SPC Benchmark 1™

Full Disclosure Report

Inspur Electronic Information Industry Co. Ltd.
Inspur AS5500G2

SPC-1 V3.8

Submission Identifier: A31016

Submitted For Review: October 1, 2018

First Edition – October 2018

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Benchmark Specification and Glossary

The official SPC Benchmark 1™ (SPC-1™) specification is available on the website of the Storage Performance Council (SPC) at www.storageperformance.org.

The SPC-1™ specification contains a glossary of the SPC-1™ terms used in this publication.

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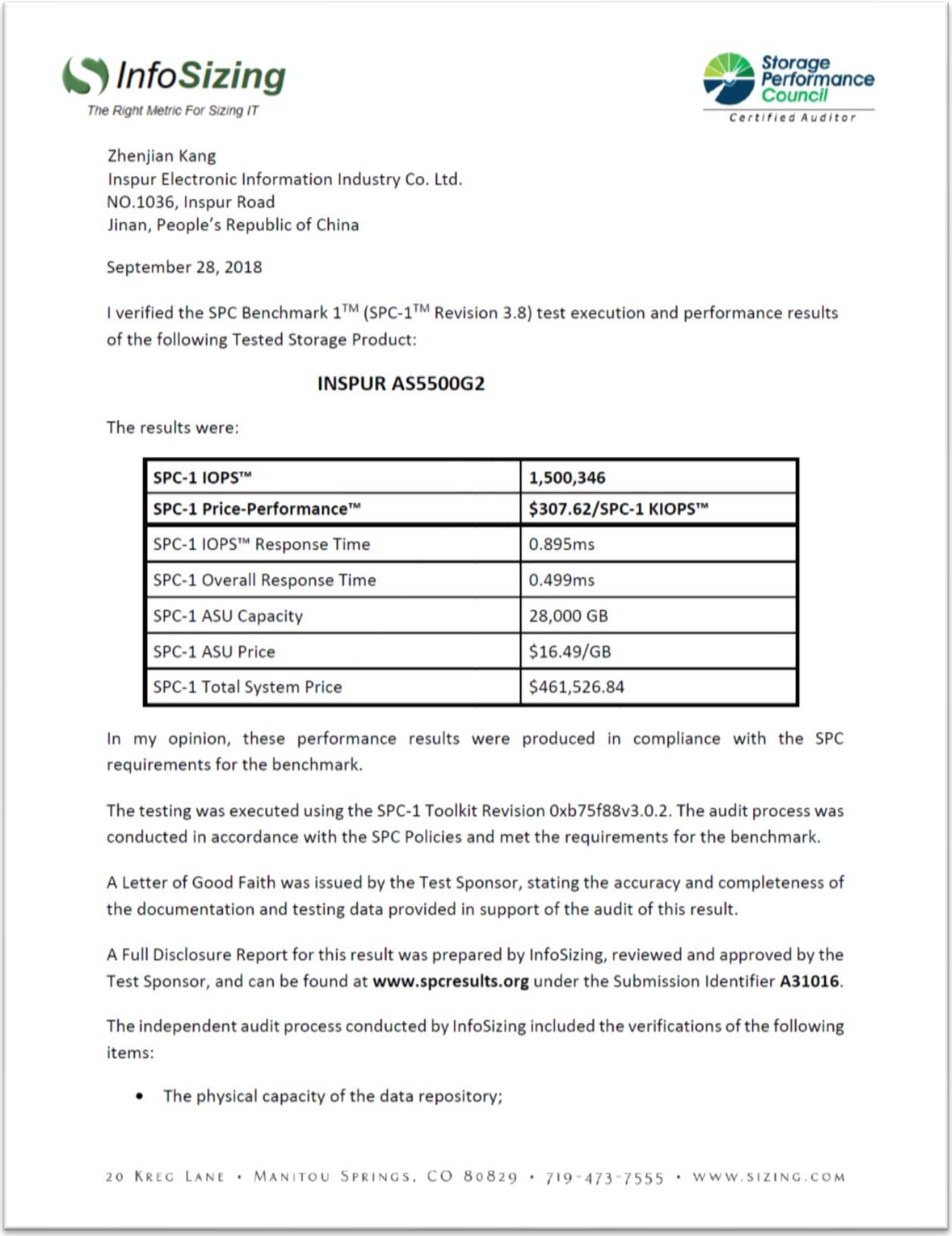
AUDIT CERTIFICATION



InfoSizing
The Right Metric For Sizing IT

Storage Performance Council
Certified Auditor

Zhenjian Kang
Inspur Electronic Information Industry Co. Ltd.
NO.1036, Inspur Road
Jinan, People's Republic of China

September 28, 2018

I verified the SPC Benchmark 1^{TM} (SPC-1^{TM} Revision 3.8) test execution and performance results of the following Tested Storage Product:

INSPUR AS5500G2

The results were:

SPC-1 IOPS™	**1,500,346**
SPC-1 Price-Performance™	**$307.62/SPC-1 KIOPS™**
SPC-1 IOPS™ Response Time	0.895ms
SPC-1 Overall Response Time	0.499ms
SPC-1 ASU Capacity	28,000 GB
SPC-1 ASU Price	$16.49/GB
SPC-1 Total System Price	$461,526.84

In my opinion, these performance results were produced in compliance with the SPC requirements for the benchmark.

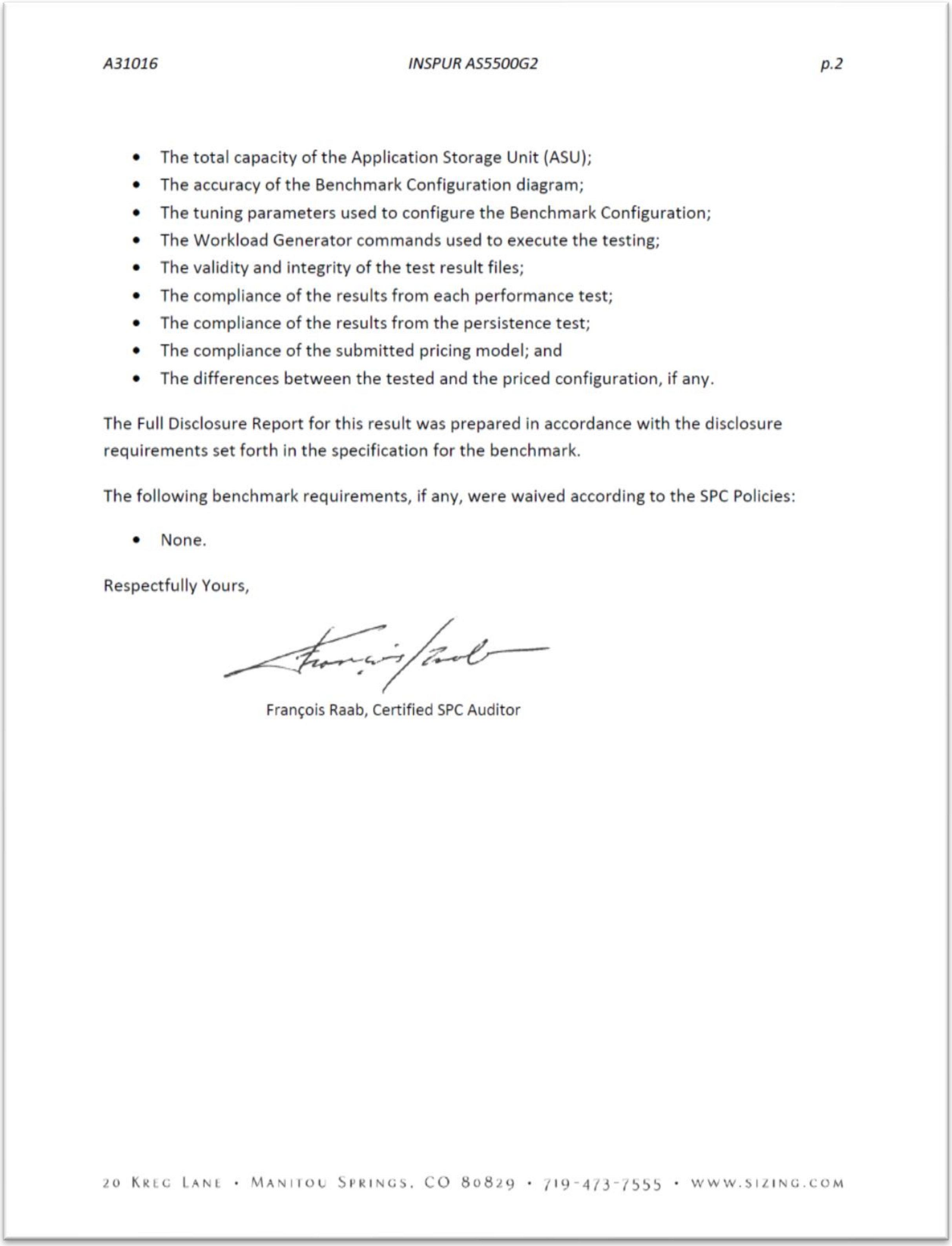
The testing was executed using the SPC-1 Toolkit Revision 0xb75f88v3.0.2. The audit process was conducted in accordance with the SPC Policies and met the requirements for the benchmark.

A Letter of Good Faith was issued by the Test Sponsor, stating the accuracy and completeness of the documentation and testing data provided in support of the audit of this result.

A Full Disclosure Report for this result was prepared by InfoSizing, reviewed and approved by the Test Sponsor, and can be found at **www.spcresults.org** under the Submission Identifier **A31016**.

The independent audit process conducted by InfoSizing included the verifications of the following items:

- The physical capacity of the data repository;



- The total capacity of the Application Storage Unit (ASU);
- The accuracy of the Benchmark Configuration diagram;
- The tuning parameters used to configure the Benchmark Configuration;
- The Workload Generator commands used to execute the testing;
- The validity and integrity of the test result files;
- The compliance of the results from each performance test;
- The compliance of the results from the persistence test;
- The compliance of the submitted pricing model; and
- The differences between the tested and the priced configuration, if any.

The Full Disclosure Report for this result was prepared in accordance with the disclosure requirements set forth in the specification for the benchmark.

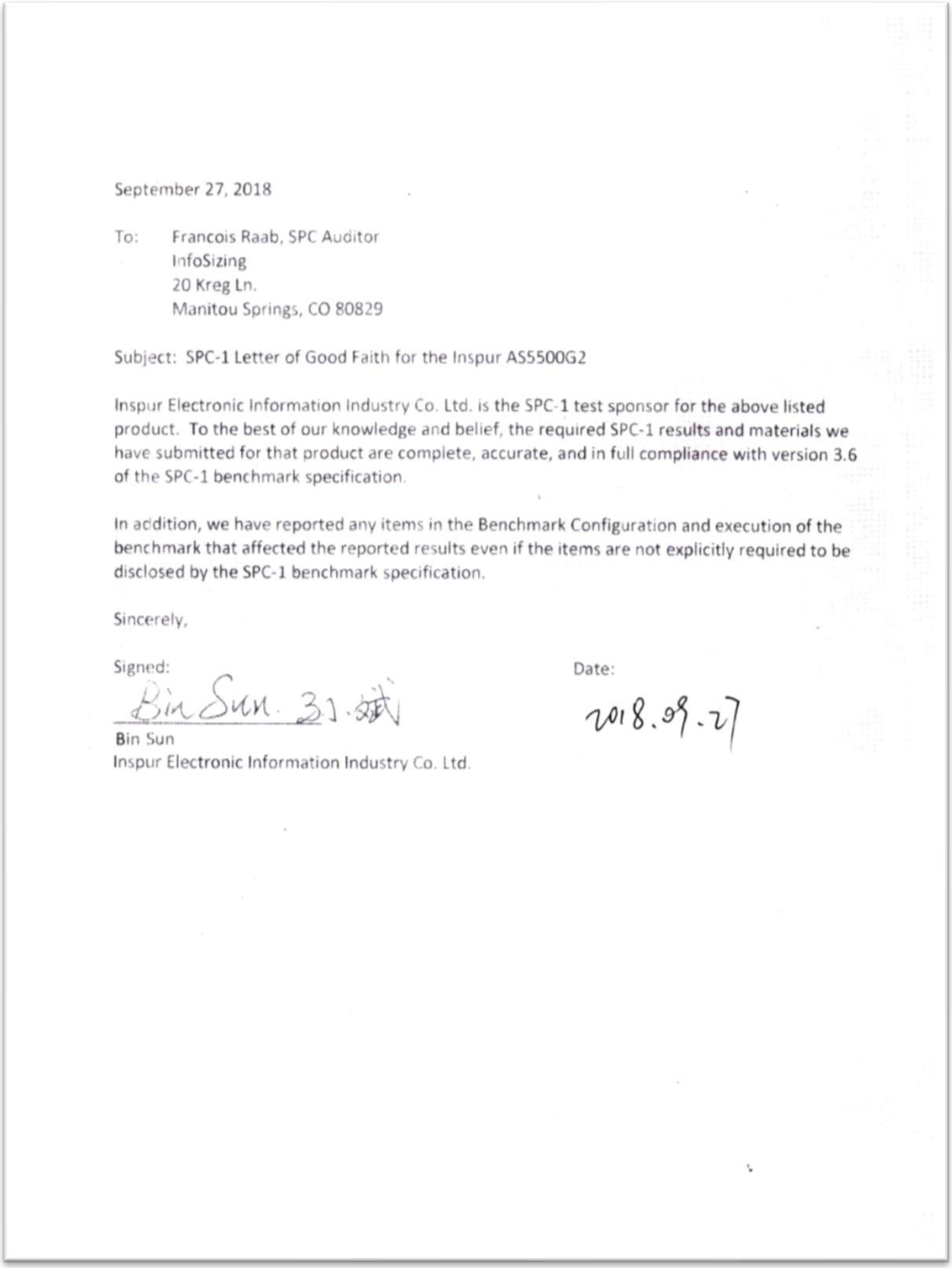
The following benchmark requirements, if any, were waived according to the SPC Policies:

- None.

Respectfully Yours,

François Raab, Certified SPC Auditor

LETTER OF GOOD FAITH



September 27, 2018

To: Francois Raab, SPC Auditor
InfoSizing
20 Kreg Ln.
Manitou Springs, CO 80829

Subject: SPC-1 Letter of Good Faith for the Inspur AS5500G2

Inspur Electronic Information Industry Co. Ltd. is the SPC-1 test sponsor for the above listed product. To the best of our knowledge and belief, the required SPC-1 results and materials we have submitted for that product are complete, accurate, and in full compliance with version 3.6 of the SPC-1 benchmark specification.

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

Sincerely,

Signed: Bin Sun. 孙斌

Bin Sun
Inspur Electronic Information Industry Co. Ltd.

Date: 2018.09.27

SPC BENCHMARK 1™

EXECUTIVE SUMMARY

INSPUR ELECTRONIC INFORMATION INDUSTRY CO. LTD.
INSPUR AS5500G2

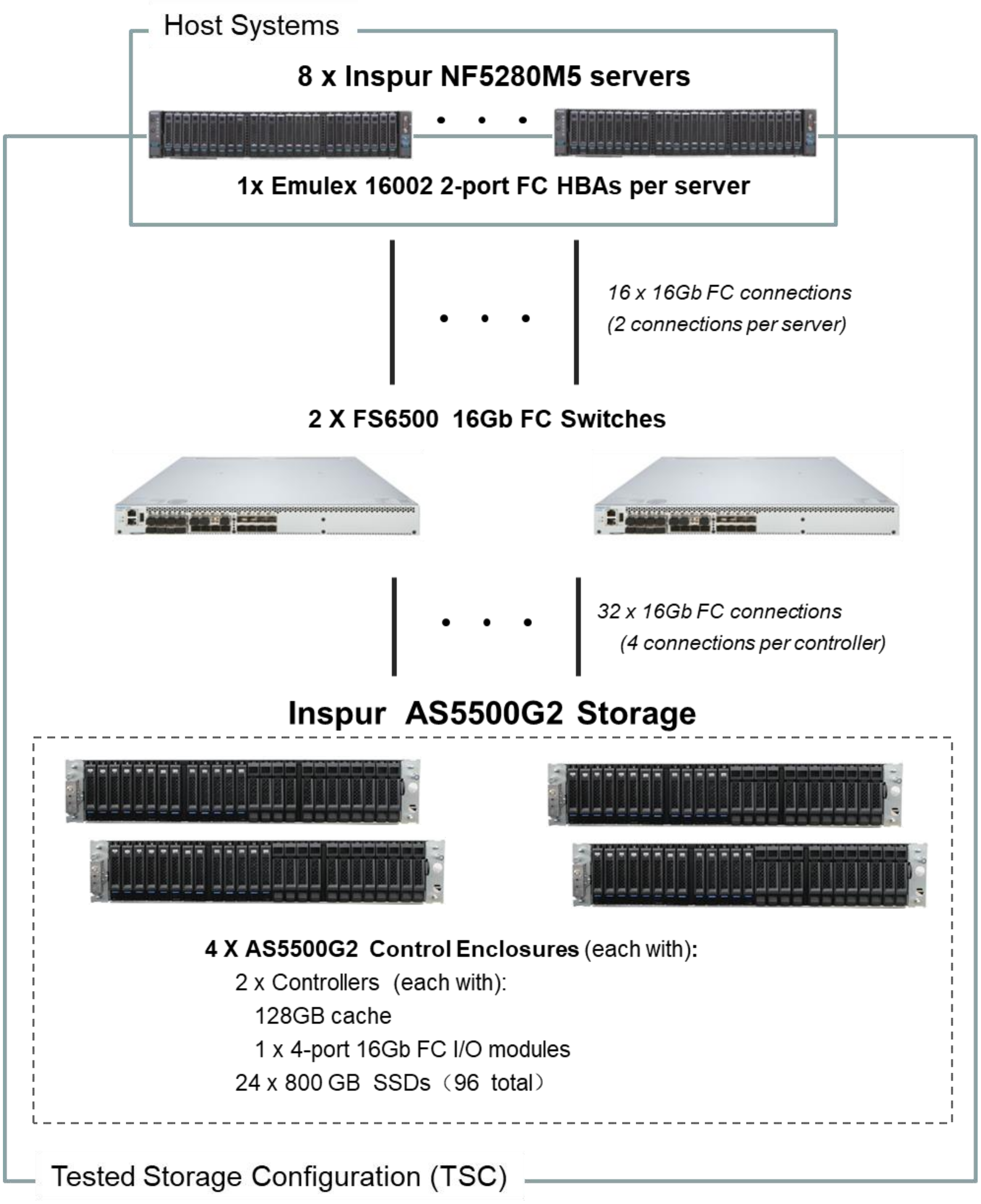
SPC-1 IOPS™	**1,500,346**
SPC-1 Price-Performance™	**$307.62/SPC-1 KIOPS™**
SPC-1 IOPS™ Response Time	0.895ms
SPC-1 Overall Response Time	0.499ms
SPC-1 ASU Capacity	28,000GB
SPC-1 ASU Price	$16.49/GB
SPC-1 Total System Price	$461,526.84
Data Protection Level	Protected 2 (RAID-10)
Physical Storage Capacity	71,492GB
Pricing Currency / Target Country	U.S. Dollars / China

SPC-1 V3.8

SUBMISSION IDENTIFIER: A31016

SUBMITTED FOR REVIEW: OCTOBER 1, 2018

Benchmark Configuration Diagram


Host Systems
8 x Inspur NF5280M5 servers
1x Emulex 16002 2-port FC HBAs per server
16 x 16Gb FC connections
(2 connections per server)
2 X FS6500 16Gb FC Switches
32 x 16Gb FC connections
(4 connections per controller)
Inspur AS5500G2 Storage
4 X AS5500G2 Control Enclosures (each with):
2 x Controllers (each with):
128GB cache
1 x 4-port 16Gb FC I/O modules
24 x 800 GB SSDs（96 total）
Tested Storage Configuration (TSC)

Tested Storage Product Description

Inspur AS5500G2 mid-range hybrid flash storage system is designed for structured or unstructured complex application environment in large and medium-sized enterprises.

With a storage operating system dedicated for cloud computing and big data environments, a full range of flexible software features, an industry-leading hardware platform, and intelligent and visualized unified management software, it meets various storage needs including data storage, data center backup and disaster recovery, and cloud backup in applications such as medium and large-sized database OLTP/OLAP, virtualization, file sharing, cloud computing, and big data.

Inspur AS5500G2 mid-range hybrid flash storage system reaches the highest standard among same-grade products in the industry in terms of performance, function, reliability and availability. It is applicable to sectors such as government, finance, communications, energy, media assets, health care, education, and SMB.

For more details, visit:

http://en.inspur.com/en/2402530/2402532/2402560/2402568/2416945/index.html

Priced Storage Configuration Components

8 x 16Gbps Emulex 16002 2-Port FC HBAs
2 x Inspur FS6500 16Gbps FC Switches (each with 24 active ports) **4 x AS5500G2 Control Enclosures, each with:** **2 x Controllers, each with:** **128 GB Cache (1,024 GB total)** **1 x 4-port 16Gbps FC I/O Modules** **24 x 800 GB SSDs (96 total)**

Storage Configuration Pricing

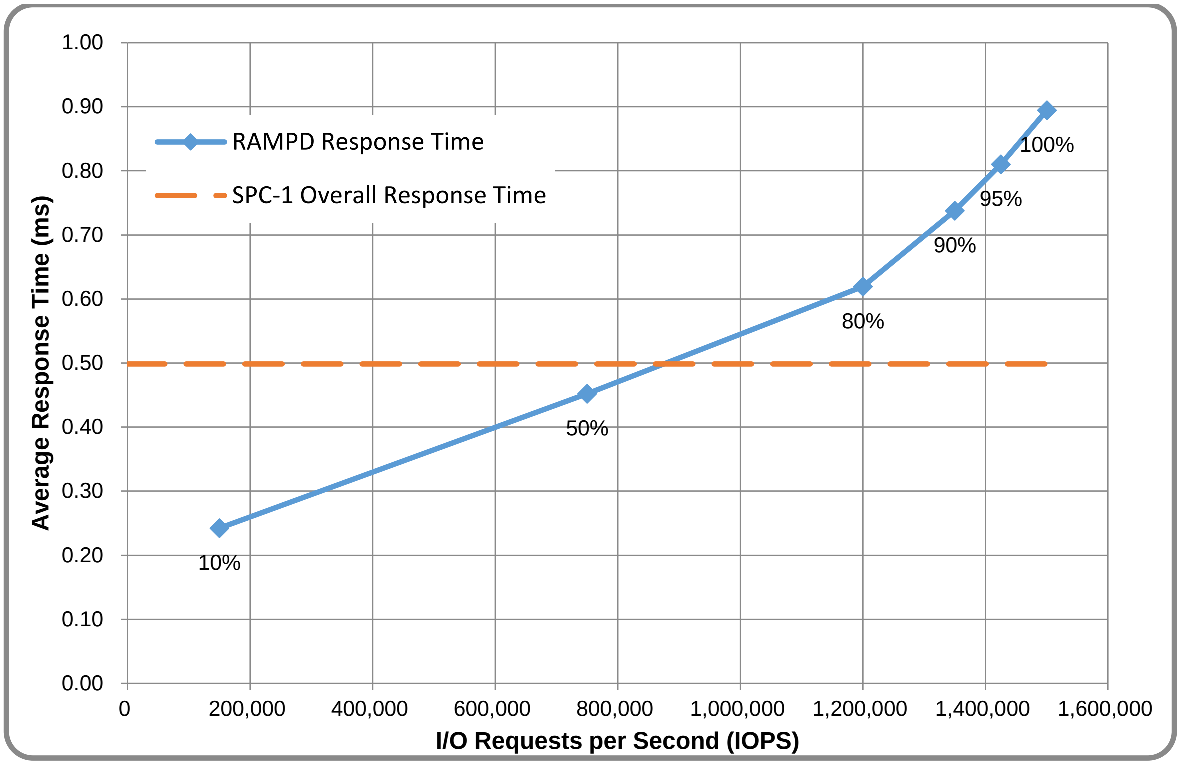
	Description	Qty	Unit Price	Ext. Price	Disc.	Disc. Price
	Hardware & Software					
UAS55G225001	Inspur AS5500G2 (25) Storage System Base Unit (2U, Dual Controllers, 256GB, 8*GE, 4 Port 4*12Gbps SAS, 25*2.5", BBU+Flash)	4	64,153.00	256,612.00	58%	107,777.04
THD054	Inspur 800GB MLC SSD Enterprise Drive (2.5")	96	7,995.00	767,520.00	64%	276,307.20
TSJ158	Inpsur AS5500G2 8*16Gbps FC Ports +SFP	4	17,373.00	69,492.00	60%	27,796.80
THS467	Inspur AS5500G2 Basic Software (InThin, InSnapshot, InClone, InBackup, InVdiskMirror, InQos, InRAID, InPath)	4	6,275.00	25,100.00	90%	2,510.00
TWF001	Inspur 10M LC-LC OM4 Fibre Channel Cable	48	94.00	4,512.00	60%	1,804.80
TSJ203	Inspur LPe16002B Dual Port 16Gbps Fibre Channel Adapter	8	4,890.00	39,120.00	60%	15,648.00
300498	Inspur FS6500 SAN Switch, Enable 16Gbps*24 Ports, +SFP	2	48,726.00	97,452.00	75%	24,363.00
					Hardware & Software Subtotal	**456,206.84**
	Support & Maintenance					
F2HII04	Installation Service - Engineering	4	893.00	3,572.00		3,572.00
F2GD0030AS55G225	Onsite Premier 24x7x4H Engineer Onsite Service - 36Month(s)	4	437.00	1,748.00		1,748.00
					Support & Maintenance Subtotal	**5,320.00**
	SPC-1 Total System Price					**461,526.84**
	SPC-1 IOPS™					1,500,346
	SPC-1 Price-Performance™ ($/SPC-1 KIOPS™)					**307.62**
	SPC-1 ASU Capacity (GB)					28,000
	SPC-1 ASU Price ($/GB)					**16.49**

Discount Details: The discounts are based on the total purchase price.

Warranty: Provide 7x24x4H arrival service within designated city and distance. The service includes 7x24 contact to the Inspur call center with 4-hours on-site Hardware replacement or troubleshooting, and online software support with access to all new software updates or troubleshooting.

Availability Date: Currently available.

Response Time and Throughput Graph



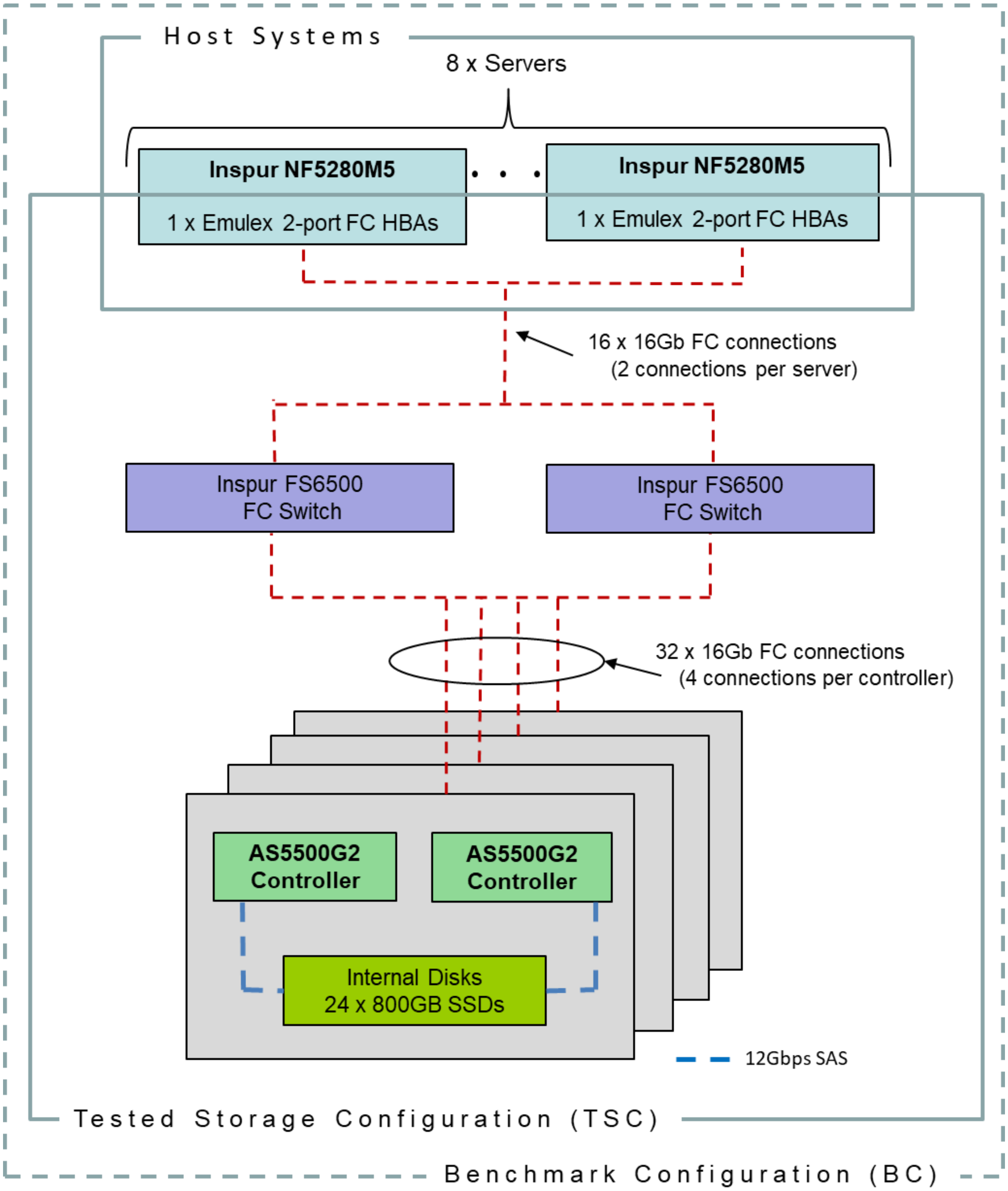
Contact Information	
Test Sponsor Primary Contact	Inspur Electronic Information Industry Co. Ltd. http://en.inspur.com Zhenjian Kang – kangzhj@inspur.com
SPC Auditor	InfoSizing – www.sizing.com Francois Raab – francois@sizing.com

Revision Information	
SPC Benchmark 1™ Revision	V3.8
SPC-1 Workload Generator Revision	0xb75f88v3.0.2
Publication Revision History	First Edition

CONFIGURATION INFORMATION

Benchmark Configuration and Tested Storage Configuration

The following diagram illustrates the Benchmark Configuration (BC), including the Tested Storage Configuration (TSC) and the Host System(s).



Storage Network Configuration

The Tested Storage Configuration (TSC) involved an external storage subsystem made of eight Inspur AS5500G2 controllers, driven by eight host systems (Inspur NF5280M5). The AS5500G2 controllers were grouped in sets of two, forming four Inspur AS5500G2 Control Enclosures. Each NF5280M5 host system connected to two Inspur FS6500 Fibre Chanel switches via a dual-port Fibre Chanel HBA. In turn, each AS5500G2 controller had two connections to each of the two Fibre Chanel switches. All Fibre Chanel paths operated at 16Gbps.

Host System and Tested Storage Configuration Components

The following table lists the components of the Host System(s) and the Tested Storage Configuration (TSC).

Host Systems
8 x Inspur NF5280M5, each with: 2 x Intel® Xeon® 6132 CPU (2.6GHz, 14-Core, 20MB L3) 192GB Main Memory Red Hat Enterprise Linux 7.4
Priced Storage Configuration
8 x 16Gbps Emulex 16002 2-Port FC HBAs
2 x Inspur FS6500 16Gbps FC Switches (each with 24 active ports) 4 x AS5500G2 Control Enclosures, each with: 2 x Controllers, each with: 128 GB Cache (1,024 GB total) 1 x 4-port 16Gbps FC I/O Modules 24 x 800 GB SSDs (96 total)

Differences Between Tested and Priced Storage Configurations

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

Component Changes in Revised Full Disclosure Report

The following table outlines component changes that were made in revisions to this Full Disclosure Report.

Original Component	Revised Component	Description of Change
n/a	n/a	Initial submission

Benchmark Configuration Creation Process

Customer Tuning Parameters and Options

All the customer tuning parameters and options that have been altered from their default values for this benchmark are included in Appendix C and in the Supporting Files (see Appendix A).

Tested Storage Configuration Creation

A detailed description of how the logical representation of the TSC was created is included in Appendix D and in the Supporting Files (see Appendix A).

Tested Storage Configuration Inventory

An inventory of the components in the TSC, as seen by the Benchmark Configuration, is included in Appendix E and in the Supporting Files (see Appendix A).

Workload Generator Storage Configuration

The SPC-1 Workload Generator storage configuration commands and parameters used to invoke the execution of the tests are included in Appendix F and in the Supporting Files (see Appendix A).

Logical Volume Capacity and ASU Mapping

The following table details the capacity of each ASU and how they are mapped to logical volumes (LV).

	LV per ASU	LV Capacity	Used per LV	Total per ASU	% ASU Capacity
ASU-1	36.0	350.0	350.0	12,600.0	45.00%
ASU-2	36.0	350.0	350.0	12,600.0	45.00%
ASU-3	8.0	350.0	350.0	2,800.0	10.00%
	SPC-1 ASU Capacity			**28,000.0**	

Physical Storage Capacity and Utilization

The following table details the Physical Capacity of the storage devices and the Physical Capacity Utilization (percentage of Total Physical Capacity used) in support of hosting the ASUs.

Devices	Count	Physical Capacity	Total Capacity
800GB SSD	96	744.7	71,491.2
Total Physical Capacity			**71,491.2**
Physical Capacity Utilization			**39.17%**

Data Protection

The data protection level used for all logical volumes was **Protected 2**, which was accomplished by configuring 4 pools of 24 drives into 24 RAID-10 arrays.

Benchmark Execution Results

This portion of the Full Disclosure Report documents the results of the various SPC-1 Tests, Test Phases, and Test Runs.

Benchmark Execution Overview

Workload Generator Input Parameters

The SPC-1 Workload Generator commands and input parameters for the Test Phases are presented in the Supporting Files (see Appendix A).

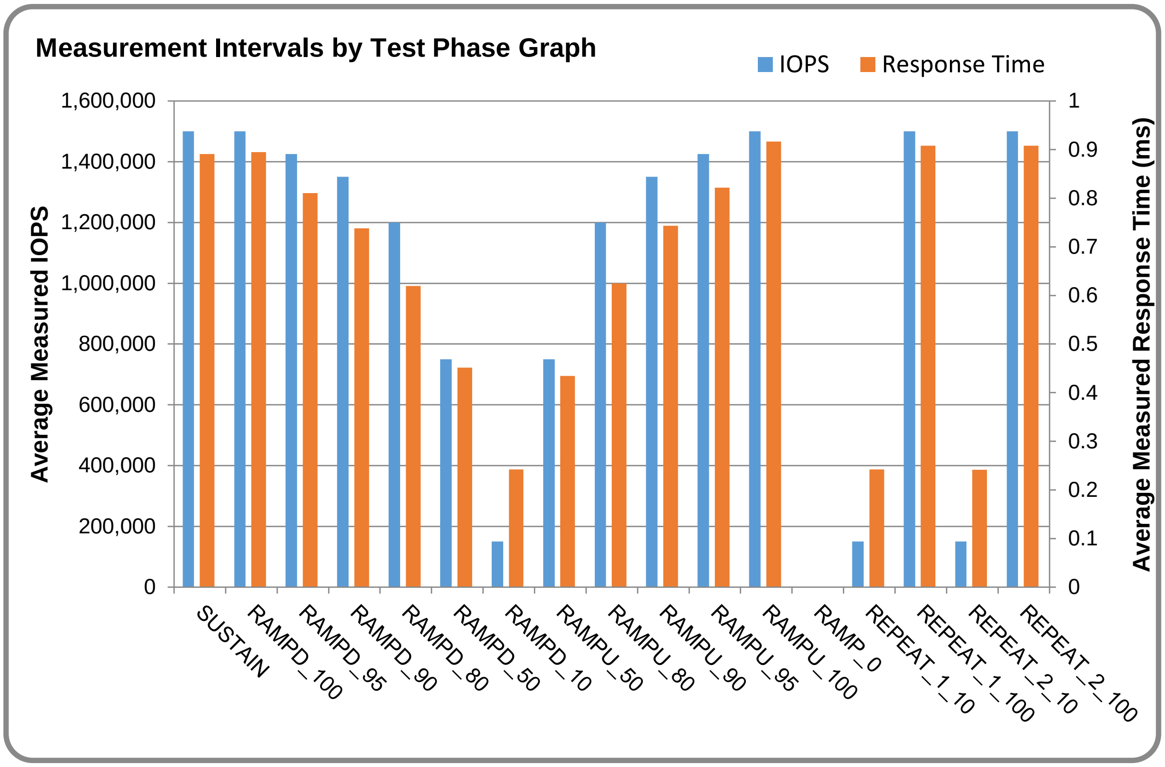
Primary Metrics Test Phases

The benchmark execution consists of the Primary Metrics Test Phases, including the Test Phases SUSTAIN, RAMPD_100 to RAMPD_10, RAMPU_50 to RAMPU_100, RAMP_0, REPEAT_1 and REPEAT_2.

Each Test Phase starts with a transition period followed by a Measurement Interval.

Measurement Intervals by Test Phase Graph

The following graph presents the average IOPS and the average Response Times measured over the Measurement Interval (MI) of each Test Phase.



Exception and Waiver

None.

SUSTAIN Test Phase

SUSTAIN – Results File

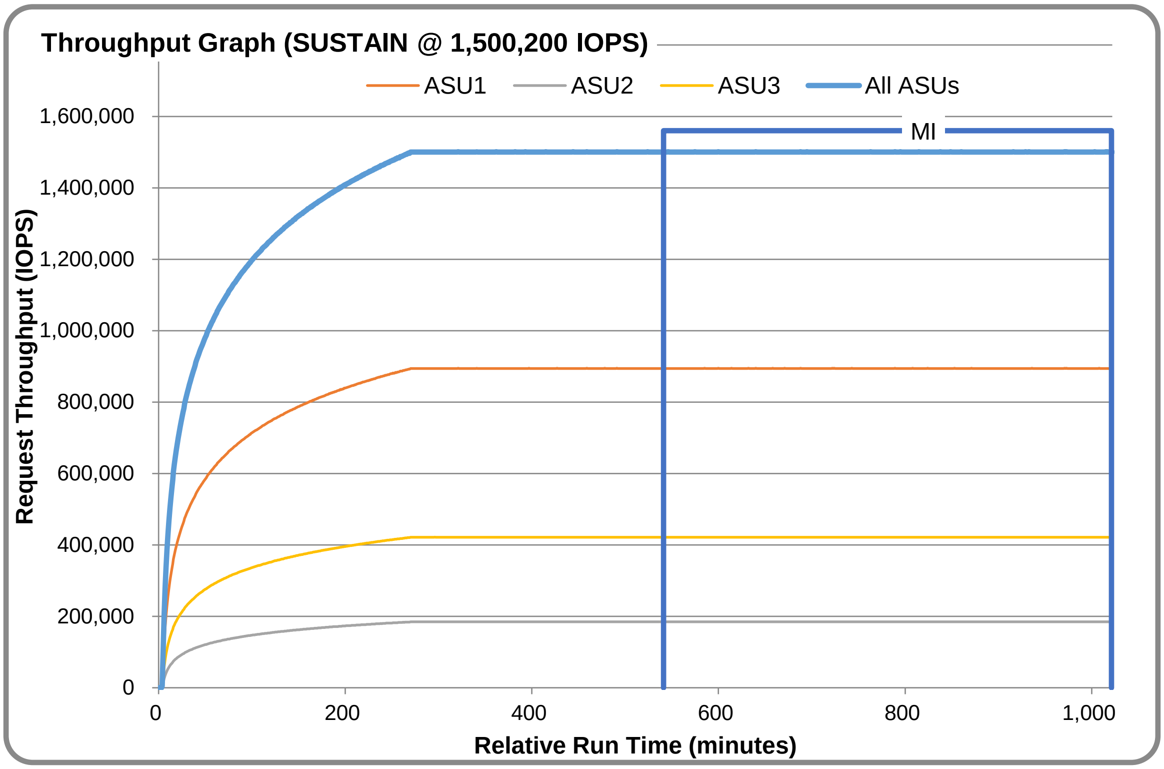
The results file generated during the execution of the SUSTAIN Test Phase is included in the Supporting Files (see Appendix A) as follows:

- **SPC1_METRICS_0_Raw_Results.xlsx**

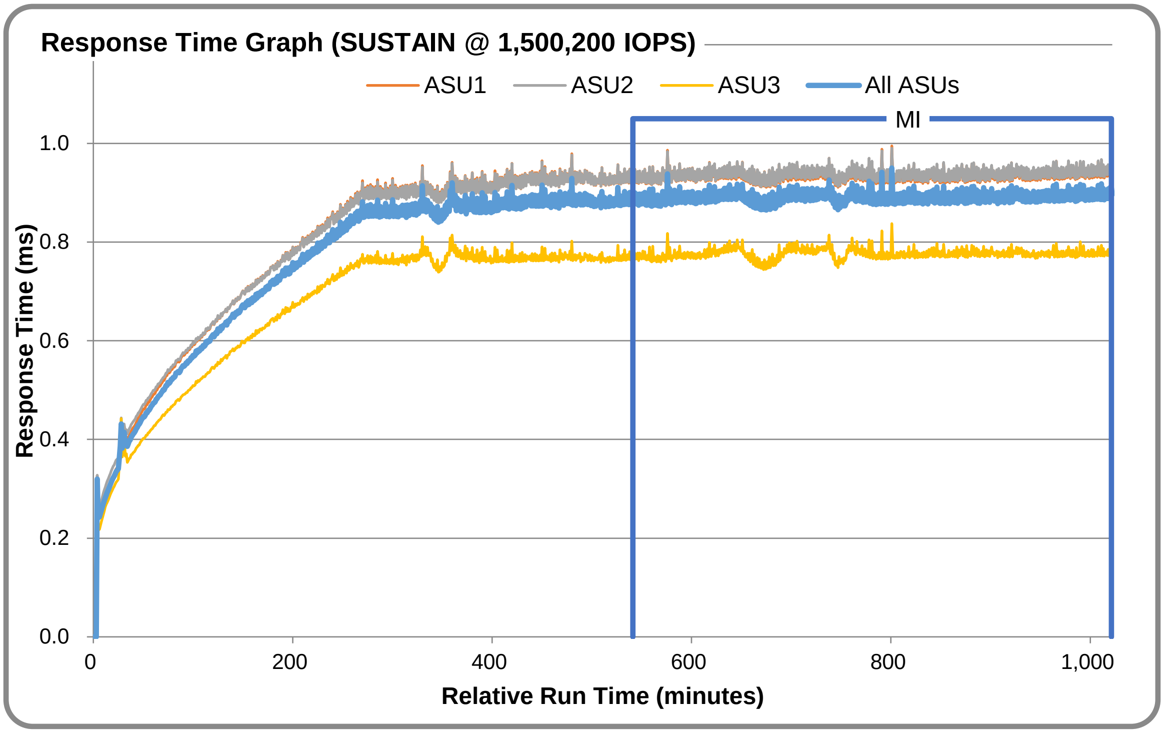
SUSTAIN – Execution Times

Interval	Start Time	End Time	Duration
Transition Period	24-Sep-18 02:47:34	24-Sep-18 11:47:34	9:00:00
Measurement Interval	24-Sep-18 11:47:34	24-Sep-18 19:47:35	8:00:01

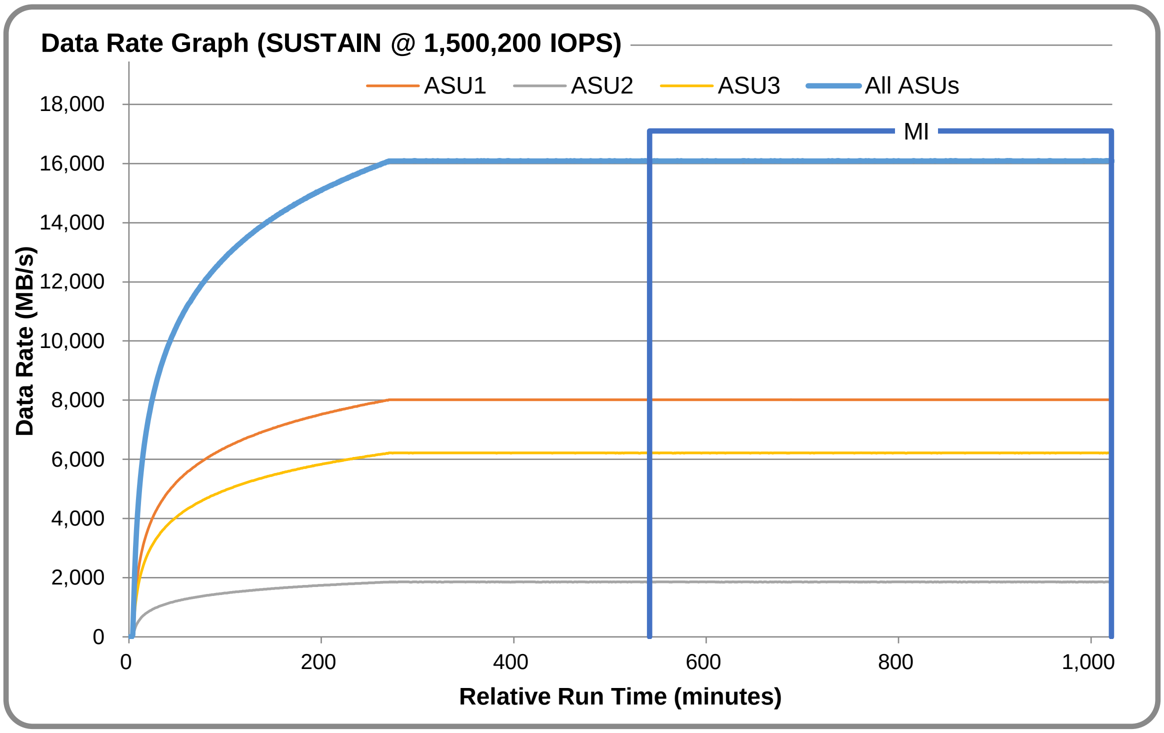
SUSTAIN – Throughput Graph



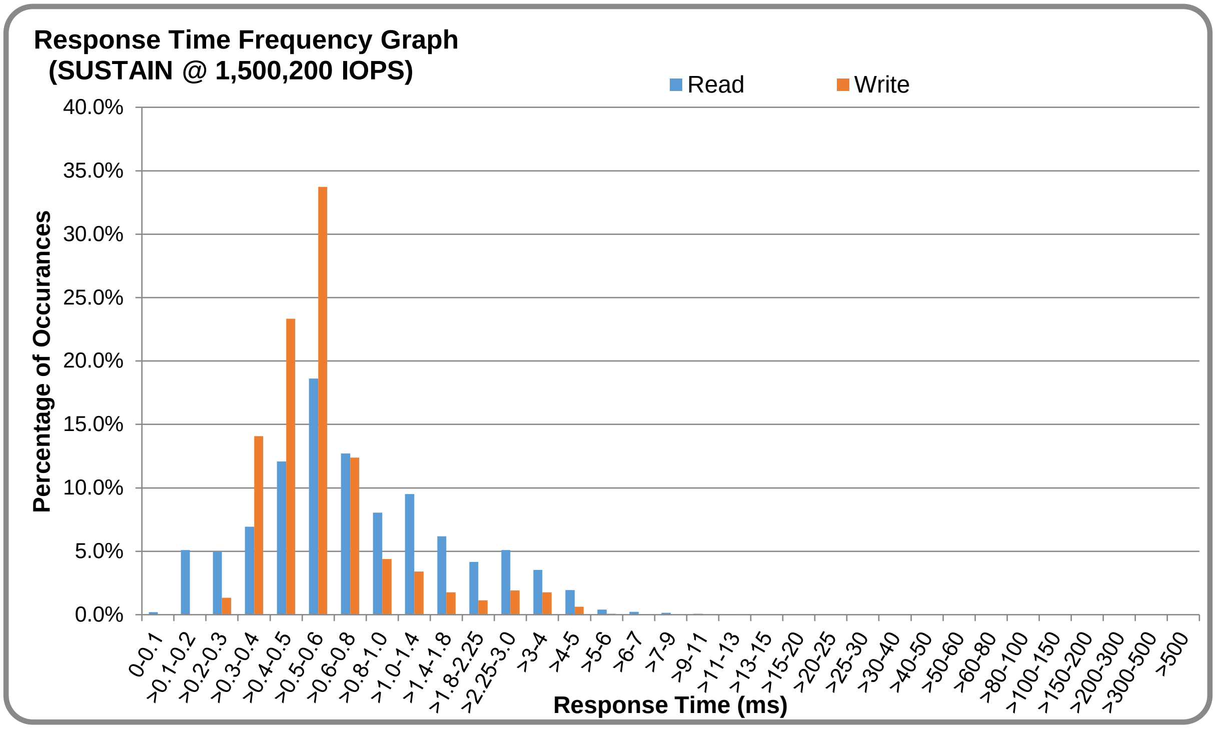
SUSTAIN – Response Time Graph



SUSTAIN – Data Rate Graph



SUSTAIN – Response Time Frequency Graph



SUSTAIN – Intensity Multiplier

The following table lists the targeted intensity multiplier (Defined), the measured intensity multiplier (Measured) for each I/O STREAM, its coefficient of variation (Variation) and the percentage of difference (Difference) between Target and Measured.

	ASU1-1	ASU1-2	ASU1-3	ASU1-4	ASU2-1	ASU2-2	ASU2-3	ASU3-1
Defined	0.0350	0.2810	0.0700	0.2100	0.0180	0.0700	0.0350	0.2810
Measured	0.0350	0.2810	0.0700	0.2100	0.0180	0.0700	0.0350	0.2810
Variation	0.0006	0.0002	0.0004	0.0002	0.0008	0.0004	0.0005	0.0002
Difference	0.008%	0.002%	0.001%	0.001%	0.002%	0.004%	0.005%	0.001%

RAMPD_100 Test Phase

RAMPD_100 – Results File

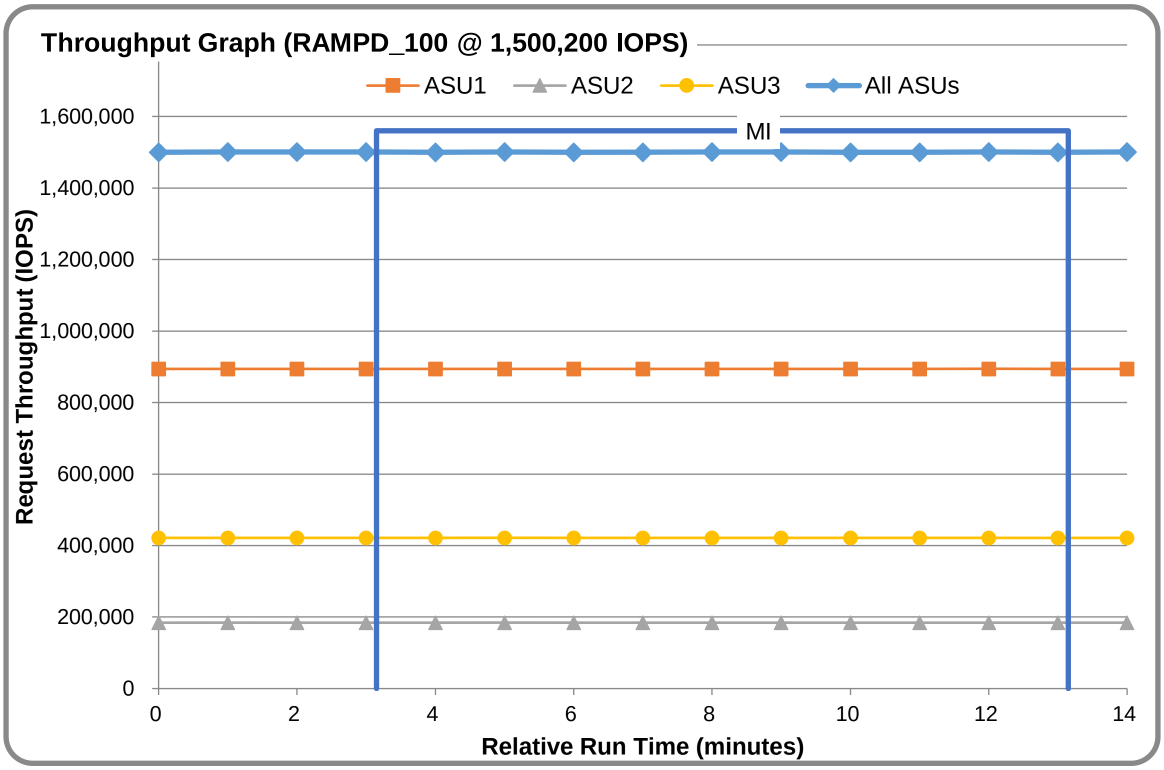
The results file generated during the execution of the RAMPD_100 Test Phase is included in the Supporting Files (see Appendix A) as follows:

- **SPC1_METRICS_0_Raw_Results.xlsx**

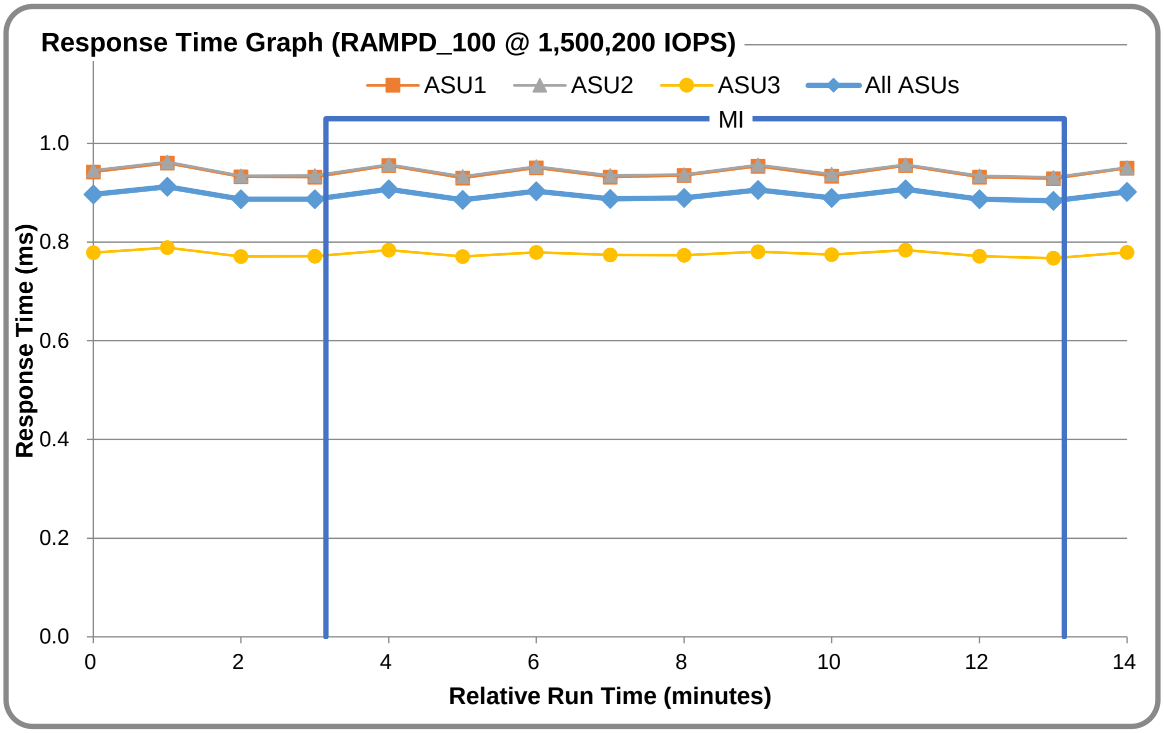
RAMPD_100 – Execution Times

Interval	Start Time	End Time	Duration
Transition Period	24-Sep-18 19:48:35	24-Sep-18 19:51:35	0:03:00
Measurement Interval	24-Sep-18 19:51:35	24-Sep-18 20:01:36	0:10:01

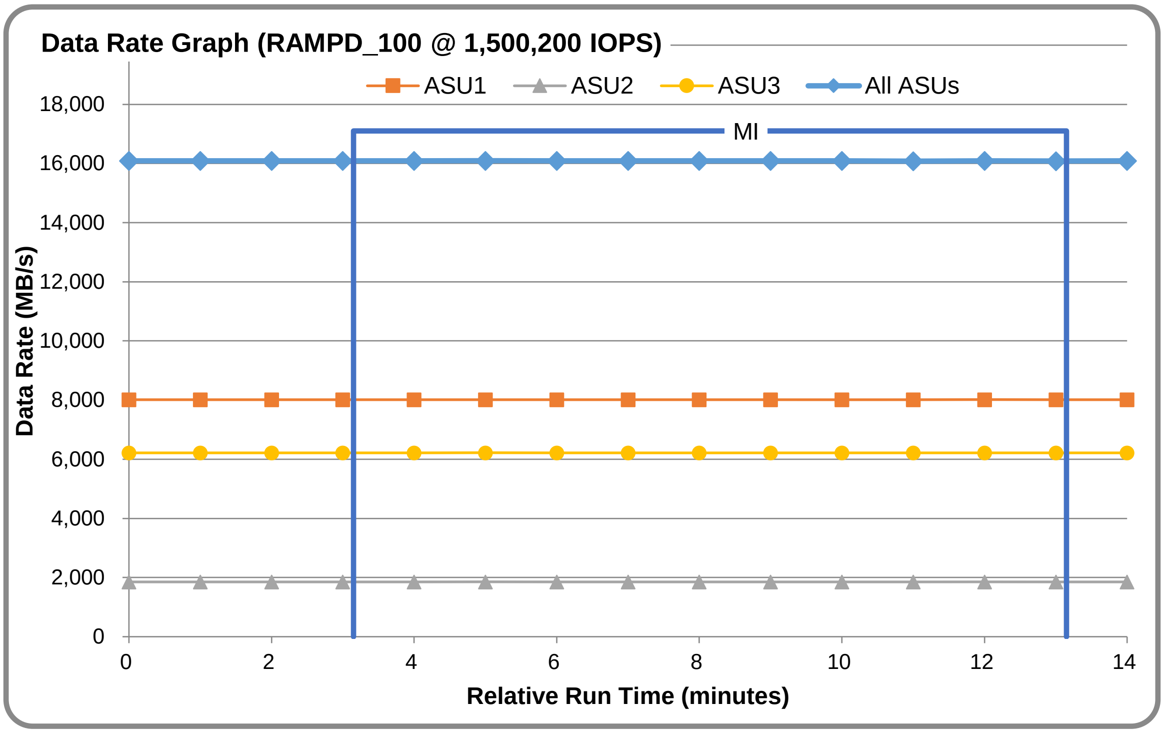
RAMPD_100 – Throughput Graph



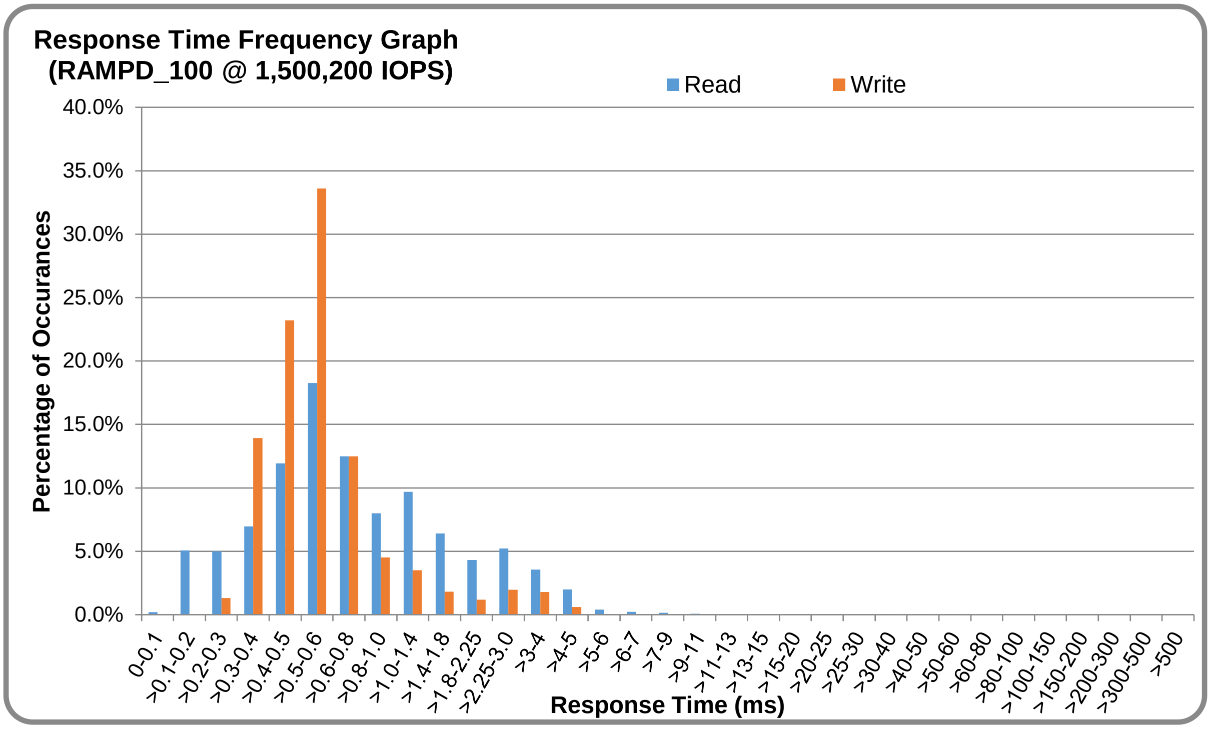
RAMPD_100 – Response Time Graph



RAMPD_100 – Data Rate Graph



RAMPD_100 – Response Time Frequency Graph



RAMPD_100 – Intensity Multiplier

The following table lists the targeted intensity multiplier (Defined), the measured intensity multiplier (Measured) for each I/O STREAM, its coefficient of variation (Variation) and the percentage of difference (Difference) between Target and Measured.

	ASU1-1	ASU1-2	ASU1-3	ASU1-4	ASU2-1	ASU2-2	ASU2-3	ASU3-1
Defined	0.0350	0.2810	0.0700	0.2100	0.0180	0.0700	0.0350	0.2810
Measured	0.0350	0.2810	0.0700	0.2100	0.0180	0.0700	0.0350	0.2810
Variation	0.0005	0.0002	0.0002	0.0003	0.0006	0.0003	0.0008	0.0002
Difference	0.011%	0.011%	0.006%	0.001%	0.054%	0.009%	0.041%	0.001%

RAMPD_100 – I/O Request Summary

I/O Requests Completed in the Measurement Interval	900,217,031
I/O Requests Completed with Response Time <= 30 ms	900,212,077
I/O Requests Completed with Response Time > 30 ms	4,954

Response Time Ramp Test

Response Time Ramp Test – Results File

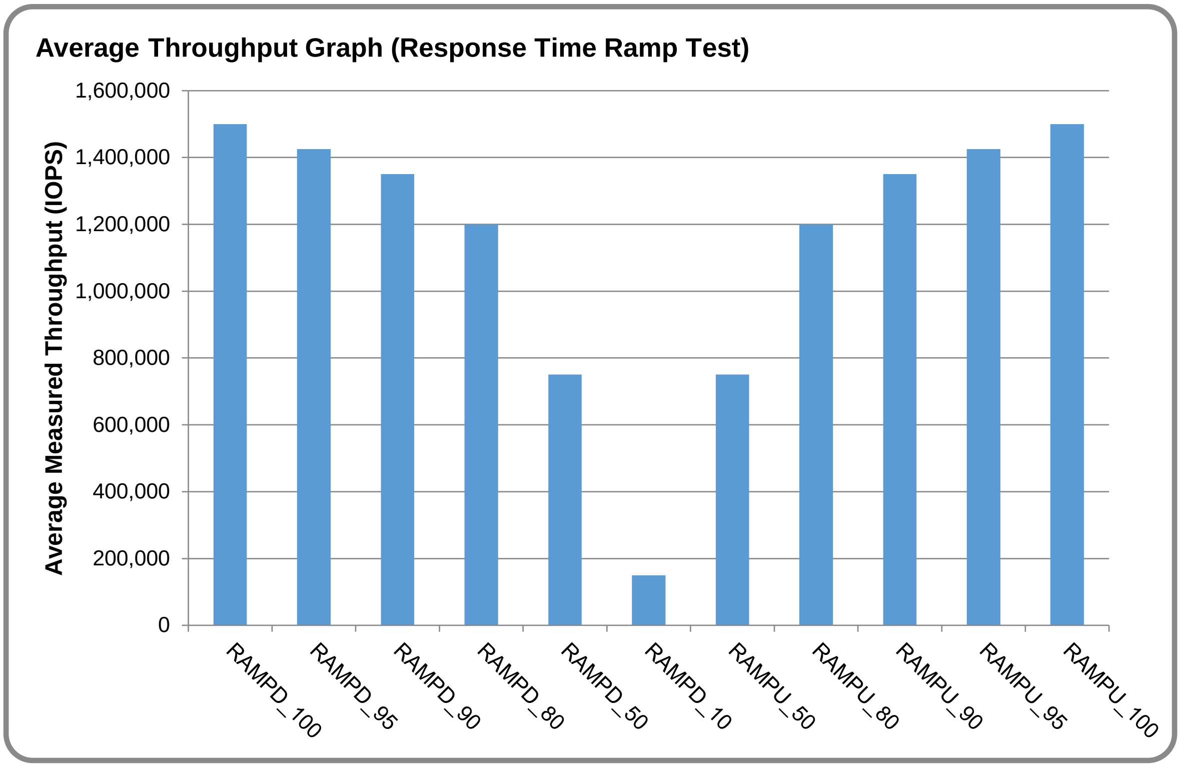
The results file generated during the execution of the Response Time Ramp Test is included in the Supporting Files (see Appendix A) as follows:

- **SPC1_METRICS_0_Raw_Results.xlsx**

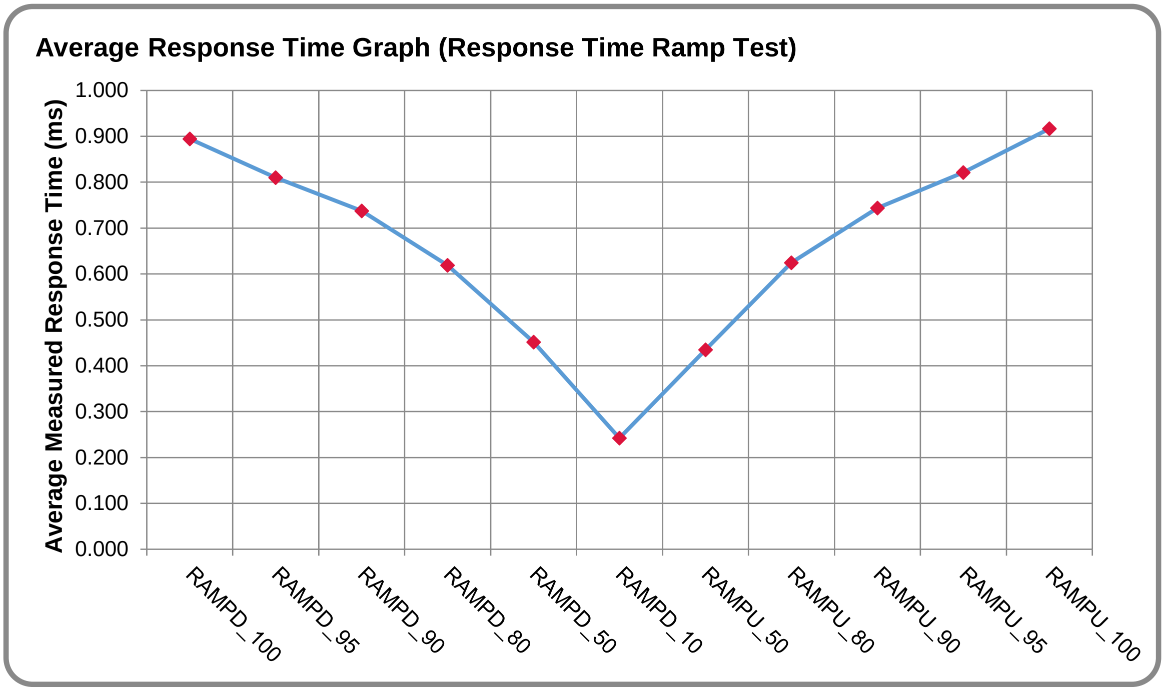
Response Time Ramp Test – Phases

The Response Time Ramp Test is comprised of 11 Test Phases, including six Ramp-Down Phases (executed at 100%, 95%, 90%, 80%, 50%, and 10% of the Business Scaling Unit) and five Ramp-Up Phases (executed at 50%, 80%, 90%, 95%, and 100% of the Business Scaling Unit).

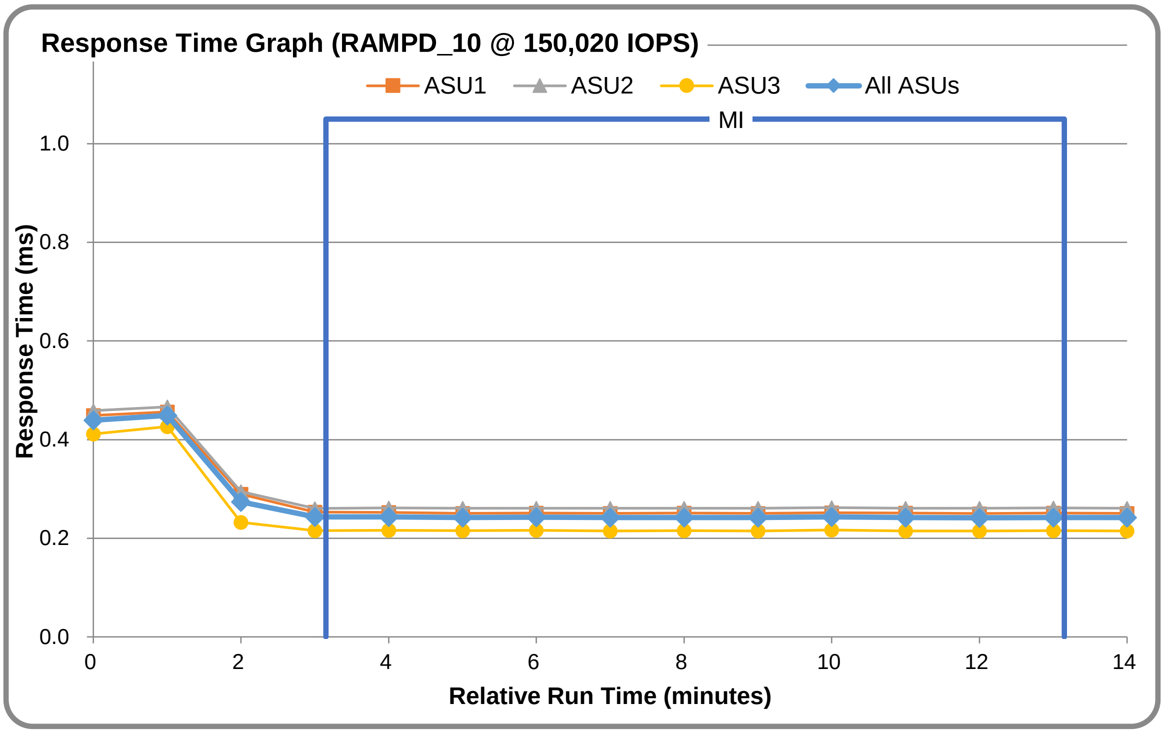
Response Time Ramp Test – Average Throughput Graph



Response Time Ramp Test – Average Response Time Graph



Response Time Ramp Test – RAMPD_10 Response Time Graph



Repeatability Test

Repeatability Test Results File

The results file generated during the execution of the Repeatability Test is included in the Supporting Files (see Appendix A) as follows:

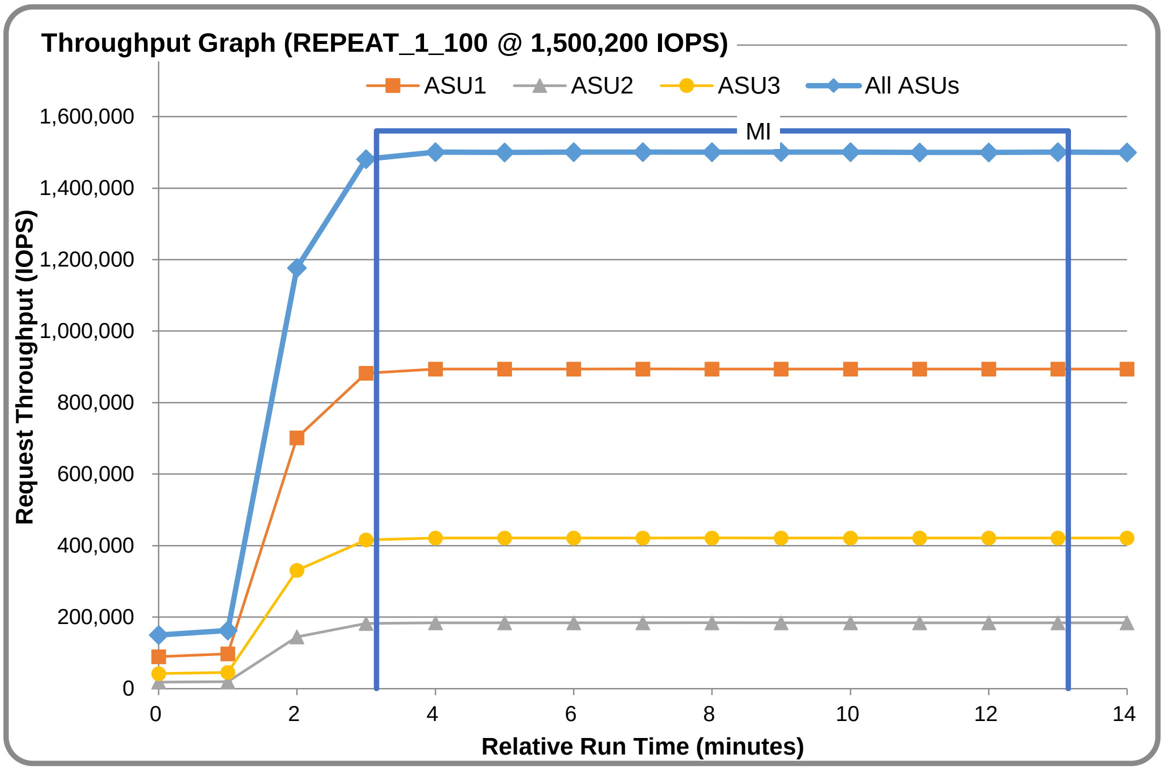
- **SPC1_METRICS_0_Raw_Results.xlsx**

Repeatability Test Results

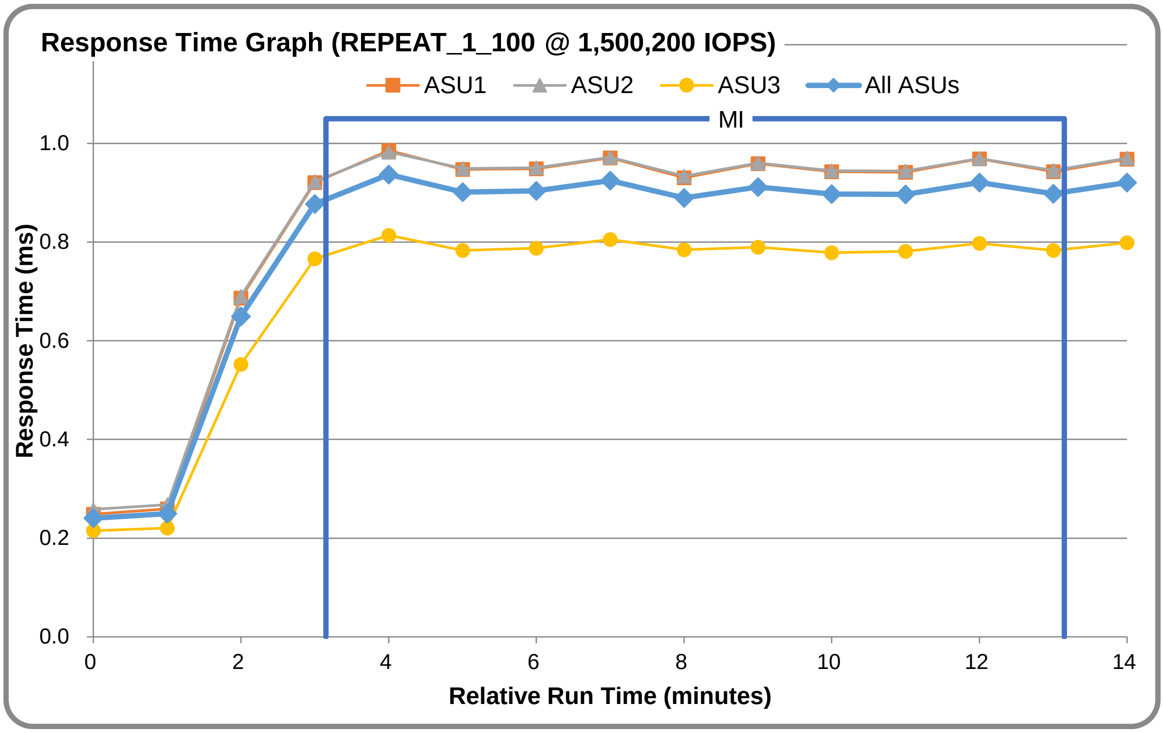
The throughput measurements for the Response Time Ramp Test (RAMPD) and the Repeatability Test Phases (REPEAT_1 and REPEAT_2) are listed in the tables below.

Test Phase	100% IOPS	10% IOPS
RAMPD	1,500,346.2	150,023.6
REPEAT_1	1,500,335.8	149,999.4
REPEAT_2	1,500,263.2	150,016.3

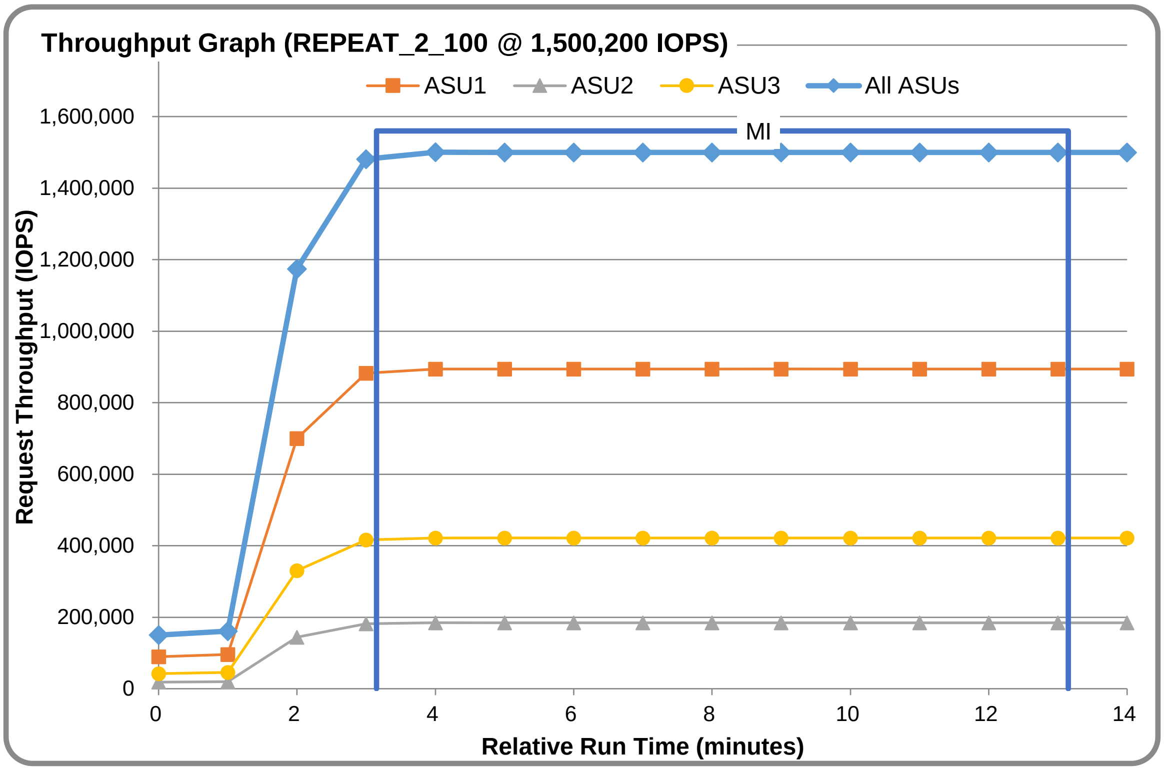
REPEAT_1_100 – Throughput Graph



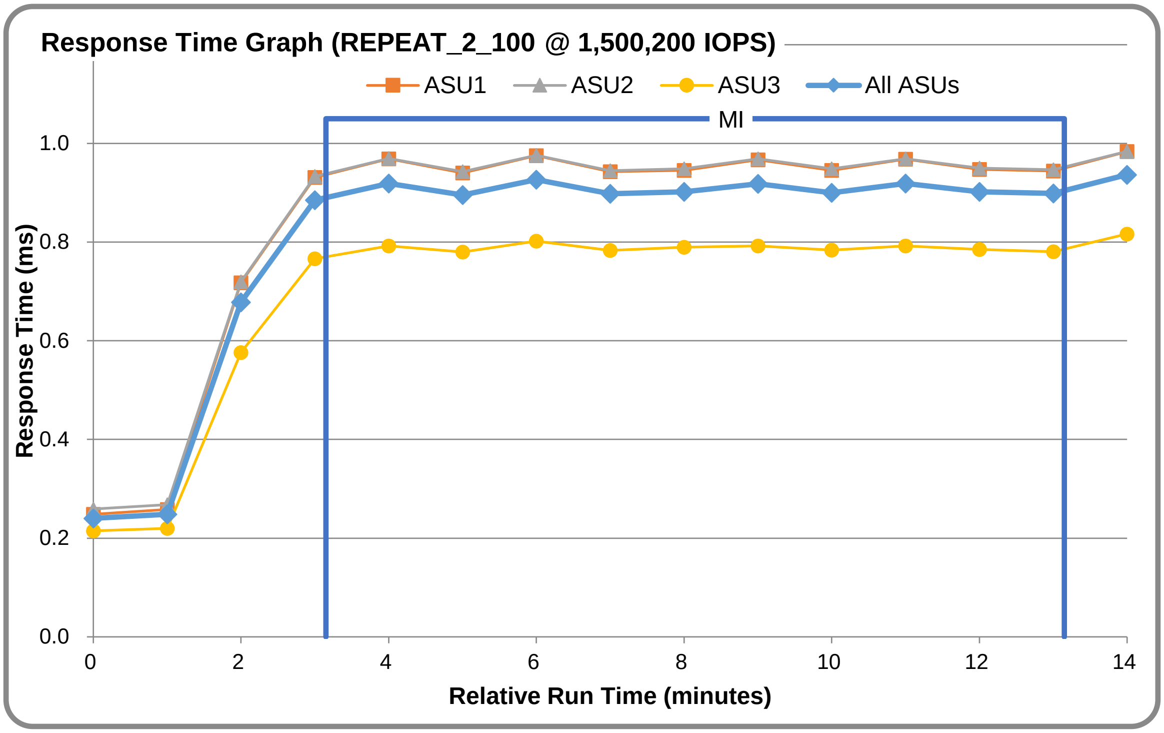
REPEAT_1_100 – Response Time Graph



REPEAT_2_100 – Throughput Graph



REPEAT_2_100 – Response Time Graph



Repeatability Test – Intensity Multiplier

The following tables lists the targeted intensity multiplier (Defined), the measured intensity multiplier (Measured) for each I/O STREAM, its coefficient of variation (Variation) and the percent of difference (Difference) between Target and Measured.

REPEAT_1_100 Test Phase

	ASU1-1	ASU1-2	ASU1-3	ASU1-4	ASU2-1	ASU2-2	ASU2-3	ASU3-1
Defined	0.0350	0.2810	0.0700	0.2100	0.0180	0.0700	0.0350	0.2810
Measured	0.0350	0.2810	0.0700	0.2100	0.0180	0.0700	0.0350	0.2810
Variation	0.0006	0.0001	0.0005	0.0002	0.0008	0.0002	0.0005	0.0002
Difference	0.011%	0.001%	0.010%	0.002%	0.019%	0.003%	0.001%	0.004%

REPEAT_2_100 Test Phase

	ASU1-1	ASU1-2	ASU1-3	ASU1-4	ASU2-1	ASU2-2	ASU2-3	ASU3-1
Defined	0.0350	0.2810	0.0700	0.2100	0.0180	0.0700	0.0350	0.2810
Measured	0.0350	0.2810	0.0700	0.2100	0.0180	0.0700	0.0350	0.2810
Variation	0.0007	0.0002	0.0002	0.0002	0.0010	0.0002	0.0005	0.0001
Difference	0.005%	0.004%	0.033%	0.001%	0.015%	0.006%	0.018%	0.014%

Data Persistence Test

Data Persistence Test Results file

The results files generated during the execution of the Data Persistence Test is included in the Supporting Files (see Appendix A) as follows:

- **SPC1_PERSIST_1_0_Raw_Results.xlsx**
- **SPC1_PERSIST_2_0_Raw_Results.xlsx**

Data Persistence Test Execution

The Data Persistence Test was executed using the following sequence of steps:

- The PERSIST_1_0 Test Phase was executed to completion.
- The Benchmark Configuration was taken through an orderly shutdown process and powered off.
- The Benchmark Configuration was powered on and taken through an orderly startup process.
- The PERSIST_2_0 Test Phase was executed to completion.

Data Persistence Test Results

Data Persistence Test Phase: Persist1	
Total Number of Logical Blocks Written	308,258,338
Total Number of Logical Blocks Verified	150,523,217
Total Number of Logical Blocks Overwritten	157,735,121
Total Number of Logical Blocks that Failed Verification	0
Time Duration for Writing Test Logical Blocks (sec.)	601
Size in bytes of each Logical Block	8,192
Number of Failed I/O Requests in the process of the Test	0

Committed Data Persistence Implementation

The committed data persistence is implemented at two levels. At the disk level, data loss is prevented through the use of RAID 10 arrays. At the controller level, the write caches are mirrored across controllers, where write requests are only completed once the local cache has been successfully mirrored in another controller’s cache. In addition, each control enclosure has two batteries and each controller has a built-in SSD as the system boot disk. When an unexpected power-down occurs, the controller continues to be powered by the battery and flushes the cache data to the SSD for permanent storage. When the power supply is restored, the data in the built-in SSD is automatically restored.

APPENDIX A: SUPPORTING FILES

The following table details the content of the Supporting Files provided as part of this Full Disclosure Report.

File Name	Description	Location
/SPC1_RESULTS	**Data reduction worksheets**	**root**
SPC1_INIT_0_Raw_Results.xlsx	Raw results for INIT Test Phase	/SPC1_RESULTS
SPC1_METRICS_0_Quick_Look.xlsx	Quick Look Test Run Overview	/SPC1_RESULTS
SPC1_METRICS_0_Raw_Results.xlsx	Raw results for Primary Metrics Test	/SPC1_RESULTS
SPC1_METRICS_0_Summary_Results.xlsx	Primary Metrics Summary	/SPC1_RESULTS
SPC1_PERSIST_1_0_Raw_Results.xlsx	Raw results for PERSIST1 Test Phase	/SPC1_RESULTS
SPC1_PERSIST_2_0_Raw_Results.xlsx	Raw results for PERSIST2 Test Phase	/SPC1_RESULTS
SPC1_Run_Set_Overview.xlsx	Run Set Overview Worksheet	/SPC1_RESULTS
SPC1_VERIFY_0_Raw_Results.xlsx	Raw results for first VERIFY Test Phase	/SPC1_RESULTS
SPC1_VERIFY_1_Raw_Results.xlsx	Raw results for second VERIFY Test Phase	/SPC1_RESULTS
/C_Tuning	**Tuning parameters and options**	**root**
set_nr_requests.sh	Set queue depth, max AIO and scheduler	/C_Tuning
/D_Creation	**Storage configuration creation**	**root**
init_as5500g2.sh	Create Pools, RAIDs, LUNs and Hosts	/D_Creation
lvm.create.vg.sh	Create physical volumes	/D_Creation
lvm.create.lv.sh	Create logical volumes	/D_Creation
lv_scan.sh	Scan and activate Logical Volumes	/D_Creation
/E_Inventory	**Configuration inventory**	**root**
profile_as5500g2.sh	Captures profile of storage environment	/E_Inventory
volume_list.sh	Captures logical volume environment	/E_Inventory
volume_listing_start.txt	List of logical volumes before INIT	/E_Inventory
profile_start_as5500g2.txt	List of storage devices before INIT	/E_Inventory
volume_listing_end.txt	List of logical volumes after restart	/E_Inventory
profile_end_as5500g2.txt	List of storage devices after restart	/E_Inventory
/F_Generator	**Workload generator**	**root**
SPC1.asu	Defining LUNs hosting the ASUs	/F_generator
8HOST.HST	Host configuration file	/F_generator
full_run_before_persist2.sh	Executing all test phases until PERSIST-2	/F_generator
test_persist_2.sh	Executing PERSIST-2	/F_generator

APPENDIX B: THIRD PARTY QUOTATION

All components are sourced directly from Inspur.

APPENDIX C: TUNING PARAMETERS AND OPTIONS

The following script was used to set tuning parameters and options:

- ***set_nr_requests.sh*** to change the maximum number of AIO operations to 1048576, to change nr_requests from 128 to 1024 on each Host System for each device, and to change the I/O scheduler from cfq to noop on each Host System, which will result in all incoming I/O requests inserted into a simple, unordered FIFO queue.

The script described above is included in the Supporting Files (see Appendix A) and listed below.

set_nr_requests.sh

```
#!/bin/sh

depth=1024

for i in `find /sys -name scaling_governor`; do cat $i; echo "performance" > $i;
   done

echo 1048576 > /proc/sys/fs/aio-max-nr

for i in  `find /sys -name nr_requests |grep "block/sd"`
do
  d=`dirname $i`
  vendor=`cat $d/../device/vendor`
  old=`cat $i`
  echo $depth > $i
  new=`cat $i`
  echo "$i $old $new"
done

for i in `find /sys/devices/virtual/block/ -name nr_requests`
do
  n=`cat $i`
  echo "$i orig: $n new: $depth"
  echo $depth > $i
done

for i in `find /sys/ -name scheduler | grep block`
do
  echo "noop" > $i
  echo $i
done
```

APPENDIX D: STORAGE CONFIGURATION CREATION

Environment

The following shell scripts are executed on one or more of the Host Systems.

- ***init_as5500g2.sh***
- ***lvm.create.vg.sh***
- ***lv_scan.sh***

Step 1 - Create Storage Pools, RAIDs, LUNs and Hosts

The ***init_as5500g2.sh*** command file, listed below, performs the following actions:

- Create 4 storage pools
- Create 24 RAID 10 arrays
- Create 160 LUNs (40 LUNs per pool)
- Create 8 Hosts
- Add the FC port's WWPN to the 8 hosts (2 WWPNs per Host)
- Map the LUNs to the 8 Hosts

The command file described above is included in the Supporting Files (see Appendix A) and listed below.

init_as5500g2.sh

```
#!/bin/sh

#step1:create pools
#step2:create mdisks(raid)
#step3:create vdisks(lun)
#step4:create hosts
#step5:map vdisks to the hosts

#step1:create Pools
RunSsh "mcsop mkmdiskgrp -ext 64  -intier off -name Pool0grp0 -warning 80%"
RunSsh "mcsop mkmdiskgrp -ext 64  -intier off -name Pool1grp1 -warning 80%"
RunSsh "mcsop mkmdiskgrp -ext 64  -intier off -name Pool2grp2 -warning 80%"
RunSsh "mcsop mkmdiskgrp -ext 64  -intier off -name Pool3grp3 -warning 80%"

#step2:create mdisks(raid)
RunSsh "mcsop mkarray -drive 0:1:2:3 -level raid10 -sparegoal 0 -strip 256
   Pool0grp0"
RunSsh "mcsop mkarray -drive 4:5:6:7 -level raid10 -sparegoal 0 -strip 256
   Pool0grp0"
RunSsh "mcsop mkarray -drive 8:9:10:11 -level raid10 -sparegoal 0 -strip 256
   Pool0grp0"
RunSsh "mcsop mkarray -drive 12:13:14:15 -level raid10 -sparegoal 0 -strip 256
   Pool0grp0"
RunSsh "mcsop mkarray -drive 16:17:18:19 -level raid10 -sparegoal 0 -strip 256
   Pool0grp0"
RunSsh "mcsop mkarray -drive 20:21:22:23 -level raid10 -sparegoal 0 -strip 256
   Pool0grp0"
```

```
RunSsh "mcsop mkarray -drive 24:25:26:27 -level raid10 -sparegoal 0 -strip 256
    Pool1grp1"
RunSsh "mcsop mkarray -drive 28:29:30:31 -level raid10 -sparegoal 0 -strip 256
    Pool1grp1"
RunSsh "mcsop mkarray -drive 32:33:34:35 -level raid10 -sparegoal 0 -strip 256
    Pool1grp1"
RunSsh "mcsop mkarray -drive 36:37:38:39 -level raid10 -sparegoal 0 -strip 256
    Pool1grp1"
RunSsh "mcsop mkarray -drive 40:41:42:43 -level raid10 -sparegoal 0 -strip 256
    Pool1grp1"
RunSsh "mcsop mkarray -drive 44:45:46:47 -level raid10 -sparegoal 0 -strip 256
    Pool1grp1"

RunSsh "mcsop mkarray -drive 48:49:50:51 -level raid10 -sparegoal 0 -strip 256
    Pool2grp2"
RunSsh "mcsop mkarray -drive 52:53:54:55 -level raid10 -sparegoal 0 -strip 256
    Pool2grp2"
RunSsh "mcsop mkarray -drive 56:57:58:59 -level raid10 -sparegoal 0 -strip 256
    Pool2grp2"
RunSsh "mcsop mkarray -drive 60:61:62:63 -level raid10 -sparegoal 0 -strip 256
    Pool2grp2"
RunSsh "mcsop mkarray -drive 64:65:66:67 -level raid10 -sparegoal 0 -strip 256
    Pool2grp2"
RunSsh "mcsop mkarray -drive 68:69:70:71 -level raid10 -sparegoal 0 -strip 256
    Pool2grp2"

RunSsh "mcsop mkarray -drive 72:73:74:75 -level raid10 -sparegoal 0 -strip 256
    Pool3grp3"
RunSsh "mcsop mkarray -drive 76:77:78:79 -level raid10 -sparegoal 0 -strip 256
    Pool3grp3"
RunSsh "mcsop mkarray -drive 80:81:82:83 -level raid10 -sparegoal 0 -strip 256
    Pool3grp3"
RunSsh "mcsop mkarray -drive 84:85:86:87 -level raid10 -sparegoal 0 -strip 256
    Pool3grp3"
RunSsh "mcsop mkarray -drive 88:89:90:91 -level raid10 -sparegoal 0 -strip 256
    Pool3grp3"
RunSsh "mcsop mkarray -drive 92:93:94:95 -level raid10 -sparegoal 0 -strip 256
    Pool3grp3"

#step3:create vdisks(lun)
RunSsh "mcsop mkvdisk -accessiogrp 0 -cache readwrite -iogrp 0 -mdiskgrp Pool0grp0
    -name g0c1a1 -node node1 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 0 -cache readwrite -iogrp 0 -mdiskgrp Pool0grp0
    -name g0c1a2 -node node1 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 0 -cache readwrite -iogrp 0 -mdiskgrp Pool0grp0
    -name g0c1a3 -node node1 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 0 -cache readwrite -iogrp 0 -mdiskgrp Pool0grp0
    -name g0c1a4 -node node1 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 0 -cache readwrite -iogrp 0 -mdiskgrp Pool0grp0
    -name g0c1a5 -node node1 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 0 -cache readwrite -iogrp 0 -mdiskgrp Pool0grp0
    -name g0c1a6 -node node1 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 0 -cache readwrite -iogrp 0 -mdiskgrp Pool0grp0
    -name g0c1a7 -node node1 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 0 -cache readwrite -iogrp 0 -mdiskgrp Pool0grp0
    -name g0c1a8 -node node1 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 0 -cache readwrite -iogrp 0 -mdiskgrp Pool0grp0
    -name g0c1a9 -node node1 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 0 -cache readwrite -iogrp 0 -mdiskgrp Pool0grp0
    -name g0c1a10 -node node1 -nofmtdisk -size 177167400960 -unit b"
```

```
RunSsh "mcsop mkvdisk -accessiogrp 0 -cache readwrite -iogrp 0 -mdiskgrp Pool0grp0
    -name g0c1b1 -node node1 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 0 -cache readwrite -iogrp 0 -mdiskgrp Pool0grp0
    -name g0c1b2 -node node1 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 0 -cache readwrite -iogrp 0 -mdiskgrp Pool0grp0
    -name g0c1b3 -node node1 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 0 -cache readwrite -iogrp 0 -mdiskgrp Pool0grp0
    -name g0c1b4 -node node1 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 0 -cache readwrite -iogrp 0 -mdiskgrp Pool0grp0
    -name g0c1b5 -node node1 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 0 -cache readwrite -iogrp 0 -mdiskgrp Pool0grp0
    -name g0c1b6 -node node1 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 0 -cache readwrite -iogrp 0 -mdiskgrp Pool0grp0
    -name g0c1b7 -node node1 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 0 -cache readwrite -iogrp 0 -mdiskgrp Pool0grp0
    -name g0c1b8 -node node1 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 0 -cache readwrite -iogrp 0 -mdiskgrp Pool0grp0
    -name g0c1b9 -node node1 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 0 -cache readwrite -iogrp 0 -mdiskgrp Pool0grp0
    -name g0c1b10 -node node1 -nofmtdisk -size 177167400960 -unit b"

RunSsh "mcsop mkvdisk -accessiogrp 0 -cache readwrite -iogrp 0 -mdiskgrp Pool0grp0
    -name g0c2a1 -node node2 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 0 -cache readwrite -iogrp 0 -mdiskgrp Pool0grp0
    -name g0c2a2 -node node2 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 0 -cache readwrite -iogrp 0 -mdiskgrp Pool0grp0
    -name g0c2a3 -node node2 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 0 -cache readwrite -iogrp 0 -mdiskgrp Pool0grp0
    -name g0c2a4 -node node2 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 0 -cache readwrite -iogrp 0 -mdiskgrp Pool0grp0
    -name g0c2a5 -node node2 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 0 -cache readwrite -iogrp 0 -mdiskgrp Pool0grp0
    -name g0c2a6 -node node2 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 0 -cache readwrite -iogrp 0 -mdiskgrp Pool0grp0
    -name g0c2a7 -node node2 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 0 -cache readwrite -iogrp 0 -mdiskgrp Pool0grp0
    -name g0c2a8 -node node2 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 0 -cache readwrite -iogrp 0 -mdiskgrp Pool0grp0
    -name g0c2a9 -node node2 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 0 -cache readwrite -iogrp 0 -mdiskgrp Pool0grp0
    -name g0c2a10 -node node2 -nofmtdisk -size 177167400960 -unit b"

RunSsh "mcsop mkvdisk -accessiogrp 0 -cache readwrite -iogrp 0 -mdiskgrp Pool0grp0
    -name g0c2b1 -node node2 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 0 -cache readwrite -iogrp 0 -mdiskgrp Pool0grp0
    -name g0c2b2 -node node2 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 0 -cache readwrite -iogrp 0 -mdiskgrp Pool0grp0
    -name g0c2b3 -node node2 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 0 -cache readwrite -iogrp 0 -mdiskgrp Pool0grp0
    -name g0c2b4 -node node2 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 0 -cache readwrite -iogrp 0 -mdiskgrp Pool0grp0
    -name g0c2b5 -node node2 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 0 -cache readwrite -iogrp 0 -mdiskgrp Pool0grp0
    -name g0c2b6 -node node2 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 0 -cache readwrite -iogrp 0 -mdiskgrp Pool0grp0
    -name g0c2b7 -node node2 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 0 -cache readwrite -iogrp 0 -mdiskgrp Pool0grp0
    -name g0c2b8 -node node2 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 0 -cache readwrite -iogrp 0 -mdiskgrp Pool0grp0
    -name g0c2b9 -node node2 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 0 -cache readwrite -iogrp 0 -mdiskgrp Pool0grp0
    -name g0c2b10 -node node2 -nofmtdisk -size 177167400960 -unit b"
```

```
RunSsh "mcsop mkvdisk -accessiogrp 1 -cache readwrite -iogrp 1 -mdiskgrp Pool1grp1
    -name g1c1a1 -node node3 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 1 -cache readwrite -iogrp 1 -mdiskgrp Pool1grp1
    -name g1c1a2 -node node3 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 1 -cache readwrite -iogrp 1 -mdiskgrp Pool1grp1
    -name g1c1a3 -node node3 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 1 -cache readwrite -iogrp 1 -mdiskgrp Pool1grp1
    -name g1c1a4 -node node3 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 1 -cache readwrite -iogrp 1 -mdiskgrp Pool1grp1
    -name g1c1a5 -node node3 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 1 -cache readwrite -iogrp 1 -mdiskgrp Pool1grp1
    -name g1c1a6 -node node3 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 1 -cache readwrite -iogrp 1 -mdiskgrp Pool1grp1
    -name g1c1a7 -node node3 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 1 -cache readwrite -iogrp 1 -mdiskgrp Pool1grp1
    -name g1c1a8 -node node3 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 1 -cache readwrite -iogrp 1 -mdiskgrp Pool1grp1
    -name g1c1a9 -node node3 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 1 -cache readwrite -iogrp 1 -mdiskgrp Pool1grp1
    -name g1c1a10 -node node3 -nofmtdisk -size 177167400960 -unit b"

RunSsh "mcsop mkvdisk -accessiogrp 1 -cache readwrite -iogrp 1 -mdiskgrp Pool1grp1
    -name g1c1b1 -node node3 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 1 -cache readwrite -iogrp 1 -mdiskgrp Pool1grp1
    -name g1c1b2 -node node3 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 1 -cache readwrite -iogrp 1 -mdiskgrp Pool1grp1
    -name g1c1b3 -node node3 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 1 -cache readwrite -iogrp 1 -mdiskgrp Pool1grp1
    -name g1c1b4 -node node3 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 1 -cache readwrite -iogrp 1 -mdiskgrp Pool1grp1
    -name g1c1b5 -node node3 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 1 -cache readwrite -iogrp 1 -mdiskgrp Pool1grp1
    -name g1c1b6 -node node3 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 1 -cache readwrite -iogrp 1 -mdiskgrp Pool1grp1
    -name g1c1b7 -node node3 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 1 -cache readwrite -iogrp 1 -mdiskgrp Pool1grp1
    -name g1c1b8 -node node3 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 1 -cache readwrite -iogrp 1 -mdiskgrp Pool1grp1
    -name g1c1b9 -node node3 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 1 -cache readwrite -iogrp 1 -mdiskgrp Pool1grp1
    -name g1c1b10 -node node3 -nofmtdisk -size 177167400960 -unit b"

RunSsh "mcsop mkvdisk -accessiogrp 1 -cache readwrite -iogrp 1 -mdiskgrp Pool1grp1
    -name g1c2a1 -node node4 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 1 -cache readwrite -iogrp 1 -mdiskgrp Pool1grp1
    -name g1c2a2 -node node4 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 1 -cache readwrite -iogrp 1 -mdiskgrp Pool1grp1
    -name g1c2a3 -node node4 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 1 -cache readwrite -iogrp 1 -mdiskgrp Pool1grp1
    -name g1c2a4 -node node4 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 1 -cache readwrite -iogrp 1 -mdiskgrp Pool1grp1
    -name g1c2a5 -node node4 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 1 -cache readwrite -iogrp 1 -mdiskgrp Pool1grp1
    -name g1c2a6 -node node4 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 1 -cache readwrite -iogrp 1 -mdiskgrp Pool1grp1
    -name g1c2a7 -node node4 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 1 -cache readwrite -iogrp 1 -mdiskgrp Pool1grp1
    -name g1c2a8 -node node4 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 1 -cache readwrite -iogrp 1 -mdiskgrp Pool1grp1
    -name g1c2a9 -node node4 -nofmtdisk -size 177167400960 -unit b"
```

```
RunSsh "mcsop mkvdisk -accessiogrp 1 -cache readwrite -iogrp 1 -mdiskgrp Pool1grp1
    -name g1c2a10 -node node4 -nofmtdisk -size 177167400960 -unit b"

RunSsh "mcsop mkvdisk -accessiogrp 1 -cache readwrite -iogrp 1 -mdiskgrp Pool1grp1
    -name g1c2b1 -node node4 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 1 -cache readwrite -iogrp 1 -mdiskgrp Pool1grp1
    -name g1c2b2 -node node4 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 1 -cache readwrite -iogrp 1 -mdiskgrp Pool1grp1
    -name g1c2b3 -node node4 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 1 -cache readwrite -iogrp 1 -mdiskgrp Pool1grp1
    -name g1c2b4 -node node4 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 1 -cache readwrite -iogrp 1 -mdiskgrp Pool1grp1
    -name g1c2b5 -node node4 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 1 -cache readwrite -iogrp 1 -mdiskgrp Pool1grp1
    -name g1c2b6 -node node4 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 1 -cache readwrite -iogrp 1 -mdiskgrp Pool1grp1
    -name g1c2b7 -node node4 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 1 -cache readwrite -iogrp 1 -mdiskgrp Pool1grp1
    -name g1c2b8 -node node4 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 1 -cache readwrite -iogrp 1 -mdiskgrp Pool1grp1
    -name g1c2b9 -node node4 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 1 -cache readwrite -iogrp 1 -mdiskgrp Pool1grp1
    -name g1c2b10 -node node4 -nofmtdisk -size 177167400960 -unit b"

RunSsh "mcsop mkvdisk -accessiogrp 2 -cache readwrite -iogrp 2 -mdiskgrp Pool2grp2
    -name g2c1a1 -node node5 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 2 -cache readwrite -iogrp 2 -mdiskgrp Pool2grp2
    -name g2c1a2 -node node5 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 2 -cache readwrite -iogrp 2 -mdiskgrp Pool2grp2
    -name g2c1a3 -node node5 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 2 -cache readwrite -iogrp 2 -mdiskgrp Pool2grp2
    -name g2c1a4 -node node5 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 2 -cache readwrite -iogrp 2 -mdiskgrp Pool2grp2
    -name g2c1a5 -node node5 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 2 -cache readwrite -iogrp 2 -mdiskgrp Pool2grp2
    -name g2c1a6 -node node5 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 2 -cache readwrite -iogrp 2 -mdiskgrp Pool2grp2
    -name g2c1a7 -node node5 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 2 -cache readwrite -iogrp 2 -mdiskgrp Pool2grp2
    -name g2c1a8 -node node5 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 2 -cache readwrite -iogrp 2 -mdiskgrp Pool2grp2
    -name g2c1a9 -node node5 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 2 -cache readwrite -iogrp 2 -mdiskgrp Pool2grp2
    -name g2c1a10 -node node5 -nofmtdisk -size 177167400960 -unit b"

RunSsh "mcsop mkvdisk -accessiogrp 2 -cache readwrite -iogrp 2 -mdiskgrp Pool2grp2
    -name g2c1b1 -node node5 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 2 -cache readwrite -iogrp 2 -mdiskgrp Pool2grp2
    -name g2c1b2 -node node5 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 2 -cache readwrite -iogrp 2 -mdiskgrp Pool2grp2
    -name g2c1b3 -node node5 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 2 -cache readwrite -iogrp 2 -mdiskgrp Pool2grp2
    -name g2c1b4 -node node5 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 2 -cache readwrite -iogrp 2 -mdiskgrp Pool2grp2
    -name g2c1b5 -node node5 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 2 -cache readwrite -iogrp 2 -mdiskgrp Pool2grp2
    -name g2c1b6 -node node5 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 2 -cache readwrite -iogrp 2 -mdiskgrp Pool2grp2
    -name g2c1b7 -node node5 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 2 -cache readwrite -iogrp 2 -mdiskgrp Pool2grp2
    -name g2c1b8 -node node5 -nofmtdisk -size 177167400960 -unit b"
```

```
RunSsh "mcsop mkvdisk -accessiogrp 2 -cache readwrite -iogrp 2 -mdiskgrp Pool2grp2
    -name g2c1b9 -node node5 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 2 -cache readwrite -iogrp 2 -mdiskgrp Pool2grp2
    -name g2c1b10 -node node5 -nofmtdisk -size 177167400960 -unit b"

RunSsh "mcsop mkvdisk -accessiogrp 2 -cache readwrite -iogrp 2 -mdiskgrp Pool2grp2
    -name g2c2a1 -node node6 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 2 -cache readwrite -iogrp 2 -mdiskgrp Pool2grp2
    -name g2c2a2 -node node6 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 2 -cache readwrite -iogrp 2 -mdiskgrp Pool2grp2
    -name g2c2a3 -node node6 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 2 -cache readwrite -iogrp 2 -mdiskgrp Pool2grp2
    -name g2c2a4 -node node6 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 2 -cache readwrite -iogrp 2 -mdiskgrp Pool2grp2
    -name g2c2a5 -node node6 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 2 -cache readwrite -iogrp 2 -mdiskgrp Pool2grp2
    -name g2c2a6 -node node6 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 2 -cache readwrite -iogrp 2 -mdiskgrp Pool2grp2
    -name g2c2a7 -node node6 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 2 -cache readwrite -iogrp 2 -mdiskgrp Pool2grp2
    -name g2c2a8 -node node6 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 2 -cache readwrite -iogrp 2 -mdiskgrp Pool2grp2
    -name g2c2a9 -node node6 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 2 -cache readwrite -iogrp 2 -mdiskgrp Pool2grp2
    -name g2c2a10 -node node6 -nofmtdisk -size 177167400960 -unit b"

RunSsh "mcsop mkvdisk -accessiogrp 2 -cache readwrite -iogrp 2 -mdiskgrp Pool2grp2
    -name g2c2b1 -node node6 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 2 -cache readwrite -iogrp 2 -mdiskgrp Pool2grp2
    -name g2c2b2 -node node6 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 2 -cache readwrite -iogrp 2 -mdiskgrp Pool2grp2
    -name g2c2b3 -node node6 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 2 -cache readwrite -iogrp 2 -mdiskgrp Pool2grp2
    -name g2c2b4 -node node6 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 2 -cache readwrite -iogrp 2 -mdiskgrp Pool2grp2
    -name g2c2b5 -node node6 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 2 -cache readwrite -iogrp 2 -mdiskgrp Pool2grp2
    -name g2c2b6 -node node6 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 2 -cache readwrite -iogrp 2 -mdiskgrp Pool2grp2
    -name g2c2b7 -node node6 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 2 -cache readwrite -iogrp 2 -mdiskgrp Pool2grp2
    -name g2c2b8 -node node6 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 2 -cache readwrite -iogrp 2 -mdiskgrp Pool2grp2
    -name g2c2b9 -node node6 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 2 -cache readwrite -iogrp 2 -mdiskgrp Pool2grp2
    -name g2c2b10 -node node6 -nofmtdisk -size 177167400960 -unit b"

RunSsh "mcsop mkvdisk -accessiogrp 3 -cache readwrite -iogrp 3 -mdiskgrp Pool3grp3
    -name g3c1a1 -node node7 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 3 -cache readwrite -iogrp 3 -mdiskgrp Pool3grp3
    -name g3c1a2 -node node7 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 3 -cache readwrite -iogrp 3 -mdiskgrp Pool3grp3
    -name g3c1a3 -node node7 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 3 -cache readwrite -iogrp 3 -mdiskgrp Pool3grp3
    -name g3c1a4 -node node7 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 3 -cache readwrite -iogrp 3 -mdiskgrp Pool3grp3
    -name g3c1a5 -node node7 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 3 -cache readwrite -iogrp 3 -mdiskgrp Pool3grp3
    -name g3c1a6 -node node7 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 3 -cache readwrite -iogrp 3 -mdiskgrp Pool3grp3
    -name g3c1a7 -node node7 -nofmtdisk -size 177167400960 -unit b"
```

```
RunSsh "mcsop mkvdisk -accessiogrp 3 -cache readwrite -iogrp 3 -mdiskgrp Pool3grp3
    -name g3c1a8 -node node7 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 3 -cache readwrite -iogrp 3 -mdiskgrp Pool3grp3
    -name g3c1a9 -node node7 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 3 -cache readwrite -iogrp 3 -mdiskgrp Pool3grp3
    -name g3c1a10 -node node7 -nofmtdisk -size 177167400960 -unit b"

RunSsh "mcsop mkvdisk -accessiogrp 3 -cache readwrite -iogrp 3 -mdiskgrp Pool3grp3
    -name g3c1b1 -node node7 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 3 -cache readwrite -iogrp 3 -mdiskgrp Pool3grp3
    -name g3c1b2 -node node7 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 3 -cache readwrite -iogrp 3 -mdiskgrp Pool3grp3
    -name g3c1b3 -node node7 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 3 -cache readwrite -iogrp 3 -mdiskgrp Pool3grp3
    -name g3c1b4 -node node7 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 3 -cache readwrite -iogrp 3 -mdiskgrp Pool3grp3
    -name g3c1b5 -node node7 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 3 -cache readwrite -iogrp 3 -mdiskgrp Pool3grp3
    -name g3c1b6 -node node7 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 3 -cache readwrite -iogrp 3 -mdiskgrp Pool3grp3
    -name g3c1b7 -node node7 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 3 -cache readwrite -iogrp 3 -mdiskgrp Pool3grp3
    -name g3c1b8 -node node7 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 3 -cache readwrite -iogrp 3 -mdiskgrp Pool3grp3
    -name g3c1b9 -node node7 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 3 -cache readwrite -iogrp 3 -mdiskgrp Pool3grp3
    -name g3c1b10 -node node7 -nofmtdisk -size 177167400960 -unit b"

RunSsh "mcsop mkvdisk -accessiogrp 3 -cache readwrite -iogrp 3 -mdiskgrp Pool3grp3
    -name g3c2a1 -node node8 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 3 -cache readwrite -iogrp 3 -mdiskgrp Pool3grp3
    -name g3c2a2 -node node8 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 3 -cache readwrite -iogrp 3 -mdiskgrp Pool3grp3
    -name g3c2a3 -node node8 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 3 -cache readwrite -iogrp 3 -mdiskgrp Pool3grp3
    -name g3c2a4 -node node8 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 3 -cache readwrite -iogrp 3 -mdiskgrp Pool3grp3
    -name g3c2a5 -node node8 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 3 -cache readwrite -iogrp 3 -mdiskgrp Pool3grp3
    -name g3c2a6 -node node8 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 3 -cache readwrite -iogrp 3 -mdiskgrp Pool3grp3
    -name g3c2a7 -node node8 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 3 -cache readwrite -iogrp 3 -mdiskgrp Pool3grp3
    -name g3c2a8 -node node8 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 3 -cache readwrite -iogrp 3 -mdiskgrp Pool3grp3
    -name g3c2a9 -node node8 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 3 -cache readwrite -iogrp 3 -mdiskgrp Pool3grp3
    -name g3c2a10 -node node8 -nofmtdisk -size 177167400960 -unit b"

RunSsh "mcsop mkvdisk -accessiogrp 3 -cache readwrite -iogrp 3 -mdiskgrp Pool3grp3
    -name g3c2b1 -node node8 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 3 -cache readwrite -iogrp 3 -mdiskgrp Pool3grp3
    -name g3c2b2 -node node8 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 3 -cache readwrite -iogrp 3 -mdiskgrp Pool3grp3
    -name g3c2b3 -node node8 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 3 -cache readwrite -iogrp 3 -mdiskgrp Pool3grp3
    -name g3c2b4 -node node8 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 3 -cache readwrite -iogrp 3 -mdiskgrp Pool3grp3
    -name g3c2b5 -node node8 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 3 -cache readwrite -iogrp 3 -mdiskgrp Pool3grp3
    -name g3c2b6 -node node8 -nofmtdisk -size 177167400960 -unit b"
```

```
RunSsh "mcsop mkvdisk -accessiogrp 3 -cache readwrite -iogrp 3 -mdiskgrp Pool3grp3
    -name g3c2b7 -node node8 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 3 -cache readwrite -iogrp 3 -mdiskgrp Pool3grp3
    -name g3c2b8 -node node8 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 3 -cache readwrite -iogrp 3 -mdiskgrp Pool3grp3
    -name g3c2b9 -node node8 -nofmtdisk -size 177167400960 -unit b"
RunSsh "mcsop mkvdisk -accessiogrp 3 -cache readwrite -iogrp 3 -mdiskgrp Pool3grp3
    -name g3c2b10 -node node8 -nofmtdisk -size 177167400960 -unit b"

#step4:create hosts
RunSsh  "mcsop  mkhost  -fcwwpn  100000109B1CE563:100000109B1CE562  -force  -iogrp
    0:1:2:3 -name host1-ip65 -type generic"
RunSsh  "mcsop  mkhost  -fcwwpn  10000090FAA90A06:10000090FAA90A07  -force  -iogrp
    0:1:2:3 -name host2-ip66 -type generic"
RunSsh  "mcsop  mkhost  -fcwwpn  100000109B1CF698:100000109B1CF699  -force  -iogrp
    0:1:2:3 -name host3-ip67 -type generic"
RunSsh  "mcsop  mkhost  -fcwwpn  100000109B1CE40E:100000109B1CE40F  -force  -iogrp
    0:1:2:3 -name host4-ip68 -type generic"
RunSsh  "mcsop  mkhost  -fcwwpn  10000090FA9F183F:10000090FA9F183E  -force  -iogrp
    0:1:2:3 -name host5-ip61 -type generic"
RunSsh  "mcsop  mkhost  -fcwwpn  10000090FA92B8E9:10000090FA92B8E8  -force  -iogrp
    0:1:2:3 -name host6-ip62 -type generic"
RunSsh  "mcsop  mkhost  -fcwwpn  10000090FACD07D3:10000090FACD07D2  -force  -iogrp
    0:1:2:3 -name host7-ip63 -type generic"
RunSsh  "mcsop  mkhost  -fcwwpn  10000090FADC8FF7:10000090FADC8FF6  -force  -iogrp
    0:1:2:3 -name host8-ip64 -type generic"

#step5:map luns to the hosts
host=`RunSsh lshost |grep online| cut -d ' ' -f 1`
vdisk=`RunSsh lsvdisk |grep io_grp| cut -d ' ' -f 1`
for hostId in $host;
do
    for vdiskId in $vdisk;
    do
        RunSsh "RunSsh "mcsop mkvdiskhostmap -force -host $hostId $vdiskID"
    done

done
```

Step 2 - Create Physical Volumes on the Master Host System

The ***lvm.create.vg.sh*** command file, listed below performs the following actions:

- Create 160 Physical Volumes
- Create 2 Volume Groups

The command file described above is included in the Supporting Files (see Appendix A) and listed below.

lvm.create.vg.sh

```
#!/bin/sh

vg1=""
j=1
while [ $j -le 10 ]
do
  for i in 0 20 40 60 80 100 120 140
  do
```

```
    let id=$j+$i
    vg1="$vg1 disk$id "
  done
  let j=$j+1
done

vg2=""
j=1
while [ $j -le 10 ]
do
  for i in 10 30 50 70 90 110 130 150
  do
    let id=$j+$i
    vg2="$vg2 disk$id "
  done
  let j=$j+1
done

pvlist1=""
count=0
for i in $vg1
do
  pvcreate /dev/mapper/$i
  pvlist1="$pvlist1 /dev/mapper/$i"
  let count=$count+1
done
vgcreate spc1vg1 $pvlist1

pvlist2=""
count=0
for i in $vg2
do
  pvcreate /dev/mapper/$i
  pvlist2="$pvlist2 /dev/mapper/$i"
  let count=$count+1
done
vgcreate spc1vg2 $pvlist2
```

Step 3 - Create Logical Volumes on the Master Host System

The ***lvm.create.lv.sh*** command file, listed below performs the following actions:

- Create 36 Logical Volumes for ASU-1
- Create 36 Logical Volumes for ASU-2
- Create 8 Logical Volumes for ASU-3

The command file described above is included in the Supporting Files (see Appendix A) and listed below.

lvm.create.lv.sh

```
#!/bin/sh

sz=350g
stripe_width1=80
stripe_width2=80

n=40
i=1
```

```
while [ $i -le $n ]
do
  lvcreate -L $sz -n asu_$i -i $stripe_width1 -I 512 spc1vg1
  lvcreate -L $sz -n asu_$i -i $stripe_width1 -I 512 spc1vg2
  let i=$i+1
done
```

Step 4 – Scan and Activate Logical Volumes

The ***lv_scan.sh*** shell script, listed below, is invoked on the master Host Systems to perform the following actions:

- Scan Physical Volumes
- Scan Volume Groups
- Scan Logical Volumes
- Activate Logical Volumes

The shell script described above is included in the Supporting Files (see Appendix A) and listed below.

lv_scan.sh

```
#!/bin/bash

echo '---------------pvscan-----------------'
pvscan
echo '---------------vgscan-----------------'
vgscan
echo '---------------lvscan-----------------'
lvscan

vgchange -ay spc1vg1
vgchange -ay spc1vg2
```

APPENDIX E: CONFIGURATION INVENTORY

An inventory of the Tested Storage Configuration was collected during the execution the scripts ***profile_as5500g2.sh***. and ***volume_list.sh***. they generated the following log files:

- ***profile_start_as5500g2.txt*** List of configured volumes before the INIT Phase.
- ***profile_end_as5500g2.txt*** List of configured storage before the INIT Phase.
- ***volume_listing_start.txt*** List of configured volumes after TSC restart.
- ***volume_listing_end.txt*** List of configured storage after TSC restart.

The above log files are included in the Supporting Files (see Appendix A).

APPENDIX F: WORKLOAD GENERATOR

The ASUs accessed by the SPC-1 workload generator were defined using the script ***SPC1.asu***.

The benchmark was executed using the script ***full_run_before_persist2.sh***. The script stopped at the end of the PERSIST_1 test phase. Once the TSC had been restarted, the PERSIST_2 test phase was executed using the script ***test_persist_2.sh***.

The above scripts are included in the Supporting Files (see Appendix A) and listed below.

SPC1.asu

```
-- SPC-1 ASU definition file
-- $:id:
--
OFFSET = 0
SIZE=0
--
ASU=1
device=/dev/mapper/spc1vg1-asu_1
device=/dev/mapper/spc1vg1-asu_2
device=/dev/mapper/spc1vg1-asu_3
device=/dev/mapper/spc1vg1-asu_4
device=/dev/mapper/spc1vg1-asu_5
device=/dev/mapper/spc1vg1-asu_6
device=/dev/mapper/spc1vg1-asu_7
device=/dev/mapper/spc1vg1-asu_8
device=/dev/mapper/spc1vg1-asu_9
device=/dev/mapper/spc1vg1-asu_10
device=/dev/mapper/spc1vg1-asu_11
device=/dev/mapper/spc1vg1-asu_12
device=/dev/mapper/spc1vg1-asu_13
device=/dev/mapper/spc1vg1-asu_14
device=/dev/mapper/spc1vg1-asu_15
device=/dev/mapper/spc1vg1-asu_16
device=/dev/mapper/spc1vg1-asu_17
device=/dev/mapper/spc1vg1-asu_18
device=/dev/mapper/spc1vg1-asu_19
device=/dev/mapper/spc1vg1-asu_20
device=/dev/mapper/spc1vg1-asu_21
device=/dev/mapper/spc1vg1-asu_22
device=/dev/mapper/spc1vg1-asu_23
device=/dev/mapper/spc1vg1-asu_24
device=/dev/mapper/spc1vg1-asu_25
device=/dev/mapper/spc1vg1-asu_26
device=/dev/mapper/spc1vg1-asu_27
device=/dev/mapper/spc1vg1-asu_28
device=/dev/mapper/spc1vg1-asu_29
device=/dev/mapper/spc1vg1-asu_30
device=/dev/mapper/spc1vg1-asu_31
device=/dev/mapper/spc1vg1-asu_32
device=/dev/mapper/spc1vg1-asu_33
device=/dev/mapper/spc1vg1-asu_34
device=/dev/mapper/spc1vg1-asu_35
device=/dev/mapper/spc1vg1-asu_36
--
```

```
ASU=2
device=/dev/mapper/spc1vg2-asu_1
device=/dev/mapper/spc1vg2-asu_2
device=/dev/mapper/spc1vg2-asu_3
device=/dev/mapper/spc1vg2-asu_4
device=/dev/mapper/spc1vg2-asu_5
device=/dev/mapper/spc1vg2-asu_6
device=/dev/mapper/spc1vg2-asu_7
device=/dev/mapper/spc1vg2-asu_8
device=/dev/mapper/spc1vg2-asu_9
device=/dev/mapper/spc1vg2-asu_10
device=/dev/mapper/spc1vg2-asu_11
device=/dev/mapper/spc1vg2-asu_12
device=/dev/mapper/spc1vg2-asu_13
device=/dev/mapper/spc1vg2-asu_14
device=/dev/mapper/spc1vg2-asu_15
device=/dev/mapper/spc1vg2-asu_16
device=/dev/mapper/spc1vg2-asu_17
device=/dev/mapper/spc1vg2-asu_18
device=/dev/mapper/spc1vg2-asu_19
device=/dev/mapper/spc1vg2-asu_20
device=/dev/mapper/spc1vg2-asu_21
device=/dev/mapper/spc1vg2-asu_22
device=/dev/mapper/spc1vg2-asu_23
device=/dev/mapper/spc1vg2-asu_24
device=/dev/mapper/spc1vg2-asu_25
device=/dev/mapper/spc1vg2-asu_26
device=/dev/mapper/spc1vg2-asu_27
device=/dev/mapper/spc1vg2-asu_28
device=/dev/mapper/spc1vg2-asu_29
device=/dev/mapper/spc1vg2-asu_30
device=/dev/mapper/spc1vg2-asu_31
device=/dev/mapper/spc1vg2-asu_32
device=/dev/mapper/spc1vg2-asu_33
device=/dev/mapper/spc1vg2-asu_34
device=/dev/mapper/spc1vg2-asu_35
device=/dev/mapper/spc1vg2-asu_36
---
ASU=3
device=/dev/mapper/spc1vg1-asu_37
device=/dev/mapper/spc1vg1-asu_38
device=/dev/mapper/spc1vg1-asu_39
device=/dev/mapper/spc1vg1-asu_40
device=/dev/mapper/spc1vg2-asu_37
device=/dev/mapper/spc1vg2-asu_38
device=/dev/mapper/spc1vg2-asu_39
device=/dev/mapper/spc1vg2-asu_40
```

full_run_before_persist2.sh

```
#!/bin/sh
echo "excute script profile_as5500g2.sh and volume_list.sh"
start_out=start`date '+%m%d_%H%M%S'`
./profile_as5500g2.sh $start_out
./volume_list.sh $start_out
sleep 3

export PATH=/v302:$PATH
cfg=8HOST.HST
base=1500200
```

```
let pers_iops=$base/4
init_speed=10000

./spc1_v3.0.2 -master $cfg  -run SPC1_INIT -iops $init_speed
./spc1_v3.0.2 -master $cfg -run SPC1_VERIFY -iops 100
./spc1_v3.0.2 -master $cfg -run SPC1_METRICS -iops $base
./spc1_v3.0.2 -master $cfg -run SPC1_VERIFY -iops 100
./spc1_v3.0.2 -master $cfg  -run SPC1_PERSIST_1 -iops $pers_iops
echo "Power cycle TSC, then Enter to continue"
```

test_persist_2.sh

```
#!/bin/sh
echo   "after   restarted   cluster,excute   script   profile_as5500g2.sh   and
   volume_list.sh"
end_out=end`date '+%m%d_%H%M%S'`
./profile_as5500g2.sh $end_out
./volume_list.sh $end_out
sleep 3

export PATH=/v302:$PATH
cfg=8HOST.HST
base=1500200
let pers_iops=$base/4
echo "target: $base persist_iops: $pers_iops"
sleep 10

./spc1_v3.0.2 -master $cfg -run SPC1_PERSIST_2 -iops $pers_iops
```