,338.80	22.60	11.60	0:09:05	4,333.14	45.14	5.80	0:16:00	4,355.57	90.74	2.88	0:23:00	4,492.73	187.20	1.39	0:30:05	226.60	226.60	1.15
0:02:05	4,348.50	22.65	11.57	0:09:10	4,337.43	45.18	5.80	0:16:05	4,389.39	91.45	2.86	0:23:05	4,556.32	189.85	1.38	0:30:10	226.75	226.75	1.15
0:02:10	4,348.03	22.65	11.57	0:09:15	4,315.10	44.95	5.83	0:16:10	4,386.30	91.38	2.86	0:23:10	4,272.21	178.01	1.47	0:30:15	227.07	227.07	1.15
0:02:15	4,355.68	22.69	11.55	0:09:20	4,330.41	45.11	5.81	0:16:15	4,414.92	91.98	2.84	0:23:15	4,422.42	184.27	1.42	0:30:20	226.70	226.70	1.15
0:02:20	4,358.30	22.70	11.54	0:09:25	4,334.39	45.15	5.80	0:16:20	4,373.93	91.12	2.87	0:23:20	4,672.30	194.68	1.34	0:30:25	226.54	226.54	1.15
0:02:25	4,345.35	22.63	11.58	0:09:30	4,328.21	45.09	5.81	0:16:25	4,377.28	91.19	2.87	0:23:25	4,574.26	190.59	1.37	0:30:30	226.49	226.49	1.15
0:02:30	4,355.89	22.69	11.55	0:09:35	4,332.56	45.13	5.80	0:16:30	4,406.12	91.79	2.85	0:23:30	4,287.05	178.63	1.46	0:30:35	226.70	226.70	1.15
0:02:35	4,349.34	22.65	11.57	0:09:40	4,329.05	45.09	5.81	0:16:35	4,394.37	91.55	2.86	0:23:35	4,533.57	188.90	1.38	0:30:40	226.70	226.70	1.15
0:02:40	4,352.74	22.67	11.55	0:09:45	4,332.14	45.13	5.81	0:16:40	4,423.37	92.15	2.84	0:23:40	4,523.19	188.47	1.39	0:30:45	226.75	226.75	1.15
0:02:45	4,347.82	22.64	11.57	0:09:50	4,326.11	45.06	5.81	0:16:45	4,420.32	92.09	2.84	0:23:45	4,326.37	180.27	1.45	0:30:50	226.65	226.65	1.15
0:02:50	4,360.98	22.71	11.53	0:09:55	4,318.19	44.98	5.82	0:16:50	4,498.60	93.72	2.79	0:23:50	4,340.27	180.84	1.44	0:30:55	226.65	226.65	1.15
0:02:55	4,351.43	22.66	11.56	0:10:00	4,329.57	45.10	5.81	0:16:55	4,454.40	92.80	2.82	0:23:55	4,682.99	195.12	1.34	0:31:00	226.60	226.60	1.15
0:03:00	4,340.69	22.61	11.59					0:17:00	4,360.82	90.85	2.88	0:24:00	4,398.25	183.26	1.42				

SPC BENCHMARK 2™ V1.3
IBM Corporation
IBM System Storage DS8700

FULL DISCLOSURE REPORT

Submitted for Review: NOVEMBER 30, 2009
Submission Identifier: B00049

SPC-2 "Large File Processing/ WRITE ONLY /256 KiB Transfer Size" Test Run Data Measurement Interval, Run-Out, and Ramp-Down Periods

TR6 192 Streams				TR7 96 Streams				TR8 48 Streams				TR9 24 Streams				TR10 1 Stream			
Test Run Sequence Time	Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	Test Run Sequence Time	Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	Test Run Sequence Time	Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	Test Run Sequence Time	Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	Test Run Sequence Time	Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms
0:03:05	4,349.07	22.65	11.57	0:10:05	4,324.12	45.04	5.82	0:17:05	4,367.21	90.98	2.88	0:24:05	4,450.00	185.42	1.41	0:31:05	226.70	226.70	1.15
0:03:10	4,355.94	22.69	11.55	0:10:10	4,330.30	45.11	5.81	0:17:10	4,331.04	90.23	2.90	0:24:10	4,455.66	185.65	1.41	0:31:10	226.96	226.96	1.15
0:03:15	4,356.47	22.69	11.55	0:10:15	4,305.30	44.85	5.84	0:17:15	4,352.95	90.69	2.89	0:24:15	4,570.22	190.43	1.37	0:31:15	226.91	226.91	1.15
0:03:20	4,351.85	22.67	11.56	0:10:20	4,315.78	44.96	5.83	0:17:20	4,455.14	92.82	2.82	0:24:20	4,666.95	194.46	1.34	0:31:20	226.96	226.96	1.15
0:03:25	4,344.77	22.63	11.58	0:10:25	4,326.53	45.07	5.81	0:17:25	4,424.47	92.18	2.84	0:24:25	4,432.12	184.67	1.38	0:31:25	226.86	226.86	1.15
0:03:30	4,347.55	22.64	11.58	0:10:30	4,309.07	44.89	5.84	0:17:30	4,378.49	91.22	2.87	0:24:30	4,487.64	186.99	1.40	0:31:30	226.81	226.81	1.15
0:03:35	4,349.02	22.65	11.57	0:10:35	4,325.32	45.06	5.81	0:17:35	4,372.72	91.10	2.87	0:24:35	4,322.49	180.10	1.45	0:31:35	226.81	226.81	1.15
0:03:40	4,340.89	22.61	11.59	0:10:40	4,316.52	44.96	5.82	0:17:40	4,393.69	91.54	2.86	0:24:40	4,598.79	191.62	1.36	0:31:40	226.81	226.81	1.15
0:03:45	4,342.83	22.62	11.59	0:10:45	4,319.77	45.00	5.83	0:17:45	4,396.00	91.58	2.86	0:24:45	4,581.07	190.88	1.37	0:31:45	226.49	226.49	1.15
0:03:50	4,353.74	22.68	11.55	0:10:50	4,309.70	44.89	5.83	0:17:50	4,382.63	91.30	2.87	0:24:50	4,450.10	185.42	1.41	0:31:50	226.91	226.91	1.15
0:03:55	4,341.94	22.61	11.59	0:10:55	4,312.43	44.92	5.83	0:17:55	4,381.58	91.28	2.87	0:24:55	4,578.76	190.78	1.37	0:31:55	226.23	226.23	1.15
0:04:00	4,360.98	22.71	11.55	0:11:00	4,314.42	44.94	5.83	0:18:00	4,431.33	92.32	2.83	0:25:00	4,627.16	192.80	1.35	0:32:00	226.91	226.91	1.15
0:04:05	4,333.19	22.57	11.59	0:11:05	4,320.87	45.01	5.82	0:18:05	4,405.80	91.79	2.85	0:25:05	4,488.01	187.00	1.40	0:32:05	227.02	227.02	1.15
0:04:10	4,342.57	22.62	11.58	0:11:10	4,311.06	44.91	5.83	0:18:10	4,347.76	90.58	2.89	0:25:10	4,474.38	186.43	1.40	0:32:10	226.91	226.91	1.15
0:04:15	4,280.65	22.30	11.55	0:11:15	4,308.86	44.88	5.83	0:18:15	4,373.40	91.11	2.87	0:25:15	4,466.72	186.11	1.40	0:32:15	226.70	226.70	1.15
0:04:20	4,348.65	22.65	11.57	0:11:20	4,319.56	45.00	5.82	0:18:20	4,394.32	91.55	2.86	0:25:20	4,633.50	193.06	1.35	0:32:20	227.02	227.02	1.15
0:04:25	4,361.81	22.72	11.55	0:11:25	4,308.13	44.88	5.83	0:18:25	4,411.57	91.91	2.85	0:25:25	4,500.91	187.54	1.39	0:32:25	226.81	226.81	1.15
0:04:30	4,347.97	22.65	11.57	0:11:30	4,311.33	44.91	5.83	0:18:30	4,411.88	91.91	2.85	0:25:30	4,522.93	188.46	1.39	0:32:30	226.13	226.13	1.15
0:04:35	4,349.13	22.65	11.56	0:11:35	4,322.49	45.03	5.82	0:18:35	4,452.67	92.76	2.82	0:25:35	4,569.27	190.39	1.37	0:32:35	227.12	227.12	1.15
0:04:40	4,357.88	22.70	11.55	0:11:40	4,321.02	45.01	5.82	0:18:40	4,494.77	93.64	2.79	0:25:40	4,613.16	192.21	1.36	0:32:40	226.91	226.91	1.15
0:04:45	4,344.20	22.63	11.58	0:11:45	4,312.74	44.92	5.83	0:18:45	4,479.52	93.32	2.80	0:25:45	4,528.54	188.69	1.38	0:32:45	226.86	226.86	1.15
0:04:50	4,353.11	22.67	11.56	0:11:50	4,319.50	44.99	5.82	0:18:50	4,474.33	93.22	2.81	0:25:50	4,552.76	189.70	1.38	0:32:50	226.81	226.81	1.15
0:04:55	4,347.13	22.64	11.57	0:11:55	4,316.36	44.96	5.83	0:18:55	4,415.66	91.99	2.84	0:25:55	4,606.76	191.95	1.36	0:32:55	226.81	226.81	1.15
0:05:00	4,342.78	22.62	11.58	0:12:00	4,312.48	44.92	5.83	0:19:00	4,379.64	91.24	2.87	0:26:00	4,414.30	183.93	1.42	0:33:00	226.86	226.86	1.15
0:05:05	4,338.33	22.60	11.60	0:12:05	4,318.40	44.98	5.82	0:19:05	4,368.84	91.02	2.87	0:26:05	4,658.04	194.08	1.35	0:33:05	226.75	226.75	1.15
0:05:10	4,351.33	22.66	11.56	0:12:10	4,325.64	45.06	5.81	0:19:10	4,367.11	90.98	2.88	0:26:10	4,670.41	194.60	1.34	0:33:10	226.86	226.86	1.15
0:05:15	4,336.12	22.58	11.60	0:12:15	4,319.35	44.99	5.82	0:19:15	4,402.60	91.72	2.85	0:26:15	4,517.32	188.22	1.39	0:33:15	226.81	226.81	1.15
0:05:20	4,355.84	22.69	11.56	0:12:20	4,315.94	44.96	5.82	0:19:20	4,338.48	90.39	2.90	0:26:20	4,621.13	192.55	1.36	0:33:20	227.02	227.02	1.15
0:05:25	4,342.68	22.62	11.58	0:12:25	4,330.93	45.11	5.81	0:19:25	4,340.32	90.42	2.89	0:26:25	4,646.29	193.60	1.35	0:33:25	226.75	226.75	1.15
0:05:30	4,344.62	22.63	11.58	0:12:30	4,317.25	44.97	5.82	0:19:30	4,473.02	93.19	2.81	0:26:30	4,629.46	192.89	1.35	0:33:30	226.49	226.49	1.15
0:05:35	4,335.44	22.58	11.60	0:12:35	4,324.43	45.05	5.81	0:19:35	4,442.76	92.56	2.83	0:26:35	4,472.23	186.34	1.40	0:33:35	226.96	226.96	1.15
0:05:40	4,348.71	22.65	11.57	0:12:40	4,314.31	44.94	5.83	0:19:40	4,430.86	92.31	2.83	0:26:40	4,556.32	189.85	1.38	0:33:40	226.75	226.75	1.15
0:05:45	4,333.29	22.57	11.61	0:12:45	4,321.40	45.01	5.82	0:19:45	4,380.58	91.26	2.87	0:26:45	4,542.27	189.26	1.38	0:33:45	227.07	227.07	1.15
0:05:50	4,345.30	22.63	11.58	0:12:50	4,322.23	45.02	5.82	0:19:50	4,368.00	91.00	2.87	0:26:50	4,558.21	189.93	1.37	0:33:50	227.07	227.07	1.15
0:05:55	4,332.30	22.56	11.61	0:12:55	4,314.52	44.94	5.83	0:19:55	4,449.42	92.70	2.82	0:26:55	4,446.54	185.27	1.41	0:33:55	226.81	226.81	1.15
0:06:00	4,346.45	22.64	11.57	0:13:00	4,324.07	45.04	5.81	0:20:00	4,393.43	91.53	2.86	0:27:00	4,522.56	188.44	1.39	0:34:00	226.86	226.86	1.15
0:06:05	4,339.11	22.60	11.60	0:13:05	4,328.52	45.09	5.81	0:20:05	4,385.41	91.36	2.86	0:27:05	4,475.11	186.46	1.40	0:34:05	226.75	226.75	1.15
0:06:10	4,344.15	22.63	11.58	0:13:10	4,312.01	44.92	5.83	0:20:10	4,368.89	91.02	2.87	0:27:10	4,331.35	180.47	1.45	0:34:10	226.65	226.65	1.15
0:06:15	4,344.09	22.63	11.58	0:13:15	4,322.96	45.03	5.82	0:20:15	4,435.58	92.41	2.83	0:27:15	4,565.71	190.24	1.37	0:34:15	227.02	227.02	1.15
0:06:20	4,342.36	22.62	11.58	0:13:20	4,315.78	44.96	5.82	0:20:20	4,461.27	92.94	2.82	0:27:20	4,630.20	192.92	1.35	0:34:20	226.81	226.81	1.15
0:06:25	4,348.92	22.65	11.58	0:13:25	4,309.96	44.90	5.83	0:20:25	4,461.80	92.95	2.81	0:27:25	4,550.03	189.58	1.38	0:34:25	226.60	226.60	1.15
0:06:30	4,347.50	22.64	11.57	0:13:30	4,320.40	45.00	5.82	0:20:30	4,463.58	92.99	2.81	0:27:30	4,490.53	187.11	1.40	0:34:30	227.07	227.07	1.15
0:06:35	4,347.92	22.65	11.57	0:13:35	4,315.89	44.96	5.83	0:20:35	4,415.97	92.00	2.84	0:27:35	4,564.66	190.19	1.37	0:34:35	226.81	226.81	1.15
0:06:40	4,354.63	22.68	11.55	0:13:40	4,327.42	45.08	5.81	0:20:40	4,399.09	91.65	2.86	0:27:40	4,620.29	192.51	1.36	0:34:40	226.86	226.86	1.15
0:06:45	4,355.21	22.68	11.55	0:13:45	4,316.88	44.97	5.83	0:20:45	4,407.01	91.81	2.85	0:27:45	4,590.40	191.27	1.37	0:34:45	226.86	226.86	1.15
0:06:50	473.12	0.00	7.05	0:13:50	423.62	0.00	3.57	0:20:50	311.79	0.00	1.98	0:27:50	320.92	0.00	1.33	0:34:50	23.33	0.00	1.15
0:06:55	0.00	0.00	0.00	0:13:55	0.00	0.00	0.00	0:20:55	0.00	0.00	0.00	0:27:55	0.00	0.00	0.00	0:34:55	0.00	0.00	0.00
0:07:00	0.00	0.00	0.00									0:28:00	0.00	0.00	0.00				

SPC BENCHMARK 2™ V1.3

IBM Corporation
IBM System Storage DS8700

FULL DISCLOSURE REPORT

Submitted for Review: NOVEMBER 30, 2009
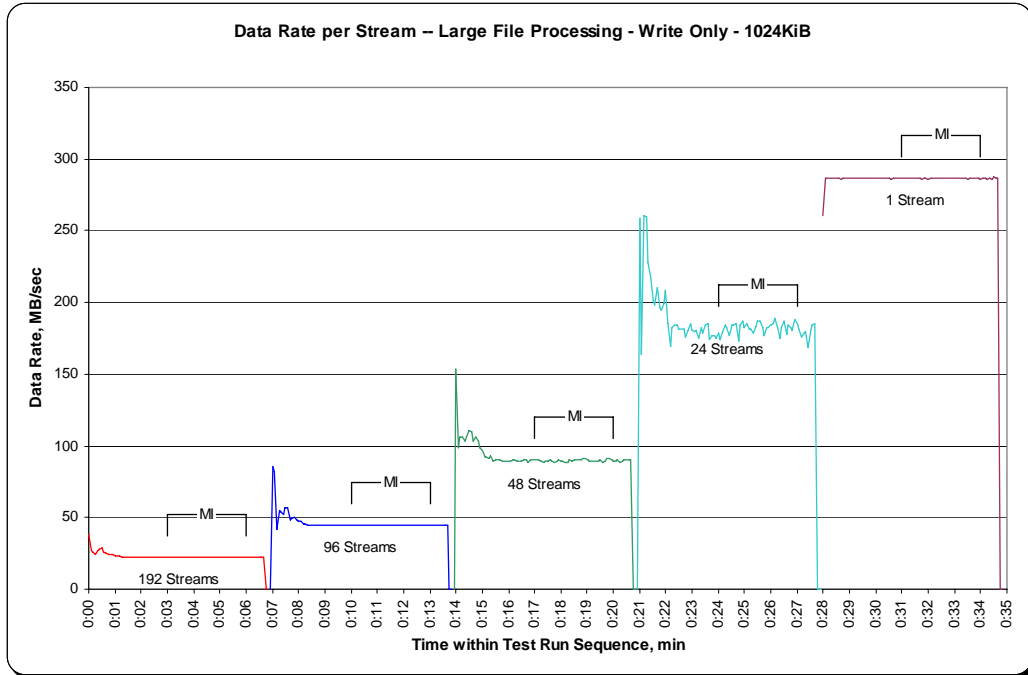Submission Identifier: B00049

SPC-2 "Large File Processing/ WRITE ONLY /256 KiB Transfer Size" Average Data Rate Graph – Complete Test Run
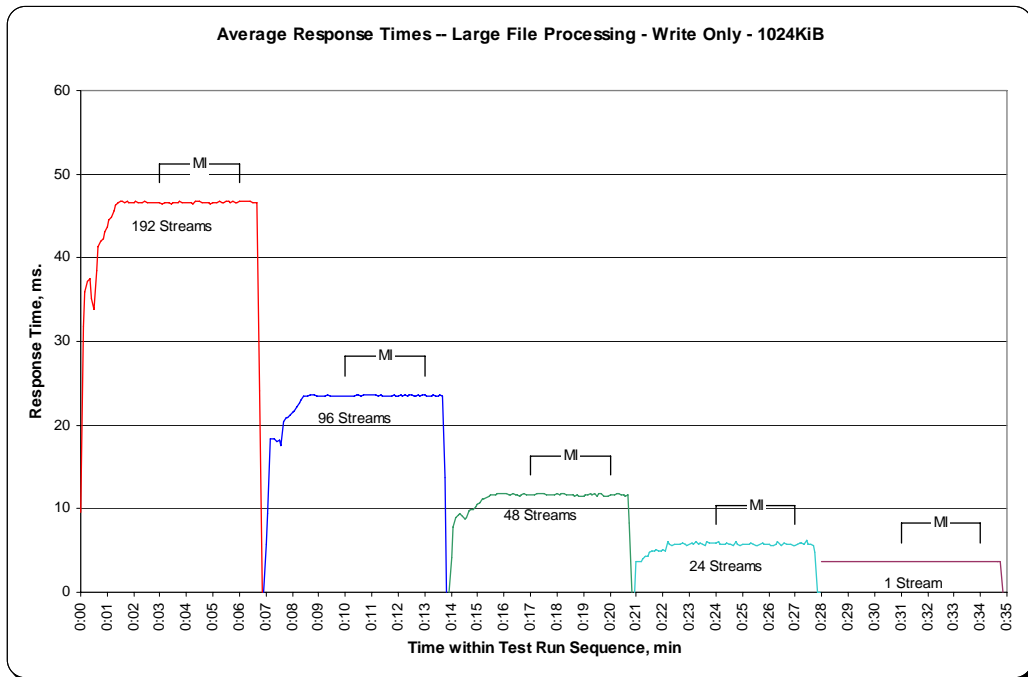

SPC-2 "Large File Processing/ WRITE ONLY /256 KiB Transfer Size" Average Data Rate Graph – Measurement Interval (MI) Only

SPC-2 "Large File Processing/ WRITE ONLY /256 KiB Transfer Size" Average Data Rate per Stream Graph

SPC-2 "Large File Processing/ WRITE ONLY /256 KiB Transfer Size" Average Response Time Graph
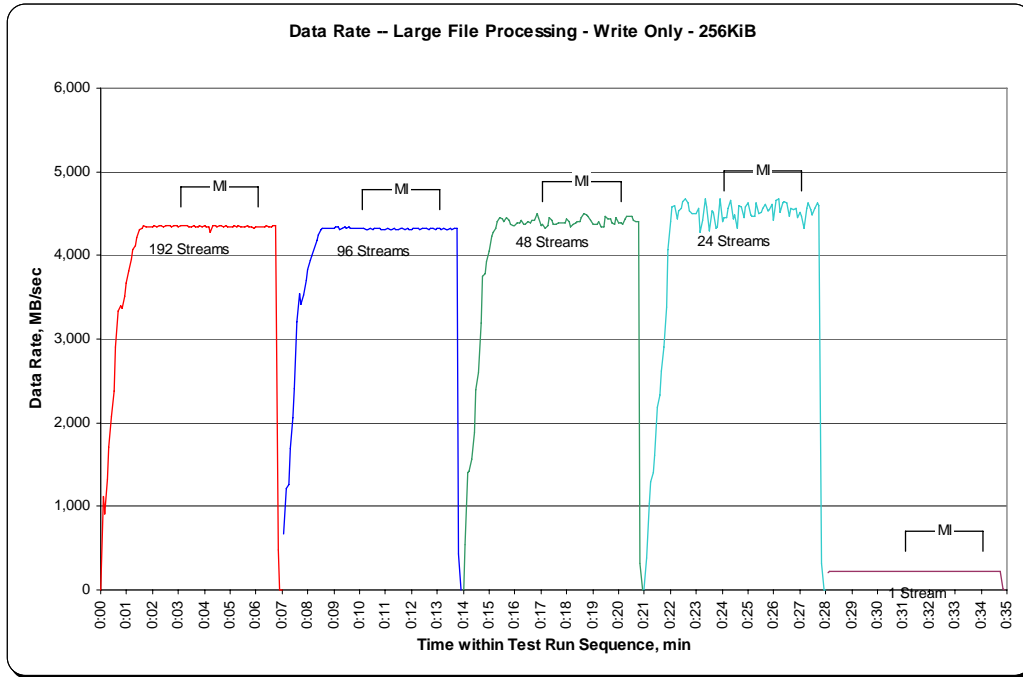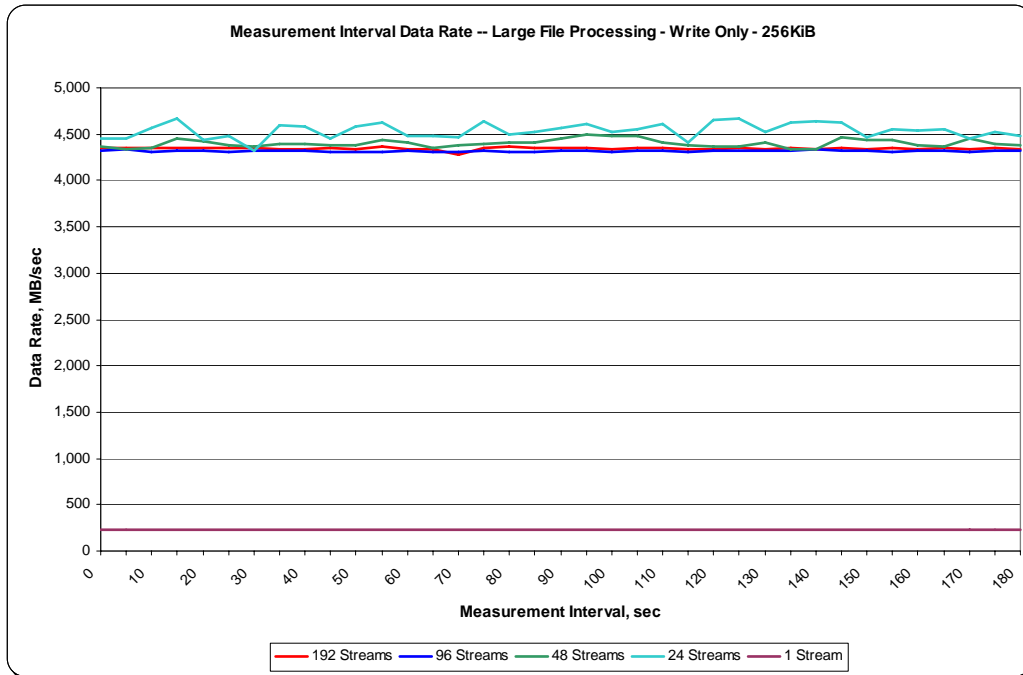
Large File Processing Test – READ-WRITE Test Phase

Clause 10.6.8.1.2

1. *A table that will contain the following information for each "READ-WRITE, 1024 KiB Transfer Size" Test Run:*

   - *The number of Streams specified.*

   - *The average data rate, average data rate per stream, and average Response Time reported at five second intervals.*

2. *Average Data Rate (intervals), Average Data Rate per Stream (intervals), and Average Response Time (intervals) graphs for the "READ-WRITE, 1024 KiB Transfer Size" Test Runs as specified in Clauses 10.1.4 – 10.1.6.*

3. *A table that will contain the following information for each " READ-WRITE, 256 KiB Transfer Size" Test Run:*

   - *The number of Streams specified.*

   - *The average data rate, average data rate per stream, and average Response Time reported at five second intervals.*

4. *Average Data Rate (intervals), Average Data Rate per Stream (intervals), and Average Response Time (intervals) graphs for the "READ-WRITE, 256 KiB Transfer Size" Test Runs as specified in Clauses 10.1.4 – 10.1.6.*

The SPC-2 "Large File Processing/READ-WRITE/1024 KiB Transfer Size" Test Run data is contained in the table that appears on the next page. That table is followed by graphs illustrating the average Data Rate, average Data Rate per Stream, and average Response Time produced by the same Test Runs. The table and graphs present the data at five-second intervals.

Immediately following the SPC-2 "Large File Processing/ READ-WRITE /1024 KiB Transfer Size" table and graphs will be the SPC-2 "Large File Processing/ READ-WRITE /64 KiB Transfer Size" table and graphs. The table contains the Test Run data and the graphs illustrate the average Data Rate, average Data Rate per Stream, and average Response Time produced by the Test Runs.

SPC-2 "Large File Processing/READ-WRITE/1024 KiB Transfer Size" Test Run Data – Ramp-Up Period

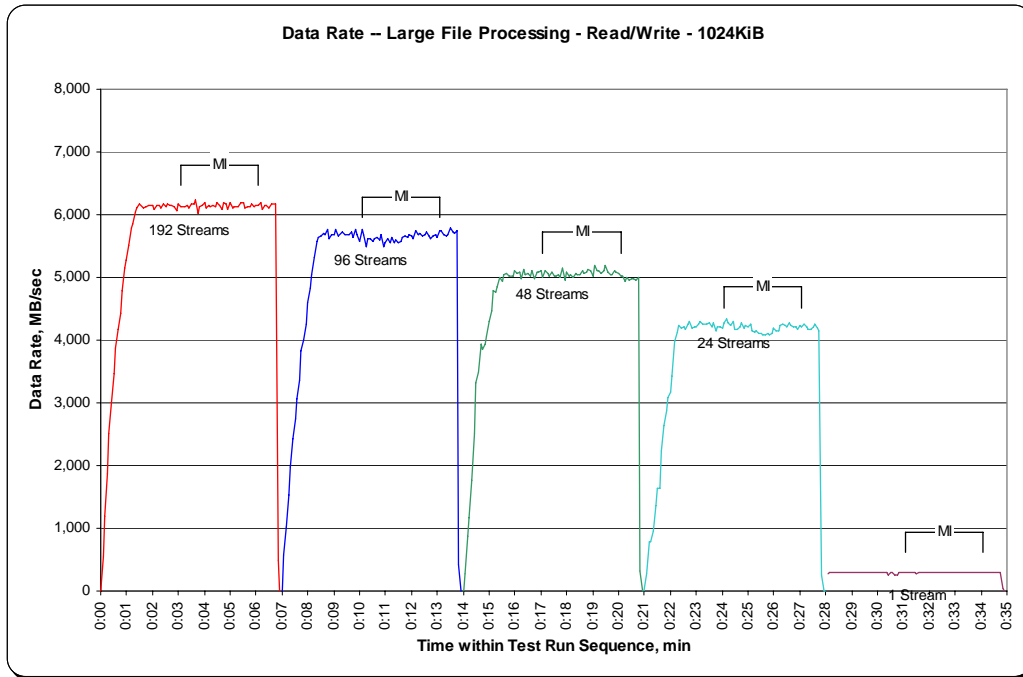| TR11 Test Run Sequence Time	192 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR12 Test Run Sequence Time	96 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR13 Test Run Sequence Time	48 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR14 Test Run Sequence Time	24 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR15 Test Run Sequence Time	1 Stream Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms
0:00:00	0.00	0.00	0.00	0:07:00	0.00	0.00	0.00	0:14:00	0.00	0.00	0.00	0:21:00	0.00	0.00	0.00	0:28:05	268.02	268.02	3.59
0:00:05	550.71	28.98	18.17	0:07:05	579.23	64.36	9.79	0:14:05	282.49	94.16	5.15	0:21:05	270.11	135.06	4.71	0:28:10	299.47	299.47	3.49
0:00:10	1,199.78	32.43	24.40	0:07:10	1,013.97	53.37	13.84	0:14:10	871.16	108.89	7.55	0:21:10	795.24	198.81	5.02	0:28:15	298.84	298.84	3.51
0:00:15	1,867.09	32.19	26.43	0:07:15	1,536.16	66.79	14.50	0:14:15	1,176.29	90.48	9.02	0:21:15	782.66	195.66	5.28	0:28:20	301.57	301.57	3.47
0:00:20	2,519.94	32.73	28.29	0:07:20	1,973.63	56.39	15.83	0:14:20	1,765.80	92.94	8.89	0:21:20	949.17	135.60	6.00	0:28:25	304.30	304.30	3.44
0:00:25	2,990.75	32.87	29.52	0:07:25	2,417.39	65.33	15.65	0:14:25	2,521.20	100.85	9.39	0:21:25	1,371.75	152.42	5.67	0:28:30	300.52	300.52	3.48
0:00:30	3,460.09	34.26	29.01	0:07:30	2,736.57	60.81	15.52	0:14:30	3,311.82	106.83	8.96	0:21:30	1,632.42	181.38	5.78	0:28:35	297.80	297.80	3.52
0:00:35	3,872.81	34.27	28.86	0:07:35	3,056.81	62.38	16.07	0:14:35	3,497.42	102.87	9.51	0:21:35	1,638.09	163.81	5.84	0:28:40	299.68	299.68	3.50
0:00:40	4,173.96	32.11	29.67	0:07:40	3,364.25	62.30	16.08	0:14:40	3,927.97	112.23	9.30	0:21:40	2,242.69	172.51	5.66	0:28:45	301.99	301.99	3.47
0:00:45	4,425.62	32.07	31.51	0:07:45	3,822.69	62.67	15.65	0:14:45	3,853.10	107.03	9.48	0:21:45	2,643.88	176.26	5.58	0:28:50	300.31	300.31	3.49
0:00:50	4,795.56	32.85	30.99	0:07:50	3,995.91	61.48	16.44	0:14:50	3,936.98	109.36	9.62	0:21:50	2,870.16	168.83	5.80	0:28:55	297.17	297.17	3.52
0:00:55	5,140.33	33.16	30.65	0:07:55	4,253.86	59.91	16.67	0:14:55	4,072.67	104.43	9.62	0:21:55	3,083.86	181.40	5.77	0:29:00	300.31	300.31	3.49
0:01:00	5,282.94	32.21	31.34	0:08:00	4,592.13	60.42	17.04	0:15:00	4,290.98	107.27	9.55	0:22:00	3,171.73	176.21	5.88	0:29:05	302.62	302.62	3.46
0:01:05	5,508.80	32.40	31.64	0:08:05	4,839.60	62.05	16.69	0:15:05	4,468.82	103.93	9.66	0:22:05	3,420.87	162.90	5.89	0:29:10	300.31	300.31	3.49
0:01:10	5,783.32	33.05	31.36	0:08:10	5,051.62	60.86	16.53	0:15:10	4,792.62	106.50	9.58	0:22:10	3,968.86	172.56	5.92	0:29:15	302.41	302.41	3.46
0:01:15	5,860.07	32.02	32.06	0:08:15	5,319.85	58.46	17.11	0:15:15	4,760.12	105.78	9.96	0:22:15	4,129.50	179.54	5.83	0:29:20	301.15	301.15	3.48
0:01:20	6,053.01	32.37	31.95	0:08:20	5,575.07	59.95	17.15	0:15:20	4,855.12	103.30	9.96	0:22:20	4,234.57	176.44	5.87	0:29:25	297.38	297.38	3.52
0:01:25	6,111.94	32.00	32.42	0:08:25	5,636.10	59.33	17.72	0:15:25	5,007.16	106.54	9.83	0:22:25	4,200.39	175.02	5.99	0:29:30	299.47	299.47	3.49
0:01:30	6,178.63	32.18	32.45	0:08:30	5,652.66	58.88	17.71	0:15:30	4,942.36	102.97	10.08	0:22:30	4,212.34	175.51	5.93	0:29:35	303.46	303.46	3.45
0:01:35	6,132.49	31.94	32.72	0:08:35	5,710.96	59.49	17.59	0:15:35	5,048.26	105.17	10.02	0:22:35	4,176.90	174.04	6.04	0:29:40	302.62	302.62	3.46
0:01:40	6,110.89	31.83	33.00	0:08:40	5,684.12	59.21	17.71	0:15:40	5,069.03	105.60	9.89	0:22:40	4,252.81	177.20	5.92	0:29:45	300.10	300.10	3.49
0:01:45	6,125.36	31.90	32.83	0:08:45	5,761.93	60.02	17.46	0:15:45	5,021.42	104.61	10.03	0:22:45	4,291.61	178.82	5.86	0:29:50	303.04	303.04	3.45
0:01:50	6,147.38	32.02	32.81	0:08:50	5,613.45	58.47	17.89	0:15:50	5,026.24	104.71	10.01	0:22:50	4,195.35	174.81	5.97	0:29:55	300.31	300.31	3.49
0:01:55	6,159.34	32.08	32.70	0:08:55	5,679.72	59.16	17.73	0:15:55	5,024.78	104.68	10.00	0:22:55	4,208.35	175.35	6.00	0:30:00	301.15	301.15	3.48
0:02:00	6,152.41	32.04	32.70	0:09:00	5,673.43	59.10	17.78	0:16:00	5,103.42	106.32	9.82	0:23:00	4,218.84	175.79	5.94	0:30:05	300.52	300.52	3.48
0:02:05	6,090.76	31.72	33.00	0:09:05	5,758.99	59.99	17.45	0:16:05	5,058.12	105.38	10.00	0:23:05	4,247.99	177.00	5.92	0:30:10	291.50	291.50	3.59
0:02:10	6,140.46	31.98	32.74	0:09:10	5,663.78	59.00	17.75	0:16:10	5,087.48	105.99	9.88	0:23:10	4,288.05	178.67	5.88	0:30:15	300.31	300.31	3.49
0:02:15	6,142.98	31.99	32.75	0:09:15	5,674.47	59.11	17.74	0:16:15	4,976.33	103.67	10.04	0:23:15	4,245.26	176.89	5.91	0:30:20	292.97	292.97	3.57
0:02:20	6,104.39	31.79	33.01	0:09:20	5,723.97	59.62	17.62	0:16:20	5,135.51	106.99	9.86	0:23:20	4,260.99	177.54	5.88	0:30:25	259.00	259.00	4.04
0:02:25	6,177.37	32.17	32.56	0:09:25	5,675.10	59.12	17.66	0:16:25	5,049.73	105.20	9.98	0:23:25	4,261.83	177.58	5.93	0:30:30	295.70	295.70	3.54
0:02:30	6,136.69	31.96	32.89	0:09:30	5,671.12	59.07	17.77	0:16:30	5,063.57	105.49	9.85	0:23:30	4,273.58	178.07	5.88	0:30:35	302.62	302.62	3.46
0:02:35	6,168.56	32.13	32.59	0:09:35	5,677.20	59.14	17.75	0:16:35	5,027.08	104.73	10.10	0:23:35	4,220.52	175.85	5.95	0:30:40	256.06	256.06	4.09
0:02:40	6,150.53	32.03	32.75	0:09:40	5,725.43	59.64	17.49	0:16:40	5,109.29	106.44	9.80	0:23:40	4,285.11	178.55	5.86	0:30:45	247.88	247.88	4.23
0:02:45	6,151.58	32.04	32.61	0:09:45	5,647.42	58.83	17.88	0:16:45	4,985.77	103.87	10.13	0:23:45	4,147.96	172.83	6.05	0:30:50	300.31	300.31	3.49
0:02:50	6,122.01	31.89	32.92	0:09:50	5,773.25	60.14	17.44	0:16:50	5,077.41	105.78	9.91	0:23:50	4,214.86	175.62	5.98	0:30:55	294.02	294.02	3.56
0:02:55	6,068.32	31.61	33.26	0:09:55	5,671.96	59.08	17.78	0:16:55	5,093.14	106.11	9.90	0:23:55	4,217.79	175.74	5.96	0:31:00	302.20	302.20	3.46
0:03:00	6,174.02	32.16	32.57	0:10:00	5,570.04	58.02	18.06	0:17:00	5,105.52	106.36	9.83	0:24:00	4,186.96	174.46	5.99				

SPC BENCHMARK 2™ V1.3

IBM Corporation
IBM System Storage DS8700

FULL DISCLOSURE REPORT

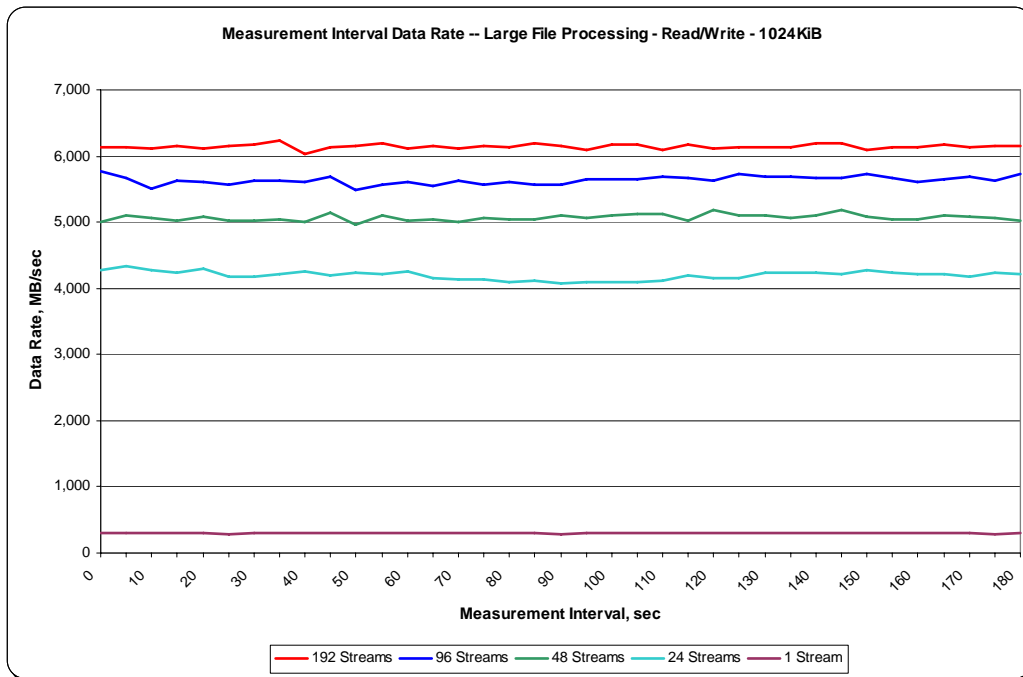Submitted for Review: NOVEMBER 30, 2009

Submission Identifier: B00049

SPC-2 "Large File Processing/READ-WRITE/1024 KiB Transfer Size" Test Run Data
Measurement Interval, Run-Out, and Ramp-Down Periods

TR11 Test Run Sequence Time	192 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR12 Test Run Sequence Time	96 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR13 Test Run Sequence Time	48 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR14 Test Run Sequence Time	24 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR15 Test Run Sequence Time	1 Stream Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms
0:03:05	6,133.33	31.94	32.78	0:10:05	5,762.97	60.03	17.50	0:17:05	5,008.42	104.34	9.98	0:24:05	4,275.67	178.15	5.89	0:31:05	299.05	299.05	3.50
0:03:10	6,137.32	31.97	32.73	0:10:10	5,674.68	59.11	17.70	0:17:10	5,101.95	106.29	9.95	0:24:10	4,336.07	180.67	5.82	0:31:10	297.59	297.59	3.52
0:03:15	6,119.49	31.87	33.02	0:10:15	5,498.10	57.27	18.18	0:17:15	5,073.43	105.70	9.90	0:24:15	4,284.48	178.52	5.86	0:31:15	299.68	299.68	3.49
0:03:20	6,153.46	32.05	32.65	0:10:20	5,625.40	58.60	18.03	0:17:20	5,013.24	104.44	10.03	0:24:20	4,241.28	176.72	5.93	0:31:20	298.01	298.01	3.51
0:03:25	6,114.04	31.84	32.92	0:10:25	5,608.41	58.42	17.93	0:17:25	5,091.89	106.08	9.88	0:24:25	4,303.15	179.30	5.85	0:31:25	293.81	293.81	3.57
0:03:30	6,160.59	32.09	32.53	0:10:30	5,568.36	58.00	17.95	0:17:30	5,023.10	104.65	9.97	0:24:30	4,171.45	173.81	6.02	0:31:30	283.33	283.33	3.70
0:03:35	6,163.53	32.10	32.79	0:10:35	5,623.93	58.58	17.88	0:17:35	5,020.16	104.59	10.00	0:24:35	4,177.95	174.08	6.02	0:31:35	297.59	297.59	3.52
0:03:40	6,223.72	32.42	32.39	0:10:40	5,633.37	58.68	17.89	0:17:40	5,035.89	104.91	10.04	0:24:40	4,220.52	175.85	5.95	0:31:40	301.15	301.15	3.48
0:03:45	6,022.18	31.37	33.36	0:10:45	5,599.82	58.33	18.04	0:17:45	5,007.16	104.32	10.04	0:24:45	4,266.24	177.76	5.90	0:31:45	300.52	300.52	3.48
0:03:50	6,127.25	31.91	32.89	0:10:50	5,687.48	59.24	17.64	0:17:50	5,142.43	107.13	9.81	0:24:50	4,195.98	174.83	5.97	0:31:50	292.76	292.76	3.58
0:03:55	6,150.32	32.03	32.75	0:10:55	5,488.67	57.17	18.23	0:17:55	4,961.65	103.37	10.06	0:24:55	4,232.26	176.34	5.94	0:31:55	303.25	303.25	3.45
0:04:00	6,201.91	32.30	32.44	0:11:00	5,559.34	57.91	18.19	0:18:00	5,095.66	106.16	9.91	0:25:00	4,215.49	175.65	5.98	0:32:00	299.26	299.26	3.50
0:04:05	6,103.13	31.79	33.02	0:11:05	5,612.40	58.46	18.04	0:18:05	5,022.05	104.63	10.05	0:25:05	4,247.57	176.98	5.90	0:32:05	303.04	303.04	3.46
0:04:10	6,148.22	32.02	32.67	0:11:10	5,549.48	57.81	18.01	0:18:10	5,052.88	105.27	9.94	0:25:10	4,158.02	173.25	6.03	0:32:10	300.94	300.94	3.48
0:04:15	6,117.39	31.86	33.01	0:11:15	5,633.58	58.68	17.88	0:18:15	5,009.47	104.36	10.02	0:25:15	4,131.60	172.15	6.11	0:32:15	296.75	296.75	3.53
0:04:20	6,152.62	32.04	32.59	0:11:20	5,561.65	57.93	18.25	0:18:20	5,061.27	105.44	9.94	0:25:20	4,141.25	172.55	6.07	0:32:20	302.41	302.41	3.46
0:04:25	6,138.15	31.97	32.94	0:11:25	5,600.65	58.34	17.78	0:18:25	5,040.50	105.01	10.02	0:25:25	4,100.35	170.85	6.11	0:32:25	298.01	298.01	3.51
0:04:30	6,184.29	32.21	32.49	0:11:30	5,563.74	57.96	18.06	0:18:30	5,044.70	105.10	9.94	0:25:30	4,115.03	171.46	6.13	0:32:30	302.62	302.62	3.46
0:04:35	6,156.19	32.06	32.62	0:11:35	5,576.33	58.09	18.09	0:18:35	5,104.47	106.34	9.88	0:25:35	4,074.56	169.77	6.18	0:32:35	287.94	287.94	3.49
0:04:40	6,094.74	31.74	33.11	0:11:40	5,642.81	58.78	17.85	0:18:40	5,071.12	105.65	9.82	0:25:40	4,086.09	170.25	6.16	0:32:40	299.47	299.47	3.50
0:04:45	6,181.36	32.19	32.50	0:11:45	5,651.41	58.87	17.66	0:18:45	5,093.77	106.12	9.94	0:25:45	4,103.92	171.00	6.11	0:32:45	300.73	300.73	3.48
0:04:50	6,171.50	32.14	32.61	0:11:50	5,644.27	58.79	18.06	0:18:50	5,126.70	106.81	9.85	0:25:50	4,091.12	170.46	6.16	0:32:50	299.47	299.47	3.49
0:04:55	6,084.26	31.69	33.12	0:11:55	5,691.46	59.29	17.72	0:18:55	5,116.21	106.59	9.83	0:25:55	4,107.69	171.15	6.11	0:32:55	301.57	301.57	3.48
0:05:00	6,182.82	32.20	32.57	0:12:00	5,670.07	59.06	17.68	0:19:00	5,023.10	104.65	9.95	0:26:00	4,198.29	174.93	6.00	0:33:00	299.05	299.05	3.50
0:05:05	6,114.04	31.84	32.89	0:12:05	5,625.40	58.60	17.86	0:19:05	5,190.03	108.13	9.74	0:26:05	4,148.38	172.85	6.06	0:33:05	299.05	299.05	3.50
0:05:10	6,133.33	31.94	32.82	0:12:10	5,736.97	59.76	17.47	0:19:10	5,110.34	106.47	9.86	0:26:10	4,154.46	173.10	6.02	0:33:10	302.20	302.20	3.47
0:05:15	6,132.70	31.94	32.86	0:12:15	5,685.38	59.22	17.82	0:19:15	5,109.29	106.44	9.83	0:26:15	4,238.13	176.59	5.94	0:33:15	299.47	299.47	3.50
0:05:20	6,126.41	31.91	32.82	0:12:20	5,696.28	59.34	17.59	0:19:20	5,056.44	105.34	9.96	0:26:20	4,245.06	176.88	5.94	0:33:20	300.10	300.10	3.51
0:05:25	6,201.07	32.30	32.52	0:12:25	5,666.71	59.03	17.85	0:19:25	5,102.58	106.30	9.78	0:26:25	4,233.94	176.41	5.92	0:33:25	300.10	300.10	3.49
0:05:30	6,190.58	32.24	32.43	0:12:30	5,677.83	59.14	17.70	0:19:30	5,188.35	108.09	9.75	0:26:30	4,211.50	175.48	5.95	0:33:30	301.36	301.36	3.47
0:05:35	6,097.26	31.76	33.06	0:12:35	5,722.71	59.61	17.62	0:19:35	5,074.69	105.72	9.83	0:26:35	4,273.16	178.05	5.92	0:33:35	300.31	300.31	3.49
0:05:40	6,123.05	31.89	32.80	0:12:40	5,665.04	59.01	17.65	0:19:40	5,046.59	105.14	10.05	0:26:40	4,238.34	176.60	5.94	0:33:40	299.05	299.05	3.49
0:05:45	6,131.44	31.93	32.92	0:12:45	5,613.87	58.48	18.03	0:19:45	5,050.57	105.22	9.92	0:26:45	4,220.52	175.85	5.96	0:33:45	301.15	301.15	3.49
0:05:50	6,165.00	32.11	32.65	0:12:50	5,653.29	58.89	17.78	0:19:50	5,100.48	106.26	9.92	0:26:50	4,222.62	175.94	5.94	0:33:50	300.31	300.31	3.49
0:05:55	6,137.11	31.96	32.72	0:12:55	5,687.27	59.24	17.73	0:19:55	5,090.21	106.05	9.84	0:26:55	4,172.91	173.87	6.01	0:33:55	299.68	299.68	3.50
0:06:00	6,151.37	32.04	32.85	0:13:00	5,632.32	58.67	17.88	0:20:00	5,063.36	105.49	9.92	0:27:00	4,238.76	176.62	5.94	0:34:00	288.36	288.36	3.63
0:06:05	6,157.24	32.07	32.69	0:13:05	5,738.23	59.77	17.44	0:20:05	5,021.84	104.62	10.02	0:27:05	4,222.20	175.92	5.97	0:34:05	302.83	302.83	3.46
0:06:10	6,184.92	32.21	32.51	0:13:10	5,734.87	59.74	17.54	0:20:10	5,013.87	104.46	10.10	0:27:10	4,257.85	177.41	5.88	0:34:10	300.73	300.73	3.48
0:06:15	6,087.19	31.70	33.07	0:13:15	5,680.98	59.18	17.77	0:20:15	4,933.76	102.79	10.15	0:27:15	4,212.76	175.53	5.99	0:34:15	300.52	300.52	3.48
0:06:20	6,143.40	32.00	32.74	0:13:20	5,658.54	58.94	17.80	0:20:20	4,996.05	104.08	10.01	0:27:20	4,160.33	173.35	6.04	0:34:20	301.15	301.15	3.48
0:06:25	6,142.14	31.99	32.82	0:13:25	5,688.32	59.25	17.76	0:20:25	4,951.17	103.15	10.21	0:27:25	4,160.54	173.36	6.05	0:34:25	296.96	296.96	3.52
0:06:30	6,104.81	31.80	33.06	0:13:30	5,794.85	60.36	17.36	0:20:30	4,987.24	103.90	10.09	0:27:30	4,211.50	175.48	5.97	0:34:30	295.28	295.28	3.55
0:06:35	6,164.37	32.11	32.60	0:13:35	5,714.11	59.52	17.61	0:20:35	4,980.32	103.76	10.16	0:27:35	4,264.77	177.70	5.89	0:34:35	298.42	298.42	3.51
0:06:40	6,166.68	32.12	32.60	0:13:40	5,700.27	59.38	17.66	0:20:40	4,955.78	103.25	10.08	0:27:40	4,195.98	174.83	6.00	0:34:40	300.73	300.73	3.48
0:06:45	6,161.22	32.09	32.68	0:13:45	5,746.41	59.86	17.47	0:20:45	5,000.87	104.18	10.12	0:27:45	4,144.60	172.69	6.09	0:34:45	299.89	299.89	3.49
0:06:50	479.62	0.00	40.24	0:13:50	423.41	0.00	18.37	0:20:50	311.22	0.00	12.01	0:27:50	247.88	0.00	6.50	0:34:50	32.72	0.00	3.52
0:06:55	0.00	0.00	0.00	0:13:55	0.00	0.00	0.00	0:20:55	0.00	0.00	0.00	0:27:55	0.00	0.00	0.00	0:34:55	0.00	0.00	0.00
												0:28:00	0.00	0.00	0.00				

SPC BENCHMARK 2™ V1.3

IBM Corporation
IBM System Storage DS8700

FULL DISCLOSURE REPORT

Submitted for Review: NOVEMBER 30, 2009

Submission Identifier: B00049

SPC-2 "Large File Processing/ READ-WRITE/1024 KiB Transfer Size" Average Data Rate Graph – Complete Test Run

SPC-2 "Large File Processing/ READ-WRITE/1024 KiB Transfer Size" Average Data Rate Graph – Measurement Interval (MI) Only
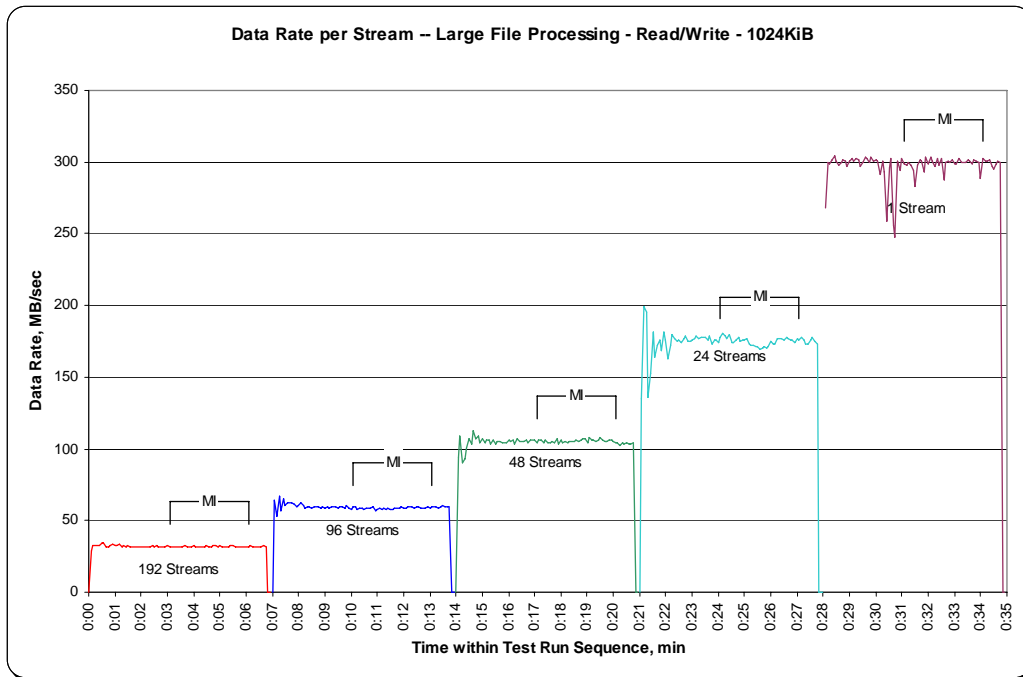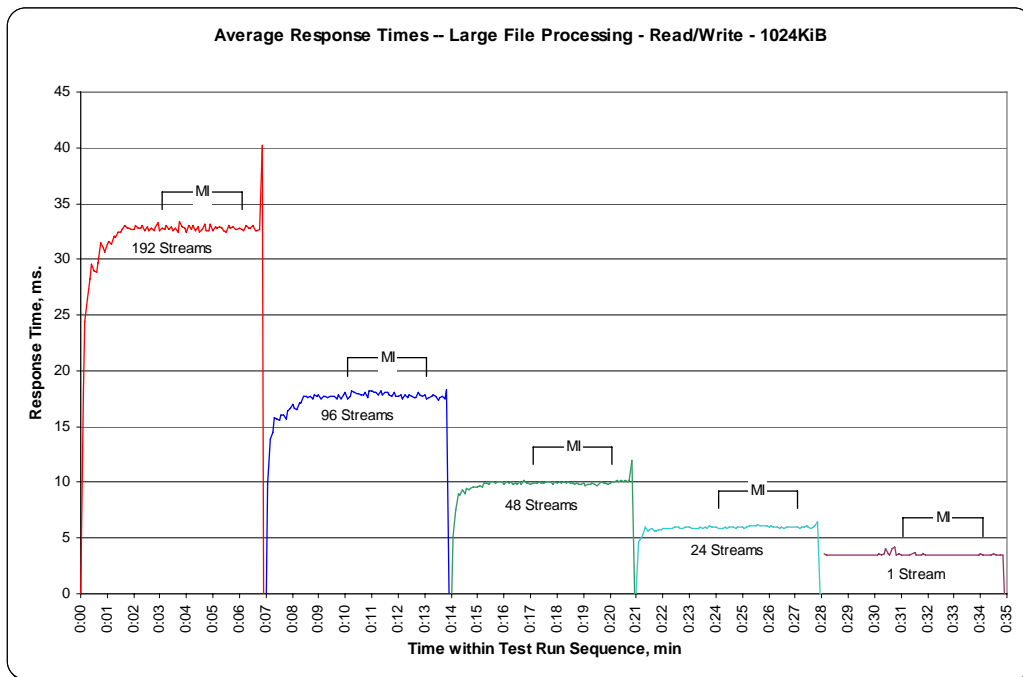
SPC-2 "Large File Processing/READ-WRITE/1024 KiB Transfer Size" Average Data Rate per Stream Graph

SPC-2 "Large File Processing/READ-WRITE/1024 KiB Transfer Size" Average Response Time Graph
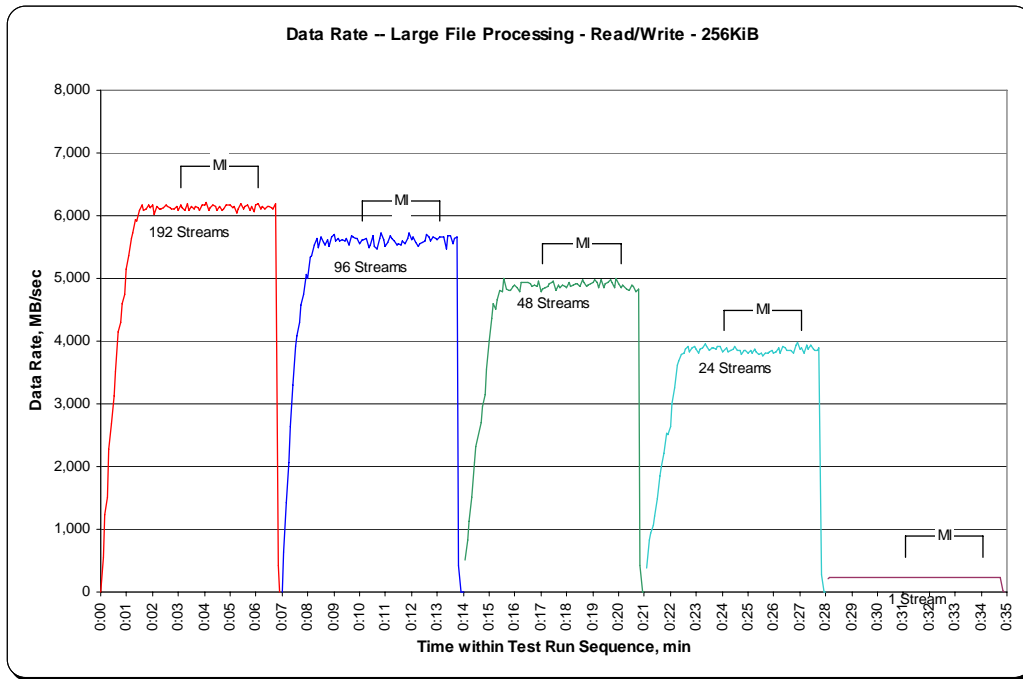
SPC-2 "Large File Processing/READ-WRITE/256 KiB Transfer Size" Test Run Data – Ramp-Up Period

TR16 Test Run Sequence Time	192 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR17 Test Run Sequence Time	96 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR18 Test Run Sequence Time	48 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR19 Test Run Sequence Time	24 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR20 Test Run Sequence Time	1 Stream Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms
0:00:00	0.00	0.00	0.00	0:07:00	0.00	0.00	0.00	0:14:05	500.12	83.35	1.66	0:21:05	378.80	126.27	1.29	0:28:05	216.58	216.58	1.09
0:00:05	549.03	28.90	4.11	0:07:05	631.03	45.07	2.84	0:14:10	824.23	103.03	2.13	0:21:10	821.30	164.26	1.49	0:28:10	240.70	240.70	1.08
0:00:10	1,240.99	37.61	5.63	0:07:10	1,426.90	62.04	3.59	0:14:15	1,131.78	94.32	2.34	0:21:15	937.01	156.17	1.54	0:28:15	239.97	239.97	1.09
0:00:15	1,503.34	28.91	7.29	0:07:15	2,064.86	57.36	3.81	0:14:20	1,516.56	89.21	2.36	0:21:20	1,056.28	150.90	1.53	0:28:20	240.81	240.81	1.08
0:00:20	2,273.10	33.43	6.94	0:07:20	2,641.83	56.21	4.04	0:14:25	2,069.21	98.53	2.42	0:21:25	1,207.17	150.90	1.59	0:28:25	242.48	242.48	1.08
0:00:25	2,680.21	33.50	7.42	0:07:25	3,302.70	61.16	3.96	0:14:30	2,314.63	105.21	2.41	0:21:30	1,487.09	148.71	1.58	0:28:30	243.11	243.11	1.07
0:00:30	3,133.30	33.33	7.28	0:07:30	3,918.48	62.20	3.97	0:14:35	2,511.02	104.63	2.42	0:21:35	1,850.58	154.21	1.61	0:28:35	239.49	239.49	1.09
0:00:35	3,520.44	32.90	7.39	0:07:35	4,086.35	62.87	4.15	0:14:40	2,698.20	103.78	2.41	0:21:40	2,000.16	153.86	1.57	0:28:40	242.85	242.85	1.07
0:00:40	4,143.82	34.53	7.15	0:07:40	4,299.00	60.55	4.20	0:14:45	2,962.33	105.80	2.40	0:21:45	2,218.16	158.44	1.55	0:28:45	241.02	241.02	1.08
0:00:45	4,291.14	32.76	7.63	0:07:45	4,563.93	59.27	4.24	0:14:50	3,158.26	98.70	2.45	0:21:50	2,521.46	168.10	1.54	0:28:50	238.45	238.45	1.09
0:00:50	4,590.35	33.26	7.64	0:07:50	4,746.80	57.19	4.34	0:14:55	3,556.56	104.60	2.38	0:21:55	2,503.42	166.89	1.57	0:28:55	241.85	241.85	1.08
0:00:55	4,753.56	32.34	7.80	0:07:55	5,065.30	61.03	4.30	0:15:00	3,989.73	102.30	2.50	0:22:00	2,629.30	154.66	1.60	0:29:00	242.80	242.80	1.07
0:01:00	5,138.65	32.52	7.68	0:08:00	5,003.49	58.86	4.37	0:15:05	4,351.64	98.90	2.46	0:22:05	2,995.41	157.65	1.63	0:29:05	241.96	241.96	1.08
0:01:05	5,367.66	32.53	7.90	0:08:05	5,331.27	61.99	4.21	0:15:10	4,592.71	104.38	2.53	0:22:10	3,257.09	162.85	1.58	0:29:10	240.23	240.23	1.09
0:01:10	5,641.76	32.99	7.88	0:08:10	5,363.83	58.94	4.34	0:15:15	4,513.65	102.58	2.54	0:22:15	3,607.89	163.99	1.56	0:29:15	243.01	243.01	1.07
0:01:15	5,731.36	32.75	7.83	0:08:15	5,527.10	59.43	4.34	0:15:20	4,656.25	99.07	2.57	0:22:20	3,676.46	159.85	1.60	0:29:20	237.29	237.29	1.10
0:01:20	5,929.33	33.12	7.87	0:08:20	5,642.96	60.68	4.29	0:15:25	4,807.41	100.15	2.59	0:22:25	3,792.23	158.01	1.61	0:29:25	240.49	240.49	1.09
0:01:25	5,908.67	31.94	8.03	0:08:25	5,496.95	57.26	4.55	0:15:30	4,786.38	99.72	2.63	0:22:30	3,805.07	158.54	1.65	0:29:30	239.76	239.76	1.09
0:01:30	6,090.50	31.89	8.06	0:08:30	5,654.39	58.90	4.46	0:15:35	4,997.41	104.11	2.52	0:22:35	3,881.20	161.72	1.62	0:29:35	241.07	241.07	1.08
0:01:35	6,165.52	32.11	8.15	0:08:35	5,568.20	58.00	4.50	0:15:40	4,833.78	100.70	2.58	0:22:40	3,910.45	162.94	1.60	0:29:40	236.77	236.77	1.10
0:01:40	6,082.84	31.68	8.29	0:08:40	5,532.39	57.63	4.52	0:15:45	4,800.07	100.00	2.63	0:22:45	3,821.74	159.24	1.64	0:29:45	240.12	240.12	1.09
0:01:45	6,101.72	31.78	8.26	0:08:45	5,610.77	58.45	4.49	0:15:50	4,802.16	100.05	2.61	0:22:50	3,901.65	162.57	1.61	0:29:50	241.02	241.02	1.08
0:01:50	6,175.64	32.16	8.13	0:08:50	5,510.37	57.40	4.59	0:15:55	4,870.32	101.47	2.57	0:22:55	3,910.19	162.92	1.60	0:29:55	241.70	241.70	1.08
0:01:55	6,136.95	31.96	8.19	0:08:55	5,651.82	58.87	4.43	0:16:00	4,885.84	101.79	2.58	0:23:00	3,870.82	161.28	1.62	0:30:00	242.22	242.22	1.08
0:02:00	6,166.52	32.12	8.15	0:09:00	5,711.80	59.50	4.41	0:16:05	4,855.85	101.16	2.58	0:23:05	3,807.01	158.63	1.65	0:30:05	243.37	243.37	1.07
0:02:05	6,029.73	31.40	8.20	0:09:05	5,600.86	58.34	4.47	0:16:10	4,797.08	99.94	2.56	0:23:10	3,872.92	161.37	1.62	0:30:10	239.91	239.91	1.09
0:02:10	6,140.57	31.98	8.20	0:09:10	5,638.72	58.74	4.48	0:16:15	4,939.53	102.91	2.53	0:23:15	3,888.33	162.01	1.62	0:30:15	232.84	232.84	1.12
0:02:15	6,114.98	31.85	8.23	0:09:15	5,591.37	58.24	4.49	0:16:20	4,934.91	102.81	2.54	0:23:20	3,958.64	164.94	1.58	0:30:20	233.88	233.88	1.12
0:02:20	6,114.98	31.85	8.22	0:09:20	5,625.30	58.60	4.45	0:16:25	4,934.70	102.81	2.55	0:23:25	3,911.50	162.98	1.60	0:30:25	235.98	235.98	1.11
0:02:25	6,136.06	31.96	8.19	0:09:25	5,600.18	58.34	4.49	0:16:30	4,936.43	102.84	2.54	0:23:30	3,859.65	160.82	1.63	0:30:30	242.59	242.59	1.08
0:02:30	6,160.70	32.09	8.17	0:09:30	5,643.65	58.79	4.49	0:16:35	4,920.44	102.51	2.55	0:23:35	3,902.59	162.61	1.60	0:30:35	242.17	242.17	1.08
0:02:35	6,152.05	32.04	8.15	0:09:35	5,539.21	57.70	4.55	0:16:40	4,875.88	101.58	2.58	0:23:40	3,895.77	162.32	1.61	0:30:40	232.00	232.00	1.13
0:02:40	6,126.36	31.91	8.25	0:09:40	5,676.05	59.13	4.41	0:16:45	4,887.94	101.83	2.56	0:23:45	3,872.60	161.36	1.62	0:30:45	238.92	238.92	1.09
0:02:45	6,111.63	31.83	8.23	0:09:45	5,660.37	58.96	4.45	0:16:50	4,878.55	101.64	2.57	0:23:50	3,916.54	163.19	1.60	0:30:50	242.01	242.01	1.08
0:02:50	6,096.53	31.75	8.26	0:09:50	5,634.21	58.69	4.47	0:16:55	4,947.08	103.06	2.54	0:23:55	3,904.63	162.69	1.61	0:30:55	235.25	235.25	1.11
0:02:55	6,141.61	31.99	8.17	0:09:55	5,642.86	58.78	4.45	0:17:00	4,779.25	99.57	2.63	0:24:00	3,833.44	159.73	1.63	0:31:00	240.96	240.96	1.08
0:03:00	6,091.07	31.72	8.28	0:10:00	5,546.50	57.78	4.53												

SPC BENCHMARK 2™ V1.3

IBM Corporation
IBM System Storage DS8700

FULL DISCLOSURE REPORT

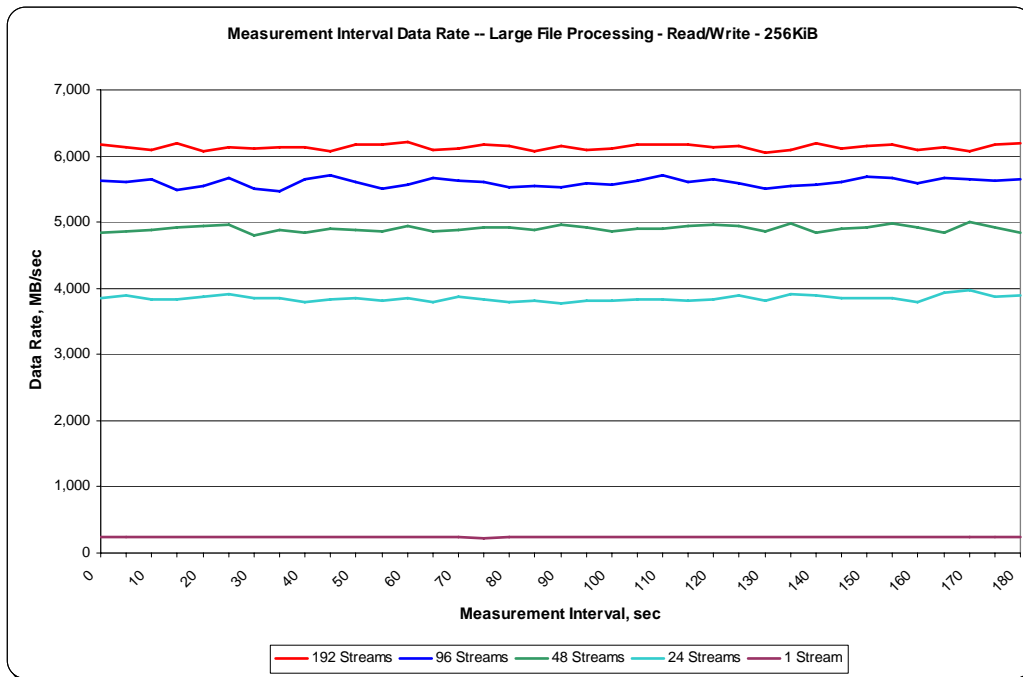Submitted for Review: NOVEMBER 30, 2009

Submission Identifier: B00049

SPC-2 "Large File Processing/READ-WRITE/256 KiB Transfer Size" Test Run Data
Measurement Interval, Run-Out, and Ramp-Down Periods

TR16	192 Streams			TR17	96 Streams			TR18	48 Streams			TR19	24 Streams			TR20	1 Stream		
Test Run Sequence Time	Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	Test Run Sequence Time	Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	Test Run Sequence Time	Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	Test Run Sequence Time	Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	Test Run Sequence Time	Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms
0:03:05	6,178.89	32.18	8.13	0:10:05	5,621.99	58.56	4.48	0:17:05	4,837.50	100.78	2.59	0:24:05	3,846.02	160.25	1.64	0:31:05	241.64	241.64	1.08
0:03:10	6,137.89	31.97	8.20	0:10:10	5,608.94	58.43	4.48	0:17:10	4,857.48	101.20	2.58	0:24:10	3,887.54	161.98	1.61	0:31:10	243.95	243.95	1.07
0:03:15	6,090.02	31.72	8.26	0:10:15	5,638.51	58.73	4.44	0:17:15	4,876.66	101.60	2.58	0:24:15	3,838.05	159.92	1.64	0:31:15	241.75	241.75	1.08
0:03:20	6,186.60	32.22	8.12	0:10:20	5,495.64	57.25	4.57	0:17:20	4,917.77	102.45	2.55	0:24:20	3,842.24	160.09	1.63	0:31:20	232.73	232.73	1.12
0:03:25	6,076.71	31.65	8.29	0:10:25	5,540.52	57.71	4.56	0:17:25	4,937.59	102.87	2.54	0:24:25	3,866.78	161.12	1.62	0:31:25	241.22	241.22	1.08
0:03:30	6,140.83	31.98	8.19	0:10:30	5,677.51	59.14	4.43	0:17:30	4,952.48	103.18	2.54	0:24:30	3,918.21	163.26	1.61	0:31:30	241.38	241.38	1.08
0:03:35	6,113.57	31.84	8.23	0:10:35	5,509.27	57.39	4.56	0:17:35	4,801.59	100.03	2.62	0:24:35	3,856.35	160.68	1.63	0:31:35	238.45	238.45	1.09
0:03:40	6,140.36	31.98	8.20	0:10:40	5,473.36	57.01	4.58	0:17:40	4,891.08	101.90	2.56	0:24:40	3,858.97	160.79	1.63	0:31:40	241.38	241.38	1.08
0:03:45	6,133.17	31.94	8.18	0:10:45	5,638.61	58.74	4.47	0:17:45	4,850.40	101.05	2.59	0:24:45	3,790.92	157.95	1.65	0:31:45	241.28	241.28	1.08
0:03:50	6,078.02	31.66	8.29	0:10:50	5,717.83	59.56	4.39	0:17:50	4,894.65	101.97	2.57	0:24:50	3,842.61	160.11	1.63	0:31:50	241.91	241.91	1.08
0:03:55	6,175.75	32.17	8.14	0:10:55	5,616.02	58.50	4.48	0:17:55	4,876.51	101.59	2.57	0:24:55	3,849.37	160.39	1.63	0:31:55	240.70	240.70	1.08
0:04:00	6,174.75	32.16	8.15	0:11:00	5,501.25	57.30	4.54	0:18:00	4,852.76	101.10	2.58	0:25:00	3,817.45	159.06	1.64	0:32:00	240.33	240.33	1.09
0:04:05	6,215.64	32.37	8.09	0:11:05	5,569.35	58.01	4.55	0:18:05	4,936.17	102.84	2.56	0:25:05	3,851.42	160.48	1.63	0:32:05	239.08	239.08	1.09
0:04:10	6,093.48	31.74	8.29	0:11:10	5,674.68	59.11	4.43	0:18:10	4,865.55	101.37	2.58	0:25:10	3,801.51	158.40	1.65	0:32:10	238.71	238.71	1.09
0:04:15	6,120.17	31.88	8.24	0:11:15	5,630.12	58.65	4.47	0:18:15	4,887.78	101.83	2.55	0:25:15	3,865.99	161.08	1.62	0:32:15	241.17	241.17	1.08
0:04:20	6,178.52	32.18	8.13	0:11:20	5,604.80	58.38	4.47	0:18:20	4,918.87	102.48	2.56	0:25:20	3,824.73	159.36	1.64	0:32:20	230.90	230.90	1.13
0:04:25	6,143.97	32.00	8.20	0:11:25	5,529.19	57.60	4.55	0:18:25	4,921.18	102.52	2.55	0:25:25	3,791.23	157.97	1.66	0:32:25	240.07	240.07	1.09
0:04:30	6,076.86	31.65	8.27	0:11:30	5,547.49	57.79	4.52	0:18:30	4,879.97	101.67	2.59	0:25:30	3,810.47	158.77	1.65	0:32:30	242.22	242.22	1.08
0:04:35	6,142.82	31.99	8.17	0:11:35	5,532.92	57.63	4.51	0:18:35	4,970.56	103.55	2.52	0:25:35	3,772.72	157.20	1.66	0:32:35	240.65	240.65	1.08
0:04:40	6,092.70	31.73	8.28	0:11:40	5,594.26	58.27	4.53	0:18:40	4,928.78	102.68	2.56	0:25:40	3,818.39	159.10	1.64	0:32:40	235.82	235.82	1.11
0:04:45	6,108.90	31.82	8.23	0:11:45	5,561.59	57.93	4.51	0:18:45	4,868.96	101.44	2.56	0:25:45	3,817.55	159.06	1.64	0:32:45	241.80	241.80	1.08
0:04:50	6,166.26	32.12	8.16	0:11:50	5,627.86	58.62	4.48	0:18:50	4,897.43	102.03	2.56	0:25:50	3,836.53	159.86	1.63	0:32:50	242.38	242.38	1.08
0:04:55	6,165.42	32.11	8.17	0:11:55	5,714.74	59.53	4.40	0:18:55	4,906.65	102.22	2.56	0:25:55	3,841.51	160.06	1.63	0:32:55	242.75	242.75	1.07
0:05:00	6,173.70	32.15	8.15	0:12:00	5,608.47	58.42	4.49	0:19:00	4,937.85	102.87	2.55	0:26:00	3,803.24	158.47	1.65	0:33:00	240.49	240.49	1.09
0:05:05	6,128.72	31.92	8.23	0:12:05	5,656.39	58.92	4.43	0:19:05	4,971.30	103.57	2.52	0:26:05	3,825.05	159.38	1.64	0:33:05	240.02	240.02	1.09
0:05:10	6,156.40	32.06	8.19	0:12:10	5,584.09	58.17	4.52	0:19:10	4,945.82	103.04	2.54	0:26:10	3,886.13	161.92	1.60	0:33:10	240.28	240.28	1.09
0:05:15	6,048.08	31.50	8.31	0:12:15	5,505.81	57.35	4.55	0:19:15	4,860.36	101.26	2.59	0:26:15	3,814.77	158.95	1.65	0:33:15	238.60	238.60	1.09
0:05:20	6,099.72	31.77	8.25	0:12:20	5,544.61	57.76	4.49	0:19:20	4,976.28	103.67	2.53	0:26:20	3,920.36	163.35	1.60	0:33:20	241.12	241.12	1.08
0:05:25	6,199.08	32.29	8.11	0:12:25	5,567.15	57.99	4.56	0:19:25	4,844.00	100.92	2.59	0:26:25	3,890.90	162.12	1.61	0:33:25	239.81	239.81	1.09
0:05:30	6,112.94	31.84	8.23	0:12:30	5,600.60	58.34	4.49	0:19:30	4,904.87	102.18	2.56	0:26:30	3,857.55	160.73	1.62	0:33:30	242.54	242.54	1.08
0:05:35	6,146.80	32.01	8.18	0:12:35	5,695.24	59.33	4.42	0:19:35	4,927.63	102.66	2.54	0:26:35	3,848.43	160.35	1.63	0:33:35	241.59	241.59	1.08
0:05:40	6,179.36	32.18	8.15	0:12:40	5,661.37	58.97	4.43	0:19:40	4,983.83	103.83	2.52	0:26:40	3,851.63	160.48	1.63	0:33:40	242.01	242.01	1.08
0:05:45	6,093.75	31.74	8.25	0:12:45	5,586.45	58.19	4.50	0:19:45	4,930.88	102.73	2.54	0:26:45	3,799.41	158.31	1.65	0:33:45	240.70	240.70	1.08
0:05:50	6,140.57	31.98	8.17	0:12:50	5,665.04	59.01	4.43	0:19:50	4,843.84	100.91	2.59	0:26:50	3,929.64	163.74	1.59	0:33:50	242.12	242.12	1.08
0:05:55	6,062.55	31.58	8.32	0:12:55	5,643.49	58.79	4.46	0:19:55	5,005.43	104.28	2.52	0:26:55	3,974.89	165.62	1.59	0:33:55	240.49	240.49	1.09
0:06:00	6,166.89	32.12	8.17	0:13:00	5,627.08	58.62	4.47	0:20:00	4,918.40	102.47	2.55	0:27:00	3,864.32	161.01	1.62	0:34:00	241.75	241.75	1.08
0:06:05	6,193.15	32.26	8.14	0:13:05	5,652.98	58.89	4.45	0:20:05	4,842.80	100.89	2.60	0:27:05	3,899.71	162.49	1.61	0:34:05	242.06	242.06	1.08
0:06:10	6,111.05	31.83	8.19	0:13:10	5,659.43	58.95	4.44	0:20:10	4,884.79	101.77	2.57	0:27:10	3,804.76	158.53	1.65	0:34:10	241.22	241.22	1.08
0:06:15	6,147.43	32.02	8.20	0:13:15	5,658.22	58.94	4.45	0:20:15	4,852.97	101.10	2.60	0:27:15	3,925.92	163.58	1.60	0:34:15	240.86	240.86	1.08
0:06:20	6,116.13	31.85	8.26	0:13:20	5,475.61	57.04	4.58	0:20:20	4,819.99	100.42	2.60	0:27:20	3,866.47	161.10	1.62	0:34:20	241.96	241.96	1.08
0:06:25	6,146.60	32.01	8.18	0:13:25	5,680.35	59.17	4.45	0:20:25	4,816.11	100.34	2.60	0:27:25	3,933.79	163.91	1.60	0:34:25	237.82	237.82	1.10
0:06:30	6,143.45	32.00	8.18	0:13:30	5,678.72	59.15	4.42	0:20:30	4,888.41	101.84	2.57	0:27:30	3,879.52	161.65	1.61	0:34:30	232.05	232.05	1.12
0:06:35	6,135.43	31.96	8.19	0:13:35	5,558.34	57.90	4.43	0:20:35	4,868.07	101.42	2.57	0:27:35	3,850.69	160.45	1.64	0:34:35	239.08	239.08	1.09
0:06:40	6,100.93	31.78	8.23	0:13:40	5,635.83	58.71	4.45	0:20:40	4,778.83	99.56	2.64	0:27:40	3,850.74	160.45	1.63	0:34:40	237.29	237.29	1.10
0:06:45	6,182.56	32.20	8.17	0:13:45	5,659.01	58.95	4.46	0:20:45	4,839.81	100.83	2.58	0:27:45	3,850.69	161.96	1.61	0:34:45	240.86	240.86	1.08
0:06:50	423.57	0.00	9.67	0:13:50	428.61	0.00	4.43	0:20:50	416.34	0.00	2.59	0:27:50	283.17	0.00	1.59	0:34:50	20.50	0.00	1.07
0:06:55	0.00	0.00	0.00	0:13:55	0.00	0.00	0.00	0:20:55	0.00	0.00	0.00	0:27:55	0.00	0.00	0.00	0:34:55	0.00	0.00	0.00
				0:14:00	0.00	0.00	0.00	0:21:00	0.00	0.00	0.00	0:28:00	0.00	0.00	0.00				

SPC BENCHMARK 2™ V1.3

IBM Corporation
IBM System Storage DS8700

FULL DISCLOSURE REPORT

Submitted for Review: NOVEMBER 30, 2009

Submission Identifier: B00049

SPC-2 "Large File Processing/READ-WRITE/256 KiB Transfer Size" Average Data Rate Graph – Complete Test Run

SPC-2 "Large File Processing/READ-WRITE/256 KiB Transfer Size" Average Data Rate Graph – Measurement Interval (MI) Only

SPC-2 "Large File Processing/READ-WRITE/256 KiB Transfer Size" Average Data Rate per Stream Graph

SPC-2 "Large File Processing/READ-WRITE/256 KiB Transfer Size" Average Response Time Graph

Large File Processing Test – READ ONLY Test Phase

Clause 10.6.8.1.3

1. *A table that will contain the following information for each "READ ONLY, 1024 KiB Transfer Size" Test Run:*

   - *The number of Streams specified.*
   - *The average data rate, average data rate per stream, and average Response Time reported at five second intervals.*

2. *Average Data Rate (intervals), Average Data Rate per Stream (intervals), and Average Response Time (intervals) graphs for the "READ ONLY, 1024 KiB Transfer Size" Test Runs as specified in Clauses 10.1.4 – 10.1.6.*

3. *A table that will contain the following information for each "READ ONLY, 256 KiB Transfer Size" Test Run:*

   - *The number of Streams specified.*
   - *The average data rate, average data rate per stream, and average Response Time reported at five second intervals.*

4. *Average Data Rate (intervals), Average Data Rate per Stream (intervals), and Average Response Time (intervals) graphs for the "READ ONLY, 256 KiB Transfer Size" Test Runs as specified in Clauses 10.1.4 – 10.1.6.*

The SPC-2 "Large File Processing/READ ONLY/1024 KiB Transfer Size" Test Run data is contained in the table that appears on the next page. That table is followed by graphs illustrating the average Data Rate, average Data Rate per Stream, and average Response Time produced by the same Test Runs. The table and graphs present the data at five-second intervals.

Immediately following the SPC-2 "Large File Processing/READ ONLY/1024 KiB Transfer Size" table and graphs will be the SPC-2 "Large File Processing/READ ONLY/64 KiB Transfer Size" table and graphs. The table contains the Test Run data and the graphs illustrate the average Data Rate, average Data Rate per Stream, and average Response Time produced by the Test Runs.
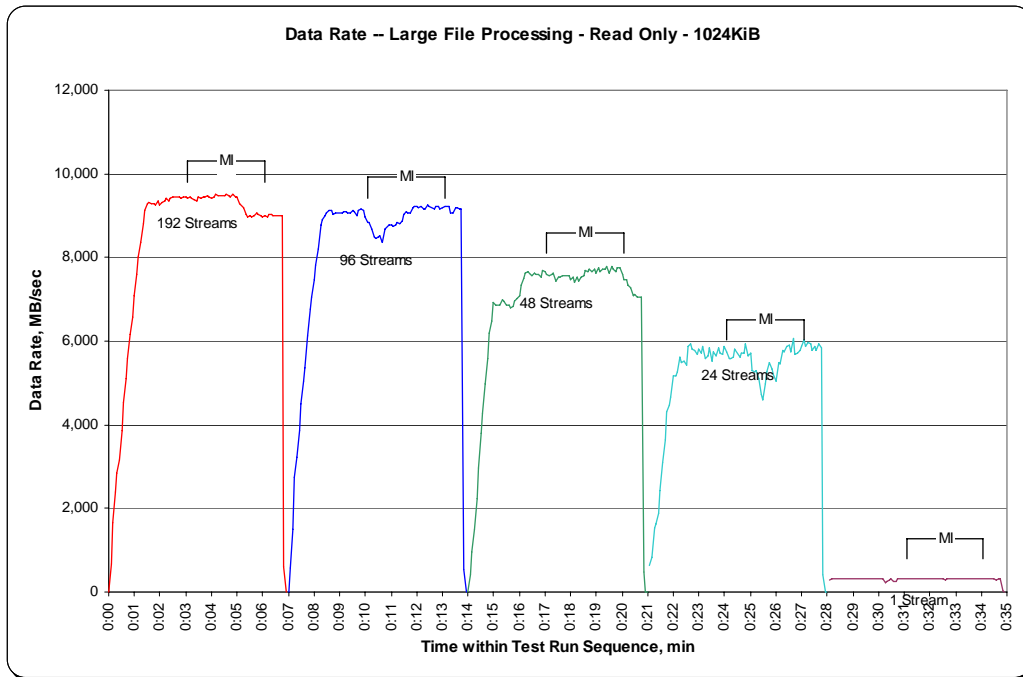
SPC-2 "Large File Processing/READ ONLY/1024 KiB Transfer Size" Test Run Data – Ramp Up Period

TR21 Test Run Sequence Time	192 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR22 Test Run Sequence Time	96 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR23 Test Run Sequence Time	48 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR24 Test Run Sequence Time	24 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR25 Test Run Sequence Time	1 Stream Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms
0:00:00	0.00	0.00	0.00	0:07:00	0.00	0.00	0.00	0:14:00	0.00	0.00	0.00	0:21:05	624.53	208.18	3.78	0:28:05	278.50	278.50	3.35
0:00:05	676.54	35.61	16.41	0:07:05	568.54	71.07	7.99	0:14:05	406.64	135.55	4.78	0:21:10	823.97	205.99	4.22	0:28:10	310.59	310.59	3.37
0:00:10	1,647.31	43.35	19.30	0:07:10	1,509.53	71.88	9.41	0:14:10	968.67	138.38	4.91	0:21:15	1,517.92	252.99	3.70	0:28:15	306.60	306.60	3.41
0:00:15	2,377.75	46.62	19.82	0:07:15	2,758.80	91.96	10.23	0:14:15	1,499.25	166.58	5.48	0:21:20	1,634.31	233.47	4.12	0:28:20	318.14	318.14	3.29
0:00:20	2,845.21	49.06	20.23	0:07:20	3,222.90	92.08	10.34	0:14:20	2,227.39	171.34	5.46	0:21:25	1,867.72	207.52	4.23	0:28:25	304.72	304.72	3.43
0:00:25	3,175.30	44.72	21.01	0:07:25	3,857.50	87.67	10.54	0:14:25	2,970.20	148.51	5.63	0:21:30	2,432.91	221.17	4.26	0:28:30	310.59	310.59	3.37
0:00:30	3,869.66	45.00	20.90	0:07:30	4,507.83	92.00	10.74	0:14:30	3,788.51	145.71	6.20	0:21:35	3,108.40	222.03	4.40	0:28:35	315.20	315.20	3.32
0:00:35	4,530.69	46.23	21.22	0:07:35	5,050.78	97.13	10.51	0:14:35	4,271.06	164.27	6.38	0:21:40	3,625.56	226.60	4.27	0:28:40	307.23	307.23	3.41
0:00:40	5,111.18	47.33	20.96	0:07:40	5,361.37	89.36	10.66	0:14:40	4,966.89	160.22	6.18	0:21:45	4,322.44	240.14	4.23	0:28:45	309.75	309.75	3.38
0:00:45	5,588.49	47.76	21.11	0:07:45	6,133.12	92.93	10.70	0:14:45	5,584.08	155.11	6.31	0:21:50	4,461.27	247.85	4.23	0:28:50	311.43	311.43	3.36
0:00:50	6,172.97	47.85	20.86	0:07:50	6,764.15	95.27	10.70	0:14:50	6,187.65	162.83	6.21	0:21:55	4,660.92	233.05	4.18	0:28:55	311.22	311.22	3.36
0:00:55	6,572.26	47.28	21.20	0:07:55	7,057.34	92.86	10.84	0:14:55	6,478.52	166.12	6.18	0:22:00	5,167.80	246.09	4.22	0:29:00	308.28	308.28	3.40
0:01:00	7,099.07	47.33	21.36	0:08:00	7,458.31	95.62	10.82	0:15:00	6,929.20	161.14	6.39	0:22:05	5,169.90	246.19	4.25	0:29:05	311.01	311.01	3.37
0:01:05	7,588.75	47.14	21.39	0:08:05	7,809.58	94.09	10.70	0:15:05	6,856.22	159.45	6.57	0:22:10	5,262.80	239.22	4.20	0:29:10	314.15	314.15	3.33
0:01:10	8,007.56	48.24	21.46	0:08:10	8,213.29	93.33	10.90	0:15:10	6,853.07	152.29	6.69	0:22:15	5,630.43	255.93	4.09	0:29:15	312.69	312.69	3.35
0:01:15	8,375.82	48.14	21.21	0:08:15	8,775.74	94.36	10.91	0:15:15	6,859.16	145.94	7.03	0:22:20	5,503.98	250.18	4.19	0:29:20	310.80	310.80	3.36
0:01:20	8,812.02	48.15	21.30	0:08:20	8,914.99	94.84	10.94	0:15:20	6,976.18	145.34	7.13	0:22:25	5,509.64	239.55	4.29	0:29:25	315.41	315.41	3.32
0:01:25	9,139.81	48.62	21.44	0:08:25	9,007.90	93.83	11.04	0:15:25	6,946.40	144.72	7.24	0:22:30	5,435.82	226.49	4.54	0:29:30	310.38	310.38	3.37
0:01:30	9,275.28	48.31	21.41	0:08:30	9,077.94	94.56	11.08	0:15:30	6,847.62	142.66	7.35	0:22:35	5,877.06	244.88	4.28	0:29:35	304.09	304.09	3.45
0:01:35	9,308.42	48.48	21.64	0:08:35	9,118.63	94.99	11.04	0:15:35	6,847.62	142.66	7.34	0:22:40	5,920.26	246.68	4.25	0:29:40	303.88	303.88	3.44
0:01:40	9,275.70	48.31	21.69	0:08:40	9,138.55	95.19	11.00	0:15:40	6,792.89	141.52	7.41	0:22:45	5,805.13	241.88	4.33	0:29:45	311.22	311.22	3.36
0:01:45	9,294.58	48.41	21.64	0:08:45	9,047.11	94.24	11.13	0:15:45	6,832.52	142.34	7.36	0:22:50	5,766.96	240.29	4.36	0:29:50	307.23	307.23	3.41
0:01:50	9,248.44	48.17	21.77	0:08:50	9,065.99	94.44	11.10	0:15:50	6,958.98	144.98	7.23	0:22:55	5,678.67	236.61	4.43	0:29:55	313.73	313.73	3.34
0:01:55	9,350.78	48.70	21.52	0:08:55	9,064.52	94.42	11.10	0:15:55	7,019.38	146.24	7.17	0:23:00	5,796.95	241.54	4.33	0:30:00	313.52	313.52	3.34
0:02:00	9,254.73	48.20	21.75	0:09:00	9,060.33	94.38	11.10	0:16:00	7,087.12	147.65	7.10	0:23:05	5,699.01	237.46	4.41	0:30:05	309.12	309.12	3.40
0:02:05	9,309.26	48.49	21.62	0:09:05	9,078.15	94.56	11.08	0:16:05	7,348.00	153.08	6.84	0:23:10	5,876.43	244.85	4.28	0:30:10	317.30	317.30	3.30
0:02:10	9,344.70	48.67	21.55	0:09:10	9,084.23	94.63	11.08	0:16:10	7,498.79	156.22	6.71	0:23:15	5,583.25	232.64	4.50	0:30:15	234.25	234.25	4.47
0:02:15	9,407.61	49.00	21.39	0:09:15	9,084.86	94.63	11.08	0:16:15	7,625.24	158.86	6.60	0:23:20	5,640.50	235.02	4.46	0:30:20	249.56	249.56	4.20
0:02:20	9,342.60	48.66	21.54	0:09:20	9,064.10	94.42	11.10	0:16:20	7,647.26	159.32	6.58	0:23:25	5,843.29	243.47	4.30	0:30:25	302.62	302.62	3.46
0:02:25	9,418.52	49.05	21.38	0:09:25	9,064.73	94.42	11.10	0:16:25	7,608.89	158.52	6.61	0:23:30	5,523.69	230.15	4.55	0:30:30	307.65	307.65	3.40
0:02:30	9,446.83	49.20	21.30	0:09:30	9,116.53	94.96	11.03	0:16:30	7,569.88	157.71	6.64	0:23:35	5,731.52	238.81	4.38	0:30:35	254.17	254.17	4.12
0:02:35	9,450.82	49.22	21.30	0:09:35	9,081.72	94.60	11.08	0:16:35	7,616.23	158.67	6.61	0:23:40	5,640.50	235.02	4.46	0:30:40	252.71	252.71	4.15
0:02:40	9,449.14	49.21	21.30	0:09:40	9,013.35	93.89	11.17	0:16:40	7,607.63	158.49	6.61	0:23:45	5,843.08	243.46	4.30	0:30:45	306.39	306.39	3.42
0:02:45	9,434.46	49.14	21.32	0:09:45	9,123.24	95.03	11.03	0:16:45	7,589.38	158.11	6.62	0:23:50	5,708.87	237.87	4.40	0:30:50	308.49	308.49	3.39
0:02:50	9,426.28	49.10	21.37	0:09:50	9,160.57	95.42	10.99	0:16:50	7,536.95	157.02	6.68	0:23:55	5,675.31	236.47	4.43	0:30:55	311.43	311.43	3.36
0:02:55	9,435.09	49.14	21.34	0:09:55	9,127.43	95.08	11.02	0:16:55	7,679.98	160.00	6.55	0:24:00	5,870.56	244.61	4.28	0:31:00	309.54	309.54	3.38
0:03:00	9,438.86	49.16	21.33	0:10:00	8,957.78	93.31	11.23	0:17:00	7,667.19	159.73	6.56								

SPC BENCHMARK 2™ V1.3

IBM Corporation
IBM System Storage DS8700

FULL DISCLOSURE REPORT

Submitted for Review: NOVEMBER 30, 2009
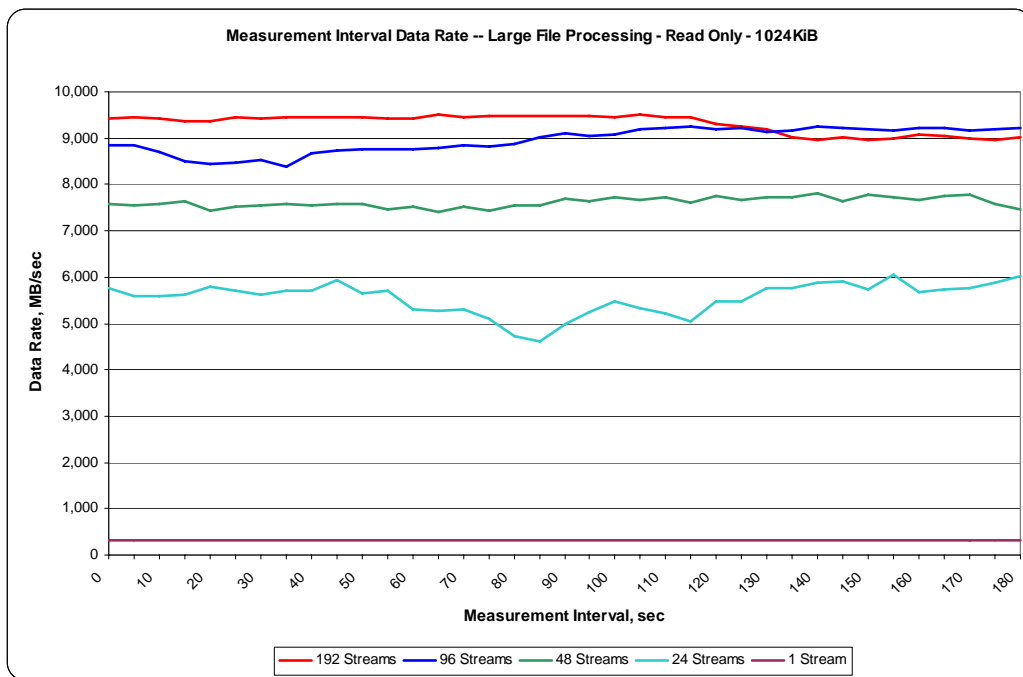Submission Identifier: B00049

SPC-2 "Large File Processing/READ ONLY/1024 KiB Transfer Size" Test Run Data
Measurement Interval, Run-Out, and Ramp-Down Periods

TR21	192 Streams			TR22	96 Streams			TR23	48 Streams			TR24	24 Streams			TR25	1 Stream		
Test Run Sequence Time	Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	Test Run Sequence Time	Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	Test Run Sequence Time	Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	Test Run Sequence Time	Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	Test Run Sequence Time	Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms
0:03:05	9,426.70	49.10	21.34	0:10:05	8,833.20	92.01	11.40	0:17:05	7,582.25	157.96	6.63	0:24:05	5,760.25	240.01	4.36	0:31:05	305.14	305.14	3.43
0:03:10	9,438.65	49.16	21.34	0:10:10	8,847.67	92.16	11.37	0:17:10	7,561.91	157.54	6.65	0:24:10	5,576.96	232.37	4.51	0:31:10	308.07	308.07	3.40
0:03:15	9,426.70	49.10	21.34	0:10:15	8,691.02	90.53	11.58	0:17:15	7,584.77	158.02	6.63	0:24:15	5,577.38	232.39	4.51	0:31:15	310.38	310.38	3.37
0:03:20	9,369.45	48.80	21.44	0:10:20	8,499.76	88.54	11.83	0:17:20	7,640.76	159.18	6.58	0:24:20	5,615.75	233.99	4.48	0:31:20	307.86	307.86	3.40
0:03:25	9,358.33	48.74	21.55	0:10:25	8,444.81	87.97	11.92	0:17:25	7,425.18	154.69	6.78	0:24:25	5,794.85	241.45	4.34	0:31:25	305.97	305.97	3.42
0:03:30	9,438.86	49.16	21.33	0:10:30	8,482.56	88.36	11.87	0:17:30	7,532.97	156.94	6.67	0:24:30	5,703.00	237.62	4.41	0:31:30	307.65	307.65	3.40
0:03:35	9,459.84	49.11	21.30	0:10:35	8,518.21	88.73	11.81	0:17:35	7,536.12	157.00	6.67	0:24:35	5,619.95	234.16	4.47	0:31:35	306.18	306.18	3.42
0:03:40	9,459.41	49.27	21.30	0:10:40	8,375.40	87.24	12.01	0:17:40	7,573.03	157.77	6.64	0:24:40	5,702.16	237.59	4.41	0:31:40	310.38	310.38	3.37
0:03:45	9,457.53	49.26	21.26	0:10:45	8,678.01	90.40	11.59	0:17:45	7,557.72	157.45	6.65	0:24:45	5,713.69	238.07	4.40	0:31:45	313.52	313.52	3.34
0:03:50	9,462.98	49.29	21.28	0:10:50	8,718.70	90.82	11.55	0:17:50	7,579.11	157.90	6.64	0:24:50	5,925.92	246.91	4.24	0:31:50	312.90	312.90	3.34
0:03:55	9,448.72	49.21	21.32	0:10:55	8,767.14	91.32	11.47	0:17:55	7,577.22	157.86	6.63	0:24:55	5,653.50	235.56	4.45	0:31:55	312.06	312.06	3.36
0:04:00	9,412.65	49.02	21.36	0:11:00	8,760.85	91.26	11.49	0:18:00	7,470.47	155.63	6.73	0:25:00	5,715.58	238.15	4.40	0:32:00	308.28	308.28	3.39
0:04:05	9,436.76	49.15	21.33	0:11:05	8,754.77	91.20	11.50	0:18:05	7,535.49	156.99	6.67	0:25:05	5,298.24	220.76	4.74	0:32:05	314.99	314.99	3.33
0:04:10	9,511.42	49.54	21.16	0:11:10	8,779.31	91.45	11.46	0:18:10	7,394.14	154.04	6.67	0:25:10	5,276.85	219.87	4.76	0:32:10	310.38	310.38	3.37
0:04:15	9,463.19	49.29	21.16	0:11:15	8,840.54	92.09	11.38	0:18:15	7,530.03	156.88	6.68	0:25:15	5,293.21	220.55	4.75	0:32:15	311.64	311.64	3.36
0:04:20	9,490.03	49.43	21.22	0:11:20	8,818.94	91.86	11.41	0:18:20	7,434.61	154.89	6.77	0:25:20	5,113.28	213.05	4.91	0:32:20	311.64	311.64	3.36
0:04:25	9,481.85	49.38	21.22	0:11:25	8,869.48	92.39	11.35	0:18:25	7,545.55	157.20	6.66	0:25:25	4,736.00	197.33	5.31	0:32:25	305.56	305.56	3.43
0:04:30	9,491.29	49.43	21.20	0:11:30	9,027.19	94.03	11.14	0:18:30	7,558.35	157.47	6.65	0:25:30	4,609.96	192.08	5.46	0:32:30	310.80	310.80	3.37
0:04:35	9,494.86	49.45	21.21	0:11:35	9,103.74	94.83	11.05	0:18:35	7,707.24	160.57	6.53	0:25:35	4,975.91	207.33	5.05	0:32:35	302.83	302.83	3.46
0:04:40	9,491.29	49.43	21.20	0:11:40	9,055.50	94.33	11.11	0:18:40	7,644.33	159.26	6.58	0:25:40	5,252.74	218.86	4.79	0:32:40	312.90	312.90	3.35
0:04:45	9,440.96	49.17	21.33	0:11:45	9,073.96	94.52	11.06	0:18:45	7,720.87	160.85	6.52	0:25:45	5,484.89	228.54	4.58	0:32:45	308.49	308.49	3.39
0:04:50	9,496.11	49.46	21.19	0:11:50	9,180.70	95.63	10.96	0:18:50	7,670.96	159.81	6.56	0:25:50	5,342.28	222.60	4.71	0:32:50	313.10	313.10	3.34
0:04:55	9,443.48	49.18	21.31	0:11:55	9,220.97	96.05	10.92	0:18:55	7,715.84	160.75	6.52	0:25:55	5,207.65	216.99	4.83	0:32:55	311.01	311.01	3.37
0:05:00	9,454.80	49.24	21.28	0:12:00	9,238.16	96.23	10.89	0:19:00	7,615.81	158.66	6.60	0:26:00	5,050.57	210.44	4.98	0:33:00	311.01	311.01	3.37
0:05:05	9,293.95	48.41	21.65	0:12:05	9,186.15	95.69	10.95	0:19:05	7,746.67	161.39	6.49	0:26:05	5,488.25	228.68	4.58	0:33:05	311.43	311.43	3.36
0:05:10	9,247.39	48.16	21.77	0:12:10	9,218.45	96.03	10.91	0:19:10	7,654.19	159.46	6.57	0:26:10	5,466.65	227.78	4.60	0:33:10	311.22	311.22	3.37
0:05:15	9,193.70	47.88	21.87	0:12:15	9,147.99	95.29	11.00	0:19:15	7,709.97	160.62	6.52	0:26:15	5,769.47	240.39	4.36	0:33:15	308.70	308.70	3.39
0:05:20	9,032.64	47.05	22.28	0:12:20	9,150.92	95.32	11.00	0:19:20	7,724.02	160.92	6.51	0:26:20	5,751.44	239.64	4.37	0:33:20	306.39	306.39	3.42
0:05:25	8,962.39	46.68	22.46	0:12:25	9,258.51	96.44	10.87	0:19:25	7,802.66	162.56	6.44	0:26:25	5,867.83	244.49	4.28	0:33:25	310.38	310.38	3.37
0:05:30	9,006.01	46.91	22.35	0:12:30	9,215.72	96.00	10.92	0:19:30	7,642.44	159.22	6.58	0:26:30	5,910.82	246.28	4.25	0:33:30	309.54	309.54	3.39
0:05:35	8,974.55	46.74	22.44	0:12:35	9,189.30	95.72	10.95	0:19:35	7,789.66	162.28	6.46	0:26:35	5,745.99	239.42	4.37	0:33:35	304.93	304.93	3.43
0:05:40	8,985.67	46.80	22.40	0:12:40	9,173.36	95.56	10.97	0:19:40	7,715.21	160.73	6.52	0:26:40	6,050.07	252.09	4.16	0:33:40	309.54	309.54	3.38
0:05:45	9,069.76	47.24	22.19	0:12:45	9,229.99	96.15	10.92	0:19:45	7,671.59	159.82	6.56	0:26:45	5,671.33	236.31	4.43	0:33:45	309.75	309.75	3.38
0:05:50	9,042.71	47.10	22.25	0:12:50	9,208.80	95.93	10.92	0:19:50	7,764.91	161.77	6.48	0:26:50	5,726.06	238.59	4.39	0:33:50	311.01	311.01	3.37
0:05:55	8,990.70	46.83	22.39	0:12:55	9,167.49	95.49	10.98	0:19:55	7,768.90	161.85	6.47	0:26:55	5,764.23	240.18	4.36	0:33:55	308.07	308.07	3.40
0:06:00	8,953.37	46.63	22.47	0:13:00	9,187.62	95.70	10.95	0:20:00	7,592.11	158.17	6.63	0:27:00	5,883.56	245.15	4.27	0:34:00	311.64	311.64	3.36
0:06:05	9,006.01	46.91	22.35	0:13:05	9,214.05	95.98	10.92	0:20:05	7,452.65	155.26	6.75	0:27:05	6,018.20	250.76	4.18	0:34:05	315.62	315.62	3.32
0:06:10	8,961.76	46.68	22.47	0:13:10	9,213.84	95.98	10.95	0:20:10	7,453.91	155.29	6.75	0:27:10	5,867.62	244.48	4.28	0:34:10	311.64	311.64	3.35
0:06:15	9,031.59	47.04	22.29	0:13:15	9,226.42	96.11	10.90	0:20:15	7,354.71	153.22	6.84	0:27:15	5,964.93	248.54	4.22	0:34:15	321.07	321.07	3.27
0:06:20	9,034.74	47.06	22.29	0:13:20	9,077.10	94.55	11.08	0:20:20	7,261.60	151.28	6.93	0:27:20	5,940.39	247.52	4.23	0:34:20	317.09	317.09	3.30
0:06:25	8,998.67	46.87	22.36	0:13:25	9,059.70	94.37	11.12	0:20:25	7,070.55	147.30	7.11	0:27:25	5,790.03	241.25	4.34	0:34:25	308.28	308.28	3.40
0:06:30	8,998.25	46.87	22.37	0:13:30	9,176.93	95.59	10.96	0:20:30	7,113.75	148.20	7.07	0:27:30	5,868.67	244.53	4.28	0:34:30	312.06	312.06	3.36
0:06:35	8,991.54	46.83	22.39	0:13:35	9,180.91	95.63	10.96	0:20:35	7,064.89	147.19	7.12	0:27:35	5,764.23	240.18	4.36	0:34:35	302.83	302.83	3.46
0:06:40	8,985.67	46.80	22.41	0:13:40	9,160.57	95.42	10.99	0:20:40	7,040.14	146.67	7.14	0:27:40	5,936.62	247.36	4.23	0:34:40	312.06	312.06	3.35
0:06:45	9,001.40	46.88	22.35	0:13:45	9,153.02	95.34	10.99	0:20:45	7,054.61	146.97	7.13	0:27:45	5,830.08	242.92	4.31	0:34:45	319.19	319.19	3.28
0:06:50	619.08	0.00	20.34	0:13:50	542.32	0.00	9.45	0:20:50	491.15	0.00	6.55	0:27:50	421.11	0.00	4.15	0:34:50	32.30	0.00	3.26
0:06:55	0.00	0.00	0.00	0:13:55	0.00	0.00	0.00	0:20:55	0.00	0.00	0.00	0:27:55	0.00	0.00	0.00	0:34:55	0.00	0.00	0.00
								0:21:00	0.00	0.00	0.00	0:28:00	0.00	0.00	0.00				

SPC-2 "Large File Processing/READ ONLY/1024 KiB Transfer Size" Average Data Rate Graph – Complete Test Run

SPC-2 "Large File Processing/READ ONLY/1024 KiB Transfer Size" Average Data Rate Graph – Measurement Interval (MI) Only
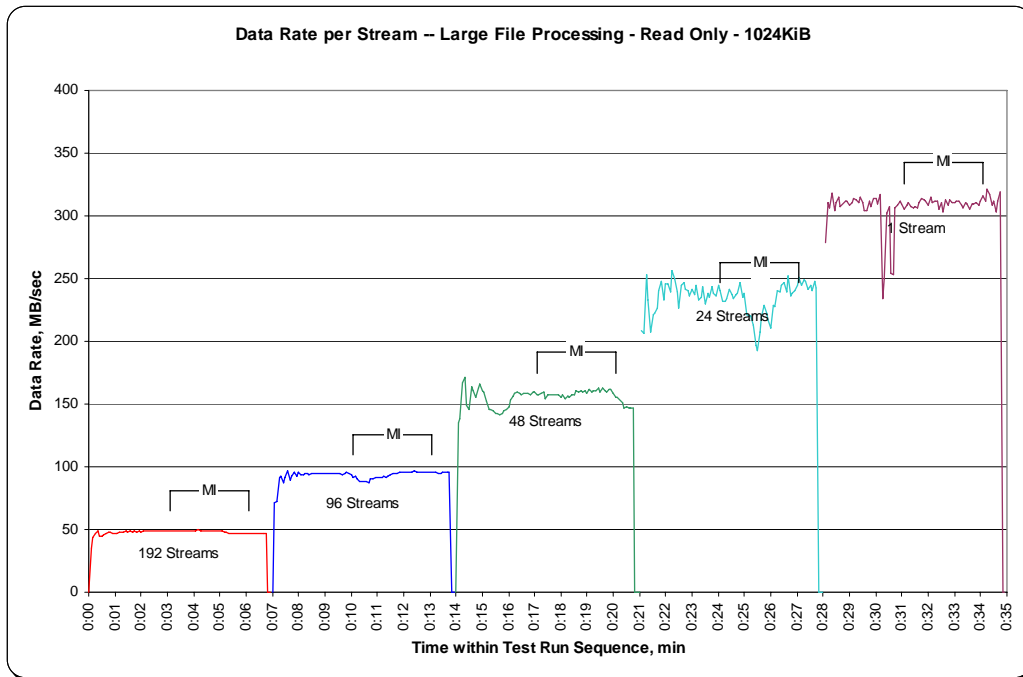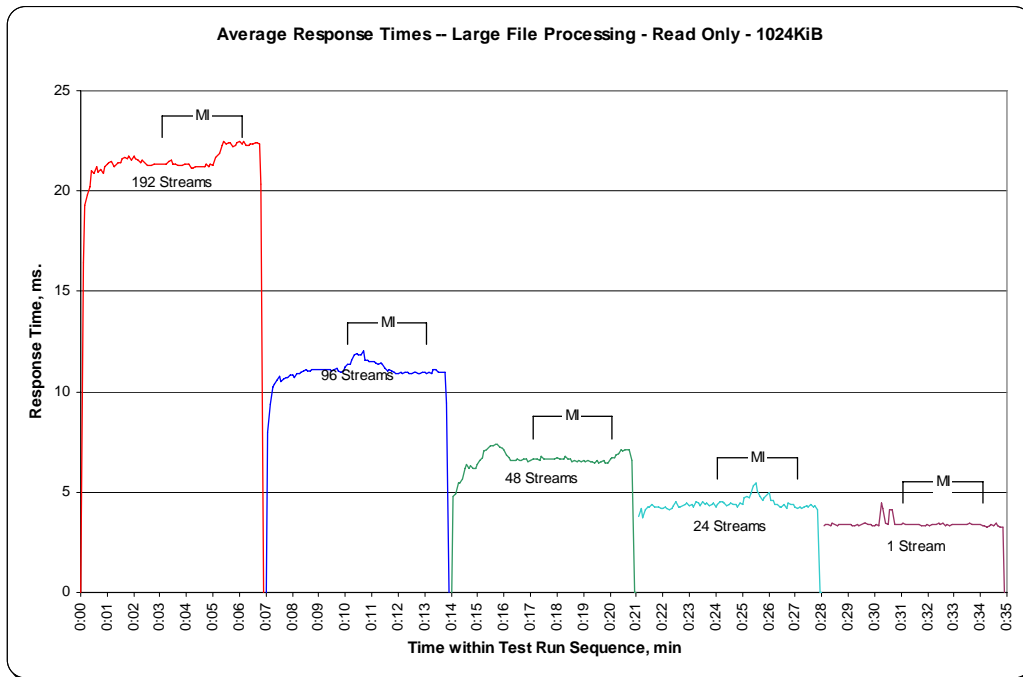
SPC-2 "Large File Processing/READ ONLY/1024 KiB Transfer Size" Average Data Rate per Stream Graph

SPC-2 "Large File Processing/READ ONLY/1024 KiB Transfer Size" Average Response Time Graph
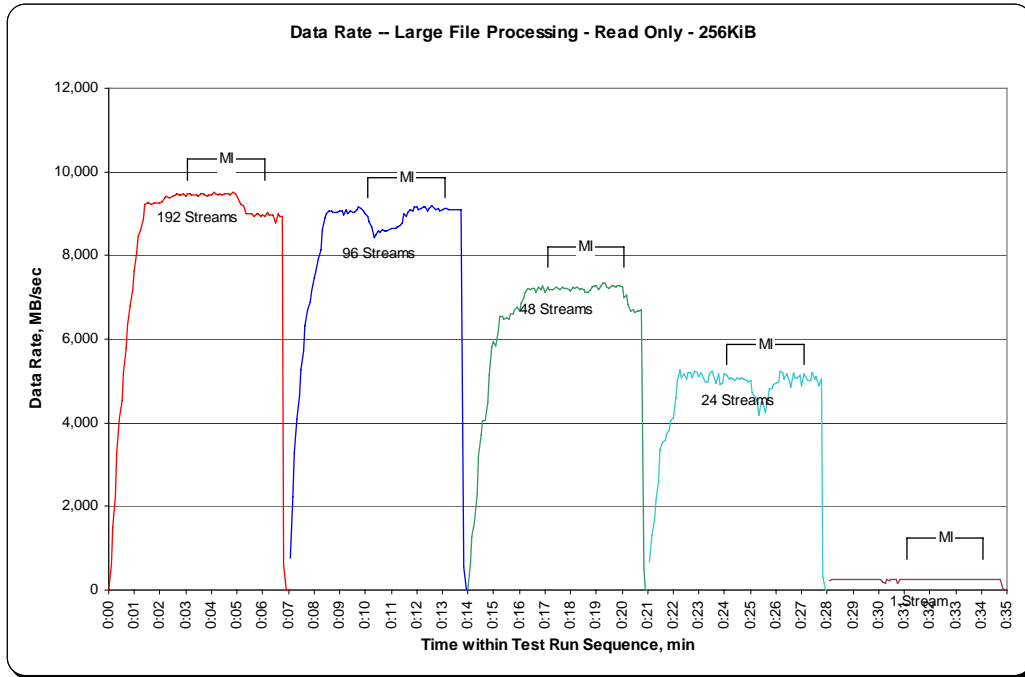
SPC-2 "Large File Processing/READ ONLY/256 KiB Transfer Size" Test Run Data – Ramp-Up Period

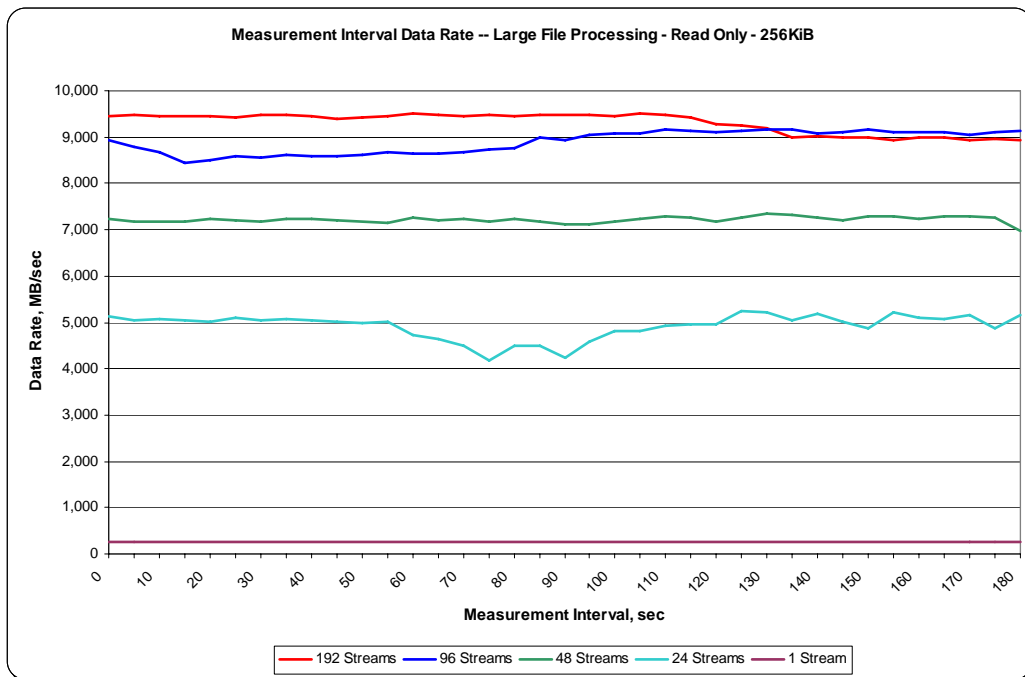| TR26 Test Run Sequence Time	192 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR27 Test Run Sequence Time	96 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR28 Test Run Sequence Time	48 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR29 Test Run Sequence Time	24 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR30 Test Run Sequence Time	1 Stream Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms
0:00:00	0.00	0.00	0.00	0:07:05	780.04	48.75	2.30	0:14:00	0.00	0.00	0.00	0:21:05	685.82	171.46	1.06	0:28:05	229.48	229.48	1.04
0:00:05	598.42	31.50	3.96	0:07:10	2,245.84	80.21	2.51	0:14:05	647.44	107.91	1.25	0:21:10	1,299.40	162.42	1.17	0:28:10	255.54	255.54	1.02
0:00:10	1,510.79	40.83	4.81	0:07:15	3,292.90	86.66	2.63	0:14:10	1,280.57	182.94	1.41	0:21:15	1,691.82	187.98	1.24	0:28:15	258.68	258.68	1.01
0:00:15	2,268.38	43.62	5.13	0:07:20	4,070.26	88.48	2.70	0:14:15	1,617.27	161.73	1.42	0:21:20	2,154.14	195.83	1.23	0:28:20	252.76	252.76	1.03
0:00:20	3,288.12	42.16	5.22	0:07:25	4,666.53	91.50	2.70	0:14:20	2,294.28	127.46	1.44	0:21:25	2,617.09	186.93	1.21	0:28:25	260.99	260.99	1.00
0:00:25	4,124.57	47.41	5.27	0:07:30	5,281.62	92.66	2.66	0:14:25	3,230.03	146.82	1.58	0:21:30	3,345.90	209.12	1.19	0:28:30	252.65	252.65	1.03
0:00:30	4,535.30	46.28	5.33	0:07:35	5,727.06	92.37	2.68	0:14:30	3,698.17	142.24	1.63	0:21:35	3,544.97	221.56	1.18	0:28:35	256.17	256.17	1.02
0:00:35	5,199.05	46.42	5.31	0:07:40	6,328.37	94.45	2.68	0:14:35	4,051.54	155.83	1.68	0:21:40	3,568.25	209.90	1.18	0:28:40	254.17	254.17	1.03
0:00:40	5,791.44	45.96	5.39	0:07:45	6,688.71	94.21	2.70	0:14:40	4,066.17	156.39	1.67	0:21:45	3,728.53	207.14	1.19	0:28:45	255.22	255.22	1.02
0:00:45	6,316.94	47.50	5.34	0:07:50	6,896.80	95.79	2.70	0:14:45	4,455.61	143.73	1.67	0:21:50	3,837.05	213.17	1.22	0:28:50	251.61	251.61	1.04
0:00:50	6,782.98	47.10	5.32	0:07:55	7,149.72	95.33	2.70	0:14:50	5,152.28	147.21	1.65	0:21:55	4,067.43	225.97	1.16	0:28:55	251.87	251.87	1.04
0:00:55	7,193.91	47.96	5.33	0:08:00	7,465.91	95.72	2.71	0:14:55	5,811.10	157.06	1.63	0:22:00	4,129.13	196.63	1.22	0:29:00	254.44	254.44	1.03
0:01:00	7,616.86	47.02	5.34	0:08:05	7,592.37	94.90	2.71	0:15:00	5,925.24	155.93	1.64	0:22:05	4,608.33	192.01	1.24	0:29:05	251.24	251.24	1.04
0:01:05	8,090.08	47.59	5.37	0:08:10	7,930.75	96.72	2.67	0:15:05	5,855.56	150.14	1.70	0:22:10	5,005.17	208.55	1.25	0:29:10	255.64	255.64	1.02
0:01:10	8,446.02	48.54	5.33	0:08:15	8,147.54	92.59	2.71	0:15:10	6,237.61	141.76	1.74	0:22:15	5,254.47	218.94	1.19	0:29:15	251.55	251.55	1.04
0:01:15	8,615.73	47.87	5.37	0:08:20	8,629.78	93.80	2.74	0:15:15	6,539.76	139.14	1.82	0:22:20	5,064.20	211.01	1.24	0:29:20	257.06	257.06	1.01
0:01:20	8,882.54	48.01	5.38	0:08:25	8,903.09	93.72	2.75	0:15:20	6,553.18	139.43	1.88	0:22:25	5,168.64	215.36	1.21	0:29:25	256.80	256.80	1.02
0:01:25	9,220.39	48.53	5.36	0:08:30	9,015.45	93.91	2.77	0:15:25	6,485.49	135.11	1.92	0:22:30	5,036.31	209.85	1.24	0:29:30	253.55	253.55	1.03
0:01:30	9,250.01	48.18	5.41	0:08:35	9,077.78	94.56	2.77	0:15:30	6,510.19	135.63	1.93	0:22:35	5,188.51	216.19	1.21	0:29:35	255.54	255.54	1.02
0:01:35	9,270.93	48.29	5.42	0:08:40	9,073.33	94.51	2.77	0:15:35	6,468.77	134.77	1.94	0:22:40	5,195.27	216.47	1.21	0:29:40	253.70	253.70	1.03
0:01:40	9,220.18	48.02	5.45	0:08:45	9,033.48	94.10	2.78	0:15:40	6,615.78	137.83	1.90	0:22:45	5,075.21	211.47	1.23	0:29:45	253.70	253.70	1.03
0:01:45	9,248.28	48.17	5.44	0:08:50	9,037.47	94.14	2.78	0:15:45	6,612.84	137.77	1.90	0:22:50	5,235.75	218.16	1.20	0:29:50	256.59	256.59	1.02
0:01:50	9,250.96	48.18	5.44	0:08:55	9,039.83	94.16	2.78	0:15:50	6,713.35	139.86	1.87	0:22:55	5,201.20	216.72	1.20	0:29:55	253.39	253.39	1.03
0:01:55	9,248.18	48.17	5.44	0:09:00	9,075.90	94.54	2.77	0:15:55	6,775.22	141.15	1.85	0:23:00	5,102.63	212.61	1.23	0:30:00	252.92	252.92	1.03
0:02:00	9,254.47	48.20	5.43	0:09:05	9,056.18	94.34	2.77	0:16:00	6,664.49	138.84	1.88	0:23:05	5,206.81	216.95	1.20	0:30:05	254.86	254.86	1.02
0:02:05	9,298.88	48.43	5.41	0:09:10	8,975.02	93.49	2.77	0:16:05	6,874.46	143.22	1.83	0:23:10	5,110.97	212.96	1.23	0:30:10	203.16	203.16	1.28
0:02:10	9,387.48	48.89	5.36	0:09:15	9,096.03	94.75	2.77	0:16:10	6,993.95	145.71	1.79	0:23:15	4,993.74	208.07	1.25	0:30:15	164.10	164.10	1.59
0:02:15	9,415.58	49.04	5.34	0:09:20	9,005.12	93.80	2.76	0:16:15	7,116.00	148.25	1.76	0:23:20	4,975.81	207.33	1.26	0:30:20	256.22	256.22	1.02
0:02:20	9,384.13	48.88	5.36	0:09:25	9,069.40	94.47	2.77	0:16:20	7,219.18	150.40	1.74	0:23:25	5,168.85	215.37	1.21	0:30:25	229.17	229.17	1.14
0:02:25	9,385.17	48.88	5.37	0:09:30	9,025.88	94.02	2.78	0:16:25	7,185.94	149.71	1.75	0:23:30	5,245.87	218.58	1.19	0:30:30	255.75	255.75	1.02
0:02:30	9,410.45	49.01	5.34	0:09:35	9,028.66	94.05	2.78	0:16:30	7,204.98	150.10	1.74	0:23:35	5,131.73	213.82	1.22	0:30:35	255.70	255.70	1.02
0:02:35	9,448.93	49.21	5.32	0:09:40	9,096.50	94.76	2.76	0:16:35	7,217.98	150.37	1.74	0:23:40	4,944.25	206.01	1.27	0:30:40	241.91	241.91	1.08
0:02:40	9,463.92	49.29	5.31	0:09:45	9,165.96	95.48	2.74	0:16:40	7,128.17	148.50	1.76	0:23:45	5,158.00	214.92	1.21	0:30:45	157.76	157.76	1.66
0:02:45	9,431.68	49.12	5.33	0:09:50	9,117.74	94.98	2.75	0:16:45	7,235.23	150.73	1.73	0:23:50	4,930.25	205.43	1.27	0:30:50	257.22	257.22	1.01
0:02:50	9,458.89	49.27	5.33	0:09:55	9,052.20	94.29	2.77	0:16:50	7,181.59	149.62	1.75	0:23:55	4,958.40	206.60	1.27	0:30:55	254.02	254.02	1.03
0:02:55	9,473.15	49.34	5.31	0:10:00	8,985.93	93.60	2.80	0:16:55	7,272.50	151.51	1.73	0:24:00	5,160.72	215.03	1.21	0:31:00	253.91	253.91	1.03
0:03:00	9,422.87	49.08	5.33					0:17:00	7,125.28	148.44	1.73								

SPC-2 "Large File Processing/READ ONLY/256 KiB Transfer Size" Test Run Data
Measurement Interval, Run-Out, and Ramp-Down Periods

TR26 Test Run Sequence Time	192 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR27 Test Run Sequence Time	96 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR28 Test Run Sequence Time	48 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR29 Test Run Sequence Time	24 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR30 Test Run Sequence Time	1 Stream Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms
0:03:05	9,466.07	49.30	5.31	0:10:05	8,927.21	92.99	2.82	0:17:05	7,233.92	150.71	1.73	0:24:05	5,127.64	213.65	1.22	0:31:05	255.85	255.85	1.02
0:03:10	9,471.11	49.33	5.31	0:10:10	8,797.24	91.64	2.86	0:17:10	7,175.30	149.49	1.75	0:24:10	5,030.91	209.62	1.25	0:31:10	252.13	252.13	1.04
0:03:15	9,448.67	49.21	5.32	0:10:15	8,683.89	90.46	2.89	0:17:15	7,172.31	149.42	1.75	0:24:15	5,077.05	211.54	1.24	0:31:15	253.81	253.81	1.03
0:03:20	9,440.07	49.17	5.33	0:10:20	8,440.93	87.93	2.97	0:17:20	7,172.84	149.43	1.75	0:24:20	5,041.71	210.07	1.24	0:31:20	254.91	254.91	1.02
0:03:25	9,460.67	49.27	5.32	0:10:25	8,498.55	88.53	2.96	0:17:25	7,241.68	150.87	1.73	0:24:25	5,009.68	208.74	1.25	0:31:25	255.85	255.85	1.02
0:03:30	9,417.37	49.05	5.34	0:10:30	8,596.59	89.55	2.92	0:17:30	7,205.55	150.12	1.74	0:24:30	5,086.85	211.95	1.23	0:31:30	253.55	253.55	1.03
0:03:35	9,479.65	49.37	5.31	0:10:35	8,565.40	89.22	2.93	0:17:35	7,174.20	149.46	1.75	0:24:35	5,057.39	210.72	1.24	0:31:35	252.86	252.86	1.03
0:03:40	9,482.22	49.39	5.31	0:10:40	8,623.86	89.83	2.92	0:17:40	7,233.60	150.70	1.74	0:24:40	5,064.26	211.01	1.24	0:31:40	253.70	253.70	1.03
0:03:45	9,450.03	49.22	5.32	0:10:45	8,597.69	89.56	2.92	0:17:45	7,227.21	150.57	1.74	0:24:45	5,034.79	209.78	1.25	0:31:45	252.44	252.44	1.04
0:03:50	9,404.52	48.98	5.35	0:10:50	8,579.87	89.37	2.93	0:17:50	7,216.40	150.34	1.74	0:24:50	5,019.64	209.15	1.25	0:31:50	253.02	253.02	1.03
0:03:55	9,437.13	49.15	5.33	0:10:55	8,624.12	89.83	2.91	0:17:55	7,184.27	149.67	1.75	0:24:55	4,983.88	207.66	1.26	0:31:55	257.11	257.11	1.01
0:04:00	9,447.25	49.20	5.33	0:11:00	8,664.49	90.26	2.90	0:18:00	7,137.71	148.70	1.76	0:25:00	5,013.98	208.92	1.25	0:32:00	256.22	256.22	1.02
0:04:05	9,512.63	49.54	5.29	0:11:05	8,637.70	89.98	2.91	0:18:05	7,258.92	151.23	1.73	0:25:05	4,717.70	196.57	1.33	0:32:05	249.40	249.40	1.05
0:04:10	9,491.97	49.44	5.30	0:11:10	8,656.36	90.17	2.90	0:18:10	7,198.79	149.97	1.74	0:25:10	4,642.99	193.46	1.35	0:32:10	256.01	256.01	1.02
0:04:15	9,442.43	49.18	5.32	0:11:15	8,670.15	90.31	2.90	0:18:15	7,245.87	150.96	1.73	0:25:15	4,492.31	187.18	1.40	0:32:15	252.60	252.60	1.03
0:04:20	9,470.84	49.33	5.31	0:11:20	8,722.32	90.86	2.88	0:18:20	7,182.96	149.64	1.75	0:25:20	4,189.22	174.55	1.50	0:32:20	251.40	251.40	1.04
0:04:25	9,445.05	49.19	5.33	0:11:25	8,770.66	91.36	2.87	0:18:25	7,222.70	150.47	1.74	0:25:25	4,500.28	187.51	1.39	0:32:25	251.92	251.92	1.04
0:04:30	9,474.04	49.34	5.31	0:11:30	8,988.34	93.63	2.79	0:18:30	7,178.50	149.55	1.75	0:25:30	4,487.17	186.97	1.40	0:32:30	254.02	254.02	1.03
0:04:35	9,477.97	49.36	5.32	0:11:35	8,935.02	93.07	2.81	0:18:35	7,123.19	148.40	1.74	0:25:35	4,239.65	176.65	1.48	0:32:35	254.65	254.65	1.02
0:04:40	9,478.34	49.37	5.31	0:11:40	9,045.02	94.22	2.78	0:18:40	7,119.20	148.32	1.74	0:25:40	4,581.65	190.90	1.37	0:32:40	255.85	255.85	1.02
0:04:45	9,450.71	49.22	5.32	0:11:45	9,083.29	94.62	2.77	0:18:45	7,184.58	149.68	1.75	0:25:45	4,821.40	200.89	1.30	0:32:45	249.67	249.67	1.05
0:04:50	9,514.36	49.55	5.29	0:11:50	9,072.49	94.51	2.77	0:18:50	7,231.29	150.65	1.74	0:25:50	4,817.05	200.71	1.30	0:32:50	255.85	255.85	1.02
0:04:55	9,469.74	49.32	5.32	0:11:55	9,159.05	95.41	2.75	0:18:55	7,287.08	151.81	1.72	0:25:55	4,926.58	205.27	1.27	0:32:55	252.39	252.39	1.03
0:05:00	9,421.77	49.07	5.35	0:12:00	9,145.00	95.26	2.75	0:19:00	7,266.79	151.39	1.73	0:26:00	4,946.92	206.12	1.27	0:33:00	254.38	254.38	1.03
0:05:05	9,285.30	48.36	5.42	0:12:05	9,107.98	94.87	2.76	0:19:05	7,174.04	149.46	1.75	0:26:05	4,967.89	207.00	1.26	0:33:05	255.70	255.70	1.02
0:05:10	9,237.27	48.11	5.44	0:12:10	9,137.61	95.18	2.75	0:19:10	7,267.84	151.41	1.73	0:26:10	5,234.12	218.09	1.20	0:33:10	253.44	253.44	1.03
0:05:15	9,182.80	47.83	5.48	0:12:15	9,161.36	95.43	2.74	0:19:15	7,335.58	152.82	1.71	0:26:15	5,206.39	216.93	1.20	0:33:15	258.00	258.00	1.01
0:05:20	8,996.78	46.86	5.59	0:12:20	9,154.70	95.36	2.74	0:19:20	7,329.23	152.69	1.71	0:26:20	5,030.65	209.61	1.25	0:33:20	251.61	251.61	1.04
0:05:25	9,007.43	46.91	5.58	0:12:25	9,070.92	94.49	2.77	0:19:25	7,248.60	151.01	1.73	0:26:25	5,179.23	215.80	1.21	0:33:25	247.46	247.46	1.06
0:05:30	8,987.08	46.81	5.60	0:12:30	9,113.59	94.93	2.76	0:19:30	7,218.29	150.38	1.74	0:26:30	5,016.02	209.00	1.25	0:33:30	253.02	253.02	1.03
0:05:35	9,000.19	46.88	5.59	0:12:35	9,176.67	95.59	2.74	0:19:35	7,276.70	151.60	1.72	0:26:35	4,860.78	202.53	1.29	0:33:35	253.34	253.34	1.03
0:05:40	8,932.35	46.52	5.63	0:12:40	9,114.96	94.95	2.76	0:19:40	7,277.01	151.60	1.72	0:26:40	5,201.88	216.75	1.20	0:33:40	255.54	255.54	1.02
0:05:45	8,993.43	46.84	5.59	0:12:45	9,107.88	94.87	2.76	0:19:45	7,235.80	150.75	1.73	0:26:45	5,089.21	212.05	1.23	0:33:45	256.64	256.64	1.02
0:05:50	8,992.38	46.84	5.59	0:12:50	9,113.33	94.93	2.76	0:19:50	7,288.28	151.84	1.72	0:26:50	5,060.38	210.85	1.24	0:33:50	251.66	251.66	1.04
0:05:55	8,940.37	46.56	5.64	0:12:55	9,061.16	94.39	2.77	0:19:55	7,288.70	151.85	1.72	0:26:55	5,148.56	214.52	1.22	0:33:55	256.11	256.11	1.02
0:06:00	8,974.97	46.74	5.60	0:13:00	9,094.09	94.73	2.76	0:20:00	7,249.80	151.04	1.73	0:27:00	4,867.44	202.81	1.29	0:34:00	257.22	257.22	1.01
0:06:05	8,929.78	46.51	5.64	0:13:05	9,142.59	95.24	2.75	0:20:05	6,980.32	145.42	1.80	0:27:05	5,168.38	215.35	1.21	0:34:05	250.77	250.77	1.04
0:06:10	9,035.32	47.06	5.57	0:13:10	9,135.93	95.17	2.75	0:20:10	7,047.95	146.83	1.78	0:27:10	5,111.91	213.00	1.23	0:34:10	254.44	254.44	1.03
0:06:15	8,963.91	46.69	5.61	0:13:15	9,086.80	94.65	2.77	0:20:15	6,816.32	142.01	1.84	0:27:15	5,014.97	208.96	1.25	0:34:15	251.03	251.03	1.04
0:06:20	8,955.42	46.64	5.61	0:13:20	9,085.86	94.64	2.76	0:20:20	6,673.03	139.02	1.88	0:27:20	5,013.14	208.88	1.25	0:34:20	251.61	251.61	1.04
0:06:25	8,963.33	46.68	5.61	0:13:25	9,096.40	94.75	2.76	0:20:25	6,712.14	139.84	1.87	0:27:25	5,213.68	217.24	1.20	0:34:25	250.14	250.14	1.04
0:06:30	8,788.43	45.77	5.61	0:13:30	9,083.87	94.62	2.76	0:20:30	6,630.62	138.14	1.89	0:27:30	5,055.50	210.65	1.24	0:34:30	258.00	258.00	1.01
0:06:35	9,009.63	46.93	5.59	0:13:35	9,093.15	94.72	2.76	0:20:35	6,676.18	139.09	1.88	0:27:35	5,120.35	213.35	1.22	0:34:35	240.54	240.54	1.08
0:06:40	8,947.39	46.60	5.62	0:13:40	9,108.09	94.88	2.76	0:20:40	6,672.93	139.02	1.88	0:27:40	4,881.12	203.38	1.28	0:34:40	251.76	251.76	1.04
0:06:45	8,941.10	46.57	5.62	0:13:45	9,093.34	94.72	2.76	0:20:45	6,701.87	139.62	1.87	0:27:45	5,053.66	210.57	1.24	0:34:45	252.08	252.08	1.03
0:06:50	620.44	0.00	5.25	0:13:50	548.77	0.00	2.51	0:20:50	504.78	0.00	1.76	0:27:50	310.54	0.00	1.21	0:34:50	21.02	0.00	1.06
0:06:55	0.00	0.00	0.00	0:13:55	0.00	0.00	0.00	0:20:55	0.00	0.00	0.00	0:27:55	0.00	0.00	0.00	0:34:55	0.00	0.00	0.00
0:07:00	0.00	0.00	0.00					0:21:00	0.00	0.00	0.00	0:28:00	0.00	0.00	0.00	0:35:00	0.00	0.00	0.00

SPC BENCHMARK 2™ V1.3

IBM Corporation
IBM System Storage DS8700

FULL DISCLOSURE REPORT

Submitted for Review: NOVEMBER 30, 2009
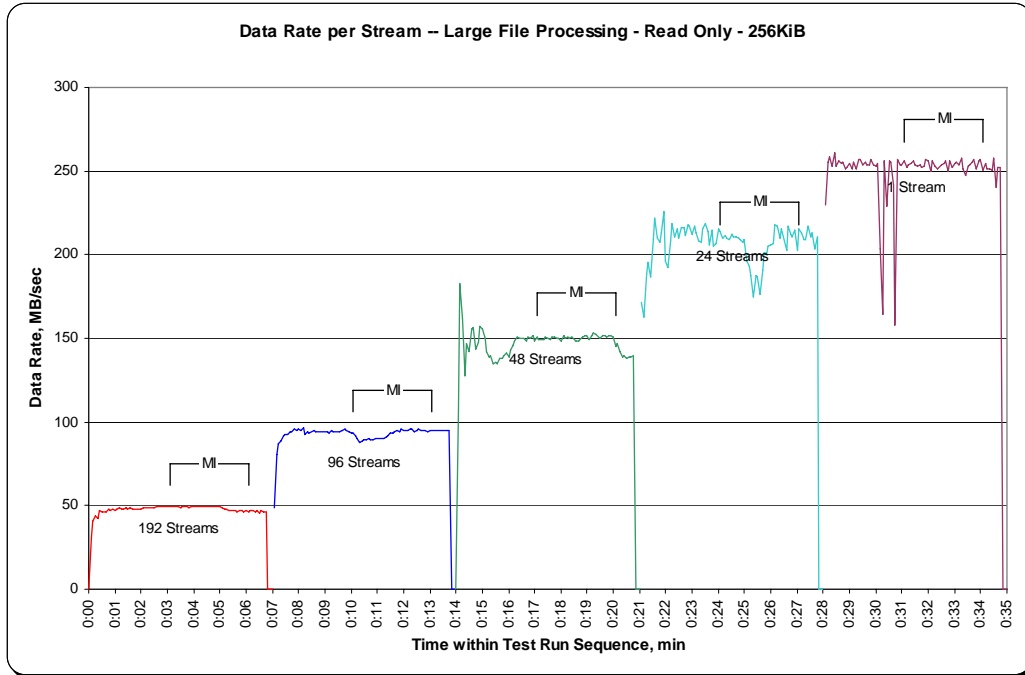
Submission Identifier: B00049

SPC-2 "Large File Processing/READ ONLY/256 KiB Transfer Size" Average Data Rate Graph – Complete Test Run
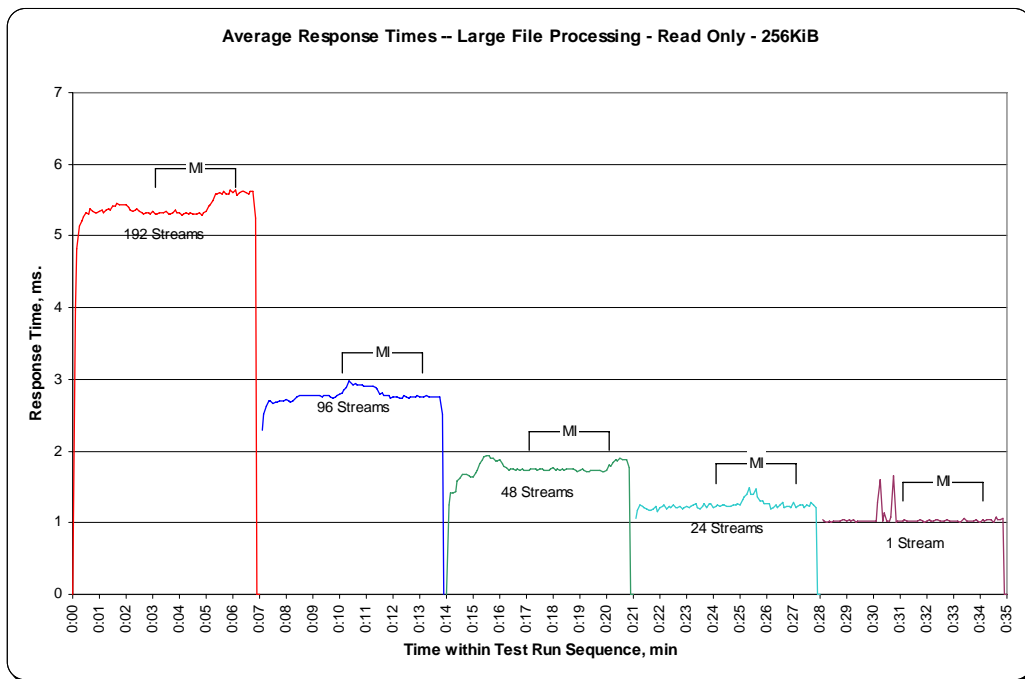

SPC-2 "Large File Processing/READ ONLY/256 KiB Transfer Size" Average Data Rate Graph – Measurement Interval (MI) Only

SPC-2 "Large File Processing/READ ONLY/256 KiB Transfer Size" Average Data Rate per Stream Graph

SPC-2 "Large File Processing/READ ONLY/256 KiB Transfer Size" Average Response Time Graph

Large Database Query Test

Clause 6.4.3.1

The Large Database Query Test is comprised of a set of I/O operations representative of scans or joins of large relational tables such as those performed for data mining or business intelligence.

Clause 6.4.3.2

The Large Database Query Test has two Test Phases, which shall be executed in the following uninterrupted sequence:

1. *1024 KIB TRANSFER SIZE*

2. *64 KIB TRANSFER SIZE*

The BC shall not be restarted or manually disturbed, altered, or adjusted during the execution of the Large File Processing Test. If power is lost to the BC during this Test all results shall be rendered invalid and the Test re-run in its entirety.

Clause 10.6.8.2

The Full Disclosure Report will contain the following content for the Large Database Query Test:

1. *A listing of the SPC-2 Workload Generator commands and parameters used to execute each of the Test Runs in the Large Database Query Test.*

2. *The human readable SPC-2 Test Results File for each of the Test Runs in the Large Database Query Test.*

3. *A table that contains the following information for each Test Run in the two Test Phases of the Large Database Query Test:*

   - *The number Streams specified.*

   - *The Ramp-Up duration in seconds.*

   - *The Measurement Interval duration in seconds.*

   - *The average data rate, in MB per second, for the Measurement Interval.*

   - *The average data rate, in MB per second, per Stream for the Measurement Interval.*

4. *Average Data Rate and Average Data Rate per Stream graphs as defined in Clauses 10.1.1 and 10.1.2.*

SPC-2 Workload Generator Commands and Parameters

The SPC-2 Workload Generator commands and parameters for the Large Database Query Test Runs are documented in "Appendix E: SPC-2 Workload Generator Execution Commands and Parameters" on Page 108.

SPC-2 Test Results File

A link to the SPC-2 Test Results file generated from the Large Database Query Test Runs is listed below.
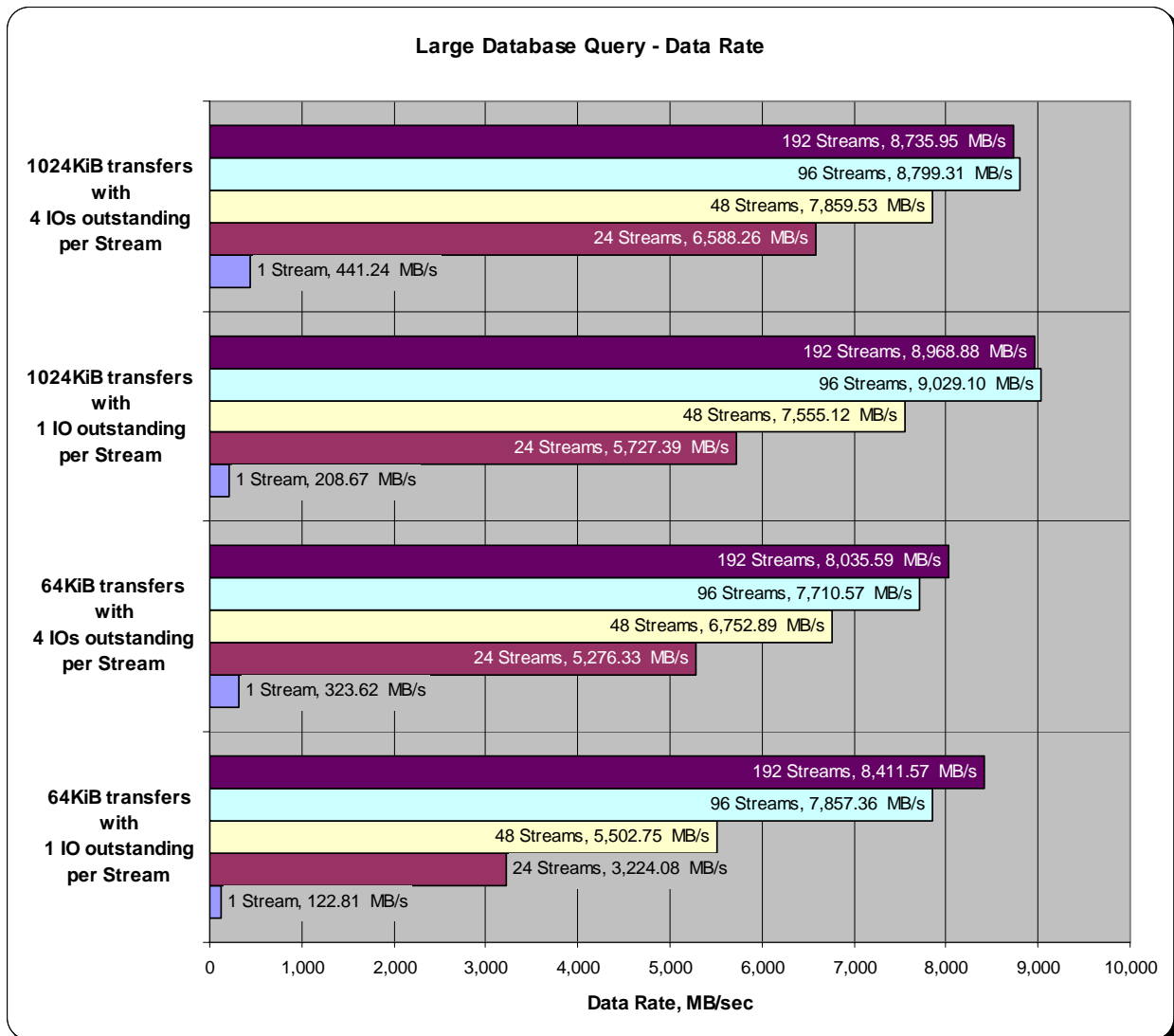
SPC-2 Large Database Query Test Results File

SPC-2 Large Database Query Average Data Rates (MB/s)

The average Data Rate (MB/s) for each Test Run in the two Test Phases of the SPC-2 Large Database Query Test is listed in the table below as well as illustrated in the following graph.

Test Run Sequence	1 Stream	24 Streams	48 Streams	96 Streams	192 Streams
1024KiB w/ 4 IOs/Stream	441.24	6,588.26	7,859.53	8,799.31	8,735.95
1024KiB w/ 1 IO/Stream	208.67	5,727.39	7,555.12	9,029.10	8,968.88
64KiB w/ 4 IOs/Stream	323.62	5,276.33	6,752.89	7,710.57	8,035.59
64KiB w/ 1 IO/Stream	122.81	3,224.08	5,502.75	7,857.36	8,411.57

SPC-2 Large Database Query Average Data Rates Graph
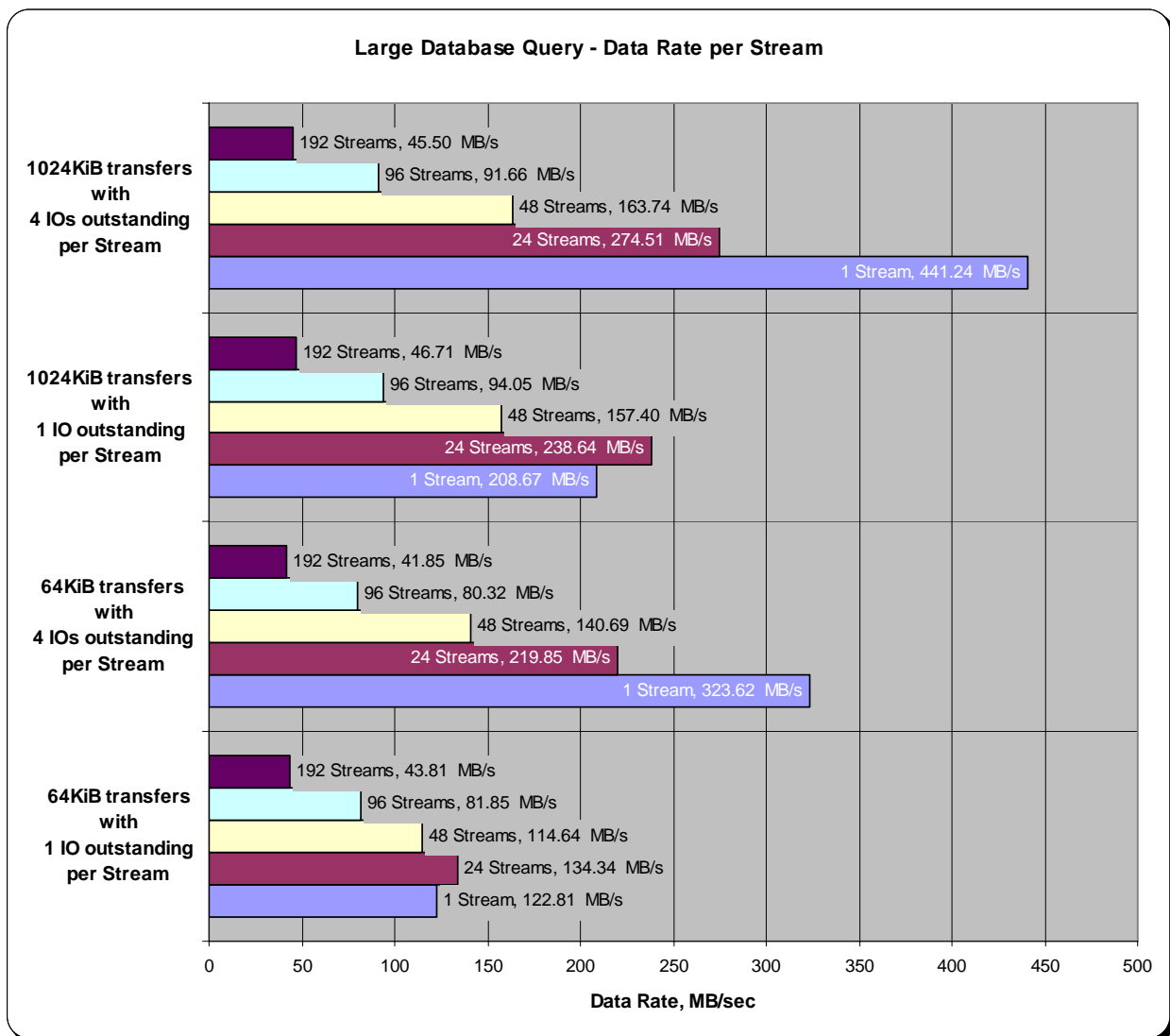

Large Database Query - Data Rate

SPC-2 Large Database Query Average Data Rate per Stream

The average Data Rate per Stream for each Test Run in the two Test Phases of the SPC-2 Large Database Query Test is listed in the table below as well as illustrated in the following graph.

Test Run Sequence	1 Stream	24 Streams	48 Streams	96 Streams	192 Streams
1024KiB w/ 4 IOs/Stream	441.24	274.51	163.74	91.66	45.50
1024KiB w/ 1 IO/Stream	208.67	238.64	157.40	94.05	46.71
64KiB w/ 4 IOs/Stream	323.62	219.85	140.69	80.32	41.85
64KiB w/ 1 IO/Stream	122.81	134.34	114.64	81.85	43.81

SPC-2 Large Database Query Average Data Rate per Stream Graph

Large Database Query - Data Rate per Stream

1024KiB transfers with 4 IOs outstanding per Stream
- 192 Streams, 45.50 MB/s
- 96 Streams, 91.66 MB/s
- 48 Streams, 163.74 MB/s
- 24 Streams, 274.51 MB/s
- 1 Stream, 441.24 MB/s

1024KiB transfers with 1 IO outstanding per Stream
- 192 Streams, 46.71 MB/s
- 96 Streams, 94.05 MB/s
- 48 Streams, 157.40 MB/s
- 24 Streams, 238.64 MB/s
- 1 Stream, 208.67 MB/s

64KiB transfers with 4 IOs outstanding per Stream
- 192 Streams, 41.85 MB/s
- 96 Streams, 80.32 MB/s
- 48 Streams, 140.69 MB/s
- 24 Streams, 219.85 MB/s
- 1 Stream, 323.62 MB/s

64KiB transfers with 1 IO outstanding per Stream
- 192 Streams, 43.81 MB/s
- 96 Streams, 81.85 MB/s
- 48 Streams, 114.64 MB/s
- 24 Streams, 134.34 MB/s
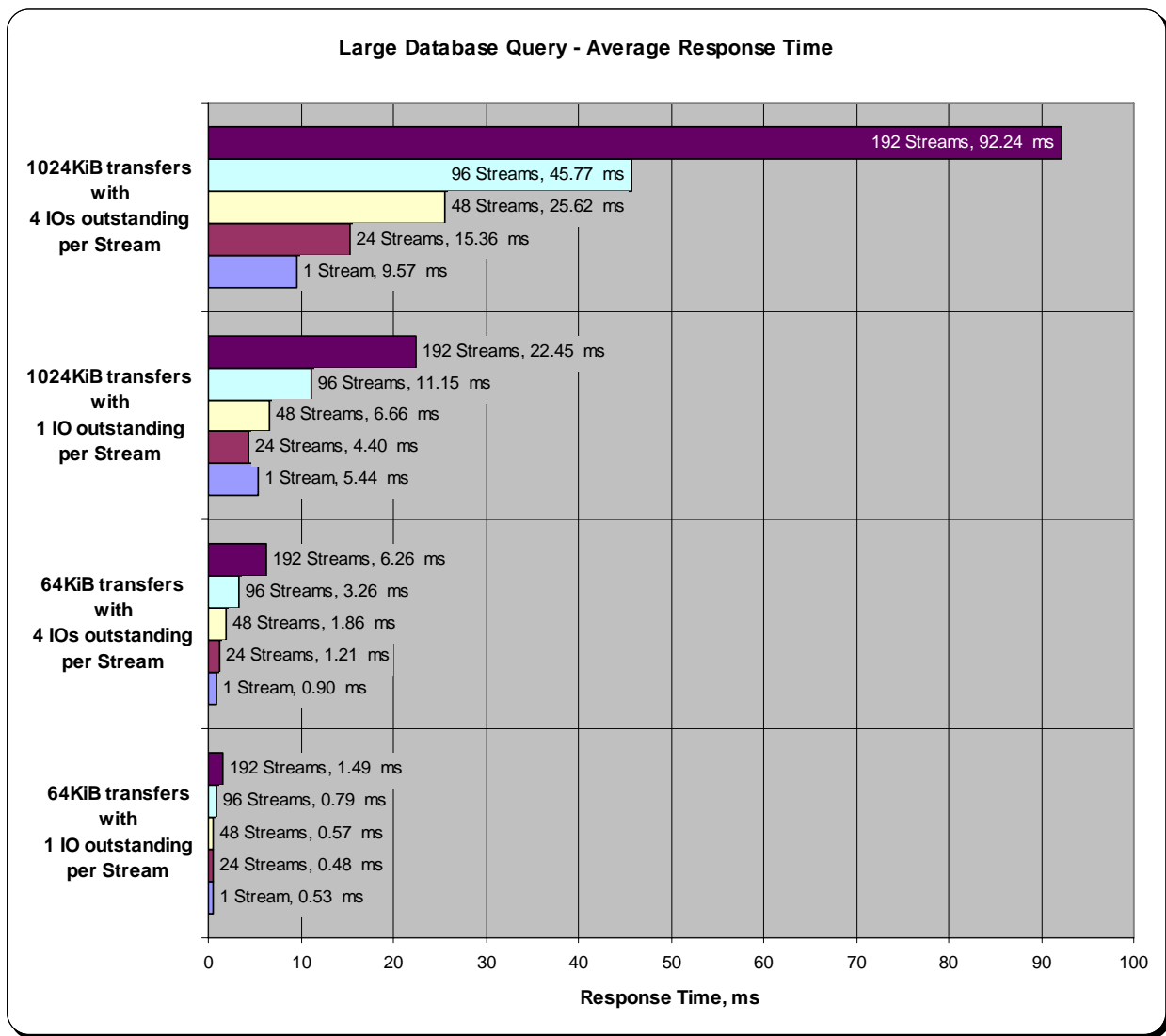- 1 Stream, 122.81 MB/s

Data Rate, MB/sec

SPC-2 Large Database Query Average Response Time

The average Response Time, in milliseconds, for each Test Run in the two Test Phases of the SPC-2 Large Database Query Test is listed in the table below as well as illustrated in the following graph.

Test Run Sequence	1 Stream	24 Streams	48 Streams	96 Streams	192 Streams
1024KiB w/ 4 IOs/Stream	9.57	15.36	25.62	45.77	92.24
1024KiB w/ 1 IO/Stream	5.44	4.40	6.66	11.15	22.45
64KiB w/ 4 IOs/Stream	0.90	1.21	1.86	3.26	6.26
64KiB w/ 1 IO/Stream	0.53	0.48	0.57	0.79	1.49

SPC-2 Large Database Query Average Response Time Graph

Large Database Query - Average Response Time

1024KiB transfers with 4 IOs outstanding per Stream
- 192 Streams, 92.24 ms
- 96 Streams, 45.77 ms
- 48 Streams, 25.62 ms
- 24 Streams, 15.36 ms
- 1 Stream, 9.57 ms

1024KiB transfers with 1 IO outstanding per Stream
- 192 Streams, 22.45 ms
- 96 Streams, 11.15 ms
- 48 Streams, 6.66 ms
- 24 Streams, 4.40 ms
- 1 Stream, 5.44 ms

64KiB transfers with 4 IOs outstanding per Stream
- 192 Streams, 6.26 ms
- 96 Streams, 3.26 ms
- 48 Streams, 1.86 ms
- 24 Streams, 1.21 ms
- 1 Stream, 0.90 ms

64KiB transfers with 1 IO outstanding per Stream
- 192 Streams, 1.49 ms
- 96 Streams, 0.79 ms
- 48 Streams, 0.57 ms
- 24 Streams, 0.48 ms
- 1 Stream, 0.53 ms

Response Time, ms

Large Database Query Test – 1024 KIB TRANSFER SIZE Test Phase

Clause 10.6.8.2.1

1. *A table that will contain the following information for each "1024 KiB Transfer Size, 4 Outstanding I/Os" Test Run:*

   - *The number of Streams specified.*

   - *The average data rate, average data rate per stream, and average Response Time reported at five second intervals.*

2. *Average Data Rate (intervals), Average Data Rate per Stream (intervals), and Average Response Time (intervals) graphs for the "1024 KiB Transfer Size, 4 Outstanding I/Os" Test Runs as specified in Clauses 10.1.4 – 10.1.6.*

3. *A table that will contain the following information for each "1024 KiB Transfer Size, 1 Outstanding I/O" Test Run:*

   - *The number of Streams specified.*

   - *The average data rate, average data rate per stream, and average Response Time reported at five second intervals.*

4. *Average Data Rate (intervals), Average Data Rate per Stream (intervals), and Average Response Time (intervals) graphs for the "1024 KiB Transfer Size, 1 Outstanding I/O" Test Runs as specified in Clauses 10.1.4 – 10.1.6.*

The SPC-2 "Large DatabaseQuery/1024 KIB TRANSFER SIZE/4 Outstanding I/Os" Test Run data is contained in the table that appears on the next page. That table is followed by graphs illustrating the average Data Rate, average Data Rate per Stream, and average Response Time produced by the same Test Runs. The table and graphs present the data at five-second intervals.

Immediately following the SPC-2 "Large DatabaseQuery/1024 KIB TRANSFER SIZE/4 Outstanding I/Os" table and graphs will be the SPC-2 "Large DatabaseQuery/1024 KIB TRANSFER SIZE/1 Outstanding I/O" table and graphs. The table contains the Test Run data and the graphs illustrate the average Data Rate, average Data Rate per Stream, and average Response Time produced by the Test Runs.

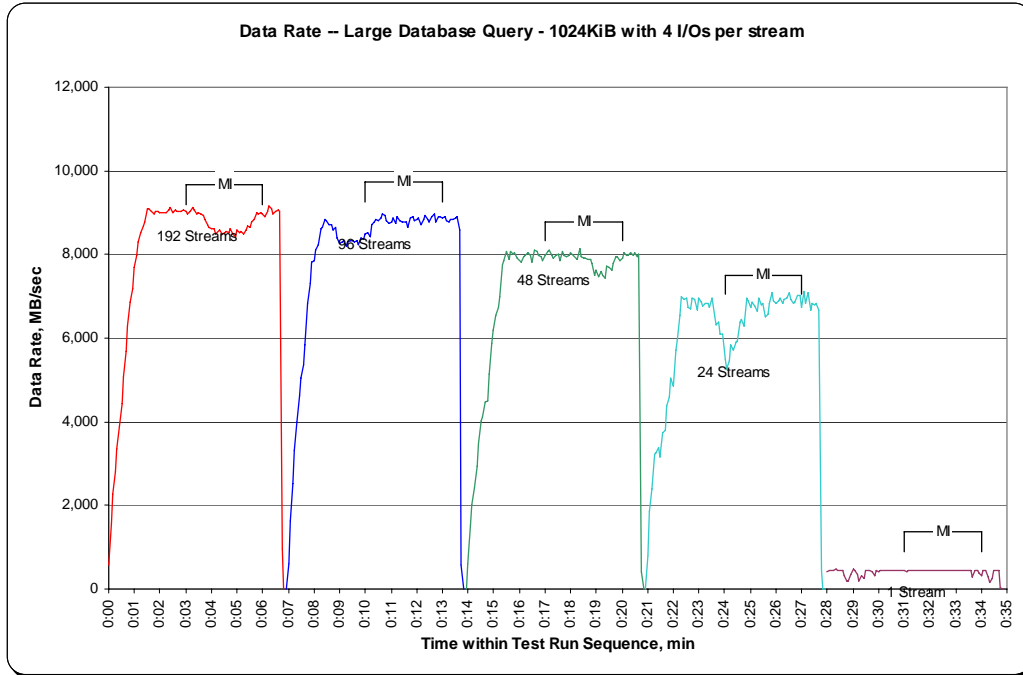## SPC-2 "Large Database Query/1024 KiB Transfer Size/4 Outstanding I/Os" Test Run Data – Ramp-Up Period

TR11 Test Run Sequence Time	192 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR12 Test Run Sequence Time	96 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR13 Test Run Sequence Time	48 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR14 Test Run Sequence Time	24 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR15 Test Run Sequence Time	1 Stream Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms
0:00:00	575.46	31.97	53.26	0:06:55	0.00	0.00	0.00	0:13:55	0.00	0.00	0.00	0:20:55	0.00	0.00	0.00	0:28:00	412.51	412.51	9.25
0:00:05	1,551.89	43.11	72.76	0:07:00	607.96	67.55	29.58	0:14:00	612.16	122.43	21.28	0:21:00	785.38	261.79	12.28	0:28:05	452.36	452.36	9.27
0:00:10	2,261.99	46.16	80.13	0:07:05	1,620.47	77.17	39.79	0:14:05	1,538.05	139.82	22.64	0:21:05	1,848.01	264.00	13.84	0:28:10	447.11	447.11	9.38
0:00:15	2,804.52	45.98	83.35	0:07:10	2,523.92	84.13	40.49	0:14:10	2,025.43	184.13	22.78	0:21:10	2,381.74	238.17	14.10	0:28:15	444.39	444.39	9.43
0:00:20	3,339.30	44.52	85.06	0:07:15	3,318.74	89.70	42.00	0:14:15	2,416.76	172.63	22.55	0:21:15	3,225.42	293.22	13.84	0:28:20	488.22	488.22	8.58
0:00:25	3,896.09	44.78	86.44	0:07:20	3,982.91	88.51	42.15	0:14:20	2,931.19	183.20	21.97	0:21:20	3,245.13	270.43	15.27	0:28:25	447.32	447.32	9.37
0:00:30	4,421.22	46.05	86.34	0:07:25	4,614.78	94.18	43.28	0:14:25	3,465.54	150.68	24.37	0:21:25	3,379.56	281.63	14.88	0:28:30	456.34	456.34	9.17
0:00:35	5,075.32	46.14	84.81	0:07:30	5,035.05	93.24	42.65	0:14:30	4,036.60	168.19	24.76	0:21:30	3,163.55	263.63	15.91	0:28:35	433.06	433.06	9.69
0:00:40	5,689.36	47.02	84.64	0:07:35	5,349.42	92.23	43.59	0:14:35	4,122.58	158.56	25.24	0:21:35	3,718.67	286.05	14.10	0:28:40	306.18	306.18	13.70
0:00:45	6,274.68	47.18	85.00	0:07:40	5,845.60	87.25	43.89	0:14:40	4,457.71	165.10	25.07	0:21:40	3,807.17	271.94	14.44	0:28:45	190.00	190.00	22.04
0:00:50	6,851.40	48.25	85.36	0:07:45	6,835.04	92.37	43.70	0:14:45	4,500.49	166.68	25.15	0:21:45	4,357.46	272.34	14.05	0:28:50	201.33	201.33	20.83
0:00:55	7,179.81	46.62	86.19	0:07:50	7,302.28	92.43	43.37	0:14:50	5,145.78	171.53	23.99	0:21:50	4,602.41	287.65	14.57	0:28:55	361.34	361.34	11.62
0:01:00	7,706.61	47.28	86.52	0:07:55	7,803.29	92.90	43.88	0:14:55	5,879.37	172.92	23.71	0:21:55	5,033.79	296.11	14.11	0:29:00	474.17	474.17	8.83
0:01:05	7,964.77	46.31	87.98	0:08:00	7,855.09	93.51	44.84	0:15:00	6,207.36	172.43	23.00	0:22:00	4,843.58	242.18	15.11	0:29:05	456.55	456.55	9.18
0:01:10	8,298.22	47.42	87.28	0:08:05	8,091.86	93.01	44.37	0:15:05	6,555.07	177.16	23.25	0:22:05	5,701.74	285.09	14.70	0:29:10	345.61	345.61	12.14
0:01:15	8,512.55	47.56	87.35	0:08:10	8,232.16	91.47	44.78	0:15:10	6,730.81	172.58	23.64	0:22:10	5,974.37	284.49	14.73	0:29:15	204.89	204.89	20.50
0:01:20	8,665.85	47.35	87.73	0:08:15	8,608.39	93.57	44.48	0:15:15	6,976.81	162.25	24.16	0:22:15	6,526.97	283.78	14.01	0:29:20	320.24	320.24	13.05
0:01:25	8,765.26	45.89	89.03	0:08:20	8,653.48	92.06	44.81	0:15:20	7,760.72	172.46	23.83	0:22:20	6,989.60	303.90	13.80	0:29:25	269.90	269.90	15.57
0:01:30	9,106.67	47.43	88.55	0:08:25	8,850.82	92.20	45.08	0:15:25	7,854.04	163.63	24.58	0:22:25	6,936.54	289.02	14.37	0:29:30	454.45	454.45	9.22
0:01:35	9,084.02	47.31	88.82	0:08:30	8,811.60	91.79	45.66	0:15:30	8,076.34	168.26	24.93	0:22:30	6,972.61	290.53	14.42	0:29:35	448.16	448.16	9.36
0:01:40	9,031.39	47.04	89.13	0:08:35	8,726.88	90.90	46.16	0:15:35	7,886.55	164.30	25.51	0:22:35	6,723.05	280.13	14.97	0:29:40	433.48	433.48	9.67
0:01:45	8,973.92	46.74	89.75	0:08:40	8,722.89	90.86	46.14	0:15:40	8,076.55	168.26	24.91	0:22:40	6,716.55	279.86	14.99	0:29:45	428.45	428.45	9.78
0:01:50	9,036.21	47.06	89.15	0:08:45	8,582.38	89.40	46.96	0:15:45	8,011.96	166.92	25.13	0:22:45	6,960.66	290.03	14.46	0:29:50	334.29	334.29	12.53
0:01:55	9,029.71	47.03	89.13	0:08:50	8,641.31	90.01	46.57	0:15:50	8,053.48	167.78	24.98	0:22:55	6,937.17	289.05	14.49	0:29:55	444.60	444.60	9.43
0:02:00	8,988.81	46.82	89.64	0:08:55	8,408.53	87.59	47.88	0:15:55	7,907.73	164.74	25.45	0:22:55	6,682.57	278.44	15.06	0:30:00	423.41	423.41	9.90
0:02:05	9,004.96	46.90	89.41	0:09:00	8,263.20	86.07	48.71	0:16:00	7,848.80	163.52	25.65	0:23:00	6,950.59	289.61	14.49	0:30:05	455.50	455.50	9.19
0:02:10	8,985.46	46.80	89.63	0:09:05	8,310.59	86.57	48.50	0:16:05	7,823.43	162.99	25.73	0:23:05	6,871.32	286.30	14.64	0:30:10	444.18	444.18	9.43
0:02:15	8,986.09	46.80	89.62	0:09:10	8,317.72	86.64	48.40	0:16:10	7,951.35	165.65	25.31	0:23:10	6,750.52	281.27	14.90	0:30:15	458.23	458.23	9.16
0:02:20	9,053.82	47.16	88.88	0:09:15	8,209.30	85.51	49.02	0:16:15	7,993.09	166.52	25.18	0:23:15	6,828.96	284.54	14.74	0:30:20	455.71	455.71	9.19
0:02:25	9,134.98	47.58	88.15	0:09:20	8,284.17	86.29	48.65	0:16:20	8,031.04	167.31	25.06	0:23:20	6,831.26	284.64	14.73	0:30:25	457.39	457.39	9.17
0:02:30	9,012.09	46.94	89.32	0:09:25	8,328.63	86.76	48.32	0:16:25	7,991.20	166.48	25.20	0:23:25	6,739.83	280.83	14.93	0:30:30	447.32	447.32	9.35
0:02:35	9,053.82	47.16	89.02	0:09:30	8,313.95	86.60	48.43	0:16:30	7,834.96	163.23	25.67	0:23:30	6,953.32	289.72	14.46	0:30:35	449.21	449.21	9.35
0:02:40	9,019.64	46.98	89.28	0:09:35	8,298.64	86.44	48.52	0:16:35	8,118.08	169.13	24.81	0:23:35	6,535.35	272.31	15.39	0:30:40	455.29	455.29	9.20
0:02:45	9,027.40	47.02	89.12	0:09:40	8,342.26	86.90	48.28	0:16:40	8,066.49	168.05	24.91	0:23:40	6,303.20	262.63	15.99	0:30:45	443.76	443.76	9.45
0:02:50	9,042.08	47.09	89.15	0:09:45	8,223.14	85.66	48.95	0:16:45	7,972.95	166.10	25.27	0:23:45	6,397.78	266.57	15.72	0:30:50	436.00	436.00	9.62
0:02:55	9,076.89	47.28	88.67	0:09:50	8,379.59	87.29	48.05	0:16:50	7,942.33	165.47	25.36	0:23:50	6,108.79	254.53	16.48	0:30:55	437.47	437.47	9.57
				0:09:55	8,352.75	87.01	48.20	0:16:55	7,855.93	163.67	25.61	0:23:55	6,089.71	253.74	16.52				

SPC BENCHMARK 2™ V1.3 FULL DISCLOSURE REPORT Submitted for Review: NOVEMBER 30, 2009
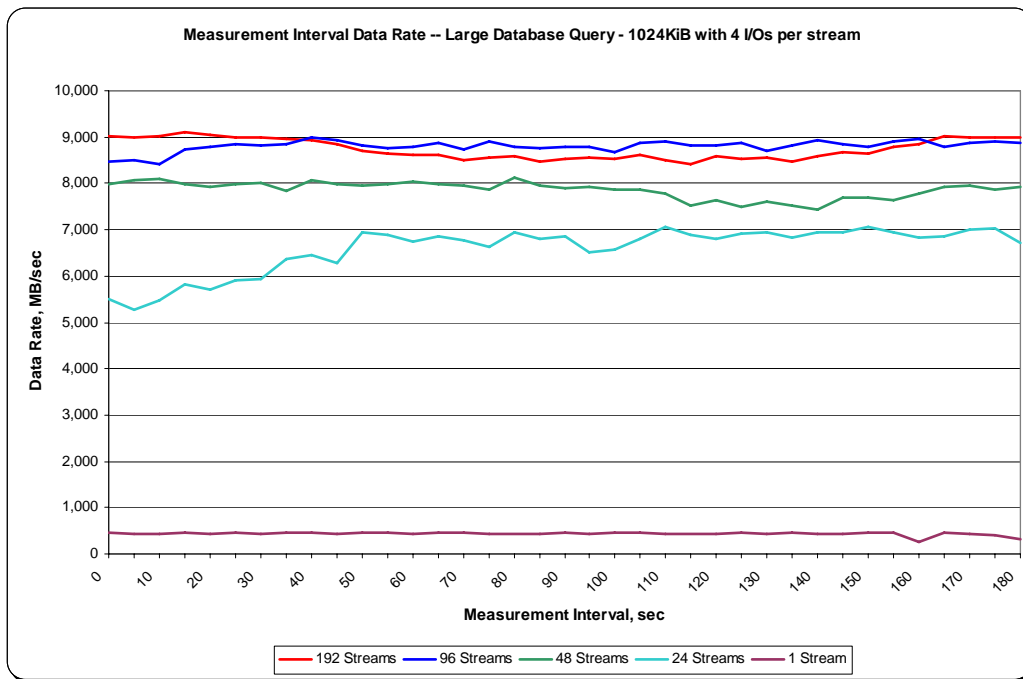IBM Corporation Submission Identifier: B00049
IBM System Storage DS8700

SPC-2 "Large Database Query/1024 KiB Transfer Size/4 Outstanding I/Os" Test Run Data Measurement Interval, Run-Out, and Ramp-Down Periods

TR11 Test Run Sequence Time	192 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR12 Test Run Sequence Time	96 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR13 Test Run Sequence Time	48 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR14 Test Run Sequence Time	24 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR15 Test Run Sequence Time	1 Stream Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms
0:03:00	9,028.66	47.02	89.19	0:10:00	8,477.95	88.31	47.51	0:17:00	7,990.78	166.47	25.19	0:24:00	5,498.52	229.11	18.30	0:31:00	455.50	455.50	9.21
0:03:05	8,978.96	46.77	89.67	0:10:05	8,510.87	88.65	47.31	0:17:05	8,058.52	167.89	24.97	0:24:05	5,276.01	219.83	19.07	0:31:05	429.08	429.08	9.77
0:03:10	9,016.08	46.96	89.36	0:10:10	8,415.45	87.66	47.86	0:17:10	8,106.33	168.88	24.84	0:24:10	5,472.73	228.03	18.39	0:31:10	445.23	445.23	9.41
0:03:15	9,113.80	47.47	88.35	0:10:15	8,724.99	90.89	46.14	0:17:15	7,975.26	166.15	25.23	0:24:15	5,825.68	242.74	17.27	0:31:15	452.36	452.36	9.27
0:03:20	9,060.33	47.19	88.85	0:10:20	8,784.34	91.50	45.83	0:17:20	7,926.61	165.14	25.40	0:24:20	5,719.56	238.32	17.60	0:31:20	445.23	445.23	9.41
0:03:25	8,982.31	46.78	89.70	0:10:25	8,835.09	92.03	45.59	0:17:25	7,984.28	166.34	25.21	0:24:25	5,908.52	246.19	17.04	0:31:25	461.58	461.58	9.10
0:03:30	9,002.02	46.89	89.49	0:10:30	8,811.81	91.79	45.66	0:17:30	8,014.06	166.96	25.11	0:24:30	5,924.03	246.83	16.98	0:31:30	441.87	441.87	9.47
0:03:35	8,967.00	46.70	89.70	0:10:35	8,857.74	92.27	45.46	0:17:35	7,846.28	163.46	25.65	0:24:35	6,373.45	265.56	15.79	0:31:35	448.37	448.37	9.34
0:03:40	8,935.13	46.54	90.22	0:10:40	8,977.49	93.52	44.86	0:17:40	8,067.32	168.07	24.95	0:24:40	6,449.37	268.72	15.60	0:31:40	458.44	458.44	9.15
0:03:45	8,848.30	46.08	90.97	0:10:45	8,930.93	93.03	45.05	0:17:45	7,975.26	166.15	25.24	0:24:45	6,275.31	261.47	16.04	0:31:45	444.81	444.81	9.42
0:03:50	8,702.76	45.33	92.56	0:10:50	8,805.94	91.73	45.79	0:17:50	7,940.87	165.43	25.34	0:24:50	6,953.74	289.74	14.47	0:31:50	456.13	456.13	9.19
0:03:55	8,653.69	45.07	92.97	0:10:55	8,755.61	91.20	45.97	0:17:55	7,978.20	166.21	25.23	0:24:55	6,901.52	287.56	14.58	0:31:55	450.68	450.68	9.29
0:04:00	8,602.52	44.80	93.68	0:11:00	8,791.26	91.58	45.81	0:18:00	8,050.76	167.72	25.00	0:25:00	6,729.55	280.40	14.95	0:32:00	446.27	446.27	9.41
0:04:05	8,620.55	44.90	93.42	0:11:05	8,866.34	92.36	45.42	0:18:05	7,989.52	166.45	25.20	0:25:05	6,868.80	286.20	14.66	0:32:05	449.00	449.00	9.34
0:04:10	8,503.95	44.29	94.69	0:11:10	8,732.75	90.97	46.08	0:18:10	7,954.92	165.73	25.30	0:25:10	6,777.37	282.39	14.84	0:32:10	450.68	450.68	9.30
0:04:15	8,564.35	44.61	94.04	0:11:15	8,896.33	92.67	45.26	0:18:15	7,877.32	164.11	25.55	0:25:15	6,625.74	276.07	15.19	0:32:15	442.92	442.92	9.46
0:04:20	8,590.14	44.74	93.66	0:11:20	8,799.65	91.66	45.80	0:18:20	8,140.93	169.60	24.72	0:25:20	6,959.40	289.97	14.46	0:32:20	446.48	446.48	9.38
0:04:25	8,484.66	44.19	94.99	0:11:25	8,762.11	91.27	45.94	0:18:25	7,943.17	165.48	25.34	0:25:25	6,812.60	283.86	14.77	0:32:25	443.13	443.13	9.47
0:04:30	8,516.11	44.35	94.57	0:11:30	8,790.84	91.57	45.80	0:18:30	7,899.55	164.57	25.47	0:25:30	6,844.47	285.19	14.70	0:32:30	457.18	457.18	9.16
0:04:35	8,560.78	44.59	94.04	0:11:35	8,780.78	91.47	45.84	0:18:35	7,919.89	165.00	25.42	0:25:35	6,511.03	271.29	15.11	0:32:35	439.14	439.14	9.54
0:04:40	8,533.31	44.44	94.35	0:11:40	8,660.40	90.21	46.54	0:18:40	7,875.02	164.06	25.56	0:25:40	6,568.91	273.70	15.31	0:32:40	453.19	453.19	9.25
0:04:45	8,615.31	44.87	93.43	0:11:45	8,863.40	92.33	45.44	0:18:45	7,881.73	164.20	25.52	0:25:45	6,815.53	283.98	14.77	0:32:45	457.81	457.81	9.15
0:04:50	8,490.11	44.22	94.90	0:11:50	8,905.98	92.77	45.24	0:18:50	7,772.26	161.92	25.91	0:25:50	7,069.50	294.56	14.23	0:32:50	445.85	445.85	9.40
0:04:55	8,424.89	43.88	95.64	0:11:55	8,804.05	91.71	45.74	0:18:55	7,509.90	156.46	26.78	0:25:55	6,881.38	286.72	14.62	0:32:55	443.76	443.76	9.45
0:05:00	8,583.01	44.70	93.77	0:12:00	8,826.07	91.94	45.60	0:19:00	7,636.36	159.09	26.38	0:26:00	6,815.32	283.97	14.77	0:33:00	438.93	438.93	9.54
0:05:05	8,530.59	44.43	94.37	0:12:05	8,865.08	92.34	45.41	0:19:05	7,482.01	155.88	26.89	0:26:05	6,906.76	287.78	14.57	0:33:05	448.79	448.79	9.33
0:05:10	8,550.72	44.53	94.23	0:12:10	8,699.20	90.62	46.28	0:19:10	7,599.24	158.32	26.50	0:26:10	6,943.25	289.30	14.49	0:33:10	440.82	440.82	9.53
0:05:15	8,481.72	44.18	94.94	0:12:15	8,826.70	91.94	45.62	0:19:15	7,515.14	156.57	26.81	0:26:15	6,838.18	284.92	14.72	0:33:15	449.00	449.00	9.34
0:05:20	8,588.26	44.73	93.81	0:12:20	8,946.24	93.19	45.00	0:19:20	7,436.29	154.92	27.07	0:26:20	6,933.39	288.89	14.51	0:33:20	445.23	445.23	9.41
0:05:25	8,685.77	45.24	92.69	0:12:25	8,851.24	92.20	45.46	0:19:25	7,708.29	160.59	26.12	0:26:25	6,947.65	289.49	14.49	0:33:25	434.11	434.11	9.65
0:05:30	8,640.27	45.00	93.18	0:12:30	8,776.79	91.42	45.88	0:19:30	7,701.37	160.45	26.12	0:26:30	7,071.39	294.64	14.22	0:33:30	448.16	448.16	9.35
0:05:35	8,790.21	45.78	91.67	0:12:35	8,910.17	92.81	45.19	0:19:35	7,641.18	159.19	26.35	0:26:35	6,936.96	289.04	14.51	0:33:35	458.65	458.65	9.14
0:05:40	8,852.71	46.11	90.91	0:12:40	8,973.50	93.47	44.85	0:19:40	7,795.32	162.40	25.81	0:26:40	6,838.81	284.95	14.71	0:33:40	271.58	271.58	15.44
0:05:45	9,008.11	46.92	89.47	0:12:45	8,775.53	91.41	45.86	0:19:45	7,933.74	165.29	25.38	0:26:45	6,856.22	285.68	14.68	0:33:45	450.89	450.89	9.29
0:05:50	8,983.78	46.79	89.65	0:12:50	8,889.41	92.60	45.28	0:19:50	7,949.04	165.61	25.32	0:26:50	7,013.72	292.24	14.34	0:33:50	439.35	439.35	9.54
0:05:55	9,003.28	46.89	89.42	0:12:55	8,892.97	92.64	45.30	0:19:55	7,866.42	163.88	25.59	0:26:55	7,033.01	293.04	14.32	0:33:55	394.47	394.47	10.60
0:06:00	8,978.33	46.76	89.68	0:13:00	8,866.34	92.36	45.43	0:20:00	7,918.01	164.96	25.42	0:27:00	6,726.20	280.26	14.97	0:34:00	312.48	312.48	13.45
0:06:05	8,913.53	46.42	90.38	0:13:05	8,904.93	92.76	45.20	0:20:05	8,038.38	167.47	25.04	0:27:05	7,132.62	297.19	14.11	0:34:05	443.97	443.97	9.45
0:06:10	9,034.11	47.05	89.14	0:13:10	8,816.43	91.84	45.65	0:20:10	7,986.16	166.38	25.20	0:27:10	6,828.96	284.54	14.73	0:34:10	443.76	443.76	9.45
0:06:15	9,149.04	47.65	88.01	0:13:15	8,791.05	91.57	45.76	0:20:15	7,966.03	165.96	25.27	0:27:15	7,078.54	294.94	14.22	0:34:15	272.84	272.84	15.34
0:06:20	9,111.08	47.45	88.41	0:13:20	8,841.38	92.10	45.58	0:20:20	8,040.27	167.51	25.03	0:27:20	6,661.18	277.55	15.10	0:34:20	150.79	150.79	27.83
0:06:25	8,975.39	46.75	89.69	0:13:25	8,847.88	92.17	45.50	0:20:25	7,979.03	166.23	25.23	0:27:25	6,838.18	284.92	14.72	0:34:25	264.66	264.66	15.85
0:06:30	9,047.74	47.12	88.99	0:13:30	8,859.42	92.29	45.44	0:20:30	8,035.03	167.40	25.04	0:27:30	6,807.57	283.65	14.79	0:34:30	440.19	440.19	9.52
0:06:35	9,066.83	47.22	88.81	0:13:35	8,892.13	92.63	45.26	0:20:35	7,949.67	165.62	25.33	0:27:35	6,822.04	284.25	14.74	0:34:35	450.68	450.68	9.30
0:06:40	9,038.73	47.08	89.07	0:13:40	8,570.85	89.28	46.93	0:20:40	8,024.75	167.18	25.07	0:27:40	6,677.96	278.25	15.07	0:34:40	443.97	443.97	9.43
0:06:45	947.28	0.00	73.43	0:13:45	563.71	0.00	41.67	0:20:45	406.43	0.00	23.28	0:27:45	439.56	0.00	15.12	0:34:45	35.02	0.00	9.99
0:06:50	0.00	0.00	0.00	0:13:50	0.00	0.00	0.00	0:20:50	0.00	0.00	0.00	0:27:50	0.00	0.00	0.00	0:34:50	0.00	0.00	0.00
												0:27:55	0.00	0.00	0.00				

SPC BENCHMARK 2™ V1.3
IBM Corporation
IBM System Storage DS8700

FULL DISCLOSURE REPORT

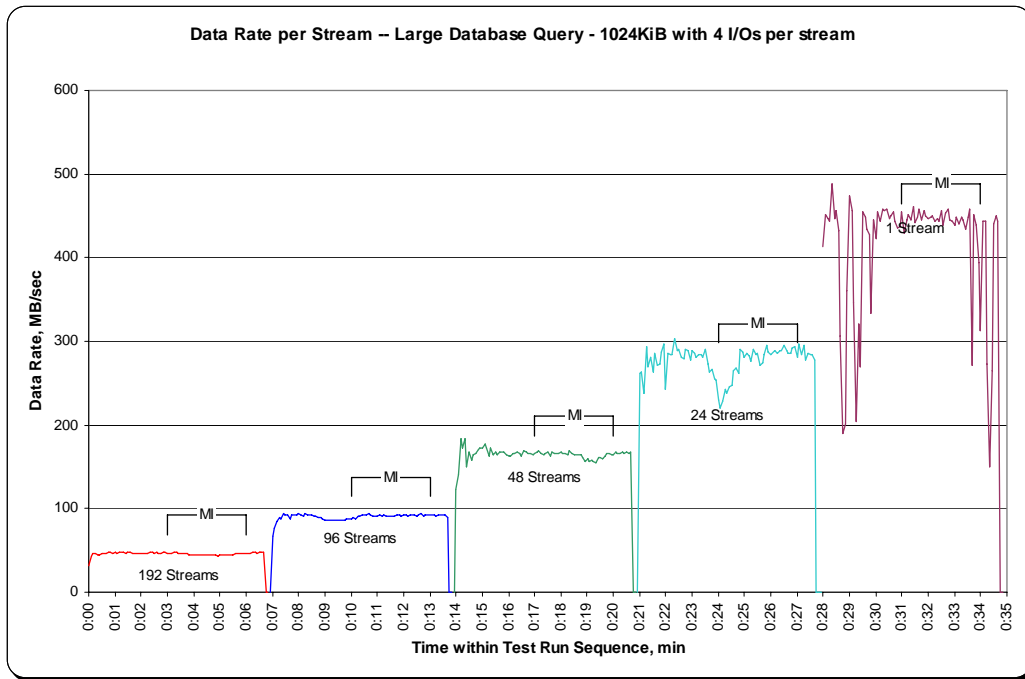Submitted for Review: NOVEMBER 30, 2009
Submission Identifier: B00049

SPC-2 "Large Database Query/1024 KiB Transfer Size/4 Outstanding I/Os" Average Data Rate Graph – Complete Test Run
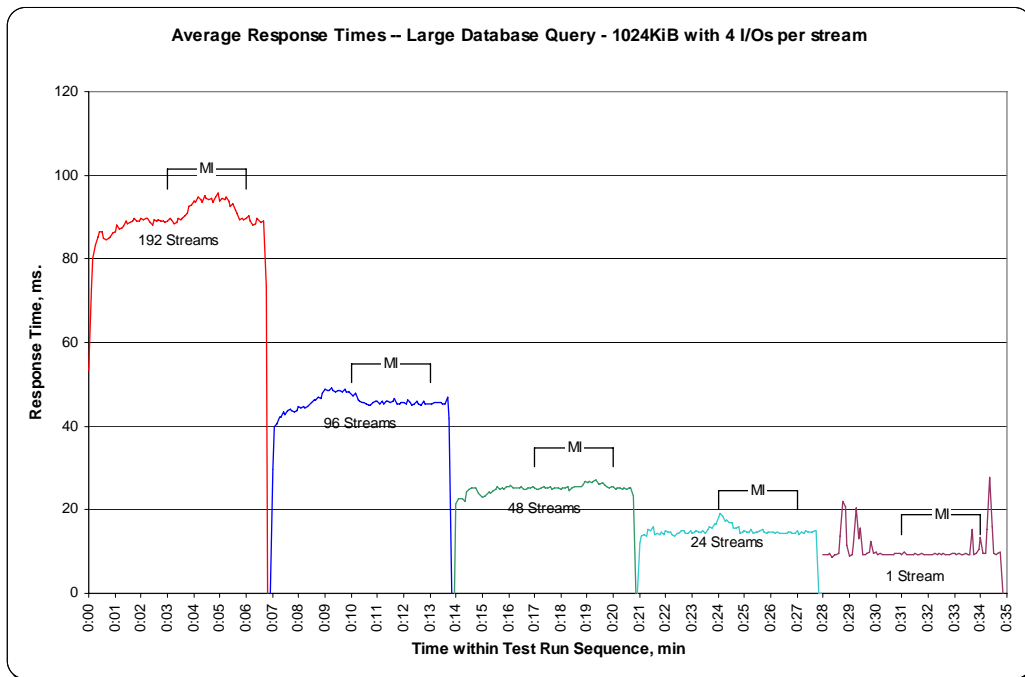

SPC-2 "Large Database Query/1024 KiB Transfer Size/4 Outstanding I/Os" Average Data Rate Graph – Measurement Interval (MI) Only

SPC-2 "Large Database Query/1024 KiB Transfer Size/4 Outstanding I/Os" Average Data Rate per Stream Graph

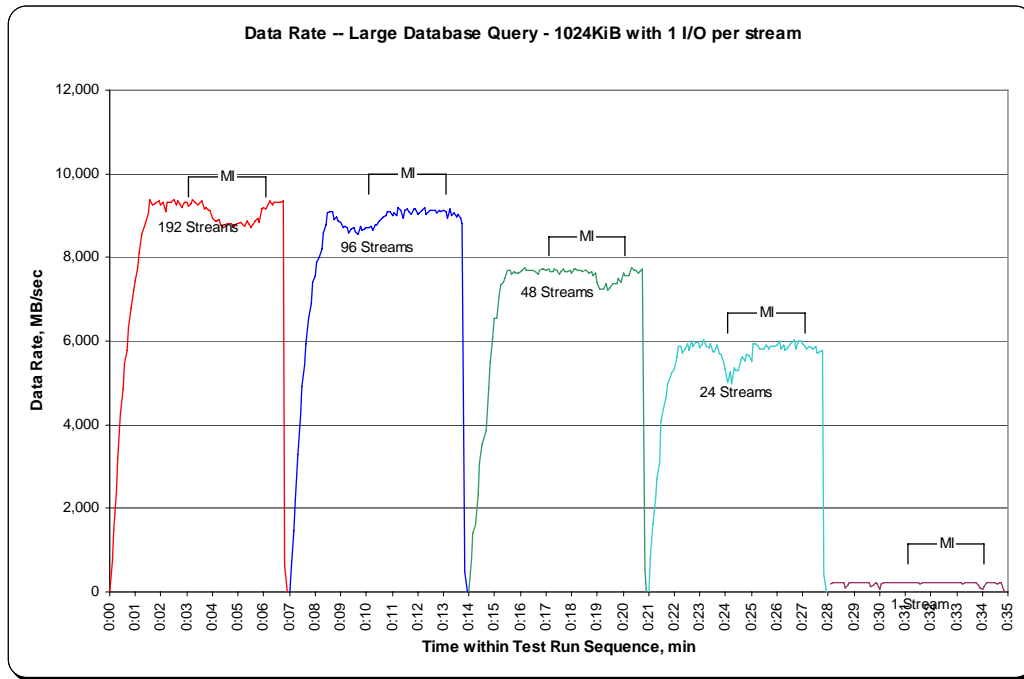## SPC-2 "Large Database Query/1024 KiB Transfer Size/4 Outstanding I/Os" Average Response Time Graph

SPC-2 "Large Database Query/1024 KiB Transfer Size/1 Outstanding I/O" Test Run Data – Ramp-Up Period

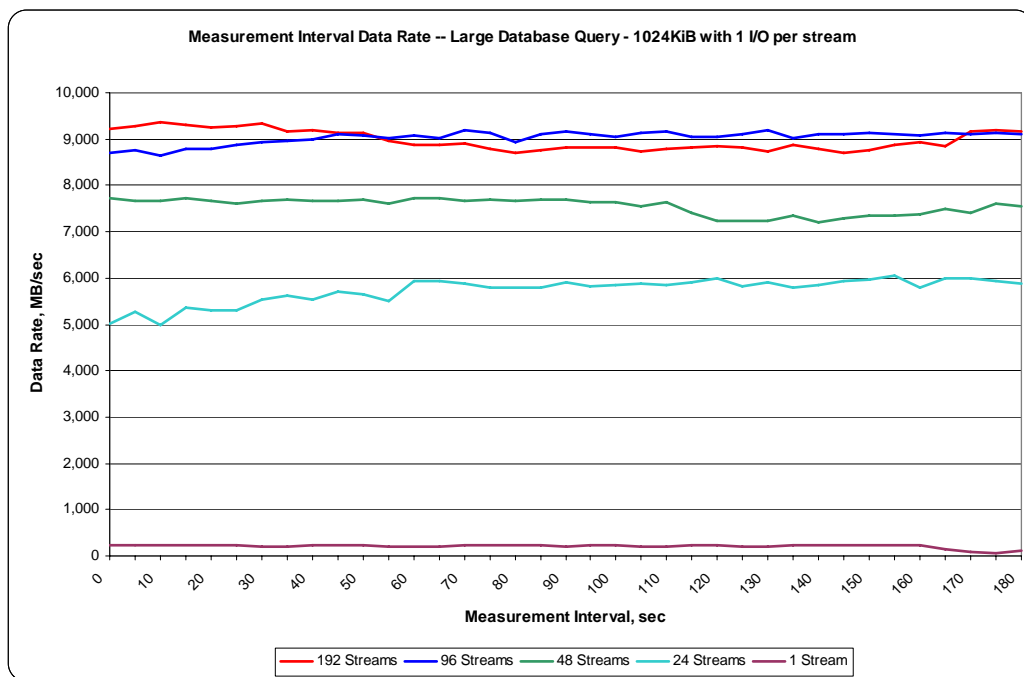| TR16 Test Run Sequence Time	192 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR17 Test Run Sequence Time	96 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR18 Test Run Sequence Time	48 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR19 Test Run Sequence Time	24 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR20 Test Run Sequence Time	1 Stream Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms
0:00:00	0.00	0.00	0.00	0:07:00	0.00	0.00	0.00	0:14:00	0.00	0.00	0.00	0:21:00	0.00	0.00	0.00	0:28:05	199.44	199.44	4.78
0:00:05	725.61	38.19	17.05	0:07:05	583.43	72.93	8.37	0:14:05	760.22	108.60	5.57	0:21:05	828.79	165.76	3.45	0:28:10	216.85	216.85	4.83
0:00:10	1,482.90	38.02	19.23	0:07:10	1,462.55	81.25	9.69	0:14:10	1,390.83	154.54	6.11	0:21:10	1,620.05	202.51	4.19	0:28:15	219.36	219.36	4.78
0:00:15	2,399.98	46.15	19.68	0:07:15	2,217.53	85.29	10.57	0:14:15	1,583.56	143.96	6.20	0:21:15	2,228.85	222.89	4.31	0:28:20	218.31	218.31	4.80
0:00:20	3,186.62	44.26	20.18	0:07:20	3,276.59	84.02	10.39	0:14:20	2,330.15	166.44	5.59	0:21:20	2,714.13	246.74	4.14	0:28:25	221.46	221.46	4.73
0:00:25	4,262.25	47.36	20.57	0:07:25	4,202.48	91.36	10.47	0:14:25	3,087.01	154.35	5.88	0:21:25	3,090.57	206.04	4.22	0:28:30	218.94	218.94	4.79
0:00:30	4,858.05	48.10	20.39	0:07:30	4,907.96	92.60	10.56	0:14:30	3,557.61	177.88	5.89	0:21:30	4,098.25	241.07	4.17	0:28:35	219.99	219.99	4.76
0:00:35	5,448.40	49.08	20.37	0:07:35	5,415.69	91.79	10.63	0:14:35	3,632.69	172.99	5.99	0:21:35	4,397.31	244.29	4.12	0:28:40	83.26	83.26	12.58
0:00:40	5,787.09	47.83	20.91	0:07:40	5,949.62	94.44	10.87	0:14:40	3,855.82	148.30	6.13	0:21:40	4,686.72	234.34	4.23	0:28:45	162.11	162.11	6.46
0:00:45	6,321.86	48.63	20.69	0:07:45	6,537.66	94.75	10.78	0:14:45	4,876.30	147.77	6.22	0:21:45	4,989.33	249.47	4.20	0:28:50	219.36	219.36	4.77
0:00:50	6,787.43	47.46	20.81	0:07:50	6,895.44	94.46	10.73	0:14:50	5,497.47	161.69	6.33	0:21:50	5,147.88	257.39	4.07	0:28:55	219.36	219.36	4.78
0:00:55	7,206.65	48.69	21.03	0:07:55	7,394.98	94.81	10.77	0:14:55	6,111.10	165.16	6.09	0:21:55	5,222.75	248.70	4.18	0:29:00	227.54	227.54	4.60
0:01:00	7,431.89	48.57	21.25	0:08:00	7,579.11	94.74	10.91	0:15:00	6,557.58	172.57	6.05	0:22:00	5,337.67	242.62	4.15	0:29:05	217.89	217.89	4.80
0:01:05	7,757.99	48.49	21.15	0:08:05	7,898.29	96.32	10.70	0:15:05	6,537.87	159.46	6.29	0:22:05	5,618.27	255.38	4.10	0:29:10	221.25	221.25	4.74
0:01:10	8,099.41	47.64	21.21	0:08:10	8,001.05	95.25	10.95	0:15:10	7,159.05	166.49	6.14	0:22:10	5,861.75	254.86	4.06	0:29:15	219.15	219.15	4.78
0:01:15	8,562.46	49.78	20.90	0:08:15	8,197.56	93.15	10.93	0:15:15	7,341.71	166.86	6.23	0:22:15	5,863.01	254.91	4.11	0:29:20	219.57	219.57	4.77
0:01:20	8,760.22	48.94	20.98	0:08:20	8,595.81	93.43	10.89	0:15:20	7,416.16	168.55	6.22	0:22:20	5,700.06	247.83	4.22	0:29:25	219.36	219.36	4.77
0:01:25	8,824.82	48.49	21.46	0:08:25	8,785.39	94.47	11.04	0:15:25	7,501.93	159.62	6.33	0:22:25	5,823.79	253.21	4.14	0:29:30	220.83	220.83	4.74
0:01:30	9,070.18	47.24	21.65	0:08:30	9,065.78	94.44	10.94	0:15:30	7,676.83	159.93	6.48	0:22:30	5,945.43	247.73	4.16	0:29:35	218.73	218.73	4.79
0:01:35	9,369.03	48.80	21.47	0:08:35	9,089.06	94.68	11.07	0:15:35	7,706.40	160.55	6.53	0:22:35	5,786.04	241.09	4.35	0:29:40	132.54	132.54	7.91
0:01:40	9,245.71	48.15	21.77	0:08:40	9,105.20	94.85	11.06	0:15:40	7,604.69	158.43	6.61	0:22:40	6,015.47	250.64	4.18	0:29:45	171.76	171.76	6.10
0:01:45	9,294.58	48.41	21.65	0:08:45	8,896.12	92.67	11.30	0:15:45	7,672.01	159.83	6.55	0:22:45	5,869.72	244.57	4.28	0:29:50	217.26	217.26	4.82
0:01:50	9,323.10	48.56	21.59	0:08:50	8,961.55	93.35	11.24	0:15:50	7,628.81	158.93	6.59	0:22:50	5,968.49	248.69	4.21	0:29:55	191.26	191.26	5.48
0:01:55	9,339.25	48.64	21.56	0:08:55	8,882.70	92.53	11.32	0:15:55	7,626.08	158.88	6.59	0:22:55	5,960.53	248.36	4.22	0:30:00	76.55	76.55	13.69
0:02:00	9,267.31	48.27	21.71	0:09:00	8,829.85	91.98	11.39	0:16:00	7,667.19	159.73	6.56	0:23:00	5,849.38	243.72	4.30	0:30:05	180.56	180.56	5.80
0:02:05	9,327.71	48.58	21.57	0:09:05	8,723.73	90.87	11.54	0:16:05	7,702.21	160.46	6.53	0:23:05	5,922.15	246.76	4.24	0:30:10	210.76	210.76	4.97
0:02:10	9,089.69	47.34	22.14	0:09:10	8,737.99	91.02	11.51	0:16:10	7,753.80	161.54	6.49	0:23:10	6,029.73	251.24	4.17	0:30:15	214.33	214.33	4.89
0:02:15	9,319.74	48.54	21.61	0:09:15	8,700.66	90.63	11.57	0:16:15	7,695.71	160.33	6.53	0:23:15	5,860.91	244.20	4.29	0:30:20	219.78	219.78	4.77
0:02:20	9,318.28	48.53	21.62	0:09:20	8,594.55	89.53	11.70	0:16:20	7,680.61	160.01	6.55	0:23:20	5,827.15	242.80	4.31	0:30:25	218.31	218.31	4.79
0:02:25	9,316.60	48.52	21.58	0:09:25	8,677.60	90.39	11.59	0:16:25	7,689.42	160.20	6.54	0:23:25	5,950.04	247.92	4.22	0:30:30	221.25	221.25	4.74
0:02:30	9,371.12	48.81	21.49	0:09:30	8,704.86	90.68	11.56	0:16:30	7,689.84	160.20	6.54	0:23:30	5,759.62	239.98	4.36	0:30:35	218.73	218.73	4.79
0:02:35	9,261.23	48.24	21.74	0:09:35	8,601.26	89.60	11.69	0:16:35	7,664.67	159.68	6.56	0:23:35	5,757.10	239.88	4.37	0:30:40	217.68	217.68	4.81
0:02:40	9,341.76	48.66	21.55	0:09:40	8,553.44	89.10	11.78	0:16:40	7,608.26	158.51	6.61	0:23:40	5,893.63	245.57	4.26	0:30:45	222.09	222.09	4.72
0:02:45	9,254.73	48.20	21.73	0:09:45	8,733.38	90.97	11.52	0:16:45	7,692.14	160.25	6.54	0:23:45	5,694.40	237.27	4.41	0:30:50	217.68	217.68	4.81
0:02:50	9,185.53	47.84	21.93	0:09:50	8,636.28	89.96	11.64	0:16:50	7,735.14	161.15	6.50	0:23:50	5,671.75	236.32	4.43	0:30:55	219.78	219.78	4.76
0:02:55	9,310.73	48.49	21.62	0:09:55	8,667.53	90.29	11.62	0:16:55	7,713.95	160.71	6.52	0:23:55	5,485.31	228.55	4.58	0:31:00	207.83	207.83	5.04
0:03:00	9,326.66	48.58	21.58	0:10:00	8,714.51	90.78	11.55	0:17:00	7,679.56	159.99	6.55	0:24:00	5,316.91	221.54	4.73				

SPC-2 "Large Database Query/1024 KiB Transfer Size/1 Outstanding I/O" Test Run Data Measurement Interval, Run-Out, and Ramp-Down Periods

TR16 Test Run Sequence Time	192 Streams Data Rate, MB/sec	192 Streams Data Rate/ Stream, MB/sec	192 Streams Response Time, ms	TR17 Test Run Sequence Time	96 Streams Data Rate, MB/sec	96 Streams Data Rate/ Stream, MB/sec	96 Streams Response Time, ms	TR18 Test Run Sequence Time	48 Streams Data Rate, MB/sec	48 Streams Data Rate/ Stream, MB/sec	48 Streams Response Time, ms	TR19 Test Run Sequence Time	24 Streams Data Rate, MB/sec	24 Streams Data Rate/ Stream, MB/sec	24 Streams Response Time, ms	TR20 Test Run Sequence Time	1 Stream Data Rate, MB/sec	1 Stream Data Rate/ Stream, MB/sec	1 Stream Response Time, ms
0:03:05	9,232.29	48.08	21.81	0:10:05	8,715.76	90.79	11.54	0:17:05	7,731.78	161.08	6.51	0:24:05	5,018.48	209.10	5.01	0:31:05	226.91	226.91	4.62
0:03:10	9,286.19	48.37	21.65	0:10:10	8,749.32	91.14	11.52	0:17:10	7,663.41	159.65	6.56	0:24:10	5,262.59	219.27	4.78	0:31:10	219.78	219.78	4.76
0:03:15	9,371.54	48.81	21.47	0:10:15	8,641.94	90.02	11.64	0:17:15	7,663.20	159.65	6.56	0:24:15	4,989.54	207.90	5.04	0:31:15	219.15	219.15	4.78
0:03:20	9,311.98	48.50	21.61	0:10:20	8,791.89	91.58	11.44	0:17:20	7,731.15	161.07	6.51	0:24:20	5,355.50	223.15	4.69	0:31:20	222.30	222.30	4.71
0:03:25	9,257.25	48.21	21.76	0:10:25	8,792.52	91.59	11.43	0:17:25	7,679.14	159.98	6.54	0:24:25	5,300.55	220.86	4.74	0:31:25	218.94	218.94	4.78
0:03:30	9,282.41	48.35	21.68	0:10:30	8,867.81	92.37	11.36	0:17:30	7,607.84	158.50	6.61	0:24:30	5,306.42	221.10	4.74	0:31:30	220.20	220.20	4.76
0:03:35	9,342.18	48.66	21.52	0:10:35	8,922.54	92.94	11.28	0:17:35	7,660.27	159.59	6.57	0:24:35	5,540.89	230.87	4.54	0:31:35	205.10	205.10	5.10
0:03:40	9,158.47	47.70	21.99	0:10:40	8,974.97	93.49	11.20	0:17:40	7,708.71	160.60	6.52	0:24:40	5,606.74	233.61	4.48	0:31:40	209.92	209.92	4.99
0:03:45	9,180.91	47.82	21.91	0:10:45	9,004.96	93.80	11.18	0:17:45	7,659.01	159.56	6.56	0:24:45	5,527.46	230.31	4.55	0:31:45	217.68	217.68	4.81
0:03:50	9,125.55	47.53	22.08	0:10:50	9,095.14	94.74	11.06	0:17:50	7,672.43	159.84	6.55	0:24:50	5,694.61	237.28	4.41	0:31:50	218.73	218.73	4.79
0:03:55	9,136.87	47.59	22.02	0:10:55	9,082.35	94.61	11.08	0:17:55	7,695.08	160.31	6.53	0:24:55	5,661.05	235.88	4.44	0:31:55	223.35	223.35	4.69
0:04:00	8,950.85	46.62	22.46	0:11:00	9,009.99	93.85	11.17	0:18:00	7,618.74	158.72	6.60	0:25:00	5,517.40	229.89	4.56	0:32:00	214.12	214.12	4.89
0:04:05	8,873.68	46.22	22.70	0:11:05	9,075.63	94.54	11.08	0:18:05	7,719.62	160.83	6.51	0:25:05	5,932.00	247.17	4.24	0:32:05	209.92	209.92	4.99
0:04:10	8,876.41	46.23	22.68	0:11:10	9,011.46	93.87	11.17	0:18:10	7,715.00	160.73	6.52	0:25:10	5,946.26	247.76	4.23	0:32:10	214.33	214.33	4.89
0:04:15	8,902.20	46.37	22.58	0:11:15	9,196.85	95.80	10.94	0:18:15	7,676.21	159.92	6.55	0:25:15	5,878.32	244.93	4.28	0:32:15	219.99	219.99	4.76
0:04:20	8,785.60	45.76	22.92	0:11:20	9,132.47	95.13	11.01	0:18:20	7,699.48	160.41	6.53	0:25:20	5,794.22	241.43	4.34	0:32:20	221.46	221.46	4.73
0:04:25	8,707.17	45.35	23.12	0:11:25	8,939.74	93.12	11.25	0:18:25	7,653.77	159.45	6.57	0:25:25	5,792.75	241.36	4.34	0:32:25	220.83	220.83	4.75
0:04:30	8,749.95	45.57	22.99	0:11:30	9,116.32	94.96	11.04	0:18:30	7,693.82	160.29	6.54	0:25:30	5,796.11	241.50	4.34	0:32:30	223.98	223.98	4.68
0:04:35	8,820.62	45.94	22.80	0:11:35	9,164.76	95.47	10.98	0:18:35	7,706.82	160.56	6.52	0:25:35	5,907.26	246.14	4.25	0:32:35	212.02	212.02	4.94
0:04:40	8,820.20	45.94	22.84	0:11:40	9,098.28	94.77	11.06	0:18:40	7,627.13	158.90	6.59	0:25:40	5,819.81	242.49	4.32	0:32:40	224.40	224.40	4.66
0:04:45	8,813.70	45.90	22.82	0:11:45	9,041.03	94.18	11.13	0:18:45	7,646.64	159.30	6.58	0:25:45	5,860.28	244.18	4.29	0:32:45	218.31	218.31	4.80
0:04:50	8,739.25	45.52	23.09	0:11:50	9,144.63	95.26	11.00	0:18:50	7,564.22	157.59	6.65	0:25:50	5,868.04	244.50	4.28	0:32:50	215.38	215.38	4.86
0:04:55	8,793.15	45.80	22.89	0:11:55	9,146.85	95.46	10.97	0:18:55	7,623.15	158.82	6.60	0:25:55	5,864.27	244.34	4.29	0:32:55	215.59	215.59	4.86
0:05:00	8,823.77	45.96	22.82	0:12:00	9,044.81	94.22	11.13	0:19:00	7,408.61	154.35	6.79	0:26:00	5,911.03	246.29	4.25	0:33:00	220.83	220.83	4.74
0:05:05	8,841.38	46.05	22.78	0:12:05	9,050.68	94.28	11.11	0:19:05	7,229.30	150.61	6.96	0:26:05	5,986.53	249.44	4.20	0:33:05	226.49	226.49	4.62
0:05:10	8,810.35	45.89	22.85	0:12:10	9,113.59	94.93	11.04	0:19:10	7,240.42	150.84	6.94	0:26:10	5,822.53	242.61	4.32	0:33:10	213.28	213.28	4.91
0:05:15	8,730.02	45.47	23.05	0:12:15	9,181.33	95.64	10.96	0:19:15	7,247.34	150.99	6.94	0:26:15	5,918.16	246.59	4.25	0:33:15	206.99	206.99	5.06
0:05:20	8,873.05	46.21	22.68	0:12:20	9,028.24	94.04	11.14	0:19:20	7,361.21	153.36	6.83	0:26:20	5,791.29	241.30	4.34	0:33:20	217.89	217.89	4.81
0:05:25	8,798.60	45.83	22.90	0:12:25	9,102.06	94.81	11.06	0:19:25	7,202.04	150.04	6.98	0:26:25	5,840.99	243.37	4.30	0:33:25	225.02	225.02	4.65
0:05:30	8,713.88	45.38	23.04	0:12:30	9,114.22	94.94	11.04	0:19:30	7,276.91	151.60	6.91	0:26:30	5,945.43	247.73	4.23	0:33:30	226.70	226.70	4.62
0:05:35	8,767.14	45.66	22.99	0:12:35	9,128.90	95.09	11.02	0:19:35	7,356.81	153.27	6.83	0:26:35	5,961.78	248.41	4.22	0:33:35	221.46	221.46	4.73
0:05:40	8,876.82	46.23	22.70	0:12:40	9,120.51	95.01	11.03	0:19:40	7,357.65	153.28	6.84	0:26:40	6,038.54	251.61	4.16	0:33:40	225.44	225.44	4.65
0:05:45	8,924.64	46.48	22.52	0:12:45	9,067.04	94.45	11.10	0:19:45	7,375.05	153.65	6.81	0:26:45	5,795.48	241.48	4.34	0:33:45	217.26	217.26	4.82
0:05:50	8,854.60	46.12	22.75	0:12:50	9,125.55	95.06	11.02	0:19:50	7,488.09	156.00	6.72	0:26:50	5,991.98	249.67	4.19	0:33:50	147.01	147.01	7.11
0:05:55	9,159.52	47.71	21.97	0:12:55	9,106.46	94.86	11.05	0:19:55	7,410.71	154.39	6.78	0:26:55	5,996.60	249.86	4.19	0:33:55	98.36	98.36	10.68
0:06:00	9,187.62	47.85	21.93	0:13:00	9,129.53	95.10	11.02	0:20:00	7,613.50	158.61	6.54	0:27:00	5,945.01	247.71	4.23	0:34:00	52.85	52.85	19.83
0:06:05	9,158.89	47.70	21.97	0:13:05	9,107.72	94.87	11.04	0:20:05	7,554.36	157.38	6.61	0:27:05	5,886.92	245.29	4.27	0:34:05	127.93	127.93	8.20
0:06:10	9,279.21	48.33	21.71	0:13:10	8,939.74	93.12	11.25	0:20:10	7,561.28	157.53	6.65	0:27:10	5,812.26	242.18	4.33	0:34:10	231.11	231.11	4.53
0:06:15	9,339.46	48.64	21.53	0:13:15	9,155.96	95.37	11.02	0:20:15	7,557.93	157.46	6.65	0:27:15	5,857.97	244.08	4.29	0:34:15	220.62	220.62	4.75
0:06:20	9,244.88	48.15	21.76	0:13:20	9,008.32	93.84	11.17	0:20:20	7,749.61	161.45	6.49	0:27:20	5,846.86	243.62	4.30	0:34:20	219.15	219.15	4.78
0:06:25	9,327.71	48.58	21.59	0:13:25	9,062.42	94.40	11.10	0:20:25	7,698.23	160.38	6.53	0:27:25	5,815.82	242.33	4.32	0:34:25	216.64	216.64	4.83
0:06:30	9,332.12	48.60	21.59	0:13:30	8,955.89	93.29	11.22	0:20:30	7,694.03	160.29	6.54	0:27:30	5,868.67	244.53	4.28	0:34:30	215.59	215.59	4.86
0:06:35	9,318.49	48.53	21.57	0:13:35	9,021.95	93.98	11.17	0:20:35	7,635.52	159.07	6.58	0:27:35	5,697.12	237.38	4.41	0:34:35	192.73	192.73	5.44
0:06:40	9,327.71	48.58	21.57	0:13:40	8,929.46	93.02	11.26	0:20:40	7,649.57	159.37	6.57	0:27:40	5,731.94	238.83	4.38	0:34:40	225.44	225.44	4.65
0:06:45	9,353.30	48.72	21.54	0:13:45	8,824.40	91.92	11.41	0:20:45	7,716.47	160.76	6.52	0:27:45	5,775.35	240.64	4.35	0:34:45	217.47	217.47	4.82
0:06:50	651.79	0.00	20.26	0:13:50	492.20	0.00	10.69	0:20:50	533.73	0.00	6.01	0:27:50	417.54	0.00	4.23	0:34:50	19.29	0.00	4.63
0:06:55	0.00	0.00	0.00	0:13:55	0.00	0.00	0.00	0:20:55	0.00	0.00	0.00	0:27:55	0.00	0.00	0.00	0:34:55	0.00	0.00	0.00
												0:28:00	0.00	0.00	0.00				

SPC BENCHMARK 2™ V1.3

FULL DISCLOSURE REPORT

Submitted for Review: NOVEMBER 30, 2009

IBM Corporation
IBM System Storage DS8700
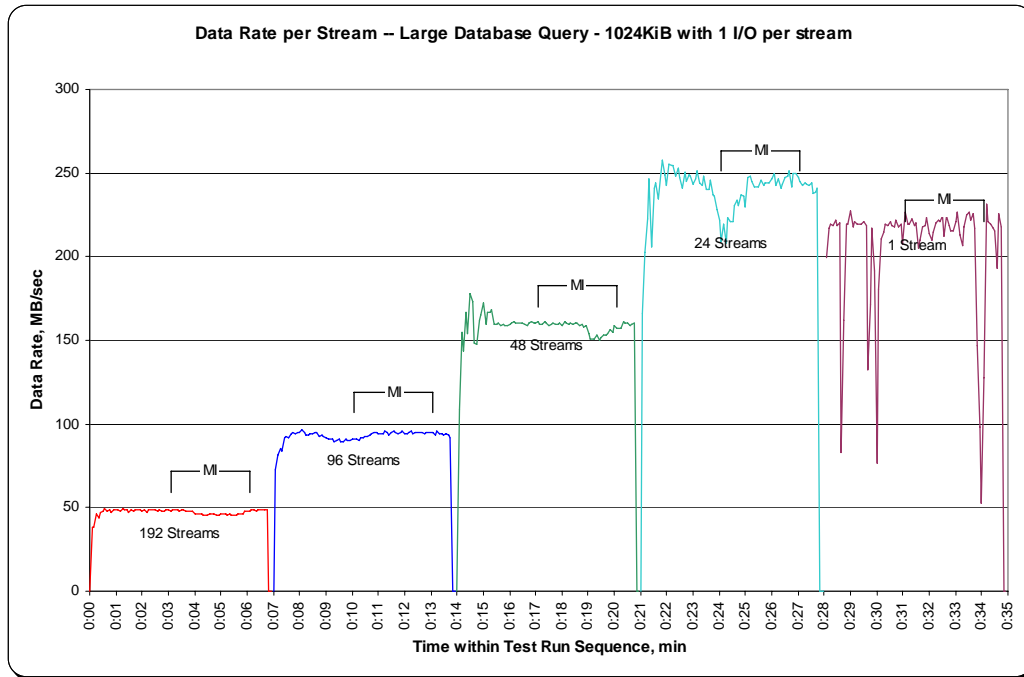
Submission Identifier: B00049

SPC-2 "Large Database Query/1024 KiB Transfer Size/1 Outstanding I/O" Average Data Rate Graph – Complete Test Run
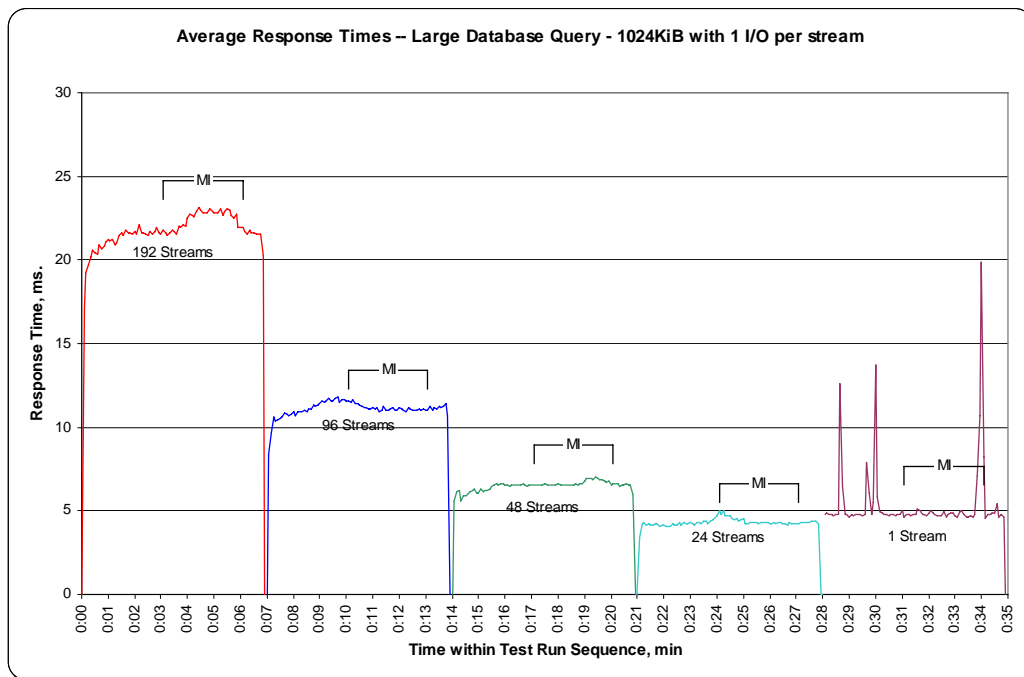

SPC-2 "Large Database Query/1024 KiB Transfer Size/1 Outstanding I/O" Average Data Rate Graph – Measurement Interval (MI) Only

SPC-2 "Large Database Query/1024 KiB Transfer Size/1 Outstanding I/O" Average Data Rate per Stream Graph

SPC-2 "Large Database Query/1024 KiB Transfer Size/1 Outstanding I/O" Average Response Time Graph

Large Database Query Test – 64 KIB TRANSFER SIZE Test Phase

Clause 10.6.8.2.1

5. *A table that will contain the following information for each "64 KiB Transfer Size, 4 Outstanding I/Os" Test Run:*

    - *The number of Streams specified.*

    - *The average data rate, average data rate per stream, and average Response Time reported at five second intervals.*

6. *Average Data Rate (intervals), Average Data Rate per Stream (intervals), and Average Response Time (intervals) graphs for the "64 KiB Transfer Size, 4 Outstanding I/Os" Test Runs as specified in Clauses 10.1.4 – 10.1.6.*

7. *A table that will contain the following information for each "64 KiB Transfer Size, 1 Outstanding I/O" Test Run:*

    - *The number of Streams specified.*

    - *The average data rate, average data rate per stream, and average Response Time reported at five second intervals.*

8. *Average Data Rate (intervals), Average Data Rate per Stream (intervals), and Average Response Time (intervals) graphs for the "64 KiB Transfer Size, 1 Outstanding I/O" Test Runs as specified in Clauses 10.1.4 – 10.1.6.*

The SPC-2 "Large DatabaseQuery/64 KIB TRANSFER SIZE/4 Outstanding I/Os" Test Run data is contained in the table that appears on the next page. That table is followed by graphs illustrating the average Data Rate, average Data Rate per Stream, and average Response Time produced by the same Test Runs. The table and graphs present the data at five-second intervals.

Immediately following the SPC-2 "Large DatabaseQuery/64 KIB TRANSFER SIZE/4 Outstanding I/Os" table and graphs will be the SPC-2 "Large DatabaseQuery/64 KIB TRANSFER SIZE/1 Outstanding I/O" table and graphs. The table contains the Test Run data and the graphs illustrate the average Data Rate, average Data Rate per Stream, and average Response Time produced by the Test Runs.

SPC-2 "Large Database Query/64 KiB Transfer Size/4 Outstanding I/Os" Test Run Data – Ramp-Up Period

TR1 Test Run Sequence Time	192 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR2 Test Run Sequence Time	96 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR3 Test Run Sequence Time	48 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR4 Test Run Sequence Time	24 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR5 Test Run Sequence Time	1 Stream Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms
0:00:00	0.00	0.00	0.00	0:07:00	0.00	0.00	0.00	0:14:05	350.48	175.24	0.88	0:21:00	0.00	0.00	0.00	0:28:05	284.84	284.84	0.84
0:00:05	575.65	30.30	5.50	0:07:05	684.47	48.89	2.40	0:14:10	705.61	100.80	1.51	0:21:05	628.12	209.37	0.78	0:28:10	311.31	311.31	0.84
0:00:10	1,458.66	36.47	5.69	0:07:10	1,528.66	76.43	2.92	0:14:15	1,698.74	113.25	1.79	0:21:10	1,169.71	194.95	1.04	0:28:15	322.86	322.86	0.81
0:00:15	2,233.25	37.22	5.96	0:07:15	2,160.19	69.68	3.16	0:14:20	2,678.82	121.76	1.78	0:21:15	1,855.76	231.97	0.97	0:28:20	322.27	322.27	0.82
0:00:20	2,883.35	39.50	5.76	0:07:20	2,623.07	79.49	3.23	0:14:25	3,709.54	142.67	1.76	0:21:20	2,082.89	208.29	1.11	0:28:25	318.43	318.43	0.82
0:00:25	3,707.95	40.75	5.81	0:07:25	3,104.39	75.72	3.21	0:14:30	3,988.58	147.73	1.74	0:21:25	3,279.94	218.66	1.05	0:28:30	322.27	322.27	0.81
0:00:30	4,405.30	44.95	5.63	0:07:30	3,655.36	83.08	3.10	0:14:35	4,335.86	154.85	1.68	0:21:30	3,822.44	224.85	1.06	0:28:35	311.01	311.01	0.84
0:00:35	4,911.11	42.34	5.76	0:07:35	3,803.28	79.23	3.12	0:14:40	4,490.51	149.68	1.66	0:21:35	4,365.44	218.27	1.09	0:28:40	307.85	307.85	0.84
0:00:40	5,296.53	43.77	5.83	0:07:40	4,412.07	74.78	3.20	0:14:45	4,572.16	138.55	1.74	0:21:40	4,772.54	238.63	1.10	0:28:45	128.93	128.93	2.03
0:00:45	5,592.15	44.38	5.83	0:07:45	4,892.96	75.28	3.31	0:14:50	5,317.52	151.93	1.68	0:21:45	4,957.58	225.34	1.12	0:28:50	310.67	310.67	0.84
0:00:50	5,820.81	44.43	5.75	0:07:50	5,566.76	78.41	3.17	0:14:55	5,285.34	146.81	1.77	0:21:50	5,037.11	228.96	1.14	0:28:55	313.02	313.02	0.83
0:00:55	6,024.16	43.97	5.74	0:07:55	5,744.67	76.60	3.27	0:15:00	5,626.35	148.06	1.70	0:21:55	5,447.81	236.86	1.06	0:29:00	168.94	168.94	1.54
0:01:00	6,509.48	43.98	5.81	0:08:00	6,421.92	80.27	3.21	0:15:05	6,334.38	150.82	1.68	0:22:00	5,213.58	226.68	1.15	0:29:05	196.49	196.49	1.33
0:01:05	6,690.85	43.73	5.86	0:08:05	6,532.11	78.70	3.28	0:15:10	6,590.15	149.78	1.70	0:22:05	5,949.53	258.68	1.01	0:29:10	240.48	240.48	1.08
0:01:10	6,925.65	44.11	5.88	0:08:10	6,837.12	78.59	3.24	0:15:15	6,809.01	148.02	1.73	0:22:10	5,481.44	228.39	1.11	0:29:15	270.49	270.49	0.96
0:01:15	7,148.20	43.85	5.80	0:08:15	7,179.66	79.77	3.25	0:15:20	6,923.73	147.31	1.74	0:22:15	5,727.93	238.66	1.09	0:29:20	317.14	317.14	0.82
0:01:20	7,795.34	44.04	5.79	0:08:20	7,306.92	78.57	3.26	0:15:25	6,855.16	142.82	1.80	0:22:20	5,738.13	239.09	1.09	0:29:25	318.49	318.49	0.82
0:01:25	7,825.41	42.30	5.91	0:08:25	7,593.88	79.94	3.22	0:15:30	7,021.04	146.27	1.79	0:22:25	5,899.75	245.82	1.06	0:29:30	251.66	251.66	1.04
0:01:30	8,306.09	43.26	5.96	0:08:30	7,713.91	80.35	3.23	0:15:35	7,098.92	147.89	1.77	0:22:30	5,588.32	232.85	1.12	0:29:35	162.34	162.34	1.61
0:01:35	8,369.08	43.59	6.02	0:08:35	7,709.45	80.31	3.26	0:15:40	6,992.31	145.67	1.79	0:22:35	5,851.28	243.80	1.07	0:29:40	308.24	308.24	0.84
0:01:40	8,203.63	42.73	6.10	0:08:40	7,690.53	80.11	3.27	0:15:45	6,912.88	144.02	1.78	0:22:40	5,694.71	237.28	1.10	0:29:45	321.56	321.56	0.81
0:01:45	8,293.48	43.20	6.10	0:08:45	7,529.74	78.43	3.33	0:15:50	7,086.54	147.64	1.79	0:22:45	5,803.91	241.83	1.08	0:29:50	303.45	303.45	0.86
0:01:50	8,264.37	43.04	5.97	0:08:50	7,326.59	76.32	3.43	0:15:55	7,058.33	147.05	1.79	0:22:50	5,523.91	230.16	1.12	0:29:55	320.00	320.00	0.81
0:01:55	8,321.65	43.34	6.04	0:08:55	7,299.71	76.04	3.44	0:16:00	6,827.78	142.25	1.84	0:22:55	5,753.12	239.71	1.07	0:30:00	323.37	323.37	0.80
0:02:00	8,338.95	43.43	6.10	0:09:00	6,898.70	71.86	3.63	0:16:05	6,951.37	144.82	1.80	0:23:00	5,288.77	220.37	1.18	0:30:05	309.38	309.38	0.84
0:02:05	8,136.65	42.38	6.06	0:09:05	6,736.27	70.17	3.68	0:16:10	6,969.31	145.19	1.80	0:23:05	5,809.05	242.04	1.08	0:30:10	312.22	312.22	0.83
0:02:10	8,493.58	44.24	6.00	0:09:10	6,561.53	68.35	3.74	0:16:15	6,922.92	144.23	1.81	0:23:10	5,600.00	233.33	1.12	0:30:15	326.13	326.13	0.80
0:02:15	8,302.36	43.24	6.06	0:09:15	6,633.30	69.10	3.80	0:16:20	6,955.02	144.90	1.80	0:23:15	5,735.18	238.97	1.09	0:30:20	324.65	324.65	0.80
0:02:20	8,391.04	43.70	6.08	0:09:20	6,406.02	66.73	3.93	0:16:25	7,108.10	148.09	1.77	0:23:20	5,741.11	239.21	1.09	0:30:25	320.24	320.24	0.81
0:02:25	8,228.76	42.86	6.08	0:09:25	6,461.07	67.30	3.89	0:16:30	7,090.37	147.72	1.77	0:23:25	5,438.73	226.61	1.15	0:30:30	312.75	312.75	0.83
0:02:30	8,196.68	42.69	6.05	0:09:30	6,449.78	67.19	3.90	0:16:35	7,002.66	145.89	1.79	0:23:30	5,843.74	243.49	1.07	0:30:35	316.46	316.46	0.82
0:02:35	8,274.01	43.09	6.08	0:09:35	6,476.96	67.47	3.88	0:16:40	7,141.55	148.78	1.76	0:23:35	5,782.89	240.95	1.08	0:30:40	310.12	310.12	0.84
0:02:40	8,242.79	42.93	6.10	0:09:40	6,554.11	68.27	3.85	0:16:45	6,754.29	140.71	1.79	0:23:40	5,346.16	222.76	1.17	0:30:45	331.51	331.51	0.78
0:02:45	8,316.28	43.31	6.05	0:09:45	6,795.18	70.78	3.70	0:16:50	7,058.87	147.06	1.78	0:23:45	5,283.04	220.13	1.18	0:30:50	320.68	320.68	0.81
0:02:50	8,264.88	43.05	6.06	0:09:50	6,865.24	71.51	3.66	0:16:55	7,091.04	147.73	1.77	0:23:50	4,919.03	204.96	1.27	0:30:55	315.95	315.95	0.82
0:02:55	8,370.56	43.60	6.02	0:09:55	7,183.86	74.83	3.51	0:17:00	7,066.34	147.22	1.78	0:23:55	4,910.44	204.60	1.27	0:31:00	309.34	309.34	0.84
0:03:00	8,306.66	43.26	6.05	0:10:00	7,480.76	77.92	3.37					0:24:00	4,757.35	198.22	1.32				

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IBM Corporation
IBM System Storage DS8700

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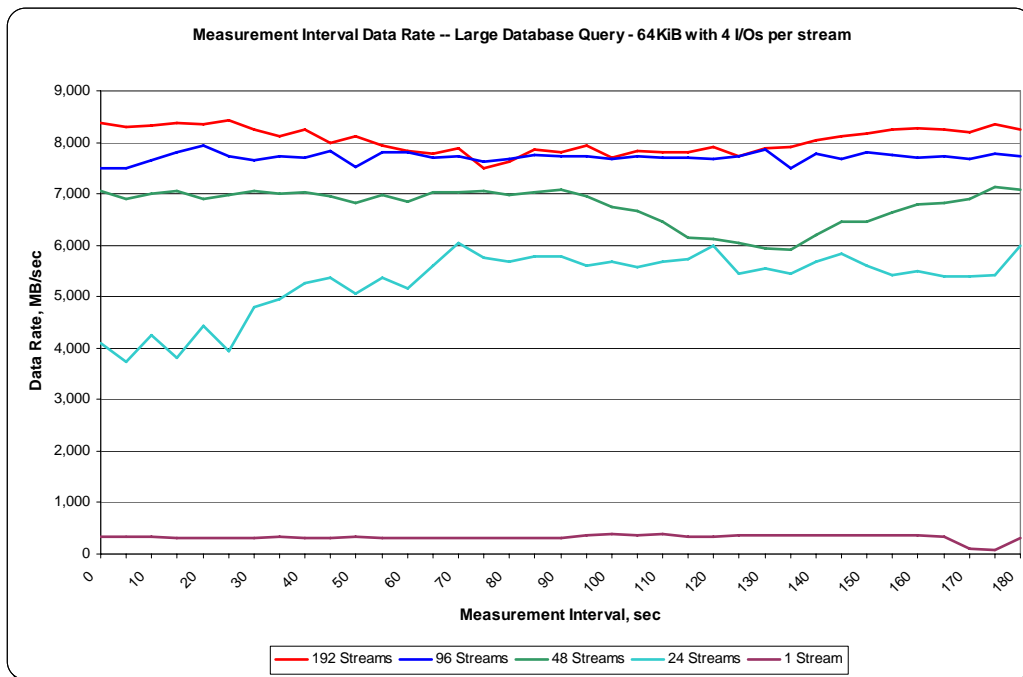Submitted for Review: NOVEMBER 30, 2009
Submission Identifier: B00049

SPC-2 "Large Database Query/64 KiB Transfer Size/4 Outstanding I/Os" Test Run Data Measurement Interval, Run-Out, and Ramp-Down Periods

TR1 Test Run Sequence Time	192 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR2 Test Run Sequence Time	96 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR3 Test Run Sequence Time	48 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR4 Test Run Sequence Time	24 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR5 Test Run Sequence Time	1 Stream Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms
0:03:05	8,388.83	43.69	6.03	0:10:05	7,484.32	77.96	3.35	0:17:05	7,048.09	146.84	1.78	0:24:05	4,100.58	170.86	1.53	0:31:05	325.62	325.62	0.80
0:03:10	8,294.93	43.20	6.06	0:10:10	7,502.45	78.15	3.35	0:17:10	6,899.96	143.75	1.82	0:24:10	3,726.09	155.25	1.68	0:31:10	324.58	324.58	0.80
0:03:15	8,331.26	43.39	6.04	0:10:15	7,648.06	79.67	3.28	0:17:15	7,003.63	145.91	1.80	0:24:15	4,262.78	177.62	1.47	0:31:15	325.11	325.11	0.80
0:03:20	8,380.76	43.65	6.07	0:10:20	7,800.78	81.26	3.22	0:17:20	7,061.12	147.11	1.78	0:24:20	3,816.38	159.02	1.64	0:31:20	314.85	314.85	0.83
0:03:25	8,348.36	43.48	6.07	0:10:25	7,923.83	82.54	3.17	0:17:25	6,900.79	143.77	1.82	0:24:25	4,436.32	184.85	1.41	0:31:25	316.62	316.62	0.82
0:03:30	8,416.77	43.84	5.98	0:10:30	7,728.30	80.50	3.25	0:17:30	6,985.50	145.53	1.80	0:24:30	3,939.62	164.15	1.59	0:31:30	307.69	307.69	0.85
0:03:35	8,236.89	42.90	6.10	0:10:35	7,662.03	79.81	3.28	0:17:35	7,056.38	147.01	1.78	0:24:35	4,806.25	200.26	1.31	0:31:35	320.56	320.56	0.81
0:03:40	8,121.42	42.30	6.13	0:10:40	7,727.70	80.50	3.25	0:17:40	7,013.66	146.12	1.79	0:24:40	4,952.94	206.37	1.27	0:31:40	338.89	338.89	0.77
0:03:45	8,245.84	42.95	6.15	0:10:45	7,694.26	80.15	3.27	0:17:45	7,017.09	146.19	1.79	0:24:45	5,272.09	219.67	1.19	0:31:45	315.73	315.73	0.82
0:03:50	7,983.10	41.58	6.16	0:10:50	7,826.16	81.52	3.21	0:17:50	6,942.75	144.64	1.81	0:24:50	5,359.78	223.32	1.17	0:31:50	323.08	323.08	0.81
0:03:55	8,128.19	42.33	6.20	0:10:55	7,523.85	78.37	3.29	0:17:55	6,833.58	142.37	1.84	0:24:55	5,070.52	211.27	1.24	0:31:55	325.05	325.05	0.80
0:04:00	7,941.35	41.36	6.34	0:11:00	7,810.23	81.36	3.26	0:18:00	6,970.45	145.22	1.81	0:25:00	5,381.02	224.21	1.13	0:32:00	320.11	320.11	0.81
0:04:05	7,840.30	40.83	6.44	0:11:05	7,815.75	81.41	3.21	0:18:05	6,837.96	142.46	1.81	0:25:05	5,166.28	215.26	1.21	0:32:05	307.66	307.66	0.85
0:04:10	7,784.15	40.54	6.44	0:11:10	7,714.31	80.36	3.26	0:18:10	7,033.66	146.53	1.79	0:25:10	5,602.01	233.42	1.12	0:32:10	314.67	314.67	0.83
0:04:15	7,878.14	41.03	6.45	0:11:15	7,717.96	80.40	3.25	0:18:15	7,027.66	146.41	1.78	0:25:15	6,052.38	252.18	1.04	0:32:15	320.86	320.86	0.81
0:04:20	7,503.49	39.08	6.60	0:11:20	7,618.14	79.36	3.30	0:18:20	7,043.23	146.73	1.78	0:25:20	5,760.76	240.03	1.09	0:32:20	316.89	316.89	0.82
0:04:25	7,623.32	39.70	6.49	0:11:25	7,666.66	79.86	3.28	0:18:25	6,981.53	145.45	1.80	0:25:25	5,670.54	236.27	1.10	0:32:25	317.22	317.22	0.82
0:04:30	7,852.36	40.90	6.41	0:11:30	7,767.91	80.92	3.24	0:18:30	7,029.53	146.45	1.79	0:25:30	5,792.75	241.36	1.08	0:32:30	314.46	314.46	0.83
0:04:35	7,806.96	40.66	6.45	0:11:35	7,718.46	80.40	3.27	0:18:35	7,083.47	147.57	1.77	0:25:35	5,796.57	241.52	1.08	0:32:35	316.97	316.97	0.82
0:04:40	7,931.86	41.31	6.40	0:11:40	7,734.02	80.56	3.25	0:18:40	6,961.07	145.02	1.80	0:25:40	5,596.76	233.20	1.12	0:32:40	355.61	355.61	0.73
0:04:45	7,698.71	40.10	6.46	0:11:45	7,682.31	80.02	3.22	0:18:45	6,737.27	140.36	1.86	0:25:45	5,677.57	236.57	1.10	0:32:45	380.85	380.85	0.68
0:04:50	7,845.39	40.86	6.43	0:11:50	7,730.67	80.53	3.25	0:18:50	6,654.83	138.64	1.89	0:25:50	5,565.36	231.89	1.12	0:32:50	360.14	360.14	0.72
0:04:55	7,801.93	40.64	6.44	0:11:55	7,705.56	80.27	3.26	0:18:55	6,454.81	134.48	1.94	0:25:55	5,682.80	236.78	1.10	0:32:55	376.22	376.22	0.69
0:05:00	7,815.20	40.70	6.44	0:12:00	7,708.48	80.30	3.26	0:19:00	6,158.43	128.30	2.04	0:26:00	5,741.39	239.22	1.09	0:33:00	344.29	344.29	0.76
0:05:05	7,900.93	41.15	6.47	0:12:05	7,684.05	80.04	3.26	0:19:05	6,116.25	127.42	2.05	0:26:05	6,001.90	250.08	1.04	0:33:05	324.87	324.87	0.80
0:05:10	7,734.19	40.28	6.42	0:12:10	7,730.78	80.53	3.25	0:19:10	6,042.19	125.88	2.08	0:26:10	5,435.07	226.46	1.15	0:33:10	365.41	365.41	0.71
0:05:15	7,891.83	41.10	6.38	0:12:15	7,852.60	81.80	3.25	0:19:15	5,935.14	123.65	2.12	0:26:15	5,553.36	231.39	1.13	0:33:15	371.01	371.01	0.70
0:05:20	7,903.98	41.17	6.39	0:12:20	7,483.06	77.95	3.26	0:19:20	5,907.01	123.06	2.12	0:26:20	5,447.47	226.98	1.15	0:33:20	353.43	353.43	0.74
0:05:25	8,049.04	41.92	6.25	0:12:25	7,781.95	81.06	3.23	0:19:25	6,198.64	129.14	2.02	0:26:25	5,690.68	237.11	1.10	0:33:25	370.61	370.61	0.70
0:05:30	8,107.01	42.22	6.21	0:12:30	7,666.64	79.86	3.28	0:19:30	6,454.04	134.46	1.94	0:26:30	5,840.14	243.34	1.07	0:33:30	372.39	372.39	0.70
0:05:35	8,163.67	42.52	6.17	0:12:35	7,818.72	81.44	3.21	0:19:35	6,458.86	134.56	1.94	0:26:35	5,609.82	233.74	1.12	0:33:35	363.06	363.06	0.72
0:05:40	8,244.62	42.94	6.10	0:12:40	7,754.10	80.77	3.24	0:19:40	6,629.10	138.11	1.90	0:26:40	5,408.85	225.37	1.16	0:33:40	370.83	370.83	0.70
0:05:45	8,278.41	43.12	6.09	0:12:45	7,707.15	80.28	3.26	0:19:45	6,783.43	141.32	1.85	0:26:45	5,507.52	229.48	1.14	0:33:45	353.25	353.25	0.74
0:05:50	8,258.39	43.01	6.08	0:12:50	7,734.44	80.57	3.25	0:19:50	6,809.73	141.87	1.84	0:26:50	5,401.85	225.08	1.16	0:33:50	340.37	340.37	0.76
0:05:55	8,196.19	42.69	5.99	0:12:55	7,679.06	79.99	3.28	0:19:55	6,905.75	143.87	1.78	0:26:55	5,404.34	225.18	1.14	0:33:55	107.28	107.28	2.44
0:06:00	8,353.59	43.51	6.04	0:13:00	7,775.65	81.00	3.23	0:20:00	7,127.53	148.49	1.76	0:27:00	5,417.51	225.73	1.16	0:34:00	74.16	74.16	3.52
0:06:05	8,245.52	42.95	6.10	0:13:05	7,740.84	80.63	3.24	0:20:05	7,076.43	147.43	1.77	0:27:05	5,983.08	249.30	1.05	0:34:05	302.91	302.91	0.86
0:06:10	8,224.62	42.84	6.09	0:13:10	7,670.14	79.90	3.27	0:20:10	6,946.40	144.72	1.81	0:27:10	5,479.75	228.32	1.11	0:34:10	306.45	306.45	0.85
0:06:15	8,386.67	43.68	6.06	0:13:15	7,732.52	80.55	3.25	0:20:15	6,979.58	145.41	1.80	0:27:15	5,305.32	221.06	1.18	0:34:15	329.34	329.34	0.79
0:06:20	8,340.52	43.44	6.03	0:13:20	7,684.64	80.05	3.27	0:20:20	7,054.09	146.96	1.78	0:27:20	5,759.25	239.97	1.09	0:34:20	207.82	207.82	1.26
0:06:25	8,320.13	43.33	6.05	0:13:25	7,718.02	80.40	3.25	0:20:25	7,068.60	147.26	1.78	0:27:25	5,686.27	236.93	1.10	0:34:25	281.35	281.35	0.93
0:06:30	8,431.39	43.91	5.99	0:13:30	7,769.49	80.93	3.24	0:20:30	7,136.23	148.67	1.76	0:27:30	5,641.30	235.05	1.11	0:34:30	366.96	366.96	0.71
0:06:35	8,287.13	43.16	6.07	0:13:35	7,697.76	80.19	3.27	0:20:35	7,014.30	146.13	1.80	0:27:35	5,283.36	220.14	1.19	0:34:35	339.82	339.82	0.77
0:06:40	8,299.21	43.23	6.01	0:13:40	7,594.26	79.11	3.31	0:20:40	6,916.88	144.10	1.78	0:27:40	5,469.44	227.89	1.15	0:34:40	379.01	379.01	0.68
0:06:45	8,361.04	43.55	6.05	0:13:45	7,473.66	77.85	3.37	0:20:45	7,077.85	147.46	1.79	0:27:45	5,509.84	229.58	1.14	0:34:45	343.67	343.67	0.76
0:06:50	589.40	0.00	4.92	0:13:50	425.15	0.00	2.94	0:20:50	435.52	0.00	1.60	0:27:50	405.61	0.00	1.10	0:34:50	23.51	0.00	0.75
0:06:55	0.00	0.00	0.00	0:13:55	0.00	0.00	0.00	0:20:55	0.00	0.00	0.00	0:27:55	0.00	0.00	0.00	0:34:55	0.00	0.00	0.00
				0:14:00	0.00	0.00	0.00					0:28:00	0.00	0.00	0.00				

SPC BENCHMARK 2™ V1.3

IBM Corporation
IBM System Storage DS8700

FULL DISCLOSURE REPORT

Submitted for Review: NOVEMBER 30, 2009
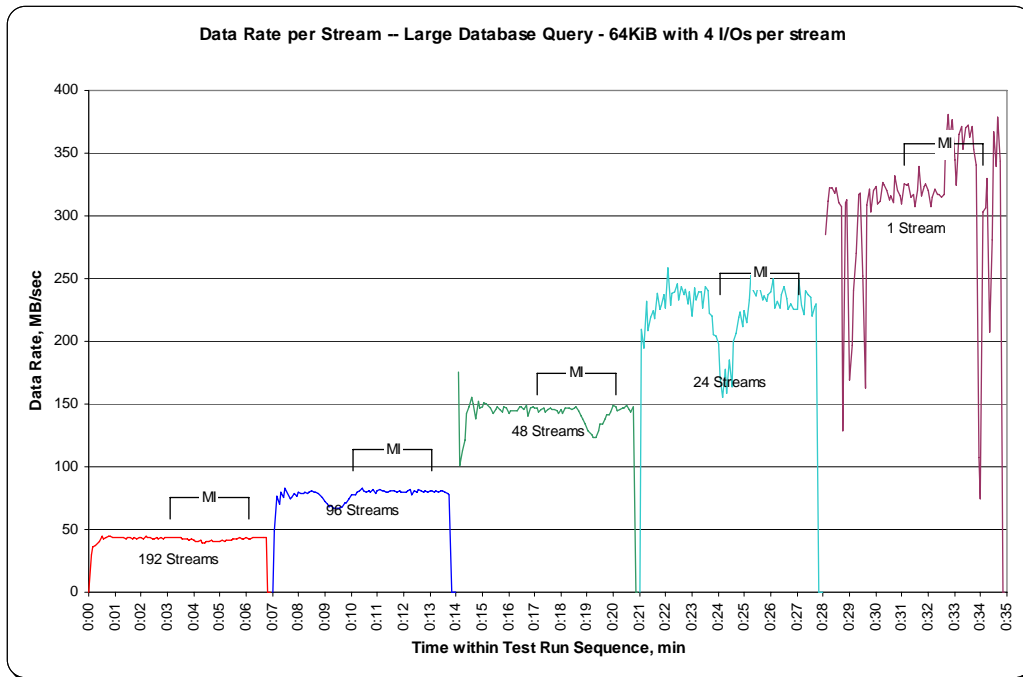Submission Identifier: B00049

SPC-2 "Large Database Query/64 KiB Transfer Size/4 Outstanding I/Os" Average Data Rate Graph – Complete Test Run
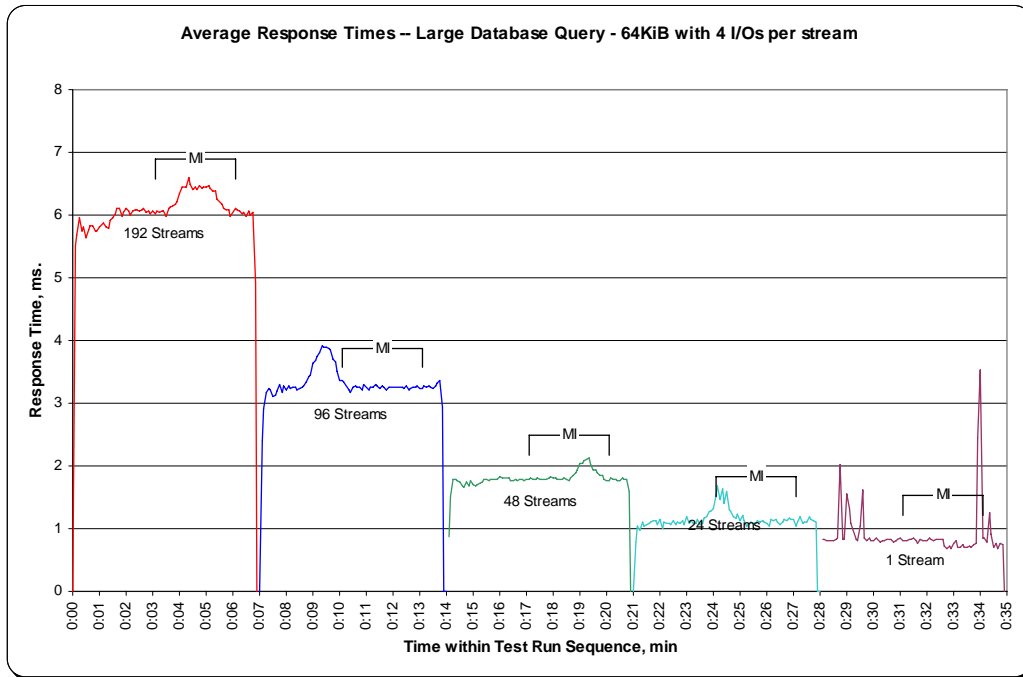

SPC-2 "Large Database Query/64 KiB Transfer Size/4 Outstanding I/Os" Average Data Rate Graph – Measurement Interval (MI) Only

SPC-2 "Large Database Query/64 KiB Transfer Size/4 Outstanding I/Os" Average Data Rate per Stream Graph

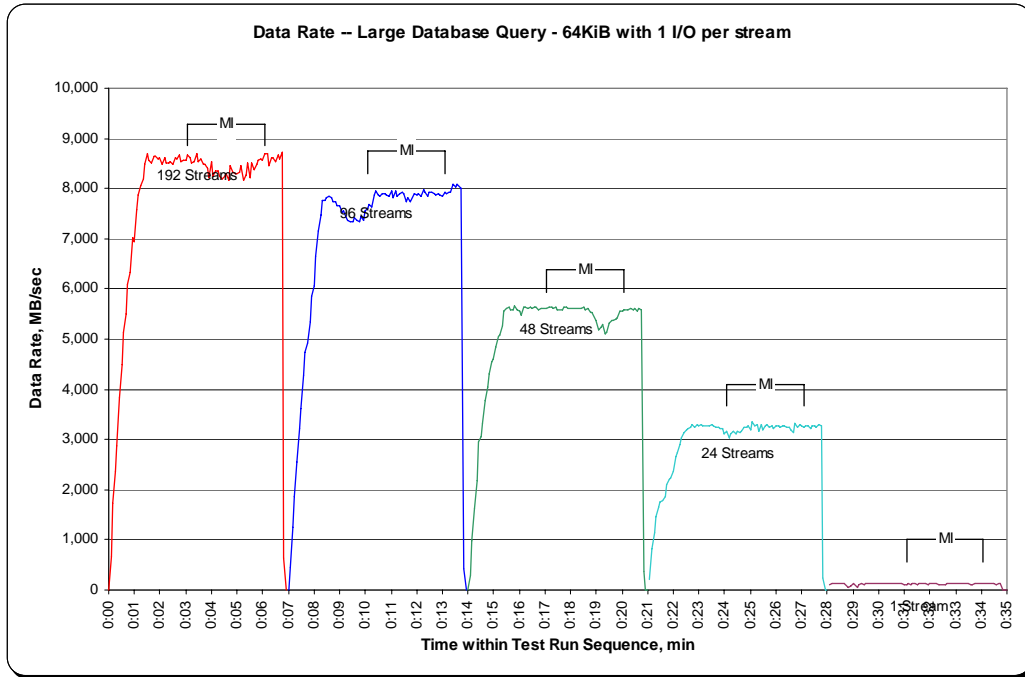## SPC-2 "Large Database Query/64 KiB Transfer Size/4 Outstanding I/Os" Average Response Time Graph

SPC-2 "Large Database Query/64 KiB Transfer Size/1 Outstanding I/O" Test Run Data – Ramp-Up Period

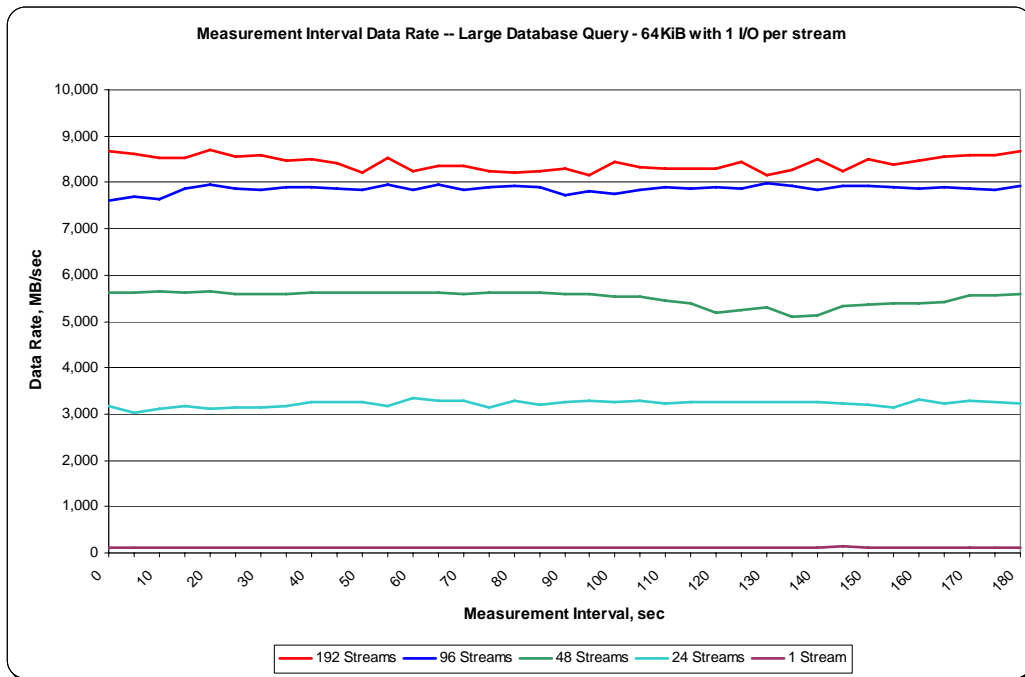| TR6 Test Run Sequence Time	192 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR7 Test Run Sequence Time	96 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR8 Test Run Sequence Time	48 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR9 Test Run Sequence Time	24 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	TR10 Test Run Sequence Time	1 Stream Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms
0:00:00	0.00	0.00	0.00	0:07:00	0.00	0.00	0.00	0:14:00	0.00	0.00	0.00	0:21:05	206.20	51.55	0.45	0:28:05	118.87	118.87	0.50
0:00:05	668.93	26.76	1.18	0:07:05	447.00	49.67	0.66	0:14:05	297.90	49.65	0.63	0:21:10	818.62	102.33	0.47	0:28:10	125.49	125.49	0.52
0:00:10	1,738.81	40.44	1.31	0:07:10	1,253.77	69.65	0.71	0:14:10	980.00	81.67	0.58	0:21:15	1,137.96	126.44	0.48	0:28:15	120.63	120.63	0.54
0:00:15	2,362.64	46.33	1.31	0:07:15	1,869.41	81.28	0.71	0:14:15	1,620.09	90.01	0.57	0:21:20	1,470.82	133.71	0.47	0:28:20	122.54	122.54	0.53
0:00:20	2,867.58	42.17	1.34	0:07:20	2,558.78	79.96	0.73	0:14:20	2,189.20	91.22	0.61	0:21:25	1,643.66	126.44	0.47	0:28:25	123.35	123.35	0.53
0:00:25	3,832.65	45.09	1.33	0:07:25	3,214.71	84.60	0.74	0:14:25	2,956.04	113.69	0.56	0:21:30	1,755.58	135.04	0.48	0:28:30	125.47	125.47	0.52
0:00:30	4,498.20	46.37	1.34	0:07:30	3,623.48	78.77	0.73	0:14:30	3,048.29	112.90	0.57	0:21:35	1,783.80	137.22	0.47	0:28:35	125.66	125.66	0.52
0:00:35	5,127.47	46.61	1.34	0:07:35	4,276.58	85.53	0.74	0:14:35	3,323.04	110.77	0.56	0:21:40	1,850.85	123.39	0.47	0:28:40	120.05	120.05	0.54
0:00:40	5,509.21	45.16	1.36	0:07:40	4,729.08	84.45	0.74	0:14:40	3,784.82	118.28	0.54	0:21:45	2,111.75	131.98	0.48	0:28:45	67.48	67.48	0.97
0:00:45	6,102.76	47.31	1.37	0:07:45	4,913.88	83.29	0.75	0:14:45	4,037.97	115.37	0.54	0:21:50	2,198.53	137.41	0.47	0:28:50	64.69	64.69	1.01
0:00:50	6,319.35	45.14	1.37	0:07:50	5,349.64	82.30	0.75	0:14:50	4,317.07	113.61	0.54	0:21:55	2,234.36	131.43	0.47	0:28:55	88.56	88.56	0.74
0:00:55	7,022.27	47.45	1.37	0:07:55	5,847.92	86.00	0.75	0:14:55	4,536.19	119.37	0.54	0:22:00	2,368.54	124.66	0.48	0:29:00	123.05	123.05	0.53
0:01:00	6,930.65	44.14	1.40	0:08:00	6,060.75	83.02	0.75	0:15:00	4,597.73	117.89	0.54	0:22:05	2,652.26	132.61	0.48	0:29:05	108.21	108.21	0.60
0:01:05	7,579.13	46.21	1.40	0:08:05	6,635.97	80.93	0.75	0:15:05	4,847.41	118.23	0.54	0:22:10	2,737.32	130.35	0.48	0:29:10	64.79	64.79	1.01
0:01:10	7,870.63	45.76	1.40	0:08:10	7,148.25	84.10	0.76	0:15:10	5,062.99	117.74	0.54	0:22:15	2,901.83	138.18	0.47	0:29:15	99.91	99.91	0.65
0:01:15	8,061.22	45.80	1.40	0:08:15	7,471.06	83.01	0.77	0:15:15	5,079.57	118.13	0.54	0:22:20	3,026.84	137.58	0.46	0:29:20	125.68	125.68	0.52
0:01:20	8,184.65	45.47	1.41	0:08:20	7,772.80	84.49	0.77	0:15:20	5,269.15	119.75	0.54	0:22:25	3,132.25	136.18	0.47	0:29:25	118.51	118.51	0.55
0:01:25	8,488.10	44.67	1.43	0:08:25	7,778.22	82.75	0.78	0:15:25	5,567.23	118.45	0.55	0:22:30	3,189.82	132.91	0.47	0:29:30	120.65	120.65	0.54
0:01:30	8,696.13	45.29	1.45	0:08:30	7,808.69	81.34	0.79	0:15:30	5,619.01	117.06	0.55	0:22:35	3,231.17	134.63	0.48	0:29:35	126.66	126.66	0.51
0:01:35	8,551.65	44.54	1.46	0:08:35	7,854.72	81.82	0.80	0:15:35	5,625.20	117.19	0.56	0:22:40	3,254.76	135.61	0.48	0:29:40	120.04	120.04	0.54
0:01:40	8,521.02	44.38	1.47	0:08:40	7,814.66	81.40	0.80	0:15:40	5,594.17	116.55	0.55	0:22:45	3,291.38	137.14	0.47	0:29:45	129.59	129.59	0.50
0:01:45	8,653.50	45.07	1.47	0:08:45	7,727.25	80.49	0.81	0:15:45	5,582.95	116.31	0.55	0:22:50	3,256.63	135.69	0.48	0:29:50	127.21	127.21	0.51
0:01:50	8,648.54	45.04	1.45	0:08:50	7,745.05	80.68	0.81	0:15:50	5,663.94	118.00	0.55	0:22:55	3,299.09	137.46	0.47	0:29:55	125.91	125.91	0.52
0:01:55	8,590.72	44.74	1.46	0:08:55	7,659.42	79.79	0.82	0:15:55	5,574.13	116.13	0.56	0:23:00	3,284.52	136.85	0.47	0:30:00	124.48	124.48	0.52
0:02:00	8,625.54	44.92	1.46	0:09:00	7,667.73	79.87	0.82	0:16:00	5,563.97	115.92	0.56	0:23:05	3,290.44	137.10	0.47	0:30:05	121.52	121.52	0.54
0:02:05	8,495.89	44.25	1.47	0:09:05	7,523.49	78.37	0.83	0:16:05	5,478.66	114.14	0.56	0:23:10	3,284.26	136.84	0.47	0:30:10	120.53	120.53	0.54
0:02:10	8,623.17	44.91	1.46	0:09:10	7,557.65	78.73	0.83	0:16:10	5,637.79	117.45	0.55	0:23:15	3,268.51	136.19	0.48	0:30:15	122.78	122.78	0.53
0:02:15	8,506.14	44.30	1.47	0:09:15	7,428.28	77.38	0.84	0:16:15	5,628.36	117.26	0.55	0:23:20	3,268.29	136.18	0.48	0:30:20	124.42	124.42	0.52
0:02:20	8,515.33	44.35	1.46	0:09:20	7,377.24	76.85	0.85	0:16:20	5,600.00	116.67	0.56	0:23:25	3,279.37	136.64	0.47	0:30:25	121.72	121.72	0.53
0:02:25	8,546.44	44.51	1.46	0:09:25	7,333.57	76.39	0.85	0:16:25	5,626.83	117.23	0.55	0:23:30	3,286.57	136.94	0.47	0:30:30	123.92	123.92	0.52
0:02:30	8,485.13	44.19	1.46	0:09:30	7,337.95	76.44	0.85	0:16:30	5,613.53	116.95	0.56	0:23:35	3,276.72	136.53	0.48	0:30:35	123.11	123.11	0.53
0:02:35	8,612.64	44.86	1.46	0:09:35	7,408.06	77.17	0.84	0:16:35	5,647.97	117.67	0.55	0:23:40	3,257.94	135.75	0.48	0:30:40	126.31	126.31	0.51
0:02:40	8,603.21	44.81	1.46	0:09:40	7,376.53	76.84	0.85	0:16:40	5,625.74	117.20	0.55	0:23:45	3,244.13	135.17	0.48	0:30:45	127.52	127.52	0.51
0:02:45	8,670.93	45.16	1.45	0:09:45	7,347.01	76.53	0.85	0:16:45	5,592.84	116.52	0.56	0:23:50	3,228.92	134.54	0.48	0:30:50	125.41	125.41	0.52
0:02:50	8,532.98	44.44	1.46	0:09:50	7,444.87	77.55	0.84	0:16:50	5,605.63	116.78	0.56	0:23:55	3,212.63	133.86	0.48	0:30:55	128.18	128.18	0.51
0:02:55	8,569.47	44.63	1.46	0:09:55	7,361.01	76.68	0.83	0:16:55	5,614.83	116.98	0.55	0:24:00	3,105.21	129.38	0.50	0:31:00	119.08	119.08	0.55
0:03:00	8,562.57	44.60	1.46	0:10:00	7,540.46	78.55	0.83	0:17:00	5,608.37	116.84	0.56								

SPC-2 "Large Database Query/64 KiB Transfer Size/1 Outstanding I/O" Test Run Data
Measurement Interval, Run-Out, and Ramp-Down Period

TR6 192 Streams				TR7 96 Streams				TR8 48 Streams				TR9 24 Streams				TR10 1 Stream			
Test Run Sequence Time	Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	Test Run Sequence Time	Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	Test Run Sequence Time	Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	Test Run Sequence Time	Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	Test Run Sequence Time	Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms
0:03:05	8,670.99	45.16	1.45	0:10:05	7,601.19	79.18	0.82	0:17:05	5,609.40	116.86	0.55	0:24:05	3,165.69	131.90	0.49	0:31:05	119.38	119.38	0.54
0:03:10	8,612.57	44.86	1.46	0:10:10	7,683.95	80.04	0.81	0:17:10	5,625.06	117.19	0.55	0:24:10	3,028.18	126.17	0.51	0:31:10	125.92	125.92	0.52
0:03:15	8,520.05	44.38	1.47	0:10:15	7,622.50	79.40	0.80	0:17:15	5,636.71	117.43	0.55	0:24:15	3,112.01	129.67	0.50	0:31:15	119.21	119.21	0.55
0:03:20	8,539.69	44.48	1.46	0:10:20	7,859.73	81.87	0.80	0:17:20	5,615.28	116.99	0.55	0:24:20	3,161.99	131.75	0.49	0:31:20	125.37	125.37	0.52
0:03:25	8,705.89	45.34	1.46	0:10:25	7,964.66	82.97	0.78	0:17:25	5,644.50	117.59	0.55	0:24:25	3,098.45	129.10	0.50	0:31:25	120.53	120.53	0.54
0:03:30	8,549.68	44.53	1.46	0:10:30	7,871.46	81.99	0.80	0:17:30	5,592.01	116.50	0.56	0:24:30	3,153.53	131.40	0.49	0:31:30	118.59	118.59	0.55
0:03:35	8,590.57	44.74	1.46	0:10:35	7,843.83	81.71	0.80	0:17:35	5,590.18	116.46	0.56	0:24:35	3,135.82	130.66	0.50	0:31:35	121.91	121.91	0.53
0:03:40	8,481.01	44.17	1.47	0:10:40	7,885.70	82.14	0.79	0:17:40	5,595.14	116.57	0.56	0:24:40	3,171.36	132.14	0.49	0:31:40	122.36	122.36	0.53
0:03:45	8,492.77	44.23	1.47	0:10:45	7,901.86	82.31	0.79	0:17:45	5,630.73	117.31	0.55	0:24:45	3,252.01	135.50	0.48	0:31:45	121.43	121.43	0.53
0:03:50	8,407.23	43.79	1.48	0:10:50	7,875.13	82.03	0.79	0:17:50	5,626.28	117.21	0.55	0:24:50	3,251.20	135.47	0.48	0:31:50	124.49	124.49	0.52
0:03:55	8,222.36	42.82	1.50	0:10:55	7,844.83	81.72	0.80	0:17:55	5,608.93	116.85	0.55	0:24:55	3,258.54	135.77	0.48	0:31:55	119.10	119.10	0.55
0:04:00	8,540.39	44.48	1.50	0:11:00	7,957.81	82.89	0.79	0:18:00	5,618.29	117.05	0.56	0:25:00	3,183.10	132.63	0.48	0:32:00	124.48	124.48	0.52
0:04:05	8,240.11	42.92	1.52	0:11:05	7,827.45	81.54	0.80	0:18:05	5,613.89	116.96	0.55	0:25:05	3,340.51	139.19	0.48	0:32:05	127.62	127.62	0.51
0:04:10	8,349.19	43.49	1.50	0:11:10	7,946.15	82.77	0.79	0:18:10	5,609.86	116.87	0.56	0:25:10	3,272.88	136.37	0.48	0:32:10	128.44	128.44	0.51
0:04:15	8,350.18	43.49	1.50	0:11:15	7,836.57	81.63	0.80	0:18:15	5,598.64	116.64	0.56	0:25:15	3,297.54	137.40	0.47	0:32:15	125.54	125.54	0.52
0:04:20	8,236.73	42.90	1.52	0:11:20	7,887.49	82.16	0.79	0:18:20	5,606.02	116.79	0.56	0:25:20	3,153.96	131.41	0.48	0:32:20	118.76	118.76	0.55
0:04:25	8,203.89	42.73	1.53	0:11:25	7,929.45	82.60	0.79	0:18:25	5,605.63	116.78	0.56	0:25:25	3,292.55	137.19	0.48	0:32:25	115.88	115.88	0.56
0:04:30	8,247.10	42.95	1.53	0:11:30	7,899.98	82.29	0.79	0:18:30	5,628.71	117.26	0.55	0:25:30	3,190.20	132.92	0.48	0:32:30	118.66	118.66	0.55
0:04:35	8,291.95	43.19	1.51	0:11:35	7,737.53	80.60	0.79	0:18:35	5,588.53	116.43	0.56	0:25:35	3,260.06	135.84	0.48	0:32:35	119.54	119.54	0.54
0:04:40	8,168.28	42.54	1.50	0:11:40	7,814.62	81.40	0.80	0:18:40	5,603.21	116.73	0.56	0:25:40	3,287.28	136.97	0.47	0:32:40	125.42	125.42	0.52
0:04:45	8,444.98	43.98	1.51	0:11:45	7,744.43	80.67	0.79	0:18:45	5,542.66	115.47	0.56	0:25:45	3,245.53	135.23	0.48	0:32:45	124.07	124.07	0.52
0:04:50	8,318.79	43.33	1.51	0:11:50	7,848.30	81.75	0.80	0:18:50	5,540.04	115.42	0.56	0:25:50	3,276.27	136.51	0.47	0:32:50	124.40	124.40	0.52
0:04:55	8,308.73	43.27	1.50	0:11:55	7,901.81	82.31	0.79	0:18:55	5,434.19	113.21	0.57	0:25:55	3,226.90	134.45	0.48	0:32:55	123.47	123.47	0.53
0:05:00	8,302.68	43.24	1.50	0:12:00	7,865.81	81.94	0.79	0:19:00	5,375.06	111.98	0.58	0:26:00	3,269.83	136.24	0.48	0:33:00	124.32	124.32	0.52
0:05:05	8,312.73	43.30	1.51	0:12:05	7,887.59	82.16	0.79	0:19:05	5,176.80	107.85	0.59	0:26:05	3,263.67	135.99	0.48	0:33:05	122.00	122.00	0.53
0:05:10	8,446.13	43.99	1.50	0:12:10	7,854.16	81.81	0.80	0:19:10	5,235.97	109.08	0.60	0:26:10	3,243.08	135.13	0.48	0:33:10	125.53	125.53	0.52
0:05:15	8,168.52	42.54	1.51	0:12:15	7,972.28	83.04	0.78	0:19:15	5,295.47	110.32	0.59	0:26:15	3,265.81	136.08	0.48	0:33:15	124.82	124.82	0.52
0:05:20	8,266.55	43.05	1.50	0:12:20	7,932.31	82.63	0.79	0:19:20	5,108.73	106.43	0.61	0:26:20	3,270.76	136.28	0.48	0:33:20	123.38	123.38	0.53
0:05:25	8,504.00	44.29	1.50	0:12:25	7,838.46	81.65	0.80	0:19:25	5,141.97	107.12	0.61	0:26:25	3,249.21	135.38	0.48	0:33:25	127.30	127.30	0.51
0:05:30	8,230.64	42.87	1.50	0:12:30	7,926.70	82.57	0.79	0:19:30	5,323.64	110.91	0.59	0:26:30	3,240.94	135.04	0.48	0:33:30	129.86	129.86	0.50
0:05:35	8,502.33	44.28	1.50	0:12:35	7,929.84	82.60	0.79	0:19:35	5,361.45	111.70	0.58	0:26:35	3,193.64	133.07	0.49	0:33:35	118.72	118.72	0.55
0:05:40	8,388.50	43.69	1.48	0:12:40	7,902.29	82.32	0.79	0:19:40	5,380.86	112.10	0.58	0:26:40	3,145.64	131.07	0.49	0:33:40	118.30	118.30	0.55
0:05:45	8,485.91	44.20	1.48	0:12:45	7,871.76	82.00	0.79	0:19:45	5,388.17	112.25	0.58	0:26:45	3,319.73	138.32	0.48	0:33:45	122.37	122.37	0.53
0:05:50	8,552.45	44.54	1.46	0:12:50	7,888.73	82.17	0.79	0:19:50	5,427.85	113.08	0.57	0:26:50	3,233.87	134.74	0.48	0:33:50	125.99	125.99	0.52
0:05:55	8,587.37	44.73	1.47	0:12:55	7,868.82	81.97	0.79	0:19:55	5,565.15	115.94	0.56	0:26:55	3,295.61	137.32	0.47	0:33:55	120.90	120.90	0.54
0:06:00	8,575.72	44.67	1.46	0:13:00	7,839.67	81.66	0.79	0:20:00	5,554.14	115.71	0.56	0:27:00	3,259.52	135.81	0.48	0:34:00	123.14	123.14	0.53
0:06:05	8,686.94	45.24	1.46	0:13:05	7,929.63	82.60	0.79	0:20:05	5,592.74	116.52	0.56	0:27:05	3,234.69	134.78	0.48	0:34:05	120.46	120.46	0.54
0:06:10	8,696.22	45.29	1.46	0:13:10	7,901.53	82.31	0.79	0:20:10	5,593.99	116.54	0.56	0:27:10	3,283.99	136.83	0.47	0:34:10	125.36	125.36	0.52
0:06:15	8,456.74	44.05	1.45	0:13:15	7,915.71	82.46	0.79	0:20:15	5,577.08	116.19	0.56	0:27:15	3,269.12	136.21	0.48	0:34:15	126.21	126.21	0.51
0:06:20	8,624.77	44.92	1.45	0:13:20	7,936.55	82.67	0.79	0:20:20	5,598.78	116.64	0.55	0:27:20	3,217.40	134.06	0.48	0:34:20	121.65	121.65	0.53
0:06:25	8,611.51	44.85	1.45	0:13:25	8,076.03	84.13	0.77	0:20:25	5,591.85	116.50	0.55	0:27:25	3,270.30	136.26	0.48	0:34:25	120.27	120.27	0.54
0:06:30	8,535.21	44.45	1.46	0:13:30	8,024.46	83.59	0.78	0:20:30	5,616.50	117.01	0.55	0:27:30	3,277.83	136.58	0.47	0:34:30	121.86	121.86	0.53
0:06:35	8,657.42	45.09	1.45	0:13:35	8,081.78	84.19	0.77	0:20:35	5,568.10	116.00	0.56	0:27:35	3,232.46	134.69	0.48	0:34:35	118.54	118.54	0.55
0:06:40	8,592.13	44.75	1.45	0:13:40	8,043.86	83.79	0.78	0:20:40	5,609.86	116.87	0.56	0:27:40	3,301.60	137.57	0.47	0:34:40	122.95	122.95	0.53
0:06:45	8,736.63	45.50	1.44	0:13:45	7,997.20	83.30	0.78	0:20:45	5,597.45	116.61	0.56	0:27:45	3,270.98	136.29	0.48	0:34:45	125.47	125.47	0.52
0:06:50	636.30	0.00	1.27	0:13:50	436.26	0.00	0.73	0:20:50	373.27	0.00	0.54	0:27:50	228.75	0.00	0.48	0:34:50	8.71	0.00	0.52
0:06:55	0.00	0.00	0.00	0:13:55	0.00	0.00	0.00	0:20:55	0.00	0.00	0.00	0:27:55	0.00	0.00	0.00	0:34:55	0.00	0.00	0.00
								0:21:00	0.00	0.00	0.00	0:28:00	0.00	0.00	0.00	0:35:00	0.00	0.00	0.00

SPC BENCHMARK 2™ V1.3

FULL DISCLOSURE REPORT

Submitted for Review: NOVEMBER 30, 2009

IBM Corporation
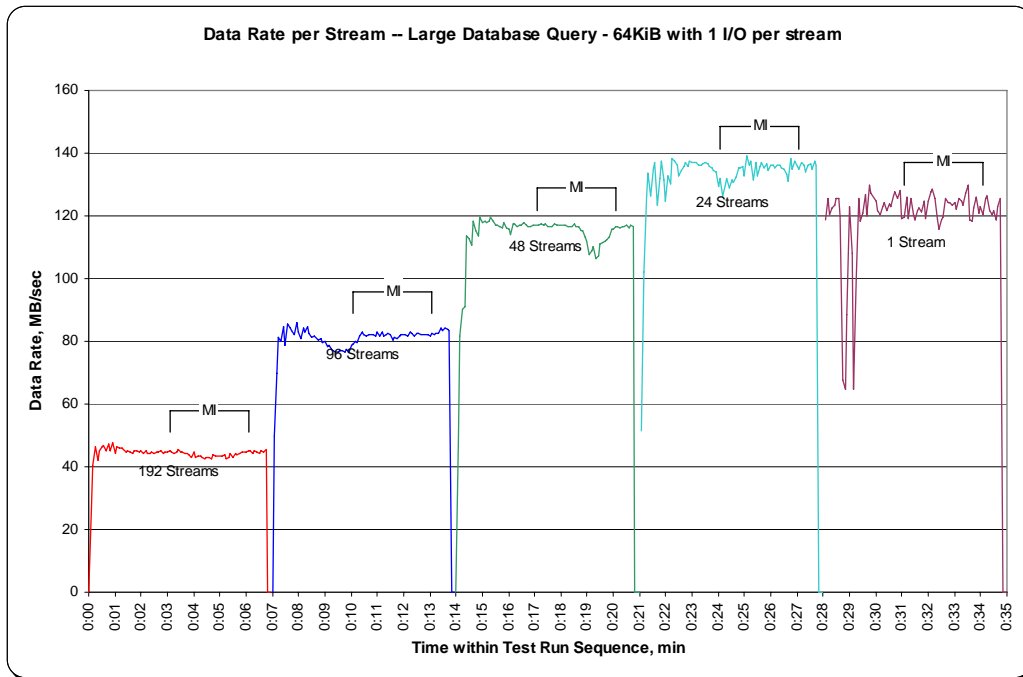IBM System Storage DS8700

Submission Identifier: B00049

SPC-2 "Large Database Query/64 KiB Transfer Size/1 Outstanding I/O" Average Data Rate Graph – Complete Test Run
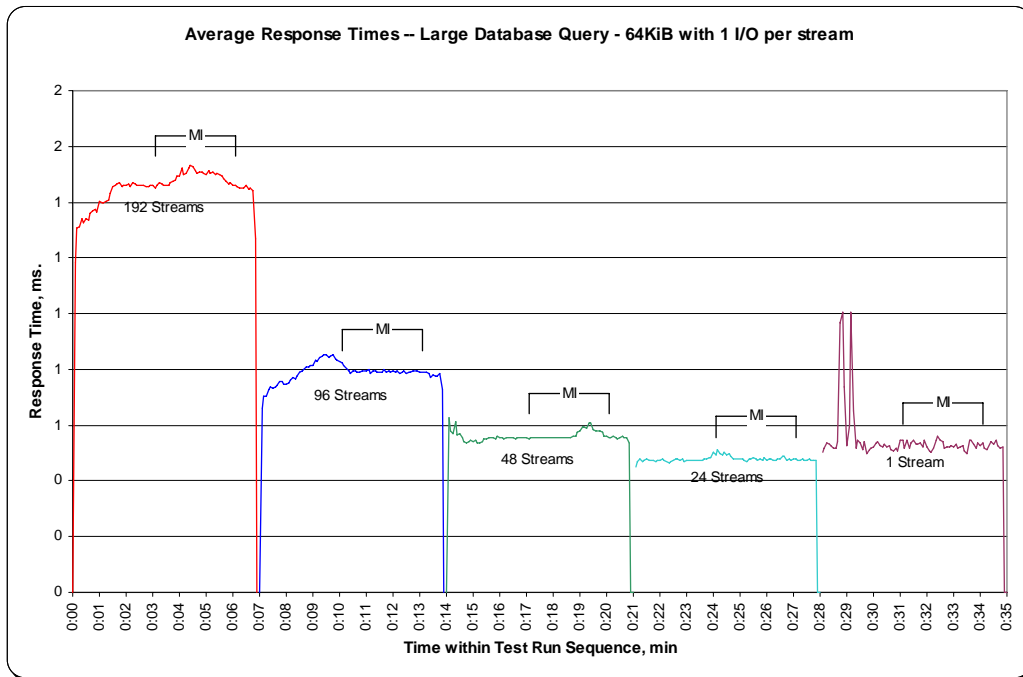

SPC-2 "Large Database Query/64 KiB Transfer Size/1 Outstanding I/O" Average Data Rate Graph – Measurement Interval (MI) Only

SPC-2 "Large Database Query/64 KiB Transfer Size/1 Outstanding I/O" Average Data Rate per Stream Graph

SPC-2 "Large Database Query/64 KiB Transfer Size/1 Outstanding I/O" Average Response Time Graph

Video on Demand Delivery Test

Clause 6.4.4.1

The Video on Demand Delivery Test represents the I/O operations required to enable individualized video entertainment for a community of subscribers, which draw from a digital film library.

Clause 6.4.2.2

The Video on Demand Delivery Test consists of one (1) Test Run.

The BC shall not be restarted or manually disturbed, altered, or adjusted during the execution of the Video on Demand Delivery Test. If power is lost to the BC during this Test all results shall be rendered invalid and the Test re-run in its entirety.

Clause 10.6.8.3

The Full Disclosure Report will contain the following content for the Video on Demand Delivery Test:

1. *A listing of the SPC-2 Workload Generator commands and parameters used to execute the Test Run in the Video on Demand Delivery Test.*

2. *The human readable SPC-2 Test Results File for the Test Run in the Video on Demand Delivery Test.*

3. *A table that contains the following information for the Test Run in the Video on Demand Delivery Test:*

   - *The number Streams specified.*

   - *The Ramp-Up duration in seconds.*

   - *The Measurement Interval duration in seconds.*

   - *The average data rate, in MB per second, for the Measurement Interval.*

   - *The average data rate, in MB per second, per Stream for the Measurement Interval.*

4. *A table that contains the following information for the single Video on Demand Delivery Test Run:*

   - *The number Streams specified.*

   - *The average data rate, average data rate per stream, average Response Time, and Maximum Response Time reported at 60 second intervals.*

5. *Average Data Rate (intervals), Average Data Rate per Stream (intervals), and Average Response Time (intervals) graphs for the single Video on Demand Delivery Test Run as specified in Clauses 10.1.4-2-10.1.6.*

6. *A Maximum Response Time (intervals) graph, which will utilize the format defined in Clause 10.1.6, substituting maximum Response Time data for average Response Time data.*

SPC-2 Workload Generator Commands and Parameters

The SPC-2 Workload Generator commands and parameters for the Video on Demand Delivery Test Run are documented in "Appendix E: SPC-2 Workload Generator Execution Commands and Parameters" on Page 108.

SPC-2 Test Results File

A link to the SPC-2 Test Results file generated from the Video on Demand Delivery Test Run is listed below.

SPC-2 Video on Demand Delivery Test Results File

SPC-2 Video on Demand Delivery Test Run Data

The number of Streams specified, Ramp-Up duration in seconds, Measurement Interval duration in seconds, average Data Rate for the Measurement Interval, and average Data Rate per Stream for the Measurement Interval are listed in the following table.

SPC-2-VOD	TR1
Number of Streams	8400
Ramp-up Time, sec	1200
Measurement Interval, sec	7200
Average Data Rate, MB/sec	6,605.98
Per Stream Data Rate, MB/sec	0.79
Average Response Time, ms	3.87
Average Max Response Time, ms	176.39

Video on Demand Delivery Test – TEST RUN DATA BY INTERVAL

The SPC-2 Video on Demand Delivery Test Run data is contained in the table that appears on the next page. That table is followed by graphs illustrating the average Data Rate and average Data Rate per Stream produced by the same Test Runs. The table and graphs present the data at sixty second intervals.

| TR1 Test Run Sequence Time	8400 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	Maximum Response Time, ms	TR1 Test Run Sequence Time	8400 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	Maximum Response Time, ms	TR1 Test Run Sequence Time	8400 Streams Data Rate, MB/sec	Data Rate / Stream, MB/sec	Response Time, ms	Maximum Response Time, ms
0:01:00	606.65	0.66	1.80	51.91	0:51:00	6,606.74	0.79	3.85	210.01	1:41:00	6,607.92	0.79	3.89	176.61
0:02:00	1,785.07	0.77	1.20	37.96	0:52:00	6,607.20	0.79	3.86	194.27	1:42:00	6,607.09	0.79	3.89	225.59
0:03:00	2,761.48	0.77	1.39	53.32	0:53:00	6,595.44	0.79	3.82	171.47	1:43:00	6,607.90	0.79	3.89	227.93
0:04:00	3,589.56	0.78	1.73	73.89	0:54:00	6,606.68	0.79	3.87	183.96	1:44:00	6,606.60	0.79	3.91	200.07
0:05:00	4,322.51	0.78	2.13	68.35	0:55:00	6,616.49	0.79	3.83	150.44	1:45:00	6,606.47	0.79	3.92	151.74
0:06:00	4,910.61	0.78	2.54	86.93	0:56:00	6,606.53	0.79	3.86	159.37	1:46:00	6,607.82	0.79	3.91	153.83
0:07:00	5,401.80	0.78	2.91	83.70	0:57:00	6,605.01	0.79	3.81	156.37	1:47:00	6,606.42	0.79	3.87	141.63
0:08:00	5,810.89	0.78	3.19	144.86	0:58:00	6,606.36	0.79	3.81	180.12	1:48:00	6,606.32	0.79	3.88	217.00
0:09:00	6,161.63	0.78	3.48	148.71	0:59:00	6,606.58	0.79	3.82	178.61	1:49:00	6,607.78	0.79	3.88	186.44
0:10:00	6,472.46	0.78	3.69	134.80	1:00:00	6,606.68	0.79	3.82	186.77	1:50:00	6,606.62	0.79	3.87	146.31
0:11:00	6,606.61	0.79	3.85	153.91	1:01:00	6,606.46	0.79	3.91	150.76	1:51:00	6,606.26	0.79	3.90	181.06
0:12:00	6,606.49	0.79	3.87	176.24	1:02:00	6,606.49	0.79	3.83	157.74	1:52:00	6,606.78	0.79	3.85	149.37
0:13:00	6,606.30	0.79	3.87	188.45	1:03:00	6,606.88	0.79	3.92	198.80	1:53:00	6,607.21	0.79	3.89	193.79
0:14:00	6,606.67	0.79	3.88	202.35	1:04:00	6,606.27	0.79	3.90	183.45	1:54:00	6,606.64	0.79	3.90	196.35
0:15:00	6,603.45	0.79	3.85	213.87	1:05:00	6,606.69	0.79	3.86	137.72	1:55:00	6,608.32	0.79	3.97	146.74
0:16:00	6,596.02	0.79	3.80	145.62	1:06:00	6,607.86	0.79	3.91	149.99	1:56:00	6,595.95	0.79	3.89	179.47
0:17:00	6,606.27	0.79	3.86	147.08	1:07:00	6,607.10	0.79	3.87	167.30	1:57:00	6,606.79	0.79	3.86	129.47
0:18:00	6,607.24	0.79	3.81	179.05	1:08:00	6,606.70	0.79	3.88	156.41	1:58:00	6,606.91	0.79	3.85	162.82
0:19:00	6,606.41	0.79	3.85	247.08	1:09:00	6,606.32	0.79	3.96	190.46	1:59:00	6,606.22	0.79	3.90	169.93
0:20:00	6,606.34	0.79	3.91	150.62	1:10:00	6,606.91	0.79	3.82	142.52	2:00:00	6,607.35	0.79	3.83	163.85
0:21:00	6,606.61	0.79	3.84	180.44	1:11:00	6,606.53	0.79	3.90	185.05	2:01:00	6,609.23	0.79	3.92	189.25
0:22:00	6,596.65	0.79	3.86	161.49	1:12:00	6,606.41	0.79	3.85	153.67	2:02:00	6,607.40	0.79	3.94	156.90
0:23:00	6,607.67	0.79	3.89	205.37	1:13:00	6,606.28	0.79	3.91	188.83	2:03:00	6,607.54	0.79	3.87	174.97
0:24:00	6,607.23	0.79	3.83	237.81	1:14:00	6,606.34	0.79	3.83	187.54	2:04:00	6,606.66	0.79	3.91	184.39
0:25:00	6,606.51	0.79	3.81	163.03	1:15:00	6,595.95	0.79	3.89	144.08	2:05:00	6,606.94	0.79	3.90	165.26
0:26:00	6,606.62	0.79	3.82	208.88	1:16:00	6,606.56	0.79	3.87	163.43	2:06:00	6,596.40	0.79	3.88	170.16
0:27:00	6,606.43	0.79	3.82	156.58	1:17:00	6,606.81	0.79	3.81	149.19	2:07:00	6,606.65	0.79	3.85	137.17
0:28:00	6,606.73	0.79	3.87	188.36	1:18:00	6,607.15	0.79	3.83	184.09	2:08:00	6,606.21	0.79	3.87	151.90
0:29:00	6,608.45	0.79	3.78	202.94	1:19:00	6,607.90	0.79	3.87	174.80	2:09:00	6,594.58	0.79	3.93	191.26
0:30:00	6,606.48	0.79	3.83	155.57	1:20:00	6,606.46	0.79	3.85	177.70	2:10:00	6,607.73	0.79	3.89	161.48
0:31:00	6,606.53	0.79	3.91	177.47	1:21:00	6,606.71	0.79	3.90	180.76	2:11:00	6,606.12	0.79	3.95	165.99
0:32:00	6,606.72	0.79	3.82	159.33	1:22:00	6,607.03	0.79	3.97	180.98	2:12:00	6,606.62	0.79	4.00	161.98
0:33:00	6,607.80	0.79	3.83	195.56	1:23:00	6,607.82	0.79	3.95	198.33	2:13:00	6,597.54	0.79	3.96	187.28
0:34:00	6,607.99	0.79	3.82	195.05	1:24:00	6,607.62	0.79	3.88	227.97	2:14:00	6,608.54	0.79	3.92	200.21
0:35:00	6,606.83	0.79	3.81	191.98	1:25:00	6,606.77	0.79	3.91	210.61	2:15:00	6,602.91	0.79	3.91	197.21
0:36:00	6,606.38	0.79	3.88	167.47	1:26:00	6,607.00	0.79	3.85	188.24	2:16:00	6,609.22	0.79	3.91	150.16
0:37:00	6,606.32	0.79	3.80	149.45	1:27:00	6,606.31	0.79	3.81	179.75	2:17:00	6,599.51	0.79	3.99	224.52
0:38:00	6,606.22	0.79	3.83	208.60	1:28:00	6,607.90	0.79	3.85	172.16	2:18:00	6,610.62	0.79	3.91	188.99
0:39:00	6,606.53	0.79	3.82	183.16	1:29:00	6,605.38	0.79	3.83	183.24	2:19:00	6,597.14	0.79	3.93	216.54
0:40:00	6,606.58	0.79	3.82	182.34	1:30:00	6,607.35	0.79	3.87	145.21	2:20:00	6,609.50	0.79	3.91	183.51
0:41:00	6,595.08	0.79	3.90	206.90	1:31:00	6,608.10	0.79	3.92	175.57					
0:42:00	6,606.43	0.79	3.86	163.66	1:32:00	6,595.46	0.79	3.88	159.04					
0:43:00	6,606.74	0.79	3.83	184.32	1:33:00	6,607.45	0.79	3.86	201.70					
0:44:00	6,606.34	0.79	3.80	186.84	1:34:00	6,606.55	0.79	3.83	198.97					
0:45:00	6,606.46	0.79	3.87	139.53	1:35:00	6,607.12	0.79	3.83	178.93					
0:46:00	6,606.60	0.79	3.78	153.98	1:36:00	6,606.42	0.79	3.82	134.74					
0:47:00	6,607.27	0.79	3.78	145.18	1:37:00	6,608.79	0.79	3.84	176.01					
0:48:00	6,607.49	0.79	3.79	168.32	1:38:00	6,611.30	0.79	3.85	171.34					
0:49:00	6,606.94	0.79	3.73	175.54	1:39:00	6,595.72	0.79	3.83	212.86					
0:50:00	6,606.38	0.79	3.78	157.90	1:40:00	6,594.10	0.79	3.81	175.90					

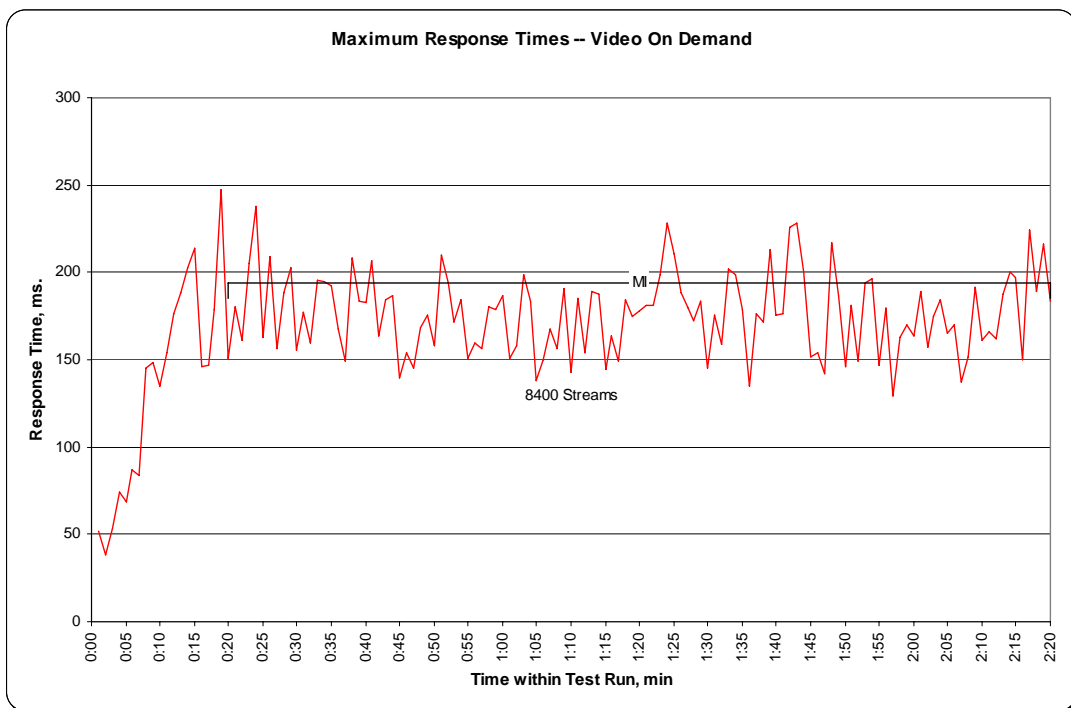## SPC-2 Video on Demand Delivery Average Data Rate Graph
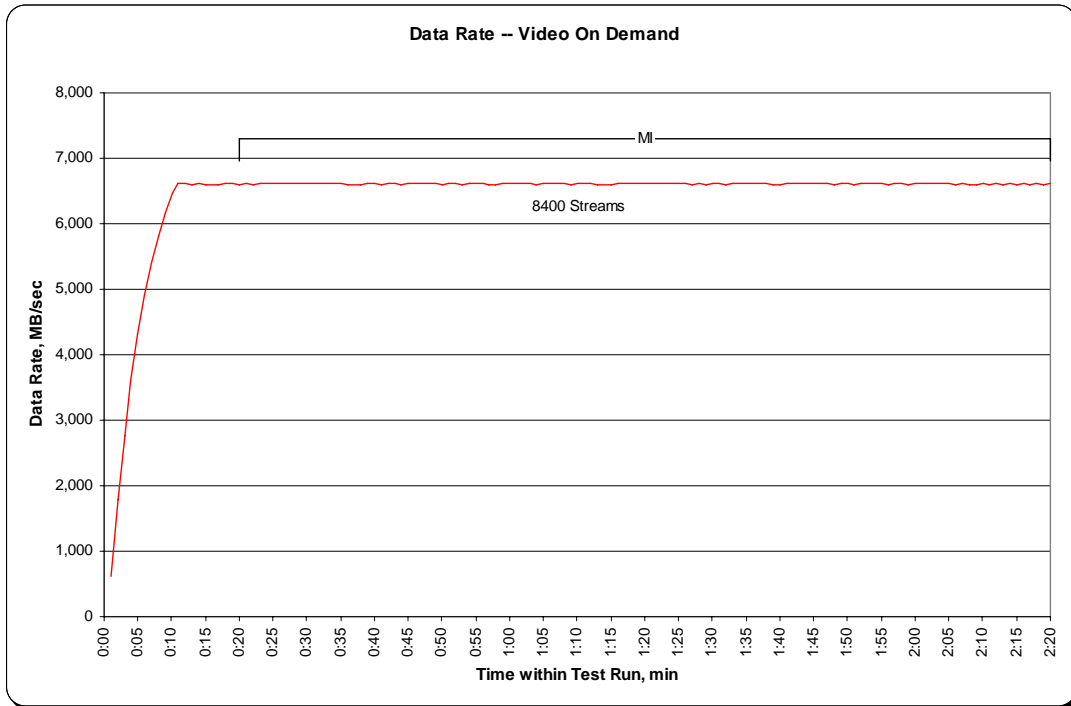
SPC-2 Video on Demand Delivery Average Data Rate per Stream Graph
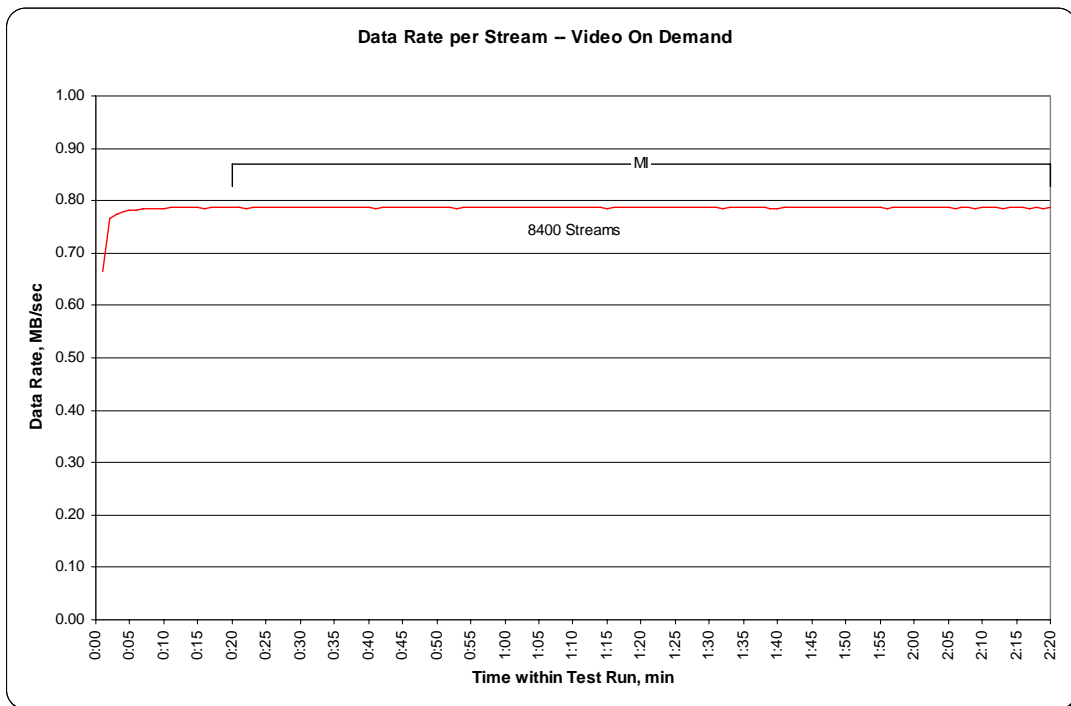
SPC-2 Video on Demand Delivery Average Response Time Graph
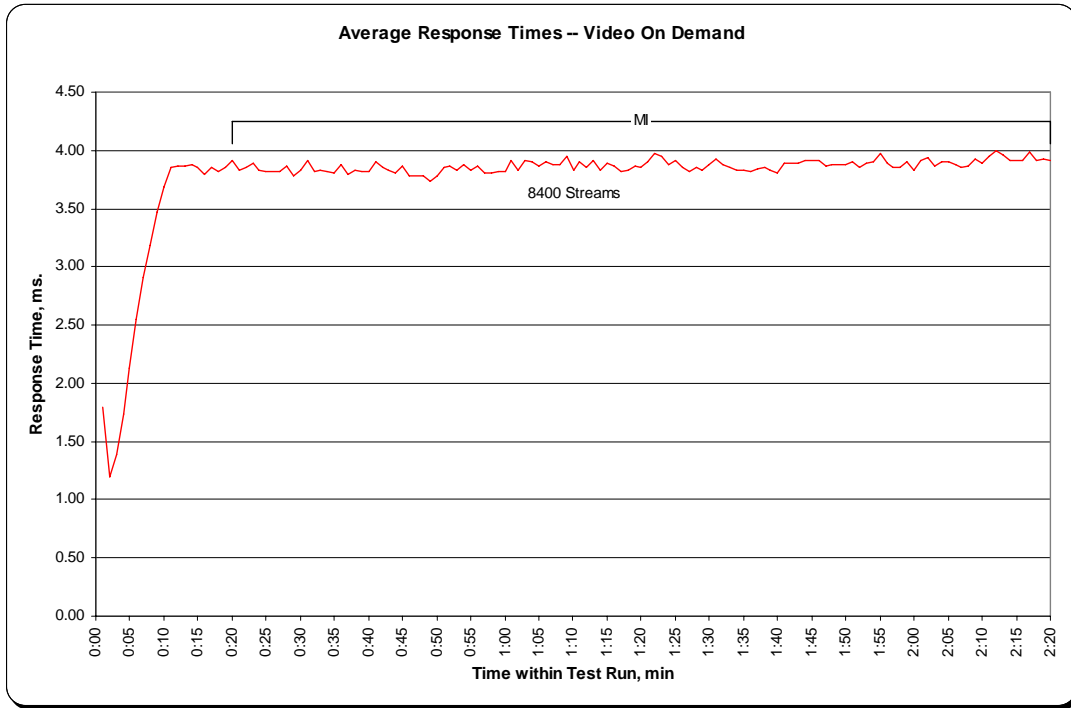
SPC-2 Video on Demand Delivery Maximum Response Time Graph

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-2 Workload Generator will write a specific pattern at randomly selected locations throughout the Total ASU Capacity (Persistence Test Run 1). The SPC-2 Workload Generator will retain the information necessary to later validate the pattern written at each location.

The Tested Storage 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.

Restart the TSC, and if the Host System(s) were shutdown and powered off, restart the Host System(s).

The SPC-2 Workload Generator will utilize the retained data from Persistence Test Run 1 to verify (Persistence Run 2) the bit patterns written in Persistence Test Run 1 and their corresponding location.

Clause 10.6.8.4

The Full Disclosure Report will contain the following content for the Data Persistence Test:

1. *A listing of the SPC-2 Workload Generator commands and parameters used to execute each of the Test Runs in the Persistence Test.*
2. *The human readable SPC-2 Test Results File for each of the Test Runs in the Data Persistence Test.*
3. *A table from the successful Persistence Test, which contains the results from the test.*

SPC-2 Workload Generator Commands and Parameters

The SPC-2 Workload Generator commands and parameters for the Persistence Test Runs are documented in "Appendix E: SPC-2 Workload Generator Execution Commands and Parameters" on Page 108.

Data Persistence Test Results File

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

Persistence 1 Test Run Results File
Persistence 2 Test Run Results File

Data Persistence Test Results

Data Persistence Test Results	
Data Persistence Test Number: 1	
Total Number of Logical Blocks Written	1,408,531
Total Number of Logical Blocks Re-referenced	31,588
Total Number of Logical Blocks Verified	1,376,943
Total Number of Logical Blocks that Failed Verification	0
Number of Failed I/O Requests in the process of the Test	0

PRICED STORAGE CONFIGURATION AVAILABILITY DATE

Clause 10.6.9

The committed delivery date 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. All availability dates, whether for individual components or for the Priced Storage Configuration as a whole, must be disclosed to a precision of one day.

*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 Priced Storage Configuration Name as described in Clause 10.6.5.3, #1 and MM is month, DD is the day, and YY is the year of the date that the Priced Storage Configuration, as documented, is available for shipment to customers as described above.*

The IBM System Storage *DS8700*, **as documented in this SPC-2 Full Disclosure Report, is currently available for customer purchase and shipment.**

ANOMALIES OR IRREGULARITIES

Clause 10.6.11

The FDR shall include a clear and complete description of any anomalies or irregularities encountered in the course of executing the SPC-2 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-2 Remote Audit of the IBM System Storage *DS8700*.

APPENDIX A: SPC-2 GLOSSARY

"Decimal" *(powers of ten)* Measurement Units

In the storage industry, the terms "kilo", "mega", "giga", "tera", "peta", and "exa" are commonly used prefixes for computing performance and capacity. For the purposes of the SPC workload definitions, all of the following terms are defined in "powers of ten" measurement units.

- A kilobyte (KB) is equal to 1,000 (10^3) bytes.

- A megabyte (MB) is equal to 1,000,000 (10^6) bytes.

- A gigabyte (GB) is equal to 1,000,000,000 (10^9) bytes.

- A terabyte (TB) is equal to 1,000,000,000,000 (10^{12}) bytes.

- A petabyte (PB) is equal to 1,000,000,000,000,000 (10^{15}) bytes

- An exabyte (EB) is equal to 1,000,000,000,000,000,000 (10^{18}) bytes

"Binary" *(powers of two)* Measurement Units

The sizes reported by many operating system components use "powers of two" measurement units rather than "power of ten" units. The following standardized definitions and terms are also valid and may be used in this document.

- A kibibyte (KiB) is equal to 1,024 (2^{10}) bytes.

- A mebibyte (MiB) is equal to 1,048,576 (2^{20}) bytes.

- A gigibyte (GiB) is equal to 1,073,741,824 (2^{30}) bytes.

- A tebibyte (TiB) is equal to 1,099,511,627,776 (2^{40}) bytes.

- A pebibyte (PiB) is equal to 1,125,899,906,842,624 (2^{50}) bytes.

- An exbibyte (EiB) is equal to 1,152,921,504,606,846,967 (2^{60}) bytes.

SPC-2 Data Repository Definitions

Total ASU Capacity: The total storage capacity read and written in the course of executing the SPC-2 benchmark.

Application Storage Unit (ASU): The logical interface between the storage and SPC-2 Workload Generator. The ASU is 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-2 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-2 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).

Data Protection Overhead: The storage capacity required to implement the selected level of data protection.

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

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 sum of unused storage capacity within the Physical Storage Capacity, Configured Storage Capacity, and Addressable Storage Capacity.

SPC-2 Data Protection Levels

RAID5: User data is distributed across the disks in the array. Check data corresponding to user data is distributed across multiple disks in the form of bit-by-bit parity.

Mirroring: Two or more identical copies of user data are maintained on separate disks.

Other Protection Level: Any data protection other than **RAID5** or **Mirroring**.

Unprotected: There is no data protection provided.

SPC-2 Test Execution Definitions

Completed I/O Request: An I/O Request with a Start Time and a Completion Time *(see "I/O Completion Types" illustrated below)*.

Completion Time: The time recorded by the Workload Generator when an I/O Request is completed by the Tested Storage Configuration (TSC) as signaled by System Software.

Data Rate: The data volume, in MB, transferred by all Measured I/O Requests in an SPC-2 Test Run divided by the length of the Test Run in seconds.

Failed I/O Request: Any I/O Request issued by the SPC-2 Workload Generator that meets one of the following conditions *(see "I/O Completion Types" illustrated below)*:

- The I/O Request was signaled as failed by System Software.

- The I/O Request started within the Measurement Interval, but did not complete prior to the end of the appropriate Run-Out period..

- The I/O Request started within the Run-Out period, but did not complete prior to the end of the appropriate Ramp-Down period.

I/O Request Throughput: The total number of Measured I/O Requests in an SPC-2 Test Run divided by the duration of the Measurement Interval in seconds.

Measured I/O Request: A Completed I/O Request that begins (Start Time) within a Measurement Interval and completes (Completion Time) prior to the end of the appropriate Ramp Down *(see "I/O Completion Types" illustrated below)*.

Measurement Interval: A specified, contiguous period of time, after the TSC has reached Steady State, when data is collected by the Workload Generator to produce the test results for a SPC-2 Test Run *(see "SPC-2 Test Run Components" illustrated below, Test Run 1: T_2-T_3 and Test Run 2: T_7-T_8)*.

Outstanding I/O Requests: The Outstanding I/O Requests parameter specifies the maximum number of concurrent I/O Requests, associated with a give Stream, which have been issued but not yet completed. *(Clause 3.4.4 of the SPC-2 Benchmark Specification)*.

Ramp-Down: A specified, contiguous period of time in which the TSC is required to complete I/O Requests started but not completed during the preceding Run-Out period. Ramp-Down begins at the end of the preceding Run-Out period *(see "SPC-2 Test Run Components" illustrated below, Test Run 1: T_4-T_5 and Test Run 2: T_9-T_{10})*. The Workload Generator will not submit any I/O Requests during the Ramp-Down.

Ramp-Up: A specified, contiguous period of time required for the Benchmark Configuration (BC) to produce Steady State throughput after the Workload Generator begins submitting I/O Requests to the TSC for execution. The Ramp-Up period ends at the beginning of the Measurement Interval *(see "SPC-2 Test Run Components" illustrated below, Test Run 1: T_0-T_2 and Test Run 2: T_5-T_7)*.

Response Time: The Response Time of a Measured I/O Request is its Completion Time minus its Start Time.

Run-Out: A specified, contiguous period of time in which the TSC is required to complete I/O Requests started but not completed during the preceding Measurement Interval. The Run-Out period begins at the end of the preceding Measurement Interval and is a component of the Steady State period *(see "SPC-2 Test Run Components" illustrated below, Test Run 1: T_3-T_4 and Test Run 2: T_9-T_{10})*. The Workload Generator will continue to submit I/O Requests at the Test Run's specified rate during the Run-Out period.

Start Time: The time recorded by the Workload Generator when an I/O Request is submitted, by the Workload Generator, to the System Software for execution on the TSC.

Steady State: The period during which the workload presented to the TSC by the SPC-2 Workload Generator is constant and the resulting TSC I/O Request Throughput is both consistent and sustainable. The Steady State period includes both the Measurement Interval and Run-Out periods *(see "SPC-2 Test Run Components" illustrated below, Test Run 1: T_1-T_4 and Test Run 2: T_6-T_9)*.

Steady State is achieved only after caches in the TSC have filled and as a result the I/O Request Throughput of the TSC has stabilized.

Stream: A collection of Stream Segments that started within a Test Run.

Stream Segment: A sequentially organized pattern of I/O requests, which transfers a contiguous range of data.

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

Test Phase: A collection of one or more SPC-2 Test Runs sharing a common objective and intended to be run in a specific sequence.

Test Run: The execution of SPC-2 that produces specific SPC-2 test results. SPC-2 Test Runs have specified, measured Ramp-Up, Measurement Interval, Run-Out and Ramp-Down periods. "SPC-2 Test Run Components" *(see below)* illustrates the Ramp-Up, Steady State, Measurement Interval, Run-Out, and Ramp-Down components contained in two uninterrupted SPC-2 Test Runs *(Test Run 1: T_0-T_5 and Test Run 2: T_5-T_{10})*.

Test Run Sequence: A related sequence of Large File Processing (LFP) or Large Database Query (LDQ) Test Runs. Each Test Run Sequence will consist of five Test Runs, which vary the number of Streams as follows:

- Test Run 1: Maximum number of Streams, which is selected by the Test Sponsor
- Test Run 2: 50% of the maximum number of Streams used in Test Run 1.
- Test Run 3: 25% of the maximum number of Streams used in Test Run 1.
- Test Run 4: 12.5% of the maximum number of Streams used in Test Run 1.
- Test Run 5: 1 Stream.

Each of the five Test Runs in a Test Run Sequence will share the same attributes with the exception of the number of Streams. For example:

- Large File Processing, Read, 1024 KiB Transfer Size: Maximum Streams
- Large File Processing, Read, 1024 KiB Transfer Size: 50% of Maximum Streams
- Large File Processing, Read, 1024 KiB Transfer Size: 25% of Maximum Streams
- Large File Processing, Read, 1024 KiB Transfer Size: 12.5% of Maximum Streams
- Large File Processing, Read, 1024 KiB Transfer Size: 1 Stream

Transfer Size: The Transfer Size parameter specifies the number of bytes in KiB to transfer. *(Clause 3.4.7 of the SPC-2 Benchmark Specification)*

I/O Completion Types
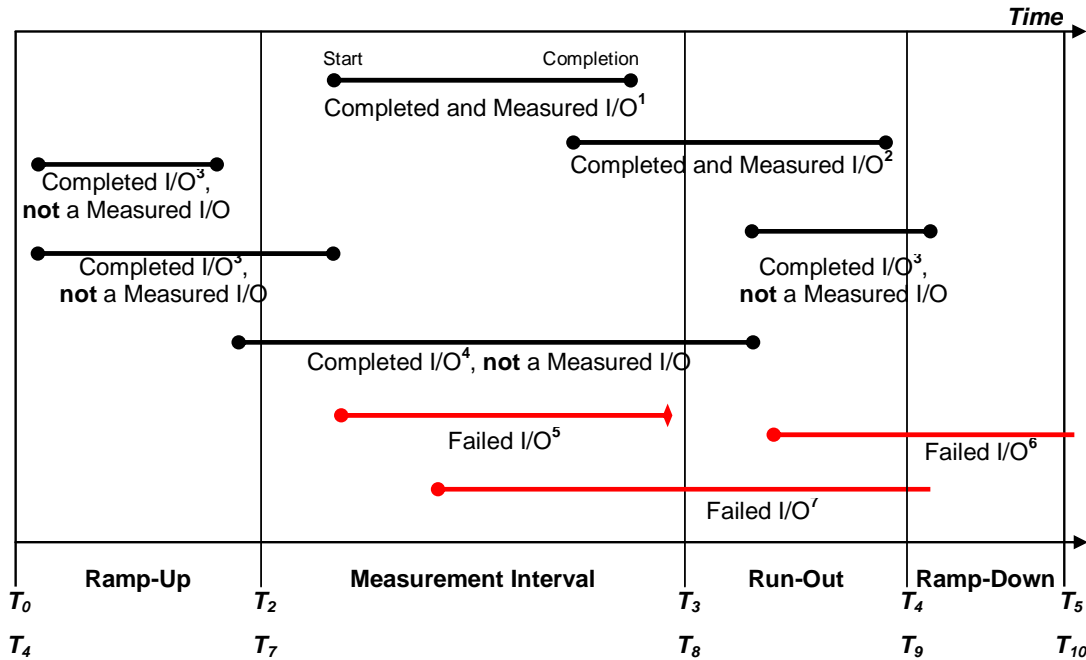
Completed and Measured I/O[1]: I/O started and completed within the Measurement Interval.

Completed and Measured I/O[2]: I/O started within the Measurement Interval and completed within Ramp Down.

Completed I/O[3]: I/O started before or after the Measurement Interval – not measured.

Completed I/O[4]: I/O started before and completed after the Measurement Interval – not measured.

Failed I/O[5]: Signaled as failed by System Software.

Failed I/O[6]: I/O did not complete prior to the end of Ramp-Down.

Failed I/O[7]: I/O did not complete prior to the end of Run-Out.

SPC-2 Test Run Components
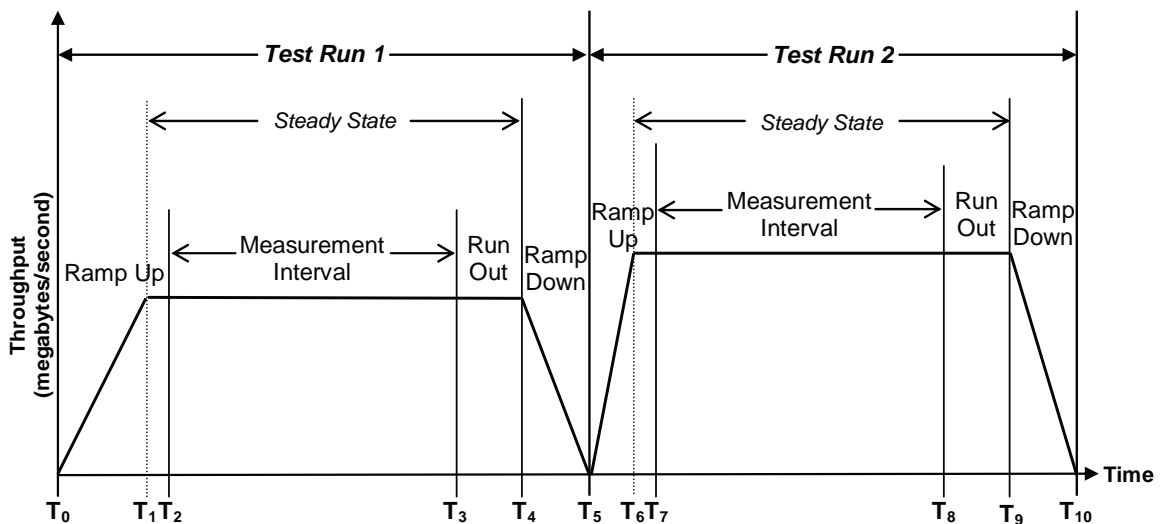
APPENDIX B: CUSTOMER TUNABLE PARAMETERS AND OPTIONS

The following customer tunable parameters were changed from their default values as documented in *"Appendix C: Tested Storage Configuration (TSC) Creation" (step5_discover.sh script)*:

- `queue_depth=256`

- `max_transfer=0x100000`

APPENDIX C: TESTED STORAGE CONFIGURATION (TSC) CREATION

Create the RAID-5 ranks

The first script, **step1_makearray.txt**, groups the physical volumes into 32 RAID-5 arrays and the system automatically generates a set of array names, A0-A31. The next script **step2_mkranks.txt**, defines the arrays, A0-A31, as 32 open system ranks, R0-R31 . As in the previous script, the rank names are assigned by the system. Step 2 also defines the ranks R0-R31 to comprise a set of 32 'extentpools" (pools of available storage) with the names P0-P31.

step1_makearray.txt

```
mkarray -dev IBM.2107-7503471 -raidtype 5 -arsite S1
mkarray -dev IBM.2107-7503471 -raidtype 5 -arsite S2
mkarray -dev IBM.2107-7503471 -raidtype 5 -arsite S3
mkarray -dev IBM.2107-7503471 -raidtype 5 -arsite S4
mkarray -dev IBM.2107-7503471 -raidtype 5 -arsite S25
mkarray -dev IBM.2107-7503471 -raidtype 5 -arsite S26
mkarray -dev IBM.2107-7503471 -raidtype 5 -arsite S27
mkarray -dev IBM.2107-7503471 -raidtype 5 -arsite S28
mkarray -dev IBM.2107-7503471 -raidtype 5 -arsite S21
mkarray -dev IBM.2107-7503471 -raidtype 5 -arsite S22
mkarray -dev IBM.2107-7503471 -raidtype 5 -arsite S23
mkarray -dev IBM.2107-7503471 -raidtype 5 -arsite S24
mkarray -dev IBM.2107-7503471 -raidtype 5 -arsite S5
mkarray -dev IBM.2107-7503471 -raidtype 5 -arsite S6
mkarray -dev IBM.2107-7503471 -raidtype 5 -arsite S7
mkarray -dev IBM.2107-7503471 -raidtype 5 -arsite S8
mkarray -dev IBM.2107-7503471 -raidtype 5 -arsite S13
mkarray -dev IBM.2107-7503471 -raidtype 5 -arsite S14
mkarray -dev IBM.2107-7503471 -raidtype 5 -arsite S15
mkarray -dev IBM.2107-7503471 -raidtype 5 -arsite S16
mkarray -dev IBM.2107-7503471 -raidtype 5 -arsite S9
mkarray -dev IBM.2107-7503471 -raidtype 5 -arsite S10
mkarray -dev IBM.2107-7503471 -raidtype 5 -arsite S11
mkarray -dev IBM.2107-7503471 -raidtype 5 -arsite S12
mkarray -dev IBM.2107-7503471 -raidtype 5 -arsite S17
mkarray -dev IBM.2107-7503471 -raidtype 5 -arsite S18
mkarray -dev IBM.2107-7503471 -raidtype 5 -arsite S19
mkarray -dev IBM.2107-7503471 -raidtype 5 -arsite S20
mkarray -dev IBM.2107-7503471 -raidtype 5 -arsite S29
mkarray -dev IBM.2107-7503471 -raidtype 5 -arsite S30
mkarray -dev IBM.2107-7503471 -raidtype 5 -arsite S31
mkarray -dev IBM.2107-7503471 -raidtype 5 -arsite S32

lsarray -dev IBM.2107-7503471 -l
```

step2_makeranks.txt

```
mkrank -dev IBM.2107-7503471 -array A0 -stgtype fb -extpool P0
mkrank -dev IBM.2107-7503471 -array A1 -stgtype fb -extpool P1
mkrank -dev IBM.2107-7503471 -array A2 -stgtype fb -extpool P2
mkrank -dev IBM.2107-7503471 -array A3 -stgtype fb -extpool P3
mkrank -dev IBM.2107-7503471 -array A4 -stgtype fb -extpool P4
mkrank -dev IBM.2107-7503471 -array A5 -stgtype fb -extpool P5
mkrank -dev IBM.2107-7503471 -array A6 -stgtype fb -extpool P6
```

```
mkrank -dev IBM.2107-7503471 -array A7 -stgtype fb -extpool P7
mkrank -dev IBM.2107-7503471 -array A8 -stgtype fb -extpool P8
mkrank -dev IBM.2107-7503471 -array A9 -stgtype fb -extpool P9
mkrank -dev IBM.2107-7503471 -array A10 -stgtype fb -extpool P10
mkrank -dev IBM.2107-7503471 -array A11 -stgtype fb -extpool P11
mkrank -dev IBM.2107-7503471 -array A12 -stgtype fb -extpool P12
mkrank -dev IBM.2107-7503471 -array A13 -stgtype fb -extpool P13
mkrank -dev IBM.2107-7503471 -array A14 -stgtype fb -extpool P14
mkrank -dev IBM.2107-7503471 -array A15 -stgtype fb -extpool P15
mkrank -dev IBM.2107-7503471 -array A16 -stgtype fb -extpool P16
mkrank -dev IBM.2107-7503471 -array A17 -stgtype fb -extpool P17
mkrank -dev IBM.2107-7503471 -array A18 -stgtype fb -extpool P18
mkrank -dev IBM.2107-7503471 -array A19 -stgtype fb -extpool P19
mkrank -dev IBM.2107-7503471 -array A20 -stgtype fb -extpool P20
mkrank -dev IBM.2107-7503471 -array A21 -stgtype fb -extpool P21
mkrank -dev IBM.2107-7503471 -array A22 -stgtype fb -extpool P22
mkrank -dev IBM.2107-7503471 -array A23 -stgtype fb -extpool P23
mkrank -dev IBM.2107-7503471 -array A24 -stgtype fb -extpool P24
mkrank -dev IBM.2107-7503471 -array A25 -stgtype fb -extpool P25
mkrank -dev IBM.2107-7503471 -array A26 -stgtype fb -extpool P26
mkrank -dev IBM.2107-7503471 -array A27 -stgtype fb -extpool P27
mkrank -dev IBM.2107-7503471 -array A28 -stgtype fb -extpool P28
mkrank -dev IBM.2107-7503471 -array A29 -stgtype fb -extpool P29
mkrank -dev IBM.2107-7503471 -array A30 -stgtype fb -extpool P30
mkrank -dev IBM.2107-7503471 -array A31 -stgtype fb -extpool P31

lsrank -dev IBM.2107-7503471 -l
```

Create the LUNs

The **step3_makevols.txt** script defines 64 LUNs on the set of 32 RAID-5 ranks. The first LUN on each rank (with size 950 GiB) was used for the SPC-2 test. Each LUN is assigned to one of two volume groups, V0-V1, so that paths can be assigned by groups of volumes. The LUNs assigned to V0 belong to ranks that are in the left, blue, or even part of the system diagram; the LUNs assigned to V1 belong to ranks that are in the right, green, or odd part of the system diagram.

step3_makevols.txt

```
mkfbvol -dev IBM.2107-7503471 -extpool P0 -volgrp V0 -cap 950 -name fb_vol_#h 1000
mkfbvol -dev IBM.2107-7503471 -extpool P2 -volgrp V0 -cap 950 -name fb_vol_#h 1010
mkfbvol -dev IBM.2107-7503471 -extpool P4 -volgrp V0 -cap 950 -name fb_vol_#h 1020
mkfbvol -dev IBM.2107-7503471 -extpool P6 -volgrp V0 -cap 950 -name fb_vol_#h 1030
mkfbvol -dev IBM.2107-7503471 -extpool P8 -volgrp V0 -cap 950 -name fb_vol_#h 1200
mkfbvol -dev IBM.2107-7503471 -extpool P10 -volgrp V0 -cap 950 -name fb_vol_#h 1210
mkfbvol -dev IBM.2107-7503471 -extpool P12 -volgrp V0 -cap 950 -name fb_vol_#h 1220
mkfbvol -dev IBM.2107-7503471 -extpool P14 -volgrp V0 -cap 950 -name fb_vol_#h 1230
mkfbvol -dev IBM.2107-7503471 -extpool P16 -volgrp V0 -cap 950 -name fb_vol_#h 1400
mkfbvol -dev IBM.2107-7503471 -extpool P18 -volgrp V0 -cap 950 -name fb_vol_#h 1410
mkfbvol -dev IBM.2107-7503471 -extpool P20 -volgrp V0 -cap 950 -name fb_vol_#h 1420
mkfbvol -dev IBM.2107-7503471 -extpool P22 -volgrp V0 -cap 950 -name fb_vol_#h 1430
mkfbvol -dev IBM.2107-7503471 -extpool P24 -volgrp V0 -cap 950 -name fb_vol_#h 1600
mkfbvol -dev IBM.2107-7503471 -extpool P26 -volgrp V0 -cap 950 -name fb_vol_#h 1610
mkfbvol -dev IBM.2107-7503471 -extpool P28 -volgrp V0 -cap 950 -name fb_vol_#h 1620
mkfbvol -dev IBM.2107-7503471 -extpool P30 -volgrp V0 -cap 950 -name fb_vol_#h 1630
mkfbvol -dev IBM.2107-7503471 -extpool P1 -volgrp V1 -cap 950 -name fb_vol_#h 1100
mkfbvol -dev IBM.2107-7503471 -extpool P3 -volgrp V1 -cap 950 -name fb_vol_#h 1110
mkfbvol -dev IBM.2107-7503471 -extpool P5 -volgrp V1 -cap 950 -name fb_vol_#h 1120
mkfbvol -dev IBM.2107-7503471 -extpool P7 -volgrp V1 -cap 950 -name fb_vol_#h 1130
mkfbvol -dev IBM.2107-7503471 -extpool P9 -volgrp V1 -cap 950 -name fb_vol_#h 1300
```

```
mkfbvol -dev IBM.2107-7503471 -extpool P11 -volgrp V1 -cap 950 -name fb_vol_#h 1310
mkfbvol -dev IBM.2107-7503471 -extpool P13 -volgrp V1 -cap 950 -name fb_vol_#h 1320
mkfbvol -dev IBM.2107-7503471 -extpool P15 -volgrp V1 -cap 950 -name fb_vol_#h 1330
mkfbvol -dev IBM.2107-7503471 -extpool P17 -volgrp V1 -cap 950 -name fb_vol_#h 1500
mkfbvol -dev IBM.2107-7503471 -extpool P19 -volgrp V1 -cap 950 -name fb_vol_#h 1510
mkfbvol -dev IBM.2107-7503471 -extpool P21 -volgrp V1 -cap 950 -name fb_vol_#h 1520
mkfbvol -dev IBM.2107-7503471 -extpool P23 -volgrp V1 -cap 950 -name fb_vol_#h 1530
mkfbvol -dev IBM.2107-7503471 -extpool P25 -volgrp V1 -cap 950 -name fb_vol_#h 1700
mkfbvol -dev IBM.2107-7503471 -extpool P27 -volgrp V1 -cap 950 -name fb_vol_#h 1710
mkfbvol -dev IBM.2107-7503471 -extpool P29 -volgrp V1 -cap 950 -name fb_vol_#h 1720
mkfbvol -dev IBM.2107-7503471 -extpool P31 -volgrp V1 -cap 950 -name fb_vol_#h 1730


mkfbvol -dev IBM.2107-7503471 -extpool P0 -volgrp V0 -cap 632 -name fb_vol_#h 1001
mkfbvol -dev IBM.2107-7503471 -extpool P2 -volgrp V0 -cap 630 -name fb_vol_#h 1011
mkfbvol -dev IBM.2107-7503471 -extpool P4 -volgrp V0 -cap 630 -name fb_vol_#h 1021
mkfbvol -dev IBM.2107-7503471 -extpool P6 -volgrp V0 -cap 630 -name fb_vol_#h 1031
mkfbvol -dev IBM.2107-7503471 -extpool P8 -volgrp V0 -cap 630 -name fb_vol_#h 1201
mkfbvol -dev IBM.2107-7503471 -extpool P10 -volgrp V0 -cap 630 -name fb_vol_#h 1211
mkfbvol -dev IBM.2107-7503471 -extpool P12 -volgrp V0 -cap 630 -name fb_vol_#h 1221
mkfbvol -dev IBM.2107-7503471 -extpool P14 -volgrp V0 -cap 630 -name fb_vol_#h 1231
mkfbvol -dev IBM.2107-7503471 -extpool P16 -volgrp V0 -cap 630 -name fb_vol_#h 1401
mkfbvol -dev IBM.2107-7503471 -extpool P18 -volgrp V0 -cap 630 -name fb_vol_#h 1411
mkfbvol -dev IBM.2107-7503471 -extpool P20 -volgrp V0 -cap 630 -name fb_vol_#h 1421
mkfbvol -dev IBM.2107-7503471 -extpool P22 -volgrp V0 -cap 630 -name fb_vol_#h 1431
mkfbvol -dev IBM.2107-7503471 -extpool P24 -volgrp V0 -cap 630 -name fb_vol_#h 1601
mkfbvol -dev IBM.2107-7503471 -extpool P26 -volgrp V0 -cap 630 -name fb_vol_#h 1611
mkfbvol -dev IBM.2107-7503471 -extpool P28 -volgrp V0 -cap 630 -name fb_vol_#h 1621
mkfbvol -dev IBM.2107-7503471 -extpool P30 -volgrp V0 -cap 630 -name fb_vol_#h 1631
mkfbvol -dev IBM.2107-7503471 -extpool P1 -volgrp V1 -cap 630 -name fb_vol_#h 1101
mkfbvol -dev IBM.2107-7503471 -extpool P3 -volgrp V1 -cap 630 -name fb_vol_#h 1111
mkfbvol -dev IBM.2107-7503471 -extpool P5 -volgrp V1 -cap 630 -name fb_vol_#h 1121
mkfbvol -dev IBM.2107-7503471 -extpool P7 -volgrp V1 -cap 630 -name fb_vol_#h 1131
mkfbvol -dev IBM.2107-7503471 -extpool P9 -volgrp V1 -cap 630 -name fb_vol_#h 1301
mkfbvol -dev IBM.2107-7503471 -extpool P11 -volgrp V1 -cap 630 -name fb_vol_#h 1311
mkfbvol -dev IBM.2107-7503471 -extpool P13 -volgrp V1 -cap 630 -name fb_vol_#h 1321
mkfbvol -dev IBM.2107-7503471 -extpool P15 -volgrp V1 -cap 630 -name fb_vol_#h 1331
mkfbvol -dev IBM.2107-7503471 -extpool P17 -volgrp V1 -cap 630 -name fb_vol_#h 1501
mkfbvol -dev IBM.2107-7503471 -extpool P19 -volgrp V1 -cap 630 -name fb_vol_#h 1511
mkfbvol -dev IBM.2107-7503471 -extpool P21 -volgrp V1 -cap 630 -name fb_vol_#h 1521
mkfbvol -dev IBM.2107-7503471 -extpool P23 -volgrp V1 -cap 630 -name fb_vol_#h 1531
mkfbvol -dev IBM.2107-7503471 -extpool P25 -volgrp V1 -cap 630 -name fb_vol_#h 1701
mkfbvol -dev IBM.2107-7503471 -extpool P27 -volgrp V1 -cap 630 -name fb_vol_#h 1711
mkfbvol -dev IBM.2107-7503471 -extpool P29 -volgrp V1 -cap 630 -name fb_vol_#h 1721
mkfbvol -dev IBM.2107-7503471 -extpool P31 -volgrp V1 -cap 630 -name fb_vol_#h 1731


mkvolgrp -dev IBM.2107-7503471 –hosttype pSeries vol_even
mkvolgrp -dev IBM.2107-7503471 –hosttype pSeries vol_odd


chvolgrp -dev IBM.2107-7503471 –action replace –volume 1000 1001 1010 1011 1020 1021
1030 1031 1200 1201 1210 1211 1220 1221 1230 1231 1400 1401 1410 1411 1420 1421 1430
1600 1601 1610 1611 1620 1621 1630 1631 V0

chvolgrp -dev IBM.2107-7503471 –action replace –volume 1100 1101 1110 1111 1120 1121
1130 1131 1300 1301 1310 1311 1320 1321 1330 1331 1500 1501 1510 1511 1520 1521 1530
1700 1701 1710 1711 1720 1721 1730 1731 V1
```

Define the LUN access path

The next step is to define the paths by which each LUN can be accessed by AIX. Two AIX hosts are used in this test; each host has 12 connections to the DS8700. The path definitions are created by the step4_define_paths.txt script. Each host WWPN (total of

24) is assigned to one of the two volume groups, V0 or V1, depending upon whether the connection is to the even or odd part respectively of the system diagram.

Step4_define_paths.txt

```
mkhostconnect -dev IBM.2107-7503471 -wwname 10000000C98C3C38 -profile "IBM pSeries -
AIX" -volgrp V0 sh4a_fcs0
mkhostconnect -dev IBM.2107-7503471 -wwname 10000000C98BA374 -profile "IBM pSeries -
AIX" -volgrp V0 sh4a_fcs4
mkhostconnect -dev IBM.2107-7503471 -wwname 10000000C98B9EDA -profile "IBM pSeries -
AIX" -volgrp V0 sh4a_fcs6
mkhostconnect -dev IBM.2107-7503471 -wwname 10000000C98C3358 -profile "IBM pSeries -
AIX" -volgrp V0 sh4a_fcs12
mkhostconnect -dev IBM.2107-7503471 -wwname 10000000C98BA27A -profile "IBM pSeries -
AIX" -volgrp V0 sh4a_fcs16
mkhostconnect -dev IBM.2107-7503471 -wwname 10000000C98B9A0C -profile "IBM pSeries -
AIX" -volgrp V0 sh4a_fcs18
mkhostconnect -dev IBM.2107-7503471 -wwname 10000000C98C3260 -profile "IBM pSeries -
AIX" -volgrp V1 sh4a_fcs24
mkhostconnect -dev IBM.2107-7503471 -wwname 10000000C98BA380 -profile "IBM pSeries -
AIX" -volgrp V1 sh4a_fcs28
mkhostconnect -dev IBM.2107-7503471 -wwname 10000000C98B9FF4 -profile "IBM pSeries -
AIX" -volgrp V1 sh4a_fcs30
mkhostconnect -dev IBM.2107-7503471 -wwname 10000000C98C3BE4 -profile "IBM pSeries -
AIX" -volgrp V1 sh4a_fcs36
mkhostconnect -dev IBM.2107-7503471 -wwname 10000000C98BA38C -profile "IBM pSeries -
AIX" -volgrp V1 sh4a_fcs40
mkhostconnect -dev IBM.2107-7503471 -wwname 10000000C98B9D22 -profile "IBM pSeries -
AIX" -volgrp V1 sh4a_fcs42

mkhostconnect -dev IBM.2107-7503471 -wwname 10000000C98C338C -profile "IBM pSeries -
AIX" -volgrp v0 sh5a_fcs0
mkhostconnect -dev IBM.2107-7503471 -wwname 10000000C98B9EBA -profile "IBM pSeries -
AIX" -volgrp v0 sh5a_fcs4
mkhostconnect -dev IBM.2107-7503471 -wwname 10000000C98BA1A0 -profile "IBM pSeries -
AIX" -volgrp v0 sh5a_fcs6
mkhostconnect -dev IBM.2107-7503471 -wwname 10000000C98C3C3C -profile "IBM pSeries -
AIX" -volgrp v0 sh5a_fcs12
mkhostconnect -dev IBM.2107-7503471 -wwname 10000000C98B407A -profile "IBM pSeries -
AIX" -volgrp v0 sh5a_fcs16
mkhostconnect -dev IBM.2107-7503471 -wwname 10000000C98B3BF8 -profile "IBM pSeries -
AIX" -volgrp v0 sh5a_fcs18
mkhostconnect -dev IBM.2107-7503471 -wwname 10000000C98C2FC6 -profile "IBM pSeries -
AIX" -volgrp v1 sh5a_fcs24
mkhostconnect -dev IBM.2107-7503471 -wwname 10000000C98B6C00 -profile "IBM pSeries -
AIX" -volgrp v1 sh5a_fcs28
mkhostconnect -dev IBM.2107-7503471 -wwname 10000000C98B9FB2 -profile "IBM pSeries -
AIX" -volgrp v1 sh5a_fcs30
mkhostconnect -dev IBM.2107-7503471 -wwname 10000000C98C2F86 -profile "IBM pSeries -
AIX" -volgrp v1 sh5a_fcs36
mkhostconnect -dev IBM.2107-7503471 -wwname 10000000C98BA000 -profile "IBM pSeries -
AIX" -volgrp v1 sh5a_fcs40
mkhostconnect -dev IBM.2107-7503471 -wwname 10000000C98B9B80 -profile "IBM pSeries -
AIX" -volgrp v1 sh5a_fcs42
```

Discover the LUNs and create multi-path "hdisks"

The **step5_discover.sh** script performs discovery on each of the 12 Host System paths on each host. In this configuration, AIX MPIO capability is utilized, creating one multi-path

hdisk that corresponds to each LUN. The script also changes the hdisk qdepth to 256 and the hdisk transfer_size to 1 MB.

step5_discover.sh script

```
cfgmgr -l fcs0
cfgmgr -l fcs4
cfgmgr -l fcs16
cfgmgr -l fcs12
cfgmgr -l fcs6
cfgmgr -l fcs18
cfgmgr -l fcs24
cfgmgr -l fcs28
cfgmgr -l fcs30
cfgmgr -l fcs36
cfgmgr -l fcs40
cfgmgr -l fcs42

DISK=$(lsdev -Cc disk | grep 2107 | awk '{ print $1 }')
for d in $DISK; do
  rmdev -l $d
  chdev -l $d -a queue_depth=256 -a max_transfer=0x100000
  cfgmgr -l $d
done
```

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APPENDIX D: SPC-2 WORKLOAD GENERATOR STORAGE COMMANDS AND PARAMETERS

Large File Processing Test *(LFP)*

```
maxlatestart=0
host=localhost,jvms=8,maxstreams=200
host=(9.11.210.232,perfsh5a),
    java=("/usr/java6/bin/java","-Xmx768m -Xgcpolicy:optavgpause"),
    shell=spc2,
    jvms=8,
    maxstreams=200
reportinginterval=5
segmentlength=512m

sd=default,host=localhost,size=950g
sd=sd1,lun=/dev/rhdisk8
sd=sd2,lun=/dev/rhdisk10
sd=sd3,lun=/dev/rhdisk12
sd=sd4,lun=/dev/rhdisk14
sd=sd5,lun=/dev/rhdisk16
sd=sd6,lun=/dev/rhdisk18
sd=sd7,lun=/dev/rhdisk20
sd=sd8,lun=/dev/rhdisk22
sd=sd9,lun=/dev/rhdisk24
sd=sd10,lun=/dev/rhdisk26
sd=sd11,lun=/dev/rhdisk28
sd=sd12,lun=/dev/rhdisk30
sd=sd13,lun=/dev/rhdisk32
sd=sd14,lun=/dev/rhdisk34
sd=sd15,lun=/dev/rhdisk36
sd=sd16,lun=/dev/rhdisk38
sd=sd17,lun=/dev/rhdisk40
sd=sd18,lun=/dev/rhdisk42
sd=sd19,lun=/dev/rhdisk44
sd=sd20,lun=/dev/rhdisk46
sd=sd21,lun=/dev/rhdisk48
sd=sd22,lun=/dev/rhdisk50
sd=sd23,lun=/dev/rhdisk52
sd=sd24,lun=/dev/rhdisk54
sd=sd25,lun=/dev/rhdisk56
sd=sd26,lun=/dev/rhdisk58
sd=sd27,lun=/dev/rhdisk60
sd=sd28,lun=/dev/rhdisk62
sd=sd29,lun=/dev/rhdisk64
sd=sd30,lun=/dev/rhdisk66
sd=sd31,lun=/dev/rhdisk68
sd=sd32,lun=/dev/rhdisk70

sd=default,host=perfsh5a,size=950g
sd=sd1,lun=/dev/rhdisk8
sd=sd2,lun=/dev/rhdisk10
sd=sd3,lun=/dev/rhdisk12
sd=sd4,lun=/dev/rhdisk14
sd=sd5,lun=/dev/rhdisk16
sd=sd6,lun=/dev/rhdisk18
sd=sd7,lun=/dev/rhdisk20
sd=sd8,lun=/dev/rhdisk22
sd=sd9,lun=/dev/rhdisk24
sd=sd10,lun=/dev/rhdisk26
```

```
sd=sd11,lun=/dev/rhdisk28
sd=sd12,lun=/dev/rhdisk30
sd=sd13,lun=/dev/rhdisk32
sd=sd14,lun=/dev/rhdisk34
sd=sd15,lun=/dev/rhdisk36
sd=sd16,lun=/dev/rhdisk38
sd=sd17,lun=/dev/rhdisk40
sd=sd18,lun=/dev/rhdisk42
sd=sd19,lun=/dev/rhdisk44
sd=sd20,lun=/dev/rhdisk46
sd=sd21,lun=/dev/rhdisk48
sd=sd22,lun=/dev/rhdisk50
sd=sd23,lun=/dev/rhdisk52
sd=sd24,lun=/dev/rhdisk54
sd=sd25,lun=/dev/rhdisk56
sd=sd26,lun=/dev/rhdisk58
sd=sd27,lun=/dev/rhdisk60
sd=sd28,lun=/dev/rhdisk62
sd=sd29,lun=/dev/rhdisk64
sd=sd30,lun=/dev/rhdisk66
sd=sd31,lun=/dev/rhdisk68
sd=sd32,lun=/dev/rhdisk70


rd=default,rampup=180,measurement=180,runout=45,rampdown=15,buffers=1,periods=90
rd=default,rdpct=0,xfersize=1024k,streams=192
rd=TR1_SPC-2-FP,streams=192
rd=TR2_SPC-2-FP,streams=96
rd=TR3_SPC-2-FP,streams=48
rd=TR4_SPC-2-FP,streams=24
rd=TR5_SPC-2-FP,streams=1
rd=default,rdpct=0,xfersize=256k,streams=192
rd=TR6_SPC-2-FP,streams=192
rd=TR7_SPC-2-FP,streams=96
rd=TR8_SPC-2-FP,streams=48
rd=TR9_SPC-2-FP,streams=24
rd=TR10_SPC-2-FP,streams=1
rd=default,rdpct=50,xfersize=1024k,streams=192
rd=TR11_SPC-2-FP,streams=192
rd=TR12_SPC-2-FP,streams=96
rd=TR13_SPC-2-FP,streams=48
rd=TR14_SPC-2-FP,streams=24
rd=TR15_SPC-2-FP,streams=1
rd=default,rdpct=50,xfersize=256k,streams=192
rd=TR16_SPC-2-FP,streams=192
rd=TR17_SPC-2-FP,streams=96
rd=TR18_SPC-2-FP,streams=48
rd=TR19_SPC-2-FP,streams=24
rd=TR20_SPC-2-FP,streams=1
rd=default,rdpct=100,xfersize=1024k,streams=192
rd=TR21_SPC-2-FP,streams=192
rd=TR22_SPC-2-FP,streams=96
rd=TR23_SPC-2-FP,streams=48
rd=TR24_SPC-2-FP,streams=24
rd=TR25_SPC-2-FP,streams=1
rd=default,rdpct=100,xfersize=256k,streams=192
rd=TR26_SPC-2-FP,streams=192
rd=TR27_SPC-2-FP,streams=96
rd=TR28_SPC-2-FP,streams=48
rd=TR29_SPC-2-FP,streams=24
rd=TR30_SPC-2-FP,streams=1
```

Large Database Query Test *(LDQ)*

```
maxlatestart=0
host=localhost,jvms=8,maxstreams=200
host=(9.11.210.232,perfsh5a),
    java=("/usr/java6/bin/java","-Xmx768m -Xgcpolicy:optavgpause"),
    shell=spc2,
    jvms=8,
    maxstreams=200
reportinginterval=5
segmentlength=512m

sd=default,host=localhost,size=950g
sd=sd1,lun=/dev/rhdisk8
sd=sd2,lun=/dev/rhdisk10
sd=sd3,lun=/dev/rhdisk12
sd=sd4,lun=/dev/rhdisk14
sd=sd5,lun=/dev/rhdisk16
sd=sd6,lun=/dev/rhdisk18
sd=sd7,lun=/dev/rhdisk20
sd=sd8,lun=/dev/rhdisk22
sd=sd9,lun=/dev/rhdisk24
sd=sd10,lun=/dev/rhdisk26
sd=sd11,lun=/dev/rhdisk28
sd=sd12,lun=/dev/rhdisk30
sd=sd13,lun=/dev/rhdisk32
sd=sd14,lun=/dev/rhdisk34
sd=sd15,lun=/dev/rhdisk36
sd=sd16,lun=/dev/rhdisk38
sd=sd17,lun=/dev/rhdisk40
sd=sd18,lun=/dev/rhdisk42
sd=sd19,lun=/dev/rhdisk44
sd=sd20,lun=/dev/rhdisk46
sd=sd21,lun=/dev/rhdisk48
sd=sd22,lun=/dev/rhdisk50
sd=sd23,lun=/dev/rhdisk52
sd=sd24,lun=/dev/rhdisk54
sd=sd25,lun=/dev/rhdisk56
sd=sd26,lun=/dev/rhdisk58
sd=sd27,lun=/dev/rhdisk60
sd=sd28,lun=/dev/rhdisk62
sd=sd29,lun=/dev/rhdisk64
sd=sd30,lun=/dev/rhdisk66
sd=sd31,lun=/dev/rhdisk68
sd=sd32,lun=/dev/rhdisk70

sd=default,host=perfsh5a,size=950g
sd=sd1,lun=/dev/rhdisk8
sd=sd2,lun=/dev/rhdisk10
sd=sd3,lun=/dev/rhdisk12
sd=sd4,lun=/dev/rhdisk14
sd=sd5,lun=/dev/rhdisk16
sd=sd6,lun=/dev/rhdisk18
sd=sd7,lun=/dev/rhdisk20
sd=sd8,lun=/dev/rhdisk22
sd=sd9,lun=/dev/rhdisk24
sd=sd10,lun=/dev/rhdisk26
sd=sd11,lun=/dev/rhdisk28
sd=sd12,lun=/dev/rhdisk30
sd=sd13,lun=/dev/rhdisk32
sd=sd14,lun=/dev/rhdisk34
sd=sd15,lun=/dev/rhdisk36
sd=sd16,lun=/dev/rhdisk38
```

```
sd=sd17,lun=/dev/rhdisk40
sd=sd18,lun=/dev/rhdisk42
sd=sd19,lun=/dev/rhdisk44
sd=sd20,lun=/dev/rhdisk46
sd=sd21,lun=/dev/rhdisk48
sd=sd22,lun=/dev/rhdisk50
sd=sd23,lun=/dev/rhdisk52
sd=sd24,lun=/dev/rhdisk54
sd=sd25,lun=/dev/rhdisk56
sd=sd26,lun=/dev/rhdisk58
sd=sd27,lun=/dev/rhdisk60
sd=sd28,lun=/dev/rhdisk62
sd=sd29,lun=/dev/rhdisk64
sd=sd30,lun=/dev/rhdisk66
sd=sd31,lun=/dev/rhdisk68
sd=sd32,lun=/dev/rhdisk70

rd=default,rdpct=99,rampup=180,measurement=180,runout=45,rampdown=15,periods=90
rd=default,xfersize=1024k,buffers=4,streams=192
rd=TR11_SPC-2-DQ,streams=192
rd=TR12_SPC-2-DQ,streams=96
rd=TR13_SPC-2-DQ,streams=48
rd=TR14_SPC-2-DQ,streams=24
rd=TR15_SPC-2-DQ,streams=1
rd=default,xfersize=1024k,buffers=1,streams=192
rd=TR16_SPC-2-DQ,streams=192
rd=TR17_SPC-2-DQ,streams=96
rd=TR18_SPC-2-DQ,streams=48
rd=TR19_SPC-2-DQ,streams=24
rd=TR20_SPC-2-DQ,streams=1
rd=default,xfersize=64k,buffers=4,streams=192
rd=TR1_SPC-2-DQ,streams=192
rd=TR2_SPC-2-DQ,streams=96
rd=TR3_SPC-2-DQ,streams=48
rd=TR4_SPC-2-DQ,streams=24
rd=TR5_SPC-2-DQ,streams=1
rd=default,xfersize=64k,buffers=1,streams=192
rd=TR6_SPC-2-DQ,streams=192
rd=TR7_SPC-2-DQ,streams=96
rd=TR8_SPC-2-DQ,streams=48
rd=TR9_SPC-2-DQ,streams=24
rd=TR10_SPC-2-DQ,streams=1
```

Video on Demand Delivery Test (VOD)

```
maxlatestart=0
host=localhost,jvms=12,maxstreams=400
host=(9.11.210.232,perfsh5a),
    java=("/usr/java6/bin/java","-Xmx768m -Xgcpolicy:optavgpause"),
    shell=spc2,
    jvms=12,
    maxstreams=400
reportinginterval=5
videosegmentduration=600
maxlatevod=0

sd=default,host=localhost,size=950g
sd=sd1,lun=/dev/rhdisk8
sd=sd2,lun=/dev/rhdisk10
sd=sd3,lun=/dev/rhdisk12
sd=sd4,lun=/dev/rhdisk14
sd=sd5,lun=/dev/rhdisk16
```

```
sd=sd6,lun=/dev/rhdisk18
sd=sd7,lun=/dev/rhdisk20
sd=sd8,lun=/dev/rhdisk22
sd=sd9,lun=/dev/rhdisk24
sd=sd10,lun=/dev/rhdisk26
sd=sd11,lun=/dev/rhdisk28
sd=sd12,lun=/dev/rhdisk30
sd=sd13,lun=/dev/rhdisk32
sd=sd14,lun=/dev/rhdisk34
sd=sd15,lun=/dev/rhdisk36
sd=sd16,lun=/dev/rhdisk38
sd=sd17,lun=/dev/rhdisk40
sd=sd18,lun=/dev/rhdisk42
sd=sd19,lun=/dev/rhdisk44
sd=sd20,lun=/dev/rhdisk46
sd=sd21,lun=/dev/rhdisk48
sd=sd22,lun=/dev/rhdisk50
sd=sd23,lun=/dev/rhdisk52
sd=sd24,lun=/dev/rhdisk54
sd=sd25,lun=/dev/rhdisk56
sd=sd26,lun=/dev/rhdisk58
sd=sd27,lun=/dev/rhdisk60
sd=sd28,lun=/dev/rhdisk62
sd=sd29,lun=/dev/rhdisk64
sd=sd30,lun=/dev/rhdisk66
sd=sd31,lun=/dev/rhdisk68
sd=sd32,lun=/dev/rhdisk70

sd=default,host=perfsh5a,size=950g
sd=sd1,lun=/dev/rhdisk8
sd=sd2,lun=/dev/rhdisk10
sd=sd3,lun=/dev/rhdisk12
sd=sd4,lun=/dev/rhdisk14
sd=sd5,lun=/dev/rhdisk16
sd=sd6,lun=/dev/rhdisk18
sd=sd7,lun=/dev/rhdisk20
sd=sd8,lun=/dev/rhdisk22
sd=sd9,lun=/dev/rhdisk24
sd=sd10,lun=/dev/rhdisk26
sd=sd11,lun=/dev/rhdisk28
sd=sd12,lun=/dev/rhdisk30
sd=sd13,lun=/dev/rhdisk32
sd=sd14,lun=/dev/rhdisk34
sd=sd15,lun=/dev/rhdisk36
sd=sd16,lun=/dev/rhdisk38
sd=sd17,lun=/dev/rhdisk40
sd=sd18,lun=/dev/rhdisk42
sd=sd19,lun=/dev/rhdisk44
sd=sd20,lun=/dev/rhdisk46
sd=sd21,lun=/dev/rhdisk48
sd=sd22,lun=/dev/rhdisk50
sd=sd23,lun=/dev/rhdisk52
sd=sd24,lun=/dev/rhdisk54
sd=sd25,lun=/dev/rhdisk56
sd=sd26,lun=/dev/rhdisk58
sd=sd27,lun=/dev/rhdisk60
sd=sd28,lun=/dev/rhdisk62
sd=sd29,lun=/dev/rhdisk64
sd=sd30,lun=/dev/rhdisk66
sd=sd31,lun=/dev/rhdisk68
sd=sd32,lun=/dev/rhdisk70

rd=default,measurement=7200,rampup=1200,runout=45,rampdown=15,periods=600
```

```
rd=TR1_SPC-2-VOD,streams=8400,buffers=8
```

Persistence Test Run 1 *(write phase)*

```
* Persistence Test Run 1
host=localhost,jvms=8,maxstreams=200
host=(9.11.210.232,perfsh5a),
    java=("/usr/java6/bin/java","-Xmx768m -Xgcpolicy:optavgpause"),
    shell=spc2,
    jvms=8,
    maxstreams=200


sd=default,host=localhost,size=950g
sd=sd1,lun=/dev/rhdisk8
sd=sd2,lun=/dev/rhdisk10
sd=sd3,lun=/dev/rhdisk12
sd=sd4,lun=/dev/rhdisk14
sd=sd5,lun=/dev/rhdisk16
sd=sd6,lun=/dev/rhdisk18
sd=sd7,lun=/dev/rhdisk20
sd=sd8,lun=/dev/rhdisk22
sd=sd9,lun=/dev/rhdisk24
sd=sd10,lun=/dev/rhdisk26
sd=sd11,lun=/dev/rhdisk28
sd=sd12,lun=/dev/rhdisk30
sd=sd13,lun=/dev/rhdisk32
sd=sd14,lun=/dev/rhdisk34
sd=sd15,lun=/dev/rhdisk36
sd=sd16,lun=/dev/rhdisk38
sd=sd17,lun=/dev/rhdisk40
sd=sd18,lun=/dev/rhdisk42
sd=sd19,lun=/dev/rhdisk44
sd=sd20,lun=/dev/rhdisk46
sd=sd21,lun=/dev/rhdisk48
sd=sd22,lun=/dev/rhdisk50
sd=sd23,lun=/dev/rhdisk52
sd=sd24,lun=/dev/rhdisk54
sd=sd25,lun=/dev/rhdisk56
sd=sd26,lun=/dev/rhdisk58
sd=sd27,lun=/dev/rhdisk60
sd=sd28,lun=/dev/rhdisk62
sd=sd29,lun=/dev/rhdisk64
sd=sd30,lun=/dev/rhdisk66
sd=sd31,lun=/dev/rhdisk68
sd=sd32,lun=/dev/rhdisk70
maxlatestart=1
reportinginterval=5
segmentlength=512m

rd=default,rampup=180,periods=90,measurement=300,runout=0,rampdown=0,buffers=1

rd=default,rdpct=0,xfersize=1024k
rd=TR1-5s_SPC-2-persist-w,streams=192
```

Persistence Test Run 2 (read phase)

```
* Persistence Test Run 2

host=localhost,jvms=8,maxstreams=200
host=(9.11.210.232,perfsh5a),
    java=("/usr/java6/bin/java","-Xmx768m -Xgcpolicy:optavgpause"),
    shell=spc2,
    jvms=8,
    maxstreams=200



sd=default,host=localhost,size=950g
sd=sd1,lun=/dev/rhdisk8
sd=sd2,lun=/dev/rhdisk10
sd=sd3,lun=/dev/rhdisk12
sd=sd4,lun=/dev/rhdisk14
sd=sd5,lun=/dev/rhdisk16
sd=sd6,lun=/dev/rhdisk18
sd=sd7,lun=/dev/rhdisk20
sd=sd8,lun=/dev/rhdisk22
sd=sd9,lun=/dev/rhdisk24
sd=sd10,lun=/dev/rhdisk26
sd=sd11,lun=/dev/rhdisk28
sd=sd12,lun=/dev/rhdisk30
sd=sd13,lun=/dev/rhdisk32
sd=sd14,lun=/dev/rhdisk34
sd=sd15,lun=/dev/rhdisk36
sd=sd16,lun=/dev/rhdisk38
sd=sd17,lun=/dev/rhdisk40
sd=sd18,lun=/dev/rhdisk42
sd=sd19,lun=/dev/rhdisk44
sd=sd20,lun=/dev/rhdisk46
sd=sd21,lun=/dev/rhdisk48
sd=sd22,lun=/dev/rhdisk50
sd=sd23,lun=/dev/rhdisk52
sd=sd24,lun=/dev/rhdisk54
sd=sd25,lun=/dev/rhdisk56
sd=sd26,lun=/dev/rhdisk58
sd=sd27,lun=/dev/rhdisk60
sd=sd28,lun=/dev/rhdisk62
sd=sd29,lun=/dev/rhdisk64
sd=sd30,lun=/dev/rhdisk66
sd=sd31,lun=/dev/rhdisk68
sd=sd32,lun=/dev/rhdisk70
maxlatestart=1
reportinginterval=5
segmentlength=512m

maxpersistenceerrors=10
*corruptstreams=3

rd=default,buffers=1,rdpct=100,xfersize=1024k
rd=TR1-5s_SPC-2-persist-r
```

APPENDIX E: SPC-2 WORKLOAD GENERATOR EXECUTION COMMANDS AND PARAMETERS

Video on Demand Delivery, Large File Processing Test, Large Database Query Tests, and Persistence Test Run 1

The following script was used to execute the Video on Demand Delivery, Large File Processing and Large Database Query Tests, as well as, Persistence Test Run 1.

```
export PATH=$PATH:/usr/java5/bin
export SPC2HOME=/perform/spc2install
export CLASSPATH=$SPC2HOME
export LIBPATH=$SPC2HOME/aix
export IBM_JAVADUMP_OUTOFMEMORY=false
export IBM_HEAPDUMP_OUTOFMEMORY=false
java -Xoptionsfile=javaopts.cfg vdbench -f lfp.cfg -o lfp
sleep 60
java -Xoptionsfile=javaopts.cfg vdbench -f ldq.cfg -o ldq
sleep 60
java -Xoptionsfile=javaopts.cfg vdbench -f vod.cfg -o vod
sleep 60
java -Xoptionsfile=javaopts.cfg vdbench -f persistw.cfg -o persistw
```

Persistence Test Run 2

The following script was used to execute Persistence Test Run 2.

```
export PATH=$PATH:/usr/java5/bin
export SPC2HOME=/perform/spc2install
export CLASSPATH=$SPC2HOME
export LIBPATH=$SPC2HOME/aix
export IBM_JAVADUMP_OUTOFMEMORY=false
export IBM_HEAPDUMP_OUTOFMEMORY=false
java -Xoptionsfile=javaopts.cfg vdbench -f persistr.cfg -o persistr
```

Java Parameters

The following file was used to supply Java options to all JVMs when executing both of the above scripts.

javaopts.cfg

```
-Xmx768m -Xss128k -Xgcpolicy:optavgpause
```