SPC Benchmark 1™

Full Disclosure Report

HUAWEI TECHNOLOGIES CO., LTD.
Huawei FusionStorage™

SPC-1 V3.4.0

Submission Identifier: A31007

Submitted For Review: June 08, 2017

Second Edition – February 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

Zhong Xu
Huawei Technologies Co., Ltd.
Huawei Industrial Base, Bantian,
Longgang, Shenzhen city,
Guangdong province, China

June 7, 2017

I verified the SPC Benchmark 1™ (SPC-1™ Revision3.4.0) test execution and performance results of the following Tested Storage Product:

HUAWEI FUSIONSTORAGE™

The results were:

SPC-1 IOPS™	4,500,392
SPC-1 Price-Performance™	$0.33/SPC-1 IOPS™
SPC-1 IOPS™ Response Time	0.787 ms
SPC-1 Overall Response Time	0.539 ms
SPC-1 ASU Capacity	83,108 GB
SPC-1 ASU Price	$17.87/GB
SPC-1 Total System Price	$1,484,643.15

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 Version 3.0.2 Build g823a. 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.storageperformance.org** under the Submission Identifier **A31007**.

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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

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LETTER OF GOOD FAITH

HUAWEI

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Huawei Industrial Base, Bantian, Longgang
Shenzhen city
Guangdong province
China
Tel: 0086-755-28780808
http://www.huawei.com/en/

Date: June 1, 2017

From: Huawei Technologies Co., Ltd.

To: Mr. Francois Raab, Certified SPC Auditor
          InfoSizing, Inc.
          20 Kreg Lane
          Manitou Springs, CO 80829

Subject: SPC-1 Letter of Good Faith for the Huawei FusionStorage

Huawei Technologies 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 benchmark results and materials we have submitted for that product are complete, accurate, and in full compliance with V3.4 of the SPC-1 benchmark specification.

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

Signed: Date:

Meng Guangbin   6.1.2017

Meng Guangbin
President of Storage Product Line

SPC BENCHMARK 1™

EXECUTIVE SUMMARY

HUAWEI TECHNOLOGIES CO., LTD.
HUAWEI FUSIONSTORAGE™

SPC-1 IOPS™	**4,500,392**
SPC-1 Price-Performance™	**$329.90/SPC-1 KIOPS™**
SPC-1 IOPS™ Response Time	0.787 ms
SPC-1 Overall Response Time	0.539 ms
SPC-1 ASU Capacity	83,108 GB
SPC-1 ASU Price	$17.87/GB
SPC-1 Total System Price	$1,484,643.15
Data Protection Level	Protected 2 (mirroring and full redundancy)
Physical Storage Capacity	233,454 GB
Pricing Currency / Target Country	U.S. Dollars / People's Republic of China

SPC-1 V3.4.0

SUBMISSION IDENTIFIER: A31007

SUBMITTED FOR REVIEW: JUNE 8, 2017

Benchmark Configuration Diagram

Host Systems

21 x Huawei FusionServer™ RH2288H V3 (each with)
2 x Intel E5 2690 V4 2.6 GHz 14 Core Xeon Processors | 64GB Memory

1 x Intel 82599 2-port 10Gbps Ethernet Adapter per node

Huawei CloudEngine™ 12808 Ethernet Switch

42 x Ethernet connections (2 per host system)

32 x Ethernet connections

Huawei CloudEngine™ 12808 Ethernet Switch

Huawei FusionStorage™ Distributed Storage System

144 x Ethernet connections (4 per Storage Node)

2 x Ethernet connections (1 per Switch/Manager Node)

Manager Nodes

Storage/ZK Nodes

33 x Huawei FusionServer™ RH2288H V3 Storage Nodes (each with)
  2 x Intel E5 2690 V4 2.6GHz 14 Core Xeon Processors | 256GB Memory
  2 x Intel 82599 2-port 10Gbps Ethernet Adapters
  4 x 1600GB Huawei ES3600C V3 NVMe SSD Cards

3 x Huawei FusionServer™ RH2288H V3 Storage+ZK Nodes (each with)
  2 x Intel E5 2690 V4 2.6GHz 14 Core Xeon Processors | 288GB Memory
  2 x Intel 82599 2-port 10Gbps Ethernet Adapters
  4 x 1600GB Huawei ES3600C V3 NVMe SSD Cards
  1 x 600GB Huawei ES3000 V2 SSD Card

2 x Huawei FusionServer™ RH2288 V3 Manager Nodes (each with)
  2 x Intel E5 2683 V4 2.1GHz 14 Core Xeon Processors | 32GB Memory
  1 x Intel 82599 2-port 10Gbps Ethernet Adapter
  2 x 300GB SAS 10Krpm HDD

Tested Storage Configuration (TSC)

Tested Storage Product Description

Huawei FusionStorage fully converged cloud storage features massive scale-out capabilities designed for cloud-based architectures. The on-board storage system software combines the local storage resources of standard x86 servers into fully distributed storage pools, allowing a single system to provide block, file, and object storage services to the upper layer. An enterprise can easily obtain the flexibility and efficiency in data storage required to keep up with the ever-changing dynamics of business.

For more details, visit:

http://e.huawei.com/en/products/cloud-computing-dc/storage/massive-storage/fusionstorage

Priced Storage Configuration Components

21 x Intel 82599 2-port 10Gbps Ethernet Adapters

2 x Huawei CloudEngine™ 12808 Ethernet Switches
 33 x Huawei FusionServer™ RH2288H V3 Storage Nodes (each with)
     2 x Intel E5 2690 V4 2.6GHz 14 Core Xeon Processors | 256GB Memory
     2 x Intel 82599 2-port 10Gbps Ethernet Adapters
     4 *x* 1600GB Huawei ES3600C V3 NVMe SSD Cards
 3 x Huawei FusionServer™ RH2288H V3 Storage+ZK Nodes (each with)
     2 x Intel E5 2690 V4 2.6GHz 14 Core Xeon Processors | 288GB Memory
     2 x Intel 82599 2-port 10Gbps Ethernet Adapters
     4 *x* 1600GB Huawei ES3600C V3 NVMe SSD Cards
     1 *x* 600GB Huawei ES3000 V2 SSD Card
 2 x Huawei FusionServer™ RH2288 V3 Manager Nodes (each with)
     2 x Intel E5 2683 V4 2.1GHz 14 Core Xeon Processors | 32GB Memory
     1 x Intel 82599 2-port 10Gbps Ethernet Adapter
     2 x 300GB SAS 10Krpm HDD

Storage Configuration Pricing

Description		Qty	Unit Price	Ext. Price	Disc.	Disc. Price
Hardware & Software						
BC4M20HGSA	RH2288H V3 (12*3.5inch HDD Chassis)(Only for oversea,except Japan)H22H-03	36	1,410.00	50,760.00	45%	27,918.00
BC4M20HGSB	RH2288 V3 (12*3.5inch HDD Chassis)(Only for oversea,except Japan)H22M-03	1	1,350.00	1,350.00	45%	742.50
BC1M35HGSB	RH2288 V3 (8*2.5inch HDD Chassis)(Only for oversea,except Japan)H22M-03	1	1,250.00	1,250.00	45%	687.50
BC1M64CPU	Intel Xeon E5-2690 v4(2.6GHz/14-core/35MB/135W) Processor (with heatsink)	72	4,769.00	343,368.00	45%	188,852.40
BC1M63CPU	Intel Xeon E5-2683 v4(2.1GHz/16-core/40MB/120W) Processor (with heatsink)	4	4,059.00	16,236.00	45%	8,929.80
N24DDR403	DDR4 RDIMM, 32GB, 2400MT/s, 2Rank(2G*4bit), 1.2V, ECC	171	1,039.00	177,669.00	45%	97,717.95
N24DDR402	DDR4 RDIMM 16GB,2400MT/s, 2Rank(1G*8bit), 1.2V, ECC	244	539.00	131,516.00	45%	72,333.80
CN21EEACJ	ES3000 V2-600 PCIe SSD Card (600GB) Half-height half-length	3	6,600.00	19,800.00	64%	7,128.00
CN2M10FACM	ES3600C V3,NVMe SSD Card,1600GB,Mixed Use,3 DWPD,PCIe 3.0 x4,HH/HL	144	7,390.00	1,064,160.00	64%	383,097.60
BC1M01ESMLB	SR430C-M 1G(LSI3108) SAS/SATA RAID Card,RAID0,1,5,6,10,50,60,12Gb/s,1GB Cache,used for RH2288 V3/RH2288H V3's 12&25HDD chassis/5288 V3	1	565.00	565.00	45%	310.75
BC1M07ESMLA	SR430C-M 2G(LSI3108) SAS/SATA RAID Card,RAID0,1,5,6,10,50,60,12Gb/s,2GB Cache,used for RH2288 V3/RH2288H V3's 12&25HDD chassis/5288 V3	1	665.00	665.00	45%	365.75
N300S1210W2	HDD,300GB,SAS 12Gb/s,10K rpm,128MB or above,2.5inch(2.5inch Drive Bay)	4	315.00	1,260.00	45%	693.00
BC1M10IHDD	2*2.5" Rear Hard Disk Backplane Module	1	59.00	59.00	45%	32.45
BC1M01FXEB02	SM231 Onboard NIC,2x10GE Optical Interface(Intel 82599),SFP+(with 2x Multi-mode Optical Transceiver)	59	1,075.00	63,425.00	45%	34,883.75
CN2ITGAA20	Ethernet Adapter,10Gb Optical Interface(Intel 82599),2-Port,SFP+(with 2x Multi-mode Optical Transceiver),PCIe 2.0 x8	36	566.00	20,376.00	0%	20,376.00
BC1M3S8XV3	PCIe Riser Card,3 slot(x8,x8,x8),used for RH2288 V3/RH2288H V3/5288 V3	72	119.00	8,568.00	45%	4,712.40
EN3MCACC	750W Platinum AC Power Module	76	279.00	21,204.00	45%	11,662.20
BC1M03FANA	8056 Plus Fan module	144	43.00	6,192.00	45%	3,405.60
BC1M06FAN	8038 Fan module	8	29.00	232.00	45%	127.60
EGUIDER01	2U Static Rail Kit	38	28.00	1,064.00	0%	1,064.00
FS1AD00SFT02	FusionStorage Advanced Edition Capacity license,per TB	231	293.00	67,683.00	50%	33,841.50
CE12808A-B02	CE12808 AC Bundle2 (AC Assembly Chassis,2*MPUA,5*SFU08B,4*PHD-3000WA)	2	111,000.00	222,000.00	70%	66,600.00
SFP-10G-USR	10GBase-USR Optical Transceiver,SFP+,10G,Multi-mode Module(850nm,0.1km,LC)	252	129.00	32,508.00	40%	19,504.80
CE-L48XS-EC	48-Port-10GE Interface Card(EC,SFP+)	6	37,000.00	222,000.00	70%	66,600.00

CE128-LIC-B15	CloudEngine 12800Basic SW,V100R005	2	10,000.00	20,000.00	70%	6,000.00
SS-OP-D-LC-M-10	Patch cord-LC/PC-LC/PC-Multimode-A1b-2mm-10m-PVC-Orange	220	8.00	1,760.00	0%	1,760.00
RACK-42U-1	42U Storage AC Cabinet	5	1,200.00	6,000.00	0%	6,000.00
PDU2000-32-1PH-20/4-B2	AC Power Distribution Unit	10	180.00	1,800.00	0%	1,800.00
Hardware & Software Subtotal						**1,067,147.35**
Support & Maintenance						
88125ESH	RH2288 V3 Installation Service - Engineering	2	546.68	1,093.36	30%	765.35
88125ESH	RH2288H V3 Installation Service - Engineering	36	2,102.80	75,700.80	30%	52,990.56
88125ESH	CE12808 Installation Service - Engineering	2	3,986.14	7,972.28	20%	6,377.82
88142DVU	FusionStorage Advanced Edition Solution Design Service	1	46,290.00	46,290.00	20%	37,032.00
88142DVP	FusionStorage Advanced Edition Solution Implementation Service	1	46,290.00	46,290.00	20%	37,032.00
TPV40550	Remark:Advance Edition Capactiy108.8TB;	1	0.01	0.01	20%	0.01
FS2AD0SNS03Y	FusionStorage Advanced Edition,3 Years Subscription and Support Service,per TB	231	187.00	43,197.00	50%	21,598.50
02311GGX-88134ULF-36	FusionCube 2000-RH2288H V3 (12HDD EXP Chassis) H22H-03 For oversea(except Japan)-Hi-Care Onsite Premier 24x7x4H Service-36Month(s)	36	903.00	32,508.00	30%	22,755.60
02311GHL-88134ULF-36	RH2288 V3(12HDD EXP Chassis)H22M-03 For oversea(except Japan)-Hi-Care Onsite Premier 24x7x4H Service-36Month(s)	1	903.00	903.00	30%	632.10
02311GGP-88134ULF-36	RH2288 V3(8HDD Passthrough Chassis)H22M-03 For oversea(except Japan)-Hi-Care Onsite Premier 24x7x4H Service-36Month(s)	1	903.00	903.00	30%	632.10
03022UUA-88134ULF-36	ES3000 V2-600 PCIe SSD Card (600GB) Half-height half-length-Hi-Care Onsite Premier 24x7x4H Service-36Month(s)	3	330.00	990.00	30%	693.00
02311PBK-88134ULF-36	ES3000 V3,CN2M16FACM,ES3600C-1600GB-3-Hi-Care Onsite Premier 24x7x4H Service-36Month(s)	144	492.54	70,925.76	30%	49,648.03
02356212-88134UFR-36	CE12808 AC Bundle2 (AC Assembly Chassis,2*MPUA,5*SFU08B,4*PAC-2700WA)-Hi-Care Onsite Premier 24x7x4H Service-36Month(s)	2	60,825.00	121,650.00	20%	97,320.00
02310MNW-88134UFR-36	10GBase-USR Optical Transceiver,SFP+,10G,Multi-mode Module(850nm,0.1km,LC)-Hi-Care Onsite Premier 24x7x4H Service-36Month(s)	252	65.95	16,619.40	20%	13,295.52
03022MNN-88134UFR-36	48-Port-10GE Interface Card(EC,SFP+)-Hi-Care Onsite Premier 24x7x4H Service-36Month(s)	6	15,984.00	95,904.00	20%	76,723.20
Support & Maintenance Subtotal						**417,495.80**

|	
SPC-1 Total System Price	**1,484,643.15**
SPC-1 IOPS™	4,500,392
SPC-1 Price-Performance™ ($/SPC-1 KIOPS™)	**329.90**
SPC-1 ASU Capacity (GB)	83,108
SPC-1 ASU Price ($/GB)	**17.87**

Third-Party Reseller: Huawei Technologies Co., Ltd. only sells its products to third-party resellers who, in turn, sell those products to U.S. customers. The above reflects the pricing quoted by one of those third-party resellers. See Appendix B of the Full Disclosure Report for a copy of the third-party reseller's quotation.

Discount Details: The discounts shown are based on the storage capacity purchased and are generally available.

Warranty: Hi-Care Premier On-Site Service include: 7x24 Technical Assistance Center Access. Access to all new software updates and Online Support. 24x7 with 4-hour On-site Hardware Replacement.

Availability Date: Currently available.

Response Time and Throughput Graph
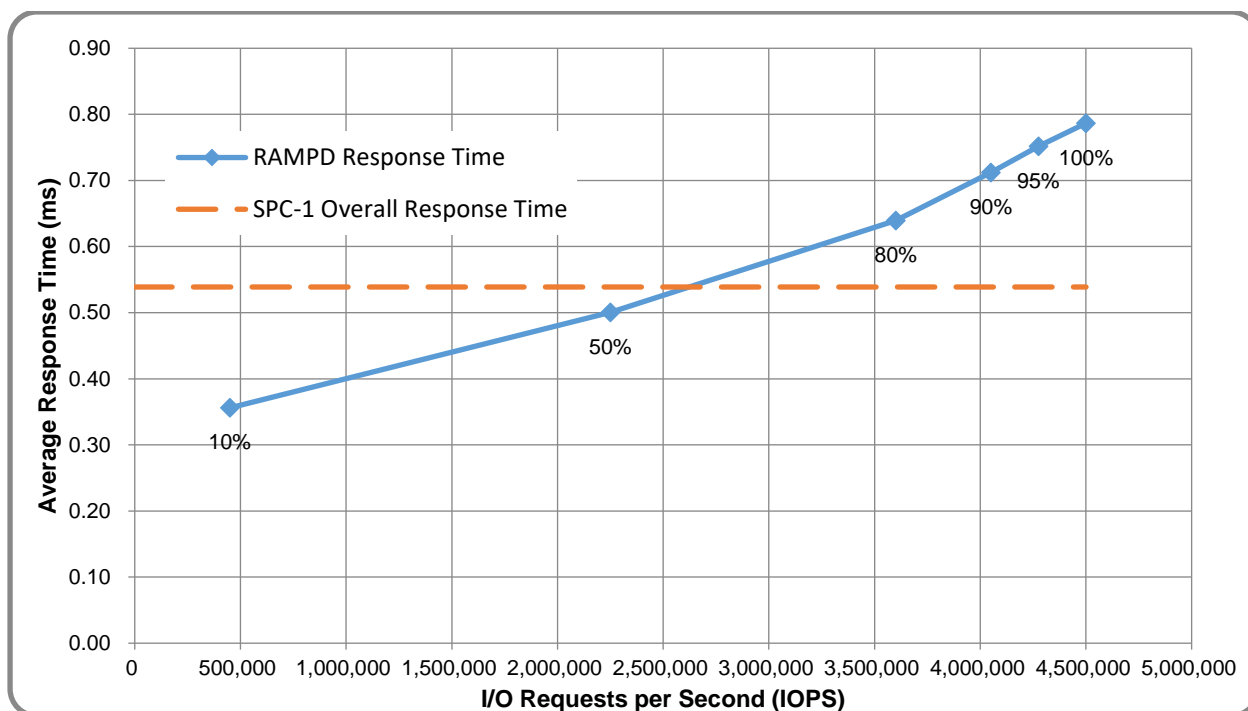
Contact Information	
Test Sponsor Primary Contact	Huawei Technologies Co., Ltd.– www.huawei.com Zhong Xu– xuzhong@huawei.com
SPC Auditor	InfoSizing – www.sizing.com Francois Raab – francois@sizing.com

Revision Information	
SPC Benchmark 1™ Revision	V3.4.0
SPC-1 Workload Generator Revision	V3.0.2 build g823a
Publication Revision History	• First Edition: June 8,2017 • Second Edition: February 15, 2018 Updated SPC-1 Price-Performance™ metric based on v3.6.0 definition.

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).
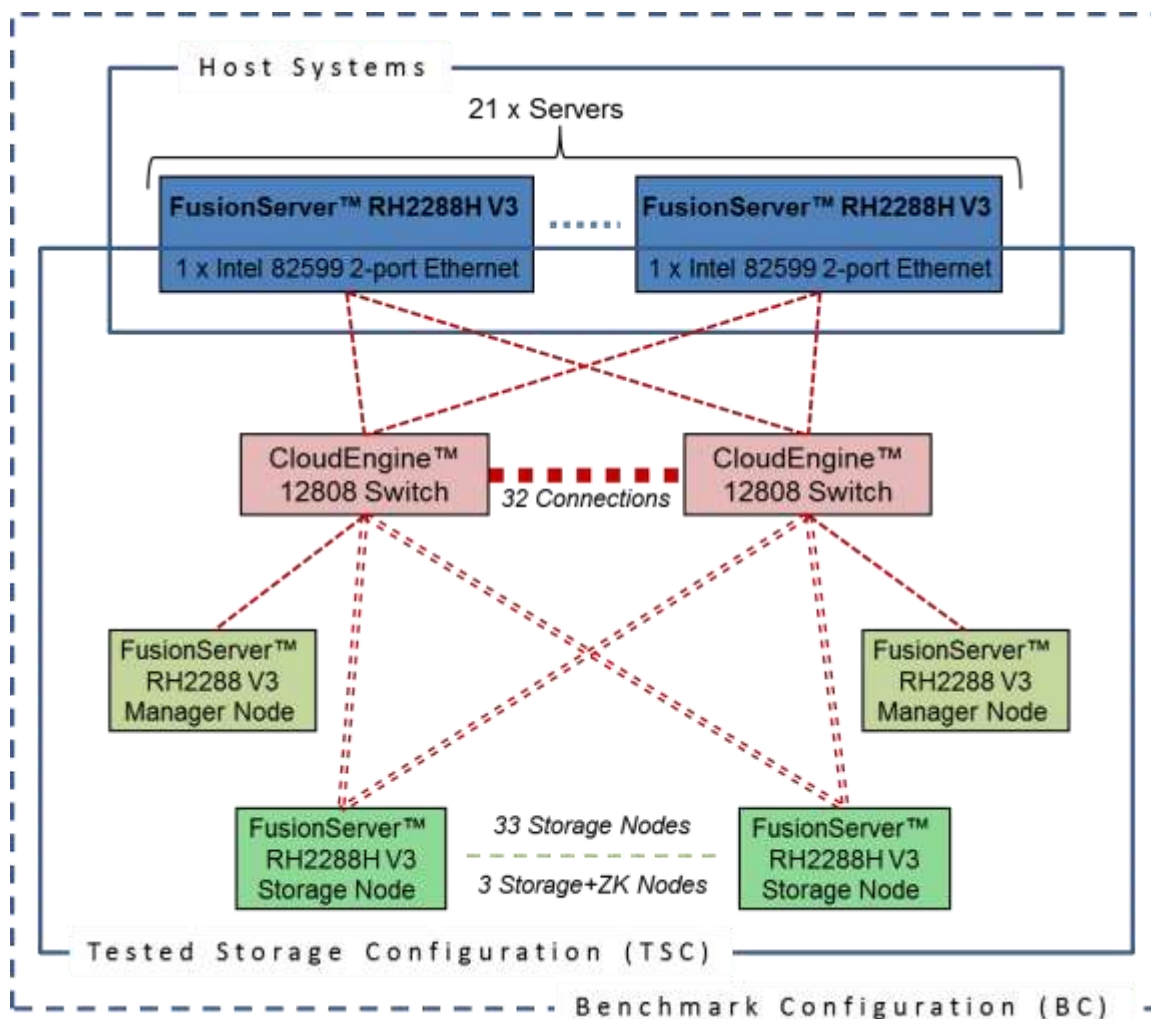
Storage Network Configuration

The Tested Storage Configuration (TSC) involved a FusionStorage™ cluster of server nodes, driven by 21 Host Systems (Huawei FusionServer™ RH2288H V3). Each RH2288H host was connected one-to-one to two Huawei CloudEngine™ 12808 Ethernet Switches operating at 10Gbps and linked together via 32 connections.

The cluster included two manager nodes and 36 storage nodes. The manager nodes (Huawei FusionServer™ RH2288 V3) had a single Ethernet connection to one of the switches. The 36 storage nodes had two Ethernet connections to each of the switches.

Host System and Tested Storage Configuration Components

The software deployment on the FusionStorage™ included the following components:

- FusionStorage Manger (FSM): On two manager nodes in active/standby mode to provides management functions.

- Object Storage Device (OSD): On 36 storage nodes to perform I/O operations.

- Zookeeper (ZK): On three of the storage nodes to provides Cluster Arbitration service.

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

Host Systems
21 x Huawei FusionServer™ RH2288H V3 (each with) 　　　　2 x Intel E5 2690 V4 2.6 GHz 14 Core Xeon Processors 　　　　64GB Memory 　　　　Red Hat Enterprise Linux 7.1
Tested Storage Configuration
21 x Intel 82599 2-port 10Gbps Ethernet Adapters (1 per Host System)
2 x Huawei CloudEngine™ 12808 Ethernet Switches 33 x Huawei FusionServer™ RH2288H V3 Storage Nodes (each with) 　　　　2 x Intel E5 2690 V4 2.6GHz 14 Core Xeon Processors | 256GB Memory 　　　　2 x Intel 82599 2-port 10Gbps Ethernet Adapters 　　　　4 *x* 1600GB Huawei ES3600C V3 NVMe SSD Cards 3 x Huawei FusionServer™ RH2288H V3 ZK Storage+ZK Nodes (each with) 　　　　2 x Intel E5 2690 V4 2.6GHz 14 Core Xeon Processors | 288GB Memory 　　　　2 x Intel 82599 2-port 10Gbps Ethernet Adapters 　　　　4 *x* 1600GB Huawei ES3600C V3 NVMe SSD Cards 　　　　1 *x* 600GB Huawei ES3000 V2 SSD Card 2 x Huawei FusionServer™ RH2288 V3 Manager Nodes (each with) 　　　　2 x Intel E5 2683 V4 2.1GHz 14 Core Xeon Processors | 32GB Memory 　　　　1 x Intel 82599 2-port 10Gbps Ethernet Adapters 　　　　2 x 300GB SAS 10Krpm HDD

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	54	692.6	692.6	37,398.4	45.00%
ASU-2	54	692.6	692.6	37,398.4	45.00%
ASU-3	12	692.6	692.6	8,310.8	10.00%
			SPC-1 ASU Capacity	**83,107.6**	

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
1.6TB NVMe SSD	144	1600.4	230,457.6
600GB PCIe SSD	3	600.1	1,800.3
300GB HDD	4	299.0	1,196.0
Total Physical Capacity			**233,453.9**
Physical Capacity Utilization			**35.59%**

Data Protection

The data protection level used for all logical volumes was **Protected 2**, which was accomplished by replicating all data on two separate nodes. In addition, all components and access paths from the Host Systems to the FusionStorage cluster were redundant.

SPC Benchmark 1™ V3.4.0 FULL DISCLOSURE REPORT Submission Identifier: A31007
Huawei Technologies Co., Ltd   Submitted for Review: June 8, 2017
Huawei FusionStorage

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.
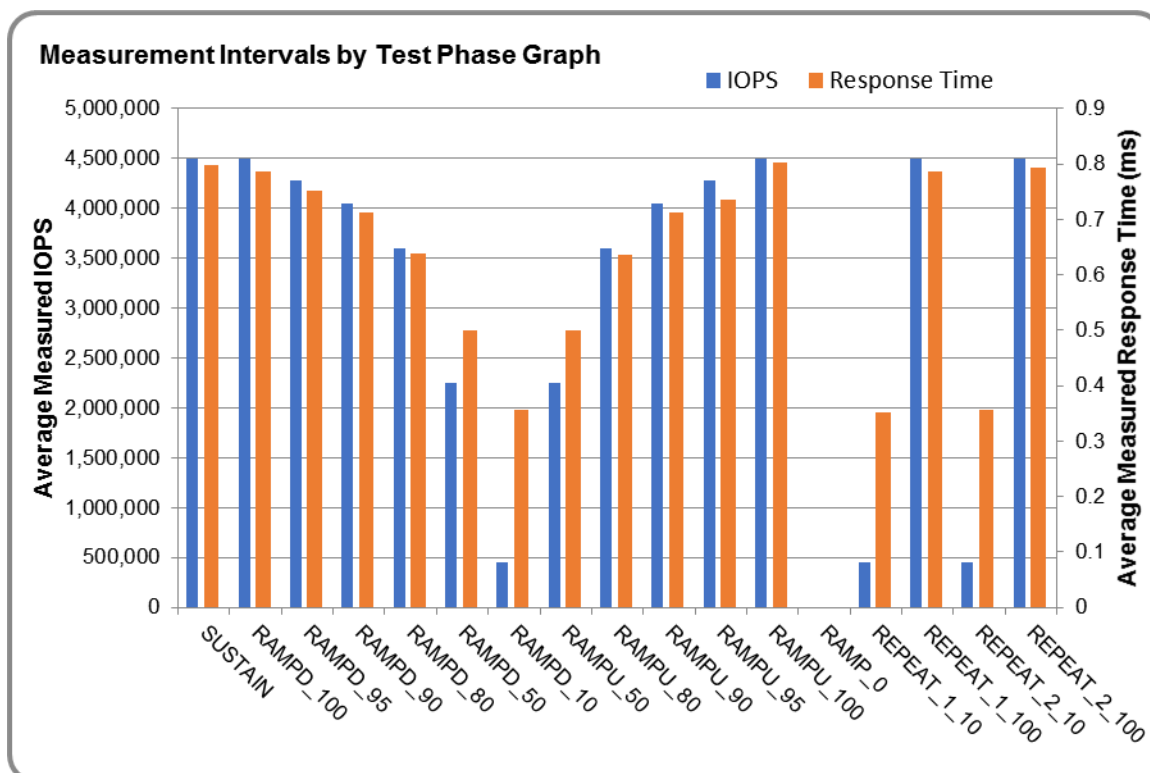
Exception and Waiver

During the course of the benchmark audit, no exceptions were encountered and no benchmark requirements were waived.

SUSTAIN Test Phase
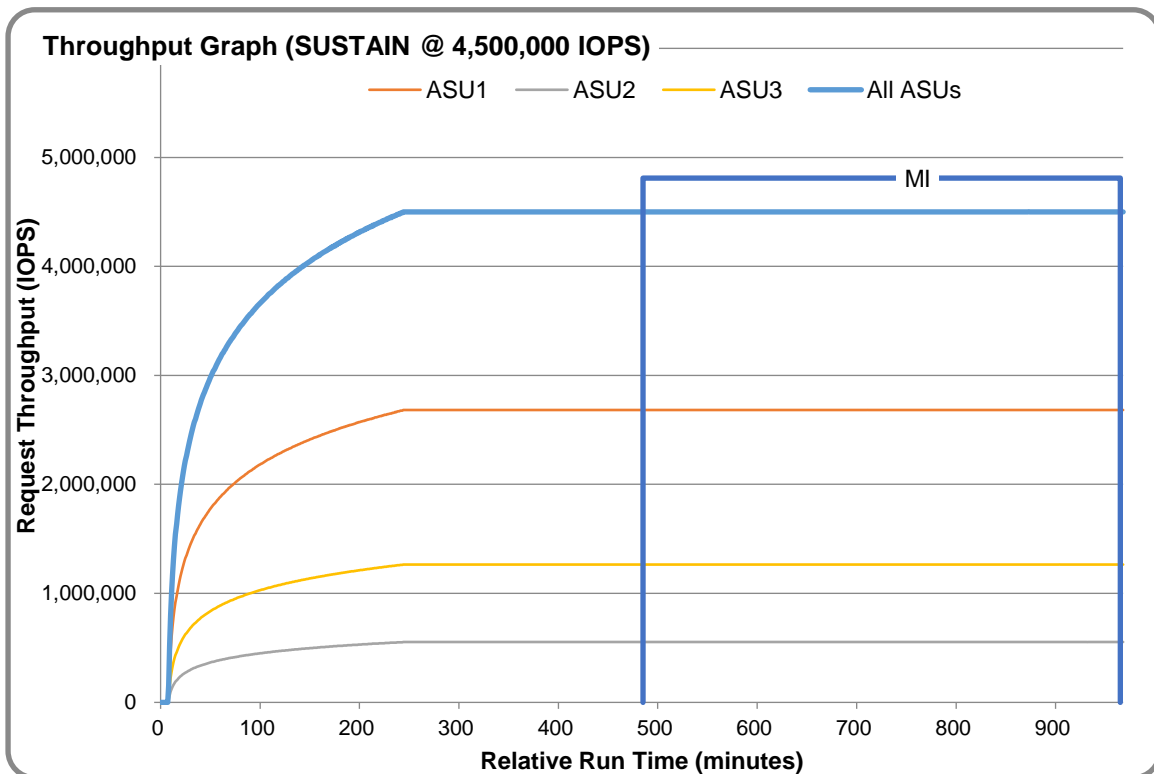
SUSTAIN – Results File

The results file generated during the execution of the SUSTAIN Test Phase is included in the Supporting Files (see Appendix A) as follows:
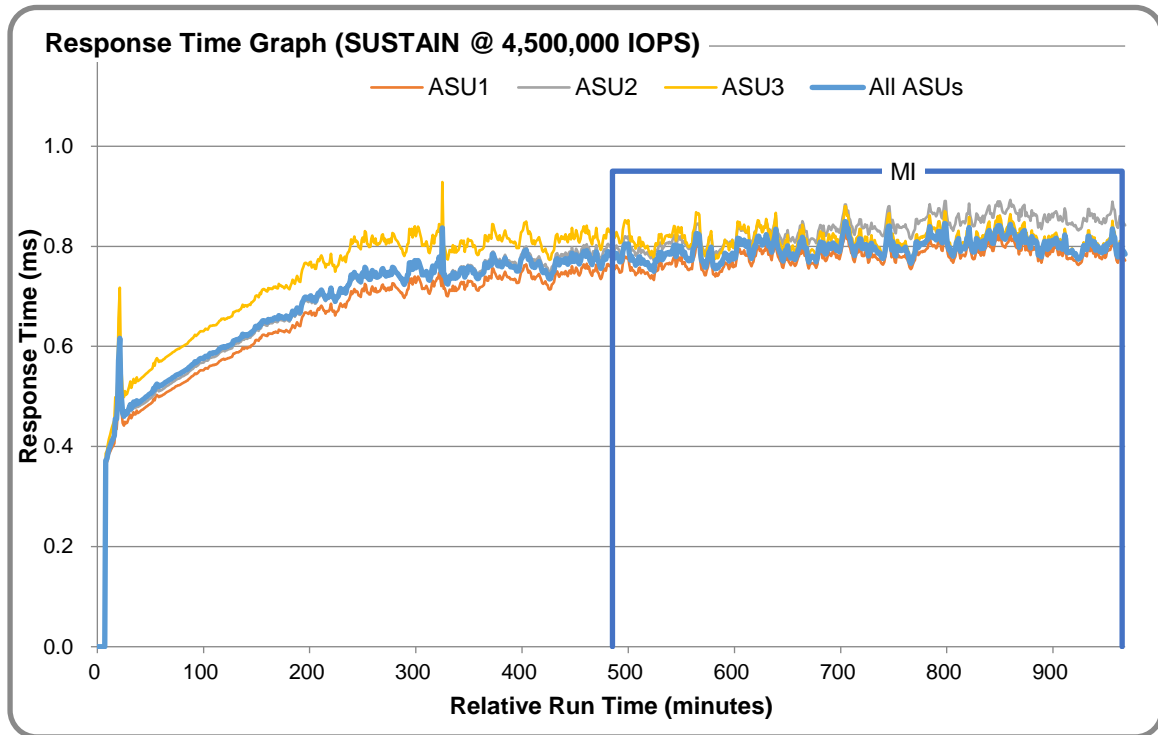
- **SPC1_METRICS_0_Raw_Results.xlsx**

SUSTAIN – Execution Times

Interval	Start Date & Time	End Date &Time	Duration
Transition Period	10-May-17 12:42:10	10-May-17 20:42:10	8:00:00
Measurement Interval	10-May-17 20:42:10	11-May-17 04:42:11	8:00:01

SUSTAIN – Throughput Graph

SUSTAIN – Response Time Graph

Response Time Graph (SUSTAIN @ 4,500,000 IOPS)
ASU1 — ASU2 — ASU3 — All ASUs

SUSTAIN – Data Rate Graph

Data Rate Graph (SUSTAIN @ 4,500,000 IOPS)
ASU1 — ASU2 — ASU3 — All ASUs
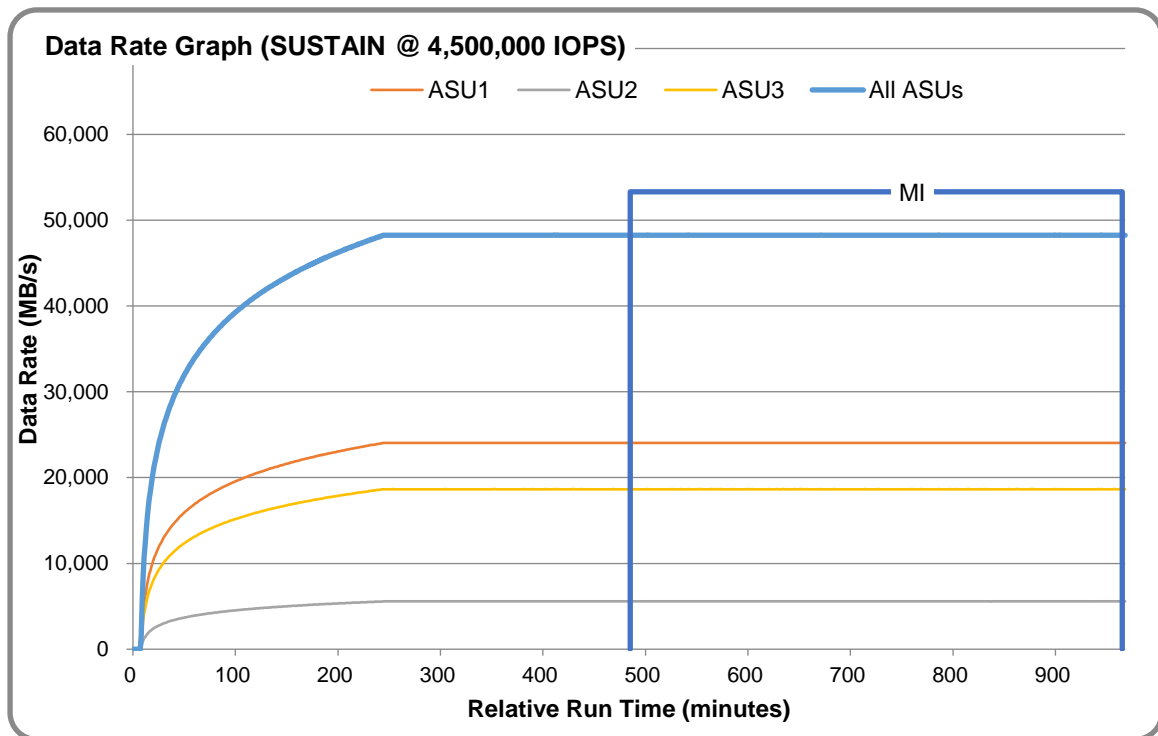
SUSTAIN – Response Time Frequency Graph
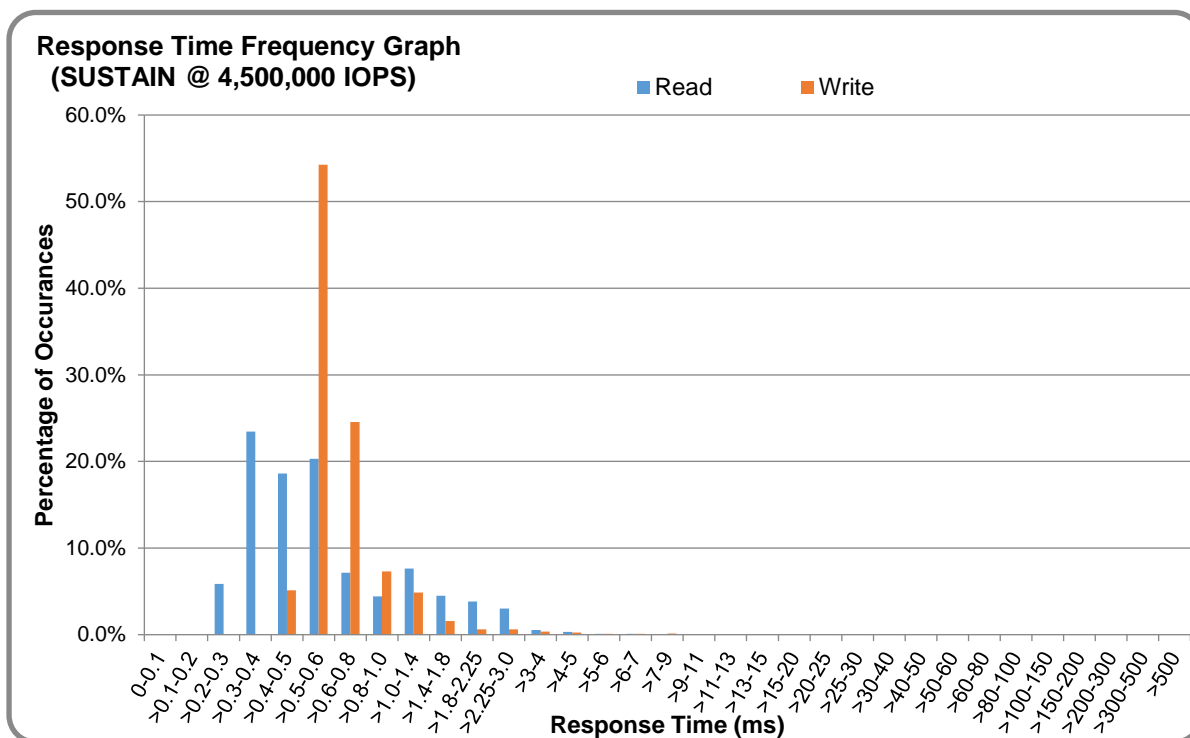
SUSTAIN – Intensity Multiplier

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	0.0003	0.0001	0.0002	0.0001	0.0004	0.0002	0.0003	0.0001
Difference	0.006%	0.001%	0.003%	0.001%	0.006%	0.003%	0.005%	0.002%

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:
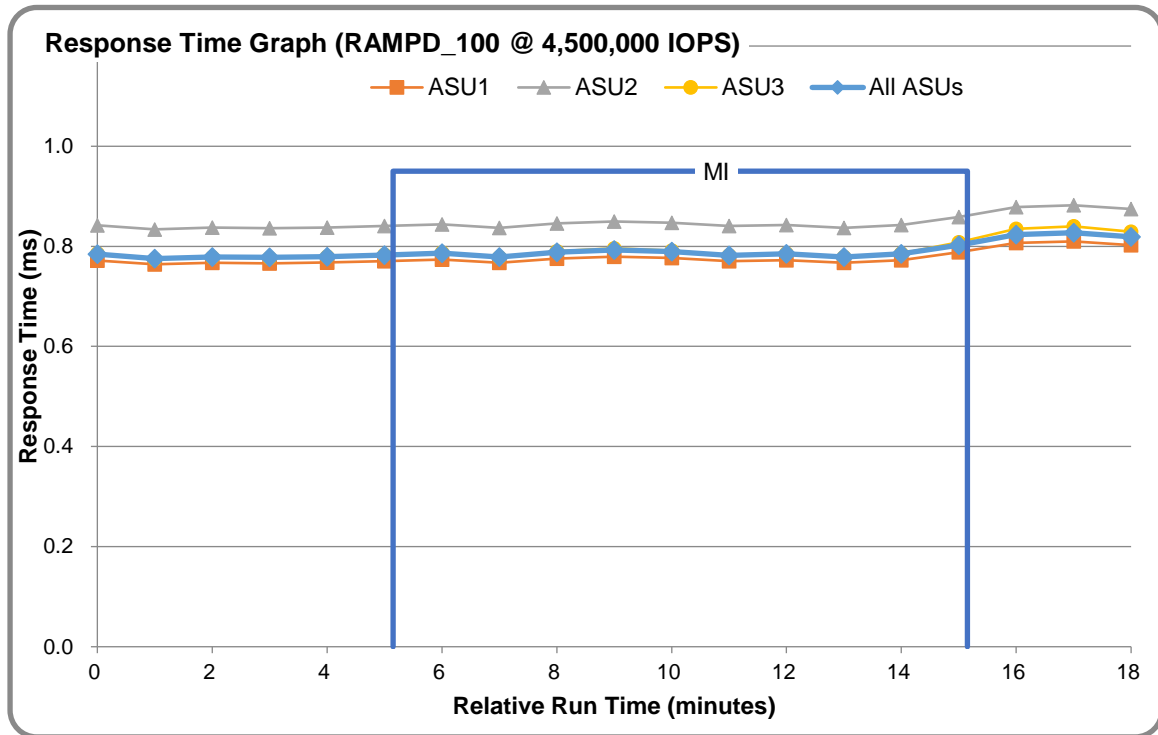
- **SPC1_METRICS_0_Raw_Results.xlsx**

RAMPD_100 – Execution Times

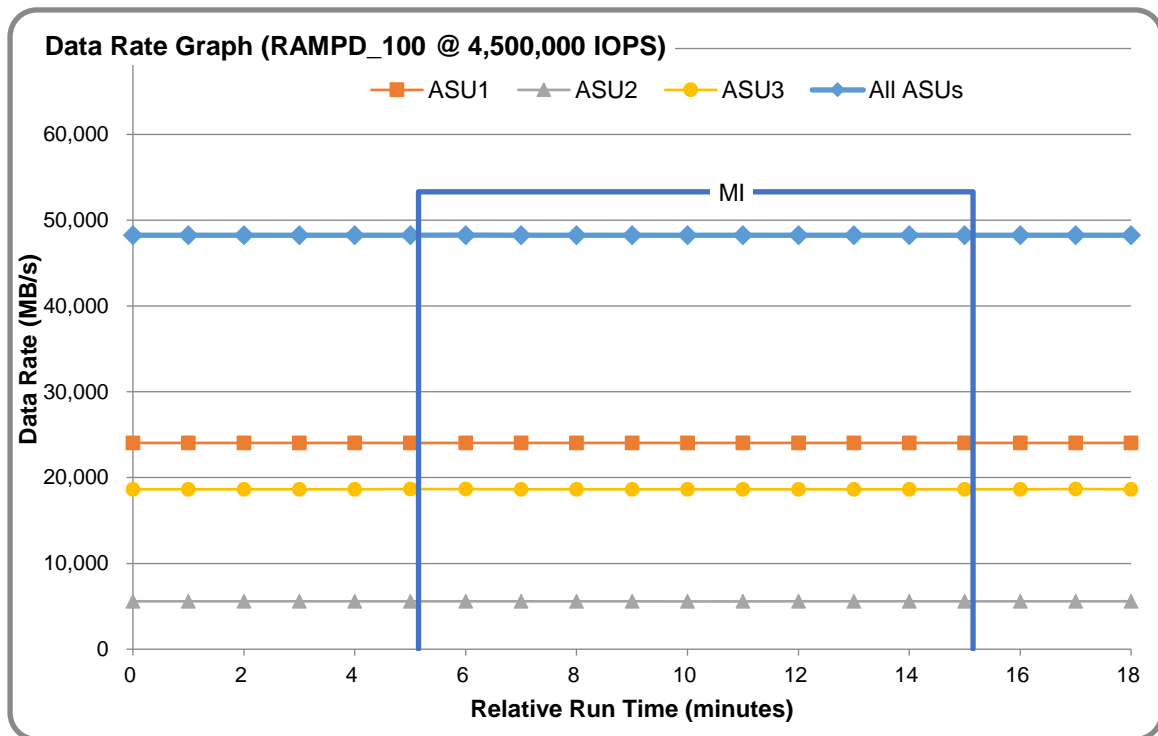| Interval	Start Date & Time	End Date &Time	Duration
Transition Period	11-May-17 04:45:11	11-May-17 04:50:12	0:05:01
Measurement Interval	11-May-17 04:50:12	11-May-17 05:00:12	0:10:00

RAMPD_100 – Throughput Graph
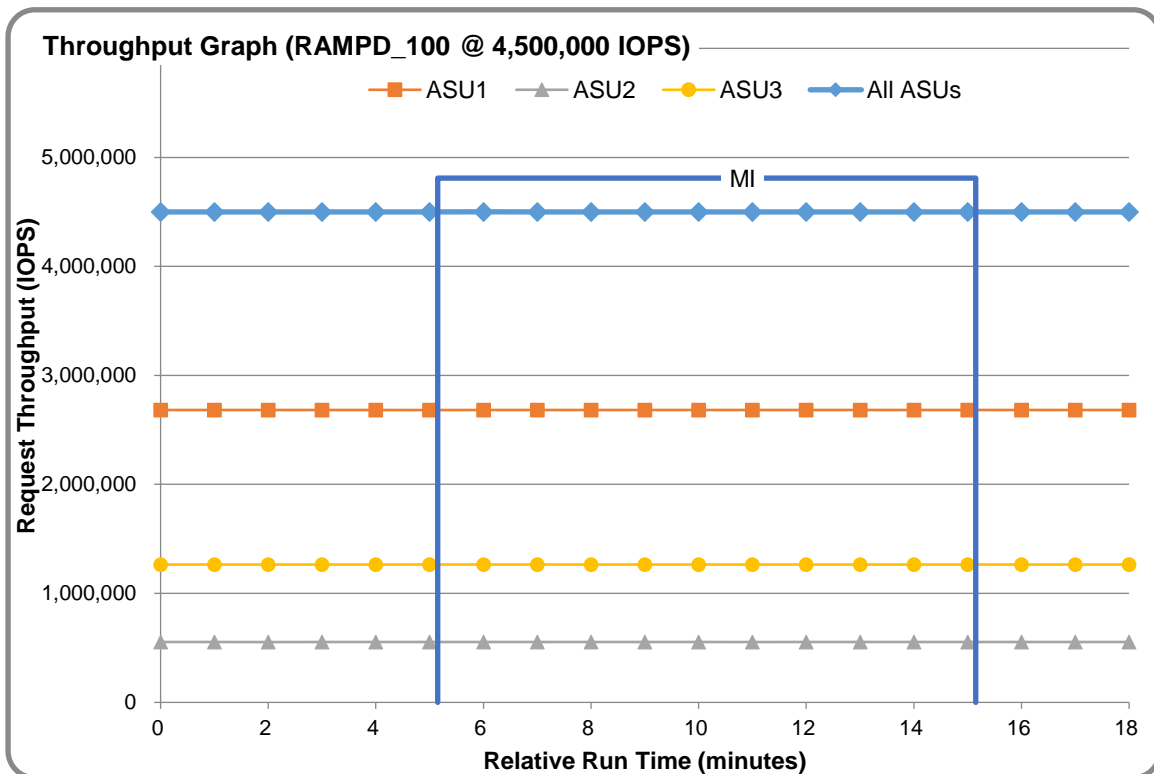
RAMPD_100 – Response Time Graph

RAMPD_100 – Data Rate Graph

RAMPD_100 – Response Time Frequency Graph

**Response Time Frequency Graph
(RAMPD_100 @ 4,500,000 IOPS)**

■ Read   ■ Write
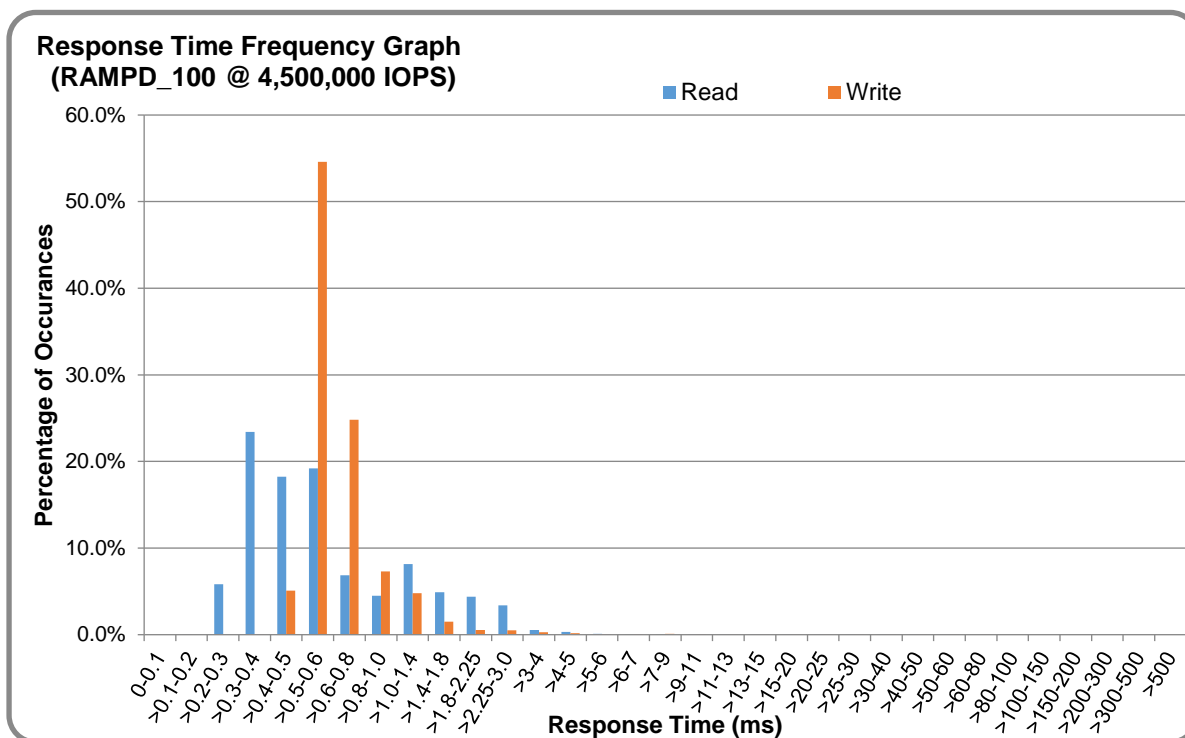
RAMPD_100 – Intensity Multiplier

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	0.0001	0.0003	0.0000	0.0003	0.0002	0.0004	0.0001
Difference	0.015%	0.007%	0.006%	0.001%	0.016%	0.001%	0.007%	0.005%

RAMPD_100 – I/O Request Summary

I/O Requests Completed in the Measurement Interval	2,700,214,910
I/O Requests Completed with Response Time <= 30 ms	2,700,203,860
I/O Requests Completed with Response Time > 30 ms	11,050

Response Time Ramp Test
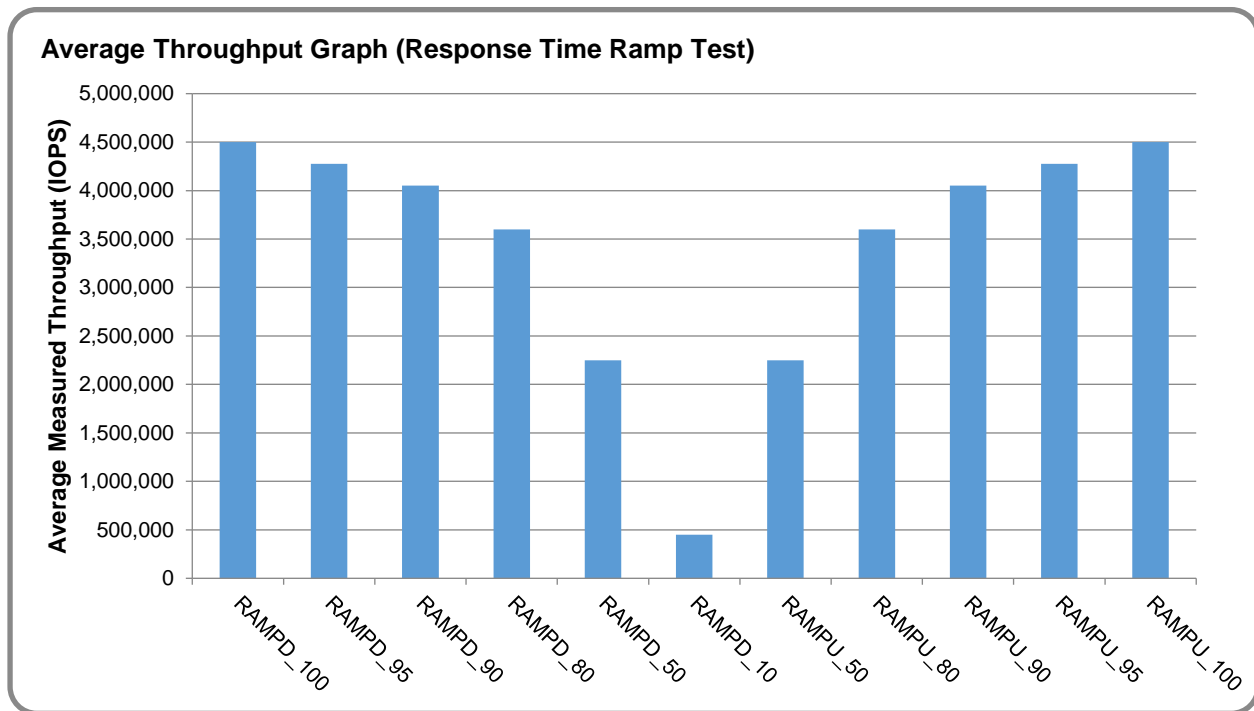
Response Time Ramp Test – Results File

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).
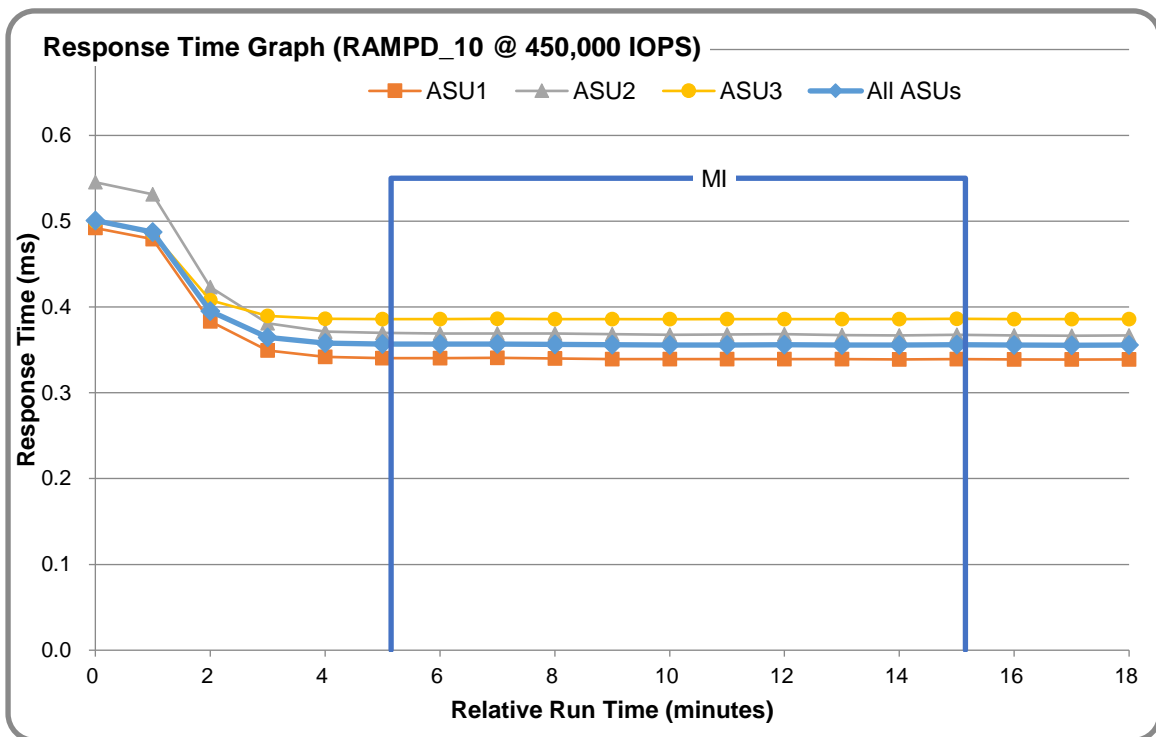
Response Time Ramp Test – Average Throughput Graph

Average Throughput Graph (Response Time Ramp Test)

Response Time Ramp Test – Average Response Time Graph

Average Response Time Graph (Response Time Ramp Test)
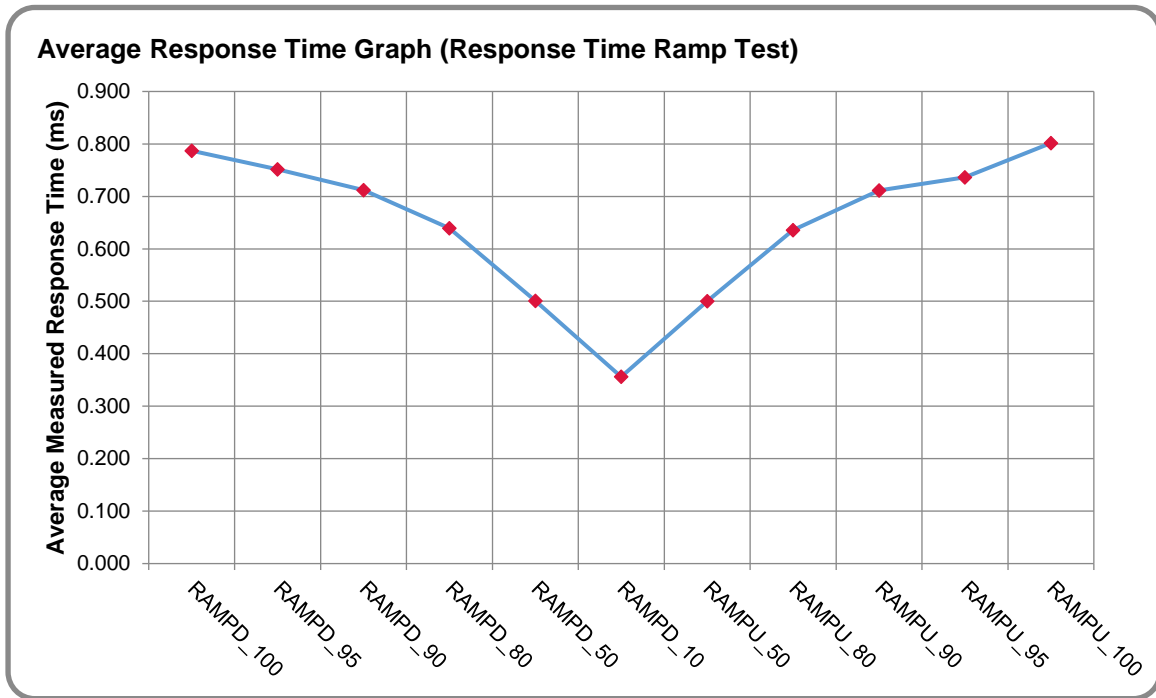
Response Time Ramp Test – RAMPD_10 Response Time Graph

Response Time Graph (RAMPD_10 @ 450,000 IOPS)

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:
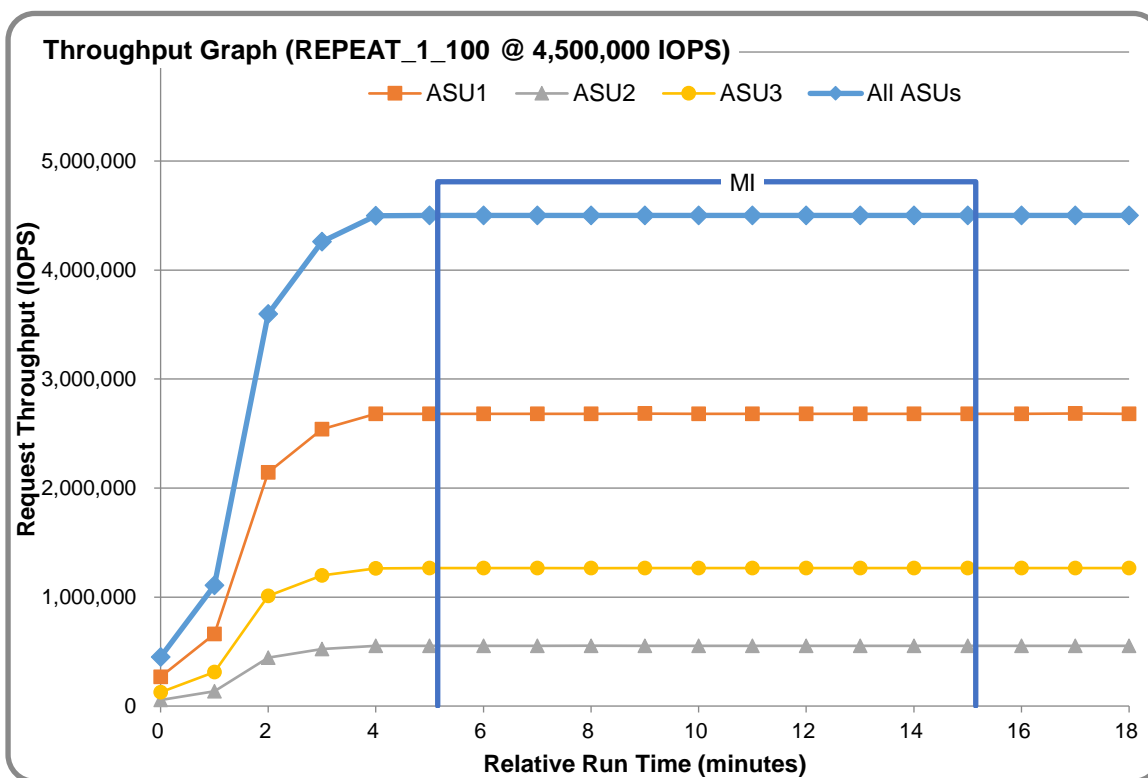
- **SPC1_METRICS_0_Raw_Results.xlsx**
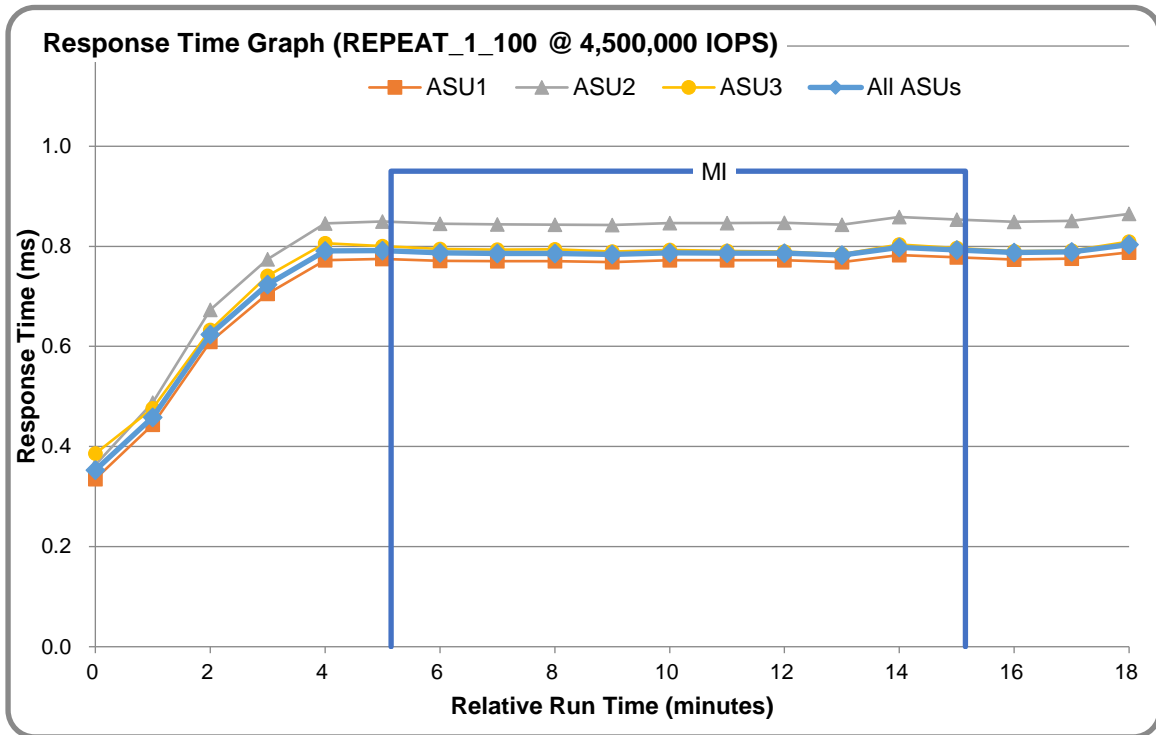
Repeatability Test Results

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.

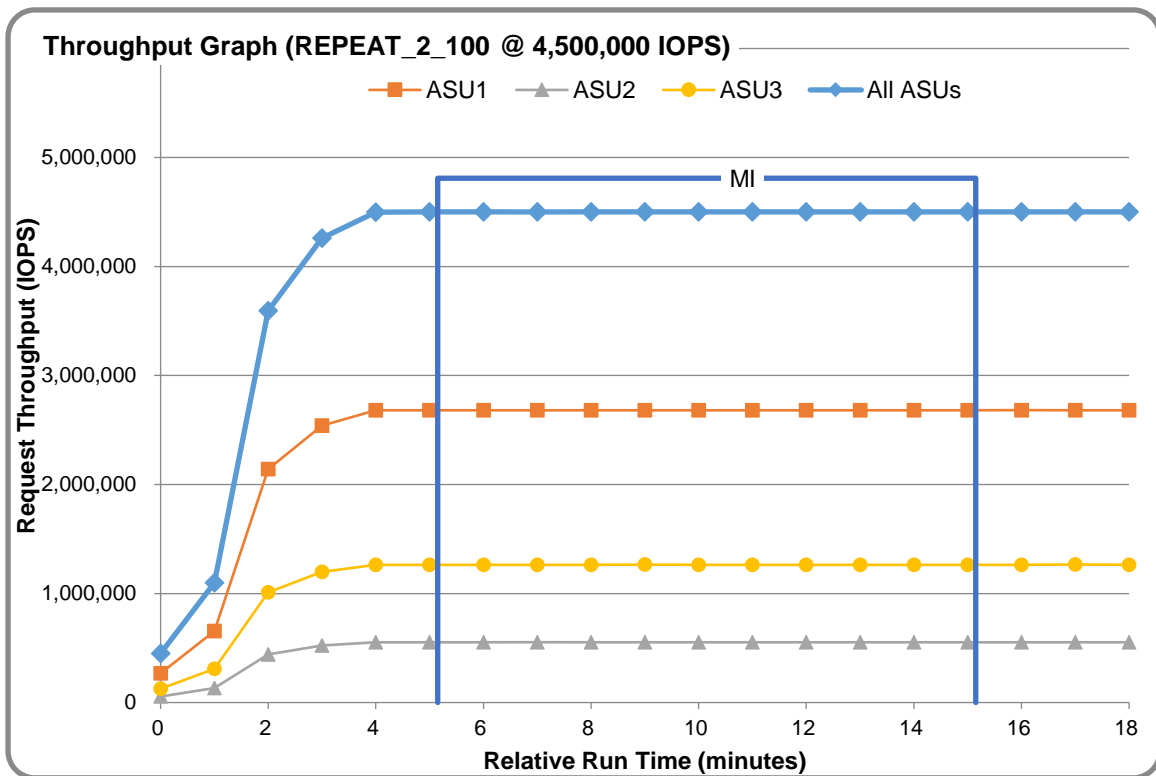| Test Phase	100% IOPS	10% IOPS
RAMPD	4,500,392	450,070
REPEAT_1	4,500,219	450,016
REPEAT_2	4,500,317	449,981

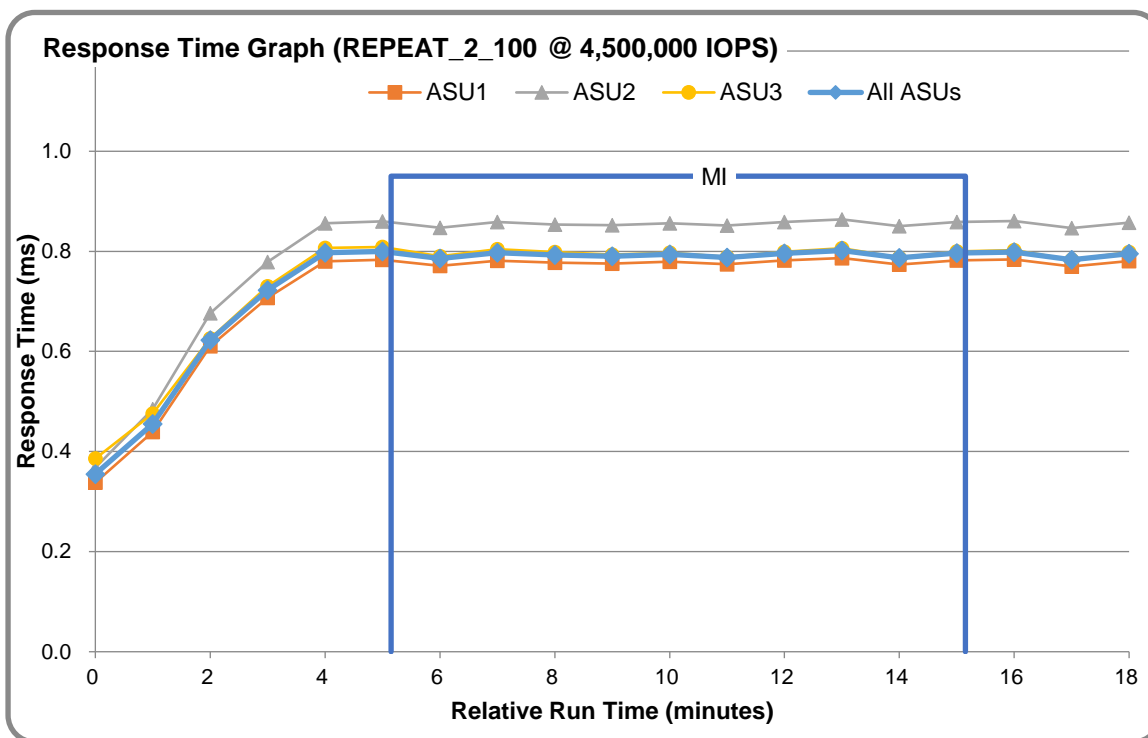### REPEAT_1_100 – Throughput Graph

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	0.0002	0.0001	0.0003	0.0001	0.0005	0.0001	0.0002	0.0001
Difference	0.012%	0.005%	0.007%	0.003%	0.006%	0.005%	0.018%	0.009%

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	0.0003	0.0001	0.0003	0.0001	0.0005	0.0003	0.0005	0.0001
Difference	0.004%	0.001%	0.002%	0.002%	0.004%	0.007%	0.006%	0.003%

Data Persistence Test

Data Persistence Test Result files

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	556,140,032
Total Number of Logical Blocks Verified	275,004,882
Total Number of Logical Blocks Overwritten	281,135,150
Total Number of Logical Blocks that Failed Verification	0
Time Duration for Writing Test Logical Blocks (sec.)	301
Size in Bytes of each Logical Block	8,192
Number of Failed I/O Requests During the Test	0

Committed Data Persistence Implementation

The Storage nodes maintain a read cache. During writes, the read cache is updated and the write is committed to disk. A write request to a primary node is also mirrored on a secondary node, prior to returning a completion status to the requestor. Consistency of data mirroring across nodes is provided using a primary/secondary model where the primary node is responsible for ensuring that all its data is mirrored on a secondary node. In case of failure of the primary node, the secondary node assumes primary responsibility and choses a new secondary node to mirror the data.

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**
aio-max-nr.sh	Set maximum asynchronous I/O	/C_Tuning
nr_request.sh	Increase disk queue depth	/C_Tuning
scheduler.sh	Change the I/O scheduler	/C_Tuning
/D_Creation	**Storage configuration creation**	**root**
mkvolume.sh	Create the Logical Volumes	/D_Creation
/E_Inventory	**Configuration inventory**	**root**
collectStorageInfo.sh	Capture storage configuration inventory	/E_Inventory
collectStorageInfo_1.log	Storage inventory before INIT	/E_Inventory
collectStorageInfo_2.log	Storage inventory after Persistence test	/E_Inventory
/F_Generator	**Workload generator**	**root**
slave_asu.asu	Defining LUNs hosting the ASUs	/F_generator
2host.HST	Host configuration file	/F_generator
full_run.sh	Execute all test phases	/F_generator

APPENDIX B: THIRD PARTY QUOTATION

CLOUD TREKKERS TECHNOLOGIES

Cloud Trekkers Technologies, Inc.

19920 Stevens Creek Blvd, Suite 100
Cupertino, CA 90014
Phone: (408)791-2828
HR Inquiries: julian@cloudtrekkers.com
General Inquiries: info@cloudtrekkers.com

5/27/2017, Quote Valid 90 Days

No.	Model	Description	Qty.	Unit Price (USD)	Ext Price (USD)	Disc. (off)	Disc. Price (USD)
1	Phase						
1.1	Location						
1.1.1	FusionStorage System						
1.1.1	Storage Server Component						
	BC4M00H05A	RH2288H V3 (12*3.5inch HDD Chassis)(Only for overseas except Japan)(H22H-03)	36	1,410.00	50,760.00	45%	27,918.00
	BC4M00H05B	RH2288 V3 (12*3.5inch HDD Chassis)(Only for overseas, except Japan)H22M-03	1	1,380.00	1,350.00	45%	742.50
	BC1M00H05B	RH2288 V3 (8*2.5inch HDD Chassis)(Only for overseas, except Japan)H22M-03	1	1,250.00	1,250.00	45%	687.50
	BC1M64CPU	Intel Xeon E5-2690 v4(2.6GHz/14-core/35MB/135W) Processor (with heatsink)	72	4,769.00	343,368.00	45%	188,852.40
	BC1M63CPU	Intel Xeon E5-2683 v4(2.1GHz/16-core/40MB/120W) Processor (with heatsink)	4	4,059.00	16,236.00	45%	8,929.80
	N24DDR403	DDR4 RDIMM Memory,32GB,2400MT/s,2Rank(2G*4bit),1.2V,ECC	171	1,028.00	117,869.00	45%	67,717.95
	N24DDR402	DDR4 RDIMM Memory,16GB,2400MT/s,2Rank(1G*8bit),1.2V,ECC	244	539.00	131,516.20	45%	72,333.90
	CN21EEACJ	ES3000 V2-600 PCIe SSD Card (600GB) Half-height half-length	3	6,600.00	19,802.00	64%	7,128.00
	CN2M10FACM	ES3600C V3,NVMe SSD Card,1600GB,Mixed Use,3 DWPD,PCIe 3.0 x4,HHHL	144	7,390.00	1,064,160.00	64%	383,097.60
	BC1M01ESMLB	SR430C-M 1G(LSI3108) SAS/SATA RAID Card,RAID0,1,5,6,10,50,60,12Gb/s,1GB Cache,used for RH2288 V3/RH2288H V3's 12&25HDD chassis/5288 V3	1	565.00	565.00	45%	310.75
	BC1M01ESMLA	SR430C-M 2G(LSI3108) SAS/SATA RAID Card,RAID0,1,5,6,10,50,60,12Gb/s,2GB Cache,used for RH2288 V3/RH2288H V3's 12&25HDD chassis/5288 V3	1	665.00	665.00	45%	365.75
	N300S1210W2	HDD,300GB,SAS 12Gb/s,10K rpm,128MB or above,2.5inch(2.5inch Drive Bay)	4	315.00	1,260.00	45%	693.00
	BC1M19HDD	2*2.5" Rear Hard Disk Backplane Module	1	59.00	59.00	45%	32.45
	BC1M01FXES02	SM231 Onboard NIC,2x10GE Optical Interface(Intel 82599),SFP+(with 2x Multi-mode Optical Transceiver)	55	1,075.00	59,125.00	45%	54,663.75
	CN21TGAA20	Ethernet Adapter,10Gb Optical Interface(Intel 82599),2-Port,SFP+(with 2x Multi-mode Optical Transceiver),PCIe	35	596.00	20,370.00	0%	20,376.00
	BC1M0SSKV3	PCIe Riser Card,3 slot(x8,x8,x8),used for R4 G2288 V3/RH2288H V3/5288 V3	72	119.00	8,568.00	45%	4,712.40
	BN3MCACC	750W Platinum AC Power Module	76	279.00	21,204.00	45%	11,662.20
	BC1M03FANA	3055 Plus Fan module	144	43.00	6,192.00	45%	3,405.60
	BC1M09FAN	3038 Fan module	8	29.00	232.00	45%	127.60
	EGU3DER01	2U Static Rail Kit	35	26.00	1,064.00	0%	1,064.00
1.1.2	FusionStorage Software						
	FS1AD00SFTU2	FusionStorage Advanced Edition Capacity license, per	291	230.00	67,665.00	50%	33,861.50
1.1.3	Switch Component						
	CE12808A-B02	CE12808 AC Bundle2 (AC Assembly Chassis,2*MPUA,3*SFU09B,4*PHD-3000WA)	2	111,000.00	222,000.00	70%	66,600.00
	SFP-10G-USR	10GBase-USR Optical Transceiver,SFP+,10G,Multi-mode Module(850nm,0.1km,LC)	252	129.00	32,908.00	40%	19,504.80
	CE-L48GS-EC	48-Port 10GE Interface Card(EC,SFP+)	6	37,000.00	222,000.00	70%	66,600.00
1.1.4	Switch Software						
	CE128-LIC-B1S	CloudEngine 12800 Basic SW V100R005	2	10,000.00	20,000.00	70%	6,000.00

SPC Benchmark 1™ V3.4.0
Huawei Technologies Co., Ltd
Huawei FusionStorage

FULL DISCLOSURE REPORT

Submission Identifier: A31007
Submitted for Review: June 8, 2017

Cloud Trekkers Technologies, Inc.

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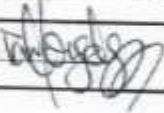General Inquiries: info@cloudtrekkers.com

5/27/2017, Quote Valid 90 Days

No.	Model	Description	Qty.	Unit Price (USD)	Ext.Price (USD)	Disc. (off)	Disc. Price (USD)
1.1.5	Accessory						
	SS-OP-D-LC-M-10	Patch cord-LC/PC-LC/PC-Multimode-A1b-2mm-10m-PVC-Orange	220	8.00	1,760.00	0%	1,760.00
1.1.6	RACK						
	RACK-42U-1	42U Storage AC Cabinet	5	1,200.00	6,000.00	0%	6,000.00
	PDU2000-2D-1PH-32V4-B2	AC Power Distribution Unit	10	180.00	1,800.00	0%	1,800.00
Total of Product							1,067,147.35
1.1.7	Installation Service						
	88125ESH	RH2288 V3 Installation Service - Engineering	3	546.08	1,871.30	50%	766.35
	88125ESH	RH2288H V3 Installation Service - Engineering	30	2,102.80	78,790.80	20%	62,890.56
	88125ESH	CE12800 Installation Service - Engineering	3	3,996.14	7,972.28	20%	6,377.82
1.1.8	FusionStorage Solution Service						
	88142DVU	FusionStorage Advanced Edition Solution Design Service	1	46,290.00	46,290.00	20%	37,032.00
	88143DVP	FusionStorage Advanced Edition Solution Implementation Service	1	46,290.00	46,290.00	20%	37,032.00
	TPV40558	Remark: Advance Edition Capacity 106.878i	1	0.01	0.01	20%	0.01
1.1.9	Maintenance Support Service						
	PS2A06GN9E3Y	FusionStorage Advanced Edition 3 Years Subscription and Support Service,per TB	231	187.00	43,197.00	50%	21,598.50
	02311GQX-88134ULF-36	FusionCube 2000-RH2288H V3 (12HDD EXP Chassis) H22H-03 For oversea(except Japan)-Hi-Care Onsite Premier 24x7x4H Engineer Onsite Service-36Month(s)	36	903.00	32,508.00	30%	22,755.60
	02311GHL-88134ULF-36	RH2288 V3(12HDD EXP Chassis)H22M-03 For oversea(except Japan)-Hi-Care Onsite Premier 24x7x4H Engineer Onsite Service-36Month(s)	1	903.00	903.00	30%	632.10
	02311GGP-88134ULF-36	RH2288 V3(8HDD Passthrough Chassis)H22M-03 For oversea(except Japan)-Hi-Care Onsite Premier 24x7x4H Engineer Onsite Service-36Month(s)	1	903.00	903.00	30%	632.10
	03022KLUA-88134ULF-36	ES3000 V3 600 PCIe SSD Card (600GB) Half height,half-length-Hi-Care Onsite Premier 24x7x4H Engineer Onsite Service-36Month(s)	3	330.00	990.00	30%	693.00
	02511PBK-88134ULF-36	ES3000 V3 CN2MHSFACM ES3600C-1600GB-3-Hi-Care Onsite Premier 24x7x4H Engineer Onsite Service-36Month(s)	144	402.54	70,825.76	20%	48,648.00
	02358212-88134UFR-36	CE12800 AC Bundle2 (AC Assembly Chassis,2*MPUA,6*SFU06B,4*PAC-2700WA)-Hi-Care Onsite Premier 24x7x4H Service-36Month(s)	2	80,625.30	121,650.81	20%	97,320.00
	02310UBNW-88134UFR-36	10GBase-USR Optical Transceiver,SFP+,10G,Multi-mode Module(850nm,0.1m-LC)-Hi-Care Onsite Premier 24x7x4H Service-36Month(s)	252	65.95	16,619.40	20%	13,295.52
	03022MNN-88134UFR-36	48-Port 10GE Interface Card(EC,SFP+)-Hi-Care Onsite Premier 24x7x4H Service-36Month(s)	6	15,994.00	95,904.00	20%	76,723.28
Total of Service							417,495.80
Total Price							1,484,643.15

Notes: Hi-Care Premier On-Site Service include: 7*24 Technical Assistance Center Access, Access to all new software updates and Online Support, 24*7*4 Hours Onsite Hardware Replacement.

CLOUD TREKKERS TECHNOLOGIES

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5/27/2017, Quote Valid 90 Days

No.	Model	Description	Qty.	Unit Price (USD)	Ext.Price (USD)	Disc. (off)	Disc. Price (USD)
Payment Terms:							
Comments:							

Noviant is an Authorized Value Added reseller (VAR) of networking products. Products sold by NF are factory new unless otherwise specified. All new products sold by NF carry its own Original Equipment Manufacturer's (OEM) Limited Warranty and software licenses. This Quote is valid for 90 days. Prices and availability is subject to change without notice. Installation and configuration costs are not included in the quoted pricing unless specified. A 22% Restocking Fee applies to all canceled orders and/or returned products. Special Orders are non-returnable. Buyer is responsible for payment of all applicable taxes and freight charges. Issuance of customer PO against this Quote constitutes acceptance of Noviant Sales Terms conditions.

I agree to the these terms and conditions.

Authorized Acceptance:	Print Name:	Date:
Cloud Trekkers	Print Name: Alan Tam	Date: May 27, 2017

APPENDIX C: TUNING PARAMETERS AND OPTIONS

The following scripts, listed below, were used to set tuning parameters and options:

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

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

scheduler.sh

```
echo noop > /sys/block/sdb/queue/scheduler
echo noop > /sys/block/sdc/queue/scheduler
echo noop > /sys/block/sdd/queue/scheduler
echo noop > /sys/block/sde/queue/scheduler
echo noop > /sys/block/sdf/queue/scheduler
echo noop > /sys/block/sdg/queue/scheduler
echo noop > /sys/block/sdh/queue/scheduler
echo noop > /sys/block/sdi/queue/scheduler
echo noop > /sys/block/sdj/queue/scheduler
echo noop > /sys/block/sdk/queue/scheduler
echo noop > /sys/block/sdl/queue/scheduler
echo noop > /sys/block/sdm/queue/scheduler
echo noop > /sys/block/sdn/queue/scheduler
echo noop > /sys/block/sdo/queue/scheduler
echo noop > /sys/block/sdp/queue/scheduler
echo noop > /sys/block/sdq/queue/scheduler
echo noop > /sys/block/sdr/queue/scheduler
echo noop > /sys/block/sds/queue/scheduler
echo noop > /sys/block/sdt/queue/scheduler
echo noop > /sys/block/sdu/queue/scheduler
echo noop > /sys/block/sdv/queue/scheduler
echo noop > /sys/block/sdw/queue/scheduler
echo noop > /sys/block/sdx/queue/scheduler
echo noop > /sys/block/sdy/queue/scheduler
echo noop > /sys/block/sdz/queue/scheduler
echo noop > /sys/block/sdaa/queue/scheduler
echo noop > /sys/block/sdab/queue/scheduler
echo noop > /sys/block/sdac/queue/scheduler
echo noop > /sys/block/sdad/queue/scheduler
echo noop > /sys/block/sdae/queue/scheduler
echo noop > /sys/block/sdaf/queue/scheduler
echo noop > /sys/block/sdag/queue/scheduler
echo noop > /sys/block/sdah/queue/scheduler
echo noop > /sys/block/sdai/queue/scheduler
echo noop > /sys/block/sdaj/queue/scheduler
echo noop > /sys/block/sdak/queue/scheduler
echo noop > /sys/block/sdal/queue/scheduler
echo noop > /sys/block/sdam/queue/scheduler
echo noop > /sys/block/sdan/queue/scheduler
echo noop > /sys/block/sdao/queue/scheduler
```

```
echo noop > /sys/block/sdap/queue/scheduler
echo noop > /sys/block/sdaq/queue/scheduler
echo noop > /sys/block/sdar/queue/scheduler
echo noop > /sys/block/sdas/queue/scheduler
echo noop > /sys/block/sdat/queue/scheduler
echo noop > /sys/block/sdau/queue/scheduler
echo noop > /sys/block/sdav/queue/scheduler
echo noop > /sys/block/sdaw/queue/scheduler
echo noop > /sys/block/sdax/queue/scheduler
echo noop > /sys/block/sday/queue/scheduler
echo noop > /sys/block/sdaz/queue/scheduler
echo noop > /sys/block/sdba/queue/scheduler
echo noop > /sys/block/sdbb/queue/scheduler
echo noop > /sys/block/sdbc/queue/scheduler
echo noop > /sys/block/sdbd/queue/scheduler
echo noop > /sys/block/sdbe/queue/scheduler
echo noop > /sys/block/sdbf/queue/scheduler
echo noop > /sys/block/sdbg/queue/scheduler
echo noop > /sys/block/sdbh/queue/scheduler
echo noop > /sys/block/sdbi/queue/scheduler
echo noop > /sys/block/sdbj/queue/scheduler
echo noop > /sys/block/sdbk/queue/scheduler
echo noop > /sys/block/sdbl/queue/scheduler
echo noop > /sys/block/sdbm/queue/scheduler
echo noop > /sys/block/sdbn/queue/scheduler
echo noop > /sys/block/sdbo/queue/scheduler
echo noop > /sys/block/sdbp/queue/scheduler
echo noop > /sys/block/sdbq/queue/scheduler
echo noop > /sys/block/sdbr/queue/scheduler
echo noop > /sys/block/sdbs/queue/scheduler
echo noop > /sys/block/sdbt/queue/scheduler
echo noop > /sys/block/sdbu/queue/scheduler
echo noop > /sys/block/sdbv/queue/scheduler
echo noop > /sys/block/sdbw/queue/scheduler
echo noop > /sys/block/sdbx/queue/scheduler
echo noop > /sys/block/sdby/queue/scheduler
echo noop > /sys/block/sdbz/queue/scheduler
echo noop > /sys/block/sdca/queue/scheduler
echo noop > /sys/block/sdcb/queue/scheduler
echo noop > /sys/block/sdcc/queue/scheduler
echo noop > /sys/block/sdcd/queue/scheduler
echo noop > /sys/block/sdce/queue/scheduler
echo noop > /sys/block/sdcf/queue/scheduler
echo noop > /sys/block/sdcg/queue/scheduler
echo noop > /sys/block/sdch/queue/scheduler
echo noop > /sys/block/sdci/queue/scheduler
echo noop > /sys/block/sdcj/queue/scheduler
echo noop > /sys/block/sdck/queue/scheduler
echo noop > /sys/block/sdcl/queue/scheduler
echo noop > /sys/block/sdcm/queue/scheduler
echo noop > /sys/block/sdcn/queue/scheduler
echo noop > /sys/block/sdco/queue/scheduler
echo noop > /sys/block/sdcp/queue/scheduler
echo noop > /sys/block/sdcq/queue/scheduler
echo noop > /sys/block/sdcr/queue/scheduler
echo noop > /sys/block/sdcs/queue/scheduler
echo noop > /sys/block/sdct/queue/scheduler
echo noop > /sys/block/sdcu/queue/scheduler
echo noop > /sys/block/sdcv/queue/scheduler
echo noop > /sys/block/sdcw/queue/scheduler
echo noop > /sys/block/sdcx/queue/scheduler
```

```
echo noop > /sys/block/sdcy/queue/scheduler
echo noop > /sys/block/sdcz/queue/scheduler
echo noop > /sys/block/sdda/queue/scheduler
echo noop > /sys/block/sddb/queue/scheduler
echo noop > /sys/block/sddc/queue/scheduler
echo noop > /sys/block/sddd/queue/scheduler
echo noop > /sys/block/sdde/queue/scheduler
echo noop > /sys/block/sddf/queue/scheduler
echo noop > /sys/block/sddg/queue/scheduler
echo noop > /sys/block/sddh/queue/scheduler
echo noop > /sys/block/sddi/queue/scheduler
echo noop > /sys/block/sddj/queue/scheduler
echo noop > /sys/block/sddk/queue/scheduler
echo noop > /sys/block/sddl/queue/scheduler
echo noop > /sys/block/sddm/queue/scheduler
echo noop > /sys/block/sddn/queue/scheduler
echo noop > /sys/block/sddo/queue/scheduler
echo noop > /sys/block/sddp/queue/scheduler
echo noop > /sys/block/sddq/queue/scheduler
```

nr_request.sh

```
echo 1024 > /sys/block/sdb/queue/nr_requests
echo 1024 > /sys/block/sdc/queue/nr_requests
echo 1024 > /sys/block/sdd/queue/nr_requests
echo 1024 > /sys/block/sde/queue/nr_requests
echo 1024 > /sys/block/sdf/queue/nr_requests
echo 1024 > /sys/block/sdg/queue/nr_requests
echo 1024 > /sys/block/sdh/queue/nr_requests
echo 1024 > /sys/block/sdi/queue/nr_requests
echo 1024 > /sys/block/sdj/queue/nr_requests
echo 1024 > /sys/block/sdk/queue/nr_requests
echo 1024 > /sys/block/sdl/queue/nr_requests
echo 1024 > /sys/block/sdm/queue/nr_requests
echo 1024 > /sys/block/sdn/queue/nr_requests
echo 1024 > /sys/block/sdo/queue/nr_requests
echo 1024 > /sys/block/sdp/queue/nr_requests
echo 1024 > /sys/block/sdq/queue/nr_requests
echo 1024 > /sys/block/sdr/queue/nr_requests
echo 1024 > /sys/block/sds/queue/nr_requests
echo 1024 > /sys/block/sdt/queue/nr_requests
echo 1024 > /sys/block/sdu/queue/nr_requests
echo 1024 > /sys/block/sdv/queue/nr_requests
echo 1024 > /sys/block/sdw/queue/nr_requests
echo 1024 > /sys/block/sdx/queue/nr_requests
echo 1024 > /sys/block/sdy/queue/nr_requests
echo 1024 > /sys/block/sdz/queue/nr_requests
echo 1024 > /sys/block/sdaa/queue/nr_requests
echo 1024 > /sys/block/sdab/queue/nr_requests
echo 1024 > /sys/block/sdac/queue/nr_requests
echo 1024 > /sys/block/sdad/queue/nr_requests
echo 1024 > /sys/block/sdae/queue/nr_requests
echo 1024 > /sys/block/sdaf/queue/nr_requests
echo 1024 > /sys/block/sdag/queue/nr_requests
echo 1024 > /sys/block/sdah/queue/nr_requests
echo 1024 > /sys/block/sdai/queue/nr_requests
echo 1024 > /sys/block/sdaj/queue/nr_requests
echo 1024 > /sys/block/sdak/queue/nr_requests
echo 1024 > /sys/block/sdal/queue/nr_requests
echo 1024 > /sys/block/sdam/queue/nr_requests
```

```
echo 1024 > /sys/block/sdan/queue/nr_requests
echo 1024 > /sys/block/sdao/queue/nr_requests
echo 1024 > /sys/block/sdap/queue/nr_requests
echo 1024 > /sys/block/sdaq/queue/nr_requests
echo 1024 > /sys/block/sdar/queue/nr_requests
echo 1024 > /sys/block/sdas/queue/nr_requests
echo 1024 > /sys/block/sdat/queue/nr_requests
echo 1024 > /sys/block/sdau/queue/nr_requests
echo 1024 > /sys/block/sdav/queue/nr_requests
echo 1024 > /sys/block/sdaw/queue/nr_requests
echo 1024 > /sys/block/sdax/queue/nr_requests
echo 1024 > /sys/block/sday/queue/nr_requests
echo 1024 > /sys/block/sdaz/queue/nr_requests
echo 1024 > /sys/block/sdba/queue/nr_requests
echo 1024 > /sys/block/sdbb/queue/nr_requests
echo 1024 > /sys/block/sdbc/queue/nr_requests
echo 1024 > /sys/block/sdbd/queue/nr_requests
echo 1024 > /sys/block/sdbe/queue/nr_requests
echo 1024 > /sys/block/sdbf/queue/nr_requests
echo 1024 > /sys/block/sdbg/queue/nr_requests
echo 1024 > /sys/block/sdbh/queue/nr_requests
echo 1024 > /sys/block/sdbi/queue/nr_requests
echo 1024 > /sys/block/sdbj/queue/nr_requests
echo 1024 > /sys/block/sdbk/queue/nr_requests
echo 1024 > /sys/block/sdbl/queue/nr_requests
echo 1024 > /sys/block/sdbm/queue/nr_requests
echo 1024 > /sys/block/sdbn/queue/nr_requests
echo 1024 > /sys/block/sdbo/queue/nr_requests
echo 1024 > /sys/block/sdbp/queue/nr_requests
echo 1024 > /sys/block/sdbq/queue/nr_requests
echo 1024 > /sys/block/sdbr/queue/nr_requests
echo 1024 > /sys/block/sdbs/queue/nr_requests
echo 1024 > /sys/block/sdbt/queue/nr_requests
echo 1024 > /sys/block/sdbu/queue/nr_requests
echo 1024 > /sys/block/sdbv/queue/nr_requests
echo 1024 > /sys/block/sdbw/queue/nr_requests
echo 1024 > /sys/block/sdbx/queue/nr_requests
echo 1024 > /sys/block/sdby/queue/nr_requests
echo 1024 > /sys/block/sdbz/queue/nr_requests
echo 1024 > /sys/block/sdca/queue/nr_requests
echo 1024 > /sys/block/sdcb/queue/nr_requests
echo 1024 > /sys/block/sdcc/queue/nr_requests
echo 1024 > /sys/block/sdcd/queue/nr_requests
echo 1024 > /sys/block/sdce/queue/nr_requests
echo 1024 > /sys/block/sdcf/queue/nr_requests
echo 1024 > /sys/block/sdcg/queue/nr_requests
echo 1024 > /sys/block/sdch/queue/nr_requests
echo 1024 > /sys/block/sdci/queue/nr_requests
echo 1024 > /sys/block/sdcj/queue/nr_requests
echo 1024 > /sys/block/sdck/queue/nr_requests
echo 1024 > /sys/block/sdcl/queue/nr_requests
echo 1024 > /sys/block/sdcm/queue/nr_requests
echo 1024 > /sys/block/sdcn/queue/nr_requests
echo 1024 > /sys/block/sdco/queue/nr_requests
echo 1024 > /sys/block/sdcp/queue/nr_requests
echo 1024 > /sys/block/sdcq/queue/nr_requests
echo 1024 > /sys/block/sdcr/queue/nr_requests
echo 1024 > /sys/block/sdcs/queue/nr_requests
echo 1024 > /sys/block/sdct/queue/nr_requests
echo 1024 > /sys/block/sdcu/queue/nr_requests
echo 1024 > /sys/block/sdcv/queue/nr_requests
```

```
echo 1024 > /sys/block/sdcw/queue/nr_requests
echo 1024 > /sys/block/sdcx/queue/nr_requests
echo 1024 > /sys/block/sdcy/queue/nr_requests
echo 1024 > /sys/block/sdcz/queue/nr_requests
echo 1024 > /sys/block/sdda/queue/nr_requests
echo 1024 > /sys/block/sddb/queue/nr_requests
echo 1024 > /sys/block/sddc/queue/nr_requests
echo 1024 > /sys/block/sddd/queue/nr_requests
echo 1024 > /sys/block/sdde/queue/nr_requests
echo 1024 > /sys/block/sddf/queue/nr_requests
echo 1024 > /sys/block/sddg/queue/nr_requests
echo 1024 > /sys/block/sddh/queue/nr_requests
echo 1024 > /sys/block/sddi/queue/nr_requests
echo 1024 > /sys/block/sddj/queue/nr_requests
echo 1024 > /sys/block/sddk/queue/nr_requests
echo 1024 > /sys/block/sddl/queue/nr_requests
echo 1024 > /sys/block/sddm/queue/nr_requests
echo 1024 > /sys/block/sddn/queue/nr_requests
echo 1024 > /sys/block/sddo/queue/nr_requests
echo 1024 > /sys/block/sddp/queue/nr_requests
echo 1024 > /sys/block/sddq/queue/nr_requests
```

aio-max-nr.sh

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

APPENDIX D: STORAGE CONFIGURATION CREATION

Step 1 - Install and configure FusionStorage

The following actions are performed:

1. Deploy the FSM (FusionStorage Manager) software on two servers running SUSE11 SP3 (kernel 3.0.101-0.47.86-default).

2. From the FSM portal, add all servers (Host servers and Storage servers) and deploy the FSA (FusionStorage Agent) software on all these servers, using the following GUI:
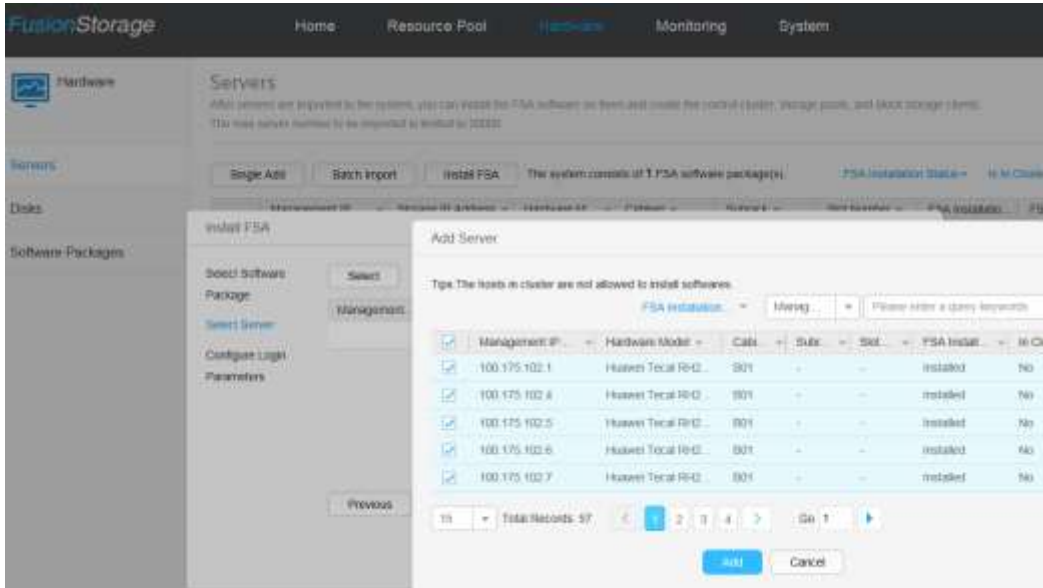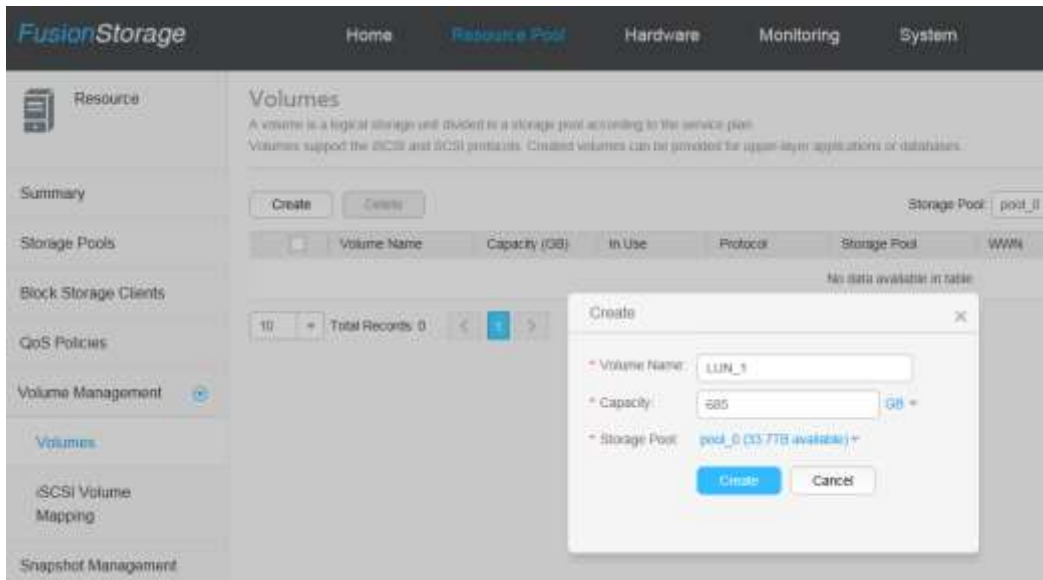

3. Create the Control Cluster, add all the Storage servers into the storage pool(s) and create a storage client on each Host servers, using the following GUI:
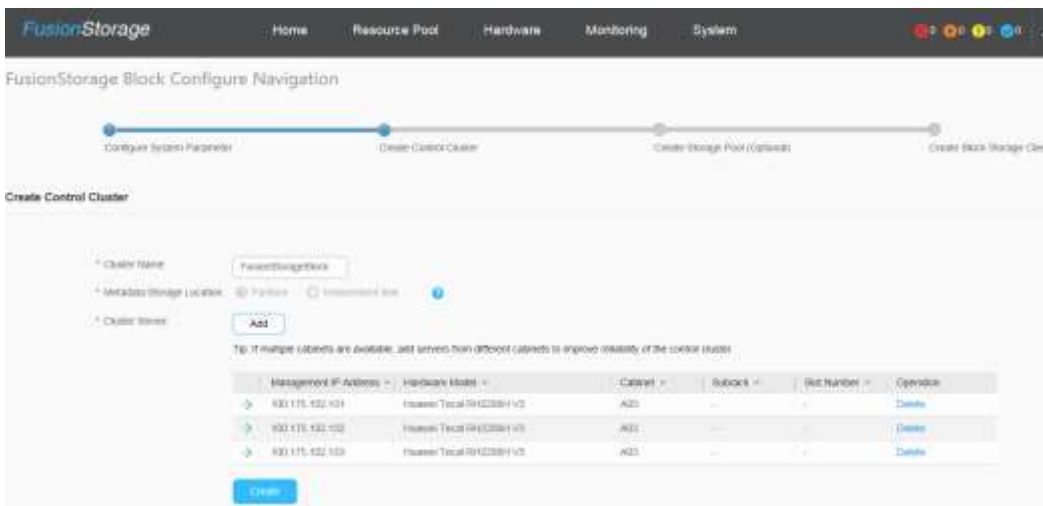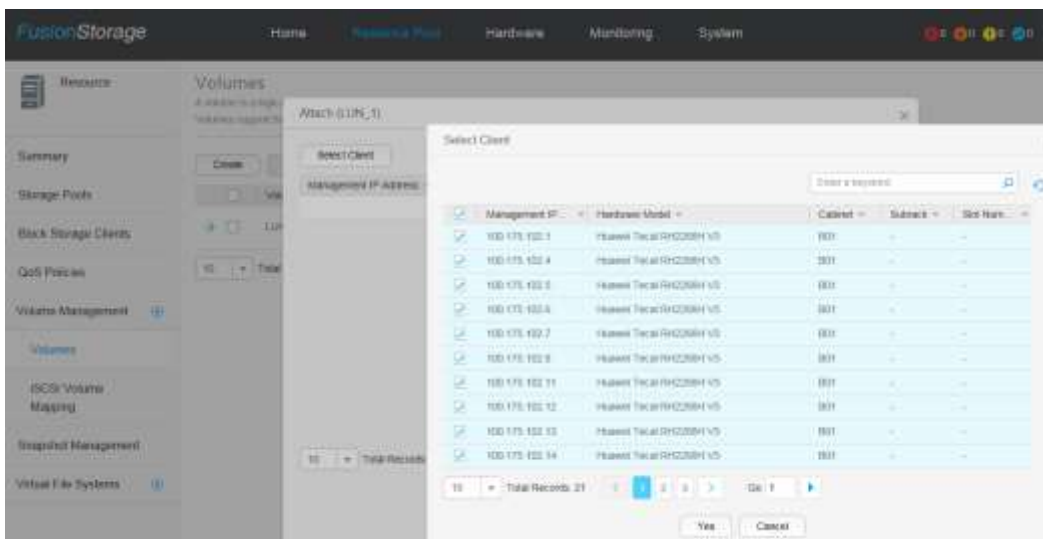
Step 2 - Create Volumes

The following actions are performed:

1. From the FSM portal, 120 volumes are created with a size of 685GiB (718.3GB), using the following GUI:

2. From the FSM portal, the volumes are attached for every storage clients, using the following GUI:

3. The script **mkvolume.sh** is executed on the master Host System to create 120 logical volumes as follows:

   - Create Physical Volume:

     Create 120 physical volumes using the *pvcreate* command.

- Create Volumes Groups:

    Create 1 volume group (*vg1*) using the *vgcreate* command over the 120 physical volumes.

- Create Logical Volumes on *vg1*, each with a capacity of 645GiB (692.5GB):

    Create 54 logical volumes for ASU-1.

    Create 54 logical volumes for ASU-2.

    Create 12 logical volumes for ASU-3.

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

mkvolume.sh

```
pvcreate /dev/sdb
pvcreate /dev/sdc
pvcreate /dev/sdd
pvcreate /dev/sde
pvcreate /dev/sdf
pvcreate /dev/sdg
pvcreate /dev/sdh
pvcreate /dev/sdi
pvcreate /dev/sdj
pvcreate /dev/sdk
pvcreate /dev/sdl
pvcreate /dev/sdm
pvcreate /dev/sdn
pvcreate /dev/sdo
pvcreate /dev/sdp
pvcreate /dev/sdq
pvcreate /dev/sdr
pvcreate /dev/sds
pvcreate /dev/sdt
pvcreate /dev/sdu
pvcreate /dev/sdv
pvcreate /dev/sdw
pvcreate /dev/sdx
pvcreate /dev/sdy
pvcreate /dev/sdz
pvcreate /dev/sdaa
pvcreate /dev/sdab
pvcreate /dev/sdac
pvcreate /dev/sdad
pvcreate /dev/sdae
pvcreate /dev/sdaf
pvcreate /dev/sdag
pvcreate /dev/sdah
pvcreate /dev/sdai
pvcreate /dev/sdaj
pvcreate /dev/sdak
pvcreate /dev/sdal
pvcreate /dev/sdam
pvcreate /dev/sdan
pvcreate /dev/sdao
pvcreate /dev/sdap
pvcreate /dev/sdaq
```

```
pvcreate /dev/sdar
pvcreate /dev/sdas
pvcreate /dev/sdat
pvcreate /dev/sdau
pvcreate /dev/sdav
pvcreate /dev/sdaw
pvcreate /dev/sdax
pvcreate /dev/sday
pvcreate /dev/sdaz
pvcreate /dev/sdba
pvcreate /dev/sdbb
pvcreate /dev/sdbc
pvcreate /dev/sdbd
pvcreate /dev/sdbe
pvcreate /dev/sdbf
pvcreate /dev/sdbg
pvcreate /dev/sdbh
pvcreate /dev/sdbi
pvcreate /dev/sdbj
pvcreate /dev/sdbk
pvcreate /dev/sdbl
pvcreate /dev/sdbm
pvcreate /dev/sdbn
pvcreate /dev/sdbo
pvcreate /dev/sdbp
pvcreate /dev/sdbq
pvcreate /dev/sdbr
pvcreate /dev/sdbs
pvcreate /dev/sdbt
pvcreate /dev/sdbu
pvcreate /dev/sdbv
pvcreate /dev/sdbw
pvcreate /dev/sdbx
pvcreate /dev/sdby
pvcreate /dev/sdbz
pvcreate /dev/sdca
pvcreate /dev/sdcb
pvcreate /dev/sdcc
pvcreate /dev/sdcd
pvcreate /dev/sdce
pvcreate /dev/sdcf
pvcreate /dev/sdcg
pvcreate /dev/sdch
pvcreate /dev/sdci
pvcreate /dev/sdcj
pvcreate /dev/sdck
pvcreate /dev/sdcl
pvcreate /dev/sdcm
pvcreate /dev/sdcn
pvcreate /dev/sdco
pvcreate /dev/sdcp
pvcreate /dev/sdcq
pvcreate /dev/sdcr
pvcreate /dev/sdcs
pvcreate /dev/sdct
pvcreate /dev/sdcu
pvcreate /dev/sdcv
pvcreate /dev/sdcw
pvcreate /dev/sdcx
pvcreate /dev/sdcy
pvcreate /dev/sdcz
```

```
pvcreate /dev/sdda
pvcreate /dev/sddb
pvcreate /dev/sddc
pvcreate /dev/sddd
pvcreate /dev/sdde
pvcreate /dev/sddf
pvcreate /dev/sddg
pvcreate /dev/sddh
pvcreate /dev/sddi
pvcreate /dev/sddj
pvcreate /dev/sddk
pvcreate /dev/sddl
pvcreate /dev/sddm
pvcreate /dev/sddn
pvcreate /dev/sddo
pvcreate /dev/sddp
pvcreate /dev/sddq

vgcreate vg1 /dev/sdb /dev/sdc /dev/sdd /dev/sde /dev/sdf /dev/sdg /dev/sdh
    /dev/sdi /dev/sdj /dev/sdk /dev/sdl /dev/sdm /dev/sdn /dev/sdo /dev/sdp
    /dev/sdq /dev/sdr /dev/sds /dev/sdt /dev/sdu /dev/sdv /dev/sdw /dev/sdx
    /dev/sdy /dev/sdz /dev/sdaa /dev/sdab /dev/sdac /dev/sdad /dev/sdae /dev/sdaf
    /dev/sdag /dev/sdah /dev/sdai /dev/sdaj /dev/sdak /dev/sdal /dev/sdam
    /dev/sdan /dev/sdao /dev/sdap /dev/sdaq /dev/sdar /dev/sdas /dev/sdat
    /dev/sdau /dev/sdav /dev/sdaw /dev/sdax /dev/sday /dev/sdaz /dev/sdba
    /dev/sdbb /dev/sdbc /dev/sdbd /dev/sdbe /dev/sdbf /dev/sdbg /dev/sdbh
    /dev/sdbi /dev/sdbj /dev/sdbk /dev/sdbl /dev/sdbm /dev/sdbn /dev/sdbo
    /dev/sdbp /dev/sdbq /dev/sdbr /dev/sdbs /dev/sdbt /dev/sdbu /dev/sdbv
    /dev/sdbw /dev/sdbx /dev/sdby /dev/sdbz /dev/sdca /dev/sdcb /dev/sdcc
    /dev/sdcd /dev/sdce /dev/sdcf /dev/sdcg /dev/sdch /dev/sdci /dev/sdcj
    /dev/sdck /dev/sdcl /dev/sdcm /dev/sdcn /dev/sdco /dev/sdcp /dev/sdcq
    /dev/sdcr /dev/sdcs /dev/sdct /dev/sdcu /dev/sdcv /dev/sdcw /dev/sdcx
    /dev/sdcy /dev/sdcz /dev/sdda /dev/sddb /dev/sddc /dev/sddd /dev/sdde
    /dev/sddf /dev/sddg /dev/sddh /dev/sddi /dev/sddj /dev/sddk /dev/sddl
    /dev/sddm /dev/sddn /dev/sddo /dev/sddp /dev/sddq

lvcreate -n asu1000 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu1001 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu1002 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu1003 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu1004 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu1005 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu1006 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu1007 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu1008 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu1009 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu1010 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu1011 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu1012 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu1013 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu1014 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu1015 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu1016 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu1017 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu1018 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu1019 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu1020 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu1021 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu1022 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu1023 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu1024 -i 120 -I 1024 -C y -L 645g vg1
```

```
lvcreate -n asu1025 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu1026 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu1027 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu1028 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu1029 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu1030 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu1031 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu1032 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu1033 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu1034 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu1035 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu1036 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu1037 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu1038 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu1039 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu1040 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu1041 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu1042 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu1043 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu1044 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu1045 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu1046 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu1047 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu1048 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu1049 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu1050 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu1051 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu1052 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu1053 -i 120 -I 1024 -C y -L 645g vg1

lvcreate -n asu2000 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu2001 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu2002 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu2003 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu2004 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu2005 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu2006 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu2007 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu2008 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu2009 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu2010 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu2011 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu2012 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu2013 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu2014 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu2015 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu2016 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu2017 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu2018 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu2019 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu2020 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu2021 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu2022 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu2023 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu2024 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu2025 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu2026 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu2027 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu2028 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu2029 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu2030 -i 120 -I 1024 -C y -L 645g vg1
```

```
lvcreate -n asu2031 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu2032 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu2033 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu2034 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu2035 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu2036 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu2037 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu2038 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu2039 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu2040 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu2041 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu2042 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu2043 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu2044 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu2045 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu2046 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu2047 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu2048 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu2049 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu2050 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu2051 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu2052 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu2053 -i 120 -I 1024 -C y -L 645g vg1

lvcreate -n asu3000 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu3001 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu3002 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu3003 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu3004 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu3005 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu3006 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu3007 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu3008 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu3009 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu3010 -i 120 -I 1024 -C y -L 645g vg1
lvcreate -n asu3011 -i 120 -I 1024 -C y -L 645g vg1
```

APPENDIX E: CONFIGURATION INVENTORY

An inventory of the Tested Storage Configuration was collected before and after the test execution. The test execution script invokes ***collectStorageInfo.sh*** to collect the inventory profile of the storage configuration. The following log files were generated and are included in the Supporting Files (see Appendix A):

- ***collectStorageInfo_1.log***   List of configured storage and volumes before test execution.

- ***collectStorageInfo_2.log***   List of configured storage and volumes after TSC restart.

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

collectStorageInfo.sh

```
bmc_pwd="Huawei12#$"
echo "Start collecting storage info... please wait..."
echo "" > /usr/tmp/$1
date >> /usr/tmp/$1
echo "----------Query FusionStorage version info start-----" >> /usr/tmp/$1
/opt/dsware/vbs/bin/dsware_vbs -v |grep version >> /usr/tmp/$1
echo "----------Query FusionStorage version info end-----" >> /usr/tmp/$1

echo "----------Query FusionStorage NVME SSD disk start-----" >> /usr/tmp/$1
cat  spc_storages.txt | while  read  storage;do  ssh  -n  root@${storage}  cat
    /proc/smio_host |grep nvme >> /usr/tmp/$1;done
echo "----------Query FusionStorage NVME SSD disk end-----" >> /usr/tmp/$1

echo "----------Query FusionStorage StoragePool Info start-----">> /usr/tmp/$1
/opt/dsware/agent/tool/dsware_insight 2 203 129.175.102.8 10901 14 425 0 >>
    /usr/tmp/$1
/opt/dsware/agent/tool/dsware_insight 2 203 129.175.102.8 10901 14 425 1 >>
    /usr/tmp/$1
/opt/dsware/agent/tool/dsware_insight 2 203 129.175.102.8 10901 14 425 2 >>
    /usr/tmp/$1
echo "----------Query FusionStorage StoragePool Info end-----">> /usr/tmp/$1

echo  "----------Query  FusionStorage  Pool  0  StorageLUN  Info  start-----">>
    /usr/tmp/$1
/opt/dsware/agent/tool/dsware_insight 2 203 129.175.102.8 10901 14 420 0 >>
    /usr/tmp/$1
echo  "----------Query  FusionStorage  Pool  0  StorageLUN  Info  end-----">>
    /usr/tmp/$1

echo  "----------Query  FusionStorage  Pool  1  StorageLUN  Info  start-----">>
    /usr/tmp/$1
/opt/dsware/agent/tool/dsware_insight 2 203 129.175.102.8 10901 14 420 1 >>
    /usr/tmp/$1
echo  "----------Query  FusionStorage  Pool  1  StorageLUN  Info  end-----">>
    /usr/tmp/$1

echo  "----------Query  FusionStorage  Pool  2  StorageLUN  Info  start-----">>
    /usr/tmp/$1
/opt/dsware/agent/tool/dsware_insight 2 203 129.175.102.8 10901 14 420 2 >>
    /usr/tmp/$1
```

```
echo "----------Query  FusionStorage  Pool  2  StorageLUN  Info  end-----">>
    /usr/tmp/$1

echo "----------Query FusionStorage StorageNode Power Supply Info start----->>
    /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.24 -U root -P ${bmc_pwd} sensor |grep Power >>
    /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.22 -U root -P ${bmc_pwd} sensor |grep Power >>
    /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.21 -U root -P ${bmc_pwd} sensor |grep Power >>
    /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.101 -U root -P ${bmc_pwd} sensor |grep Power
    >> /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.102 -U root -P ${bmc_pwd} sensor |grep Power
    >> /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.103 -U root -P ${bmc_pwd} sensor |grep Power
    >> /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.104 -U root -P ${bmc_pwd} sensor |grep Power
    >> /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.105 -U root -P ${bmc_pwd} sensor |grep Power
    >> /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.106 -U root -P ${bmc_pwd} sensor |grep Power
    >> /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.107 -U root -P ${bmc_pwd} sensor |grep Power
    >> /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.108 -U root -P ${bmc_pwd} sensor |grep Power
    >> /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.111 -U root -P ${bmc_pwd} sensor |grep Power
    >> /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.112 -U root -P ${bmc_pwd} sensor |grep Power
    >> /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.113 -U root -P ${bmc_pwd} sensor |grep Power
    >> /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.114 -U root -P ${bmc_pwd} sensor |grep Power
    >> /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.115 -U root -P ${bmc_pwd} sensor |grep Power
    >> /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.116 -U root -P ${bmc_pwd} sensor |grep Power
    >> /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.117 -U root -P ${bmc_pwd} sensor |grep Power
    >> /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.118 -U root -P ${bmc_pwd} sensor |grep Power
    >> /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.131 -U root -P ${bmc_pwd} sensor |grep Power
    >> /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.132 -U root -P ${bmc_pwd} sensor |grep Power
    >> /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.133 -U root -P ${bmc_pwd} sensor |grep Power
    >> /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.134 -U root -P ${bmc_pwd} sensor |grep Power
    >> /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.135 -U root -P ${bmc_pwd} sensor |grep Power
    >> /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.136 -U root -P ${bmc_pwd} sensor |grep Power
    >> /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.137 -U root -P ${bmc_pwd} sensor |grep Power
    >> /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.138 -U root -P ${bmc_pwd} sensor |grep Power
    >> /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.139 -U root -P ${bmc_pwd} sensor |grep Power
    >> /usr/tmp/$1
```

```
ipmitool -I lanplus -H 100.175.100.141 -U root -P ${bmc_pwd} sensor |grep Power
    >> /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.142 -U root -P ${bmc_pwd} sensor |grep Power
    >> /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.143 -U root -P ${bmc_pwd} sensor |grep Power
    >> /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.144 -U root -P ${bmc_pwd} sensor |grep Power
    >> /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.145 -U root -P ${bmc_pwd} sensor |grep Power
    >> /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.146 -U root -P ${bmc_pwd} sensor |grep Power
    >> /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.147 -U root -P ${bmc_pwd} sensor |grep Power
    >> /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.148 -U root -P ${bmc_pwd} sensor |grep Power
    >> /usr/tmp/$1

echo "----------Query FusionStorage StorageNode Power Supply Info end-----">>
    /usr/tmp/$1

echo "----------Query  FusionStorage  StorageNode  FAN  Info  start----->>
    /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.101 -U root -P ${bmc_pwd} sensor |grep FAN >>
    /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.102 -U root -P ${bmc_pwd} sensor |grep FAN >>
    /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.103 -U root -P ${bmc_pwd} sensor |grep FAN >>
    /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.104 -U root -P ${bmc_pwd} sensor |grep FAN >>
    /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.105 -U root -P ${bmc_pwd} sensor |grep FAN >>
    /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.106 -U root -P ${bmc_pwd} sensor |grep FAN >>
    /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.107 -U root -P ${bmc_pwd} sensor |grep FAN >>
    /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.108 -U root -P ${bmc_pwd} sensor |grep FAN >>
    /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.111 -U root -P ${bmc_pwd} sensor |grep FAN >>
    /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.112 -U root -P ${bmc_pwd} sensor |grep FAN >>
    /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.113 -U root -P ${bmc_pwd} sensor |grep FAN >>
    /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.114 -U root -P ${bmc_pwd} sensor |grep FAN >>
    /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.115 -U root -P ${bmc_pwd} sensor |grep FAN >>
    /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.116 -U root -P ${bmc_pwd} sensor |grep FAN >>
    /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.117 -U root -P ${bmc_pwd} sensor |grep FAN >>
    /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.118 -U root -P ${bmc_pwd} sensor |grep FAN >>
    /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.131 -U root -P ${bmc_pwd} sensor |grep FAN >>
    /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.132 -U root -P ${bmc_pwd} sensor |grep FAN >>
    /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.133 -U root -P ${bmc_pwd} sensor |grep FAN >>
    /usr/tmp/$1
```

```
ipmitool -I lanplus -H 100.175.100.134 -U root -P ${bmc_pwd} sensor |grep FAN >>
    /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.135 -U root -P ${bmc_pwd} sensor |grep FAN >>
    /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.136 -U root -P ${bmc_pwd} sensor |grep FAN >>
    /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.137 -U root -P ${bmc_pwd} sensor |grep FAN >>
    /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.138 -U root -P ${bmc_pwd} sensor |grep FAN >>
    /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.139 -U root -P ${bmc_pwd} sensor |grep FAN >>
    /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.141 -U root -P ${bmc_pwd} sensor |grep FAN >>
    /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.142 -U root -P ${bmc_pwd} sensor |grep FAN >>
    /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.143 -U root -P ${bmc_pwd} sensor |grep FAN >>
    /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.144 -U root -P ${bmc_pwd} sensor |grep FAN >>
    /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.145 -U root -P ${bmc_pwd} sensor |grep FAN >>
    /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.146 -U root -P ${bmc_pwd} sensor |grep FAN >>
    /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.147 -U root -P ${bmc_pwd} sensor |grep FAN >>
    /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.148 -U root -P ${bmc_pwd} sensor |grep FAN >>
    /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.21 -U root -P ${bmc_pwd} sensor |grep FAN >>
    /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.22 -U root -P ${bmc_pwd} sensor |grep FAN >>
    /usr/tmp/$1
ipmitool -I lanplus -H 100.175.100.24 -U root -P ${bmc_pwd} sensor |grep FAN >>
    /usr/tmp/$1
echo "---------Query FusionStorage StorageNode FAN Info end-----">> /usr/tmp/$1

echo "---------Query Hosts Info start-----">> /usr/tmp/$1
/opt/dsware/agent/tool/dsware_insight 0 22 129.175.102.131 10530 8 110 |grep -e
    PORT -e 10901 >> /usr/tmp/$1
echo "---------Query Hosts Info end-----">> /usr/tmp/$1

echo "---------Query Hosts Logical Volume Info start-----">> /usr/tmp/$1
lvdisplay >> /usr/tmp/$1
echo "---------Query Hosts Logical Volume Info end-----">> /usr/tmp/$1
date >> /usr/tmp/$1
```

APPENDIX F: WORKLOAD GENERATOR

The host parameters for the SPC-1 workload generator were defined using the script *21host.HST*.

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

The initial test phases of the benchmark were invoked using the script **full_run.sh**, which paused to allow for the Persistence Test shutdown. Once the TSC had been restarted, the PERSIST_2 test phase was invoked by resuming the execution of the script.

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

21host.HST

```
PORT=1962
LOGIN=root
CONFIG=/spc1
WEIGHT=1
STORAGE=slave_asu.asu
EXEC=spc1
-- Host Entries
HOST=100.175.102.1
HOST=100.175.102.4
HOST=100.175.102.5
HOST=100.175.102.6
HOST=100.175.102.7
HOST=100.175.102.8
HOST=100.175.102.11
HOST=100.175.102.12
HOST=100.175.102.13
HOST=100.175.102.14
HOST=100.175.102.15
HOST=100.175.102.16
HOST=100.175.102.17
HOST=100.175.102.18
HOST=100.175.102.19
HOST=100.175.102.25
HOST=100.175.102.23
HOST=100.175.102.26
HOST=100.175.102.27
HOST=100.175.102.28
HOST=100.175.102.29
```


slave_asu.asu

```
ASU=1
OFFSET=0
SIZE=0
DEVICE=/dev/vg1/asu1000
DEVICE=/dev/vg1/asu1001
DEVICE=/dev/vg1/asu1002
DEVICE=/dev/vg1/asu1003
```

```
DEVICE=/dev/vg1/asu1004
DEVICE=/dev/vg1/asu1005
DEVICE=/dev/vg1/asu1006
DEVICE=/dev/vg1/asu1007
DEVICE=/dev/vg1/asu1008
DEVICE=/dev/vg1/asu1009
DEVICE=/dev/vg1/asu1010
DEVICE=/dev/vg1/asu1011
DEVICE=/dev/vg1/asu1012
DEVICE=/dev/vg1/asu1013
DEVICE=/dev/vg1/asu1014
DEVICE=/dev/vg1/asu1015
DEVICE=/dev/vg1/asu1016
DEVICE=/dev/vg1/asu1017
DEVICE=/dev/vg1/asu1018
DEVICE=/dev/vg1/asu1019
DEVICE=/dev/vg1/asu1020
DEVICE=/dev/vg1/asu1021
DEVICE=/dev/vg1/asu1022
DEVICE=/dev/vg1/asu1023
DEVICE=/dev/vg1/asu1024
DEVICE=/dev/vg1/asu1025
DEVICE=/dev/vg1/asu1026
DEVICE=/dev/vg1/asu1027
DEVICE=/dev/vg1/asu1028
DEVICE=/dev/vg1/asu1029
DEVICE=/dev/vg1/asu1030
DEVICE=/dev/vg1/asu1031
DEVICE=/dev/vg1/asu1032
DEVICE=/dev/vg1/asu1033
DEVICE=/dev/vg1/asu1034
DEVICE=/dev/vg1/asu1035
DEVICE=/dev/vg1/asu1036
DEVICE=/dev/vg1/asu1037
DEVICE=/dev/vg1/asu1038
DEVICE=/dev/vg1/asu1039
DEVICE=/dev/vg1/asu1040
DEVICE=/dev/vg1/asu1041
DEVICE=/dev/vg1/asu1042
DEVICE=/dev/vg1/asu1043
DEVICE=/dev/vg1/asu1044
DEVICE=/dev/vg1/asu1045
DEVICE=/dev/vg1/asu1046
DEVICE=/dev/vg1/asu1047
DEVICE=/dev/vg1/asu1048
DEVICE=/dev/vg1/asu1049
DEVICE=/dev/vg1/asu1050
DEVICE=/dev/vg1/asu1051
DEVICE=/dev/vg1/asu1052
DEVICE=/dev/vg1/asu1053
--
ASU=2
OFFSET=0
SIZE=0
DEVICE=/dev/vg1/asu2000
DEVICE=/dev/vg1/asu2001
DEVICE=/dev/vg1/asu2002
DEVICE=/dev/vg1/asu2003
DEVICE=/dev/vg1/asu2004
DEVICE=/dev/vg1/asu2005
DEVICE=/dev/vg1/asu2006
```

```
DEVICE=/dev/vg1/asu2007
DEVICE=/dev/vg1/asu2008
DEVICE=/dev/vg1/asu2009
DEVICE=/dev/vg1/asu2010
DEVICE=/dev/vg1/asu2011
DEVICE=/dev/vg1/asu2012
DEVICE=/dev/vg1/asu2013
DEVICE=/dev/vg1/asu2014
DEVICE=/dev/vg1/asu2015
DEVICE=/dev/vg1/asu2016
DEVICE=/dev/vg1/asu2017
DEVICE=/dev/vg1/asu2018
DEVICE=/dev/vg1/asu2019
DEVICE=/dev/vg1/asu2020
DEVICE=/dev/vg1/asu2021
DEVICE=/dev/vg1/asu2022
DEVICE=/dev/vg1/asu2023
DEVICE=/dev/vg1/asu2024
DEVICE=/dev/vg1/asu2025
DEVICE=/dev/vg1/asu2026
DEVICE=/dev/vg1/asu2027
DEVICE=/dev/vg1/asu2028
DEVICE=/dev/vg1/asu2029
DEVICE=/dev/vg1/asu2030
DEVICE=/dev/vg1/asu2031
DEVICE=/dev/vg1/asu2032
DEVICE=/dev/vg1/asu2033
DEVICE=/dev/vg1/asu2034
DEVICE=/dev/vg1/asu2035
DEVICE=/dev/vg1/asu2036
DEVICE=/dev/vg1/asu2037
DEVICE=/dev/vg1/asu2038
DEVICE=/dev/vg1/asu2039
DEVICE=/dev/vg1/asu2040
DEVICE=/dev/vg1/asu2041
DEVICE=/dev/vg1/asu2042
DEVICE=/dev/vg1/asu2043
DEVICE=/dev/vg1/asu2044
DEVICE=/dev/vg1/asu2045
DEVICE=/dev/vg1/asu2046
DEVICE=/dev/vg1/asu2047
DEVICE=/dev/vg1/asu2048
DEVICE=/dev/vg1/asu2049
DEVICE=/dev/vg1/asu2050
DEVICE=/dev/vg1/asu2051
DEVICE=/dev/vg1/asu2052
DEVICE=/dev/vg1/asu2053
--
ASU=3
OFFSET=0
SIZE=0
DEVICE=/dev/vg1/asu3000
DEVICE=/dev/vg1/asu3001
DEVICE=/dev/vg1/asu3002
DEVICE=/dev/vg1/asu3003
DEVICE=/dev/vg1/asu3004
DEVICE=/dev/vg1/asu3005
DEVICE=/dev/vg1/asu3006
DEVICE=/dev/vg1/asu3007
DEVICE=/dev/vg1/asu3008
DEVICE=/dev/vg1/asu3009
```

```
    DEVICE=/dev/vg1/asu3010
    DEVICE=/dev/vg1/asu3011
```

full_run.sh

```
#!/bin/sh
sh collectStorageInfo.sh collectStorageInfo_1.log
spc1   -run   SPC1_INIT   -iops   25000   -storage   slave_asu.asu   -output
    /spc1_out/spc1_full_run_4500k_iops -master 21host.HST
spc1   -run   SPC1_VERIFY   -iops   100   -storage   slave_asu.asu   -output
    /spc1_out/spc1_full_run_4500k_iops
spc1   -run   SPC1_METRICS   -iops   4500000   -storage   slave_asu.asu   -output
    /spc1_out/spc1_full_run_4500k_iops -master 21host.HST
spc1   -run   SPC1_VERIFY   -iops   100   -storage   slave_asu.asu   -output
    /spc1_out/spc1_full_run_4500k_iops
spc1   -run   SPC1_PERSIST_1   -iops   1125000   -storage   slave_asu.asu   -output
    /spc1_out/spc1_full_run_4500k_iops -master 21host.HST
echo "Power cycle TSC, then Enter to contitue"
read
sh collectSysShutdownLog.sh
sh collectStorageInfo.sh collectStorageInfo_2.log
spc1   -run   SPC1_PERSIST_2   -iops   1125000   -storage   slave_asu.asu   -output
    /spc1_out/spc1_full_run_4500k_iops -master 21host.HST
```