



SPC BENCHMARK 1™
EXECUTIVE SUMMARY

DATA CORE SOFTWARE CORPORATION
DATA CORE SANSYMPHONY 10.0
(DUAL NODE, HIGH AVAILABILITY, HYPER-CONVERGED)

SPC-1 V1.14

Submitted for Review: June 13, 2016
Submission Identifier: A00178

EXECUTIVE SUMMARY**Test Sponsor and Contact Information**

Test Sponsor and Contact Information	
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Auditor	Storage Performance Council – http://www.storageperformance.org Walter E. Baker – AuditService@StoragePerformance.org 643 Bair Island Road, Suite 103 Redwood City, CA 94063 Phone: (650) 556-9384 FAX: (650) 556-9385

Revision Information and Key Dates

Revision Information and Key Dates	
SPC-1 Specification revision number	V1.14
SPC-1 Workload Generator revision number	V2.3.0
Date Results were first used publicly	June 13, 2016
Date the FDR was submitted to the SPC	June 13, 2016
Date the Priced Storage Configuration is available for shipment to customers	September 6, 2016
Date the TSC completed audit certification	June 13, 2016

Tested Storage Product (TSP) Description

SANsymphony provides a flexible software platform that has been proven in enterprise environments for over a decade. Because it is designed from the outset as parallel storage software, SANsymphony is uniquely able to scale to its underlying hardware environment and to do so in both conventional storage topologies and in more recent converged environments.

The Tested Storage Configuration (TSC) used to produce this SPC-1 Result was a converged configuration consisting of two Lenovo x3650 servers acting both as a dual-node, high availability, hyperconverged SANsymphony configuration and as the SPC-1 Host Systems providing the reported SPC-1 I/O requests.

This version of SANsymphony improved on the performance demonstrated by the current SANsymphony-V 10.0 SPC-1 Result[1]. In addition, the dual-node SANsymphony configuration provided an additional level of protection by synchronously mirroring the SPC-1 Data Repository across directly connected, redundant Fibre Channel (FC) ports between the two nodes, which resulted in active-active storage for the SPC-1 Test Runs executing on the TSC.

[1] The SPC-1 Executive Summary and Full Disclosure Report for the Data Core SANsymphony-V 10.0 (459,290.87 SPC-1 IOPS) are available at:
http://www.storageperformance.org/results/benchmark_results_spc1_active/#a00164

Summary of Results

SPC-1 Reported Data	
Tested Storage Product (TSP) Name: DataCore SANsymphony 10.0 <i>(Dual Node, High Availability, Hyper-converged)</i>	
Metric	Reported Result
SPC-1 IOPS™	1,201,961.83
SPC-1 Price-Performance™	\$0.10/SPC-1 IOPS™
Total ASU Capacity	3,325.000 GB
Data Protection Level	Protected 2 (<i>Mirroring</i>)
Total Price	\$115,142.76
Currency Used	U.S. Dollars
Target Country for availability, sales and support	USA

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

SPC-1 Price-Performance™ is the ratio of **Total Price** to **SPC-1 IOPS™**.

Total ASU (Application Storage Unit) **Capacity** represents the total storage capacity available to be read and written in the course of executing the SPC-1 benchmark.

A **Data Protection Level** of **Protected 1** using **Mirroring** configures two or more identical copies of user data.

***Protected 1:** The single point of failure of any **storage device** in the configuration will not result in permanent loss of access to or integrity of the SPC-1 Data Repository.*

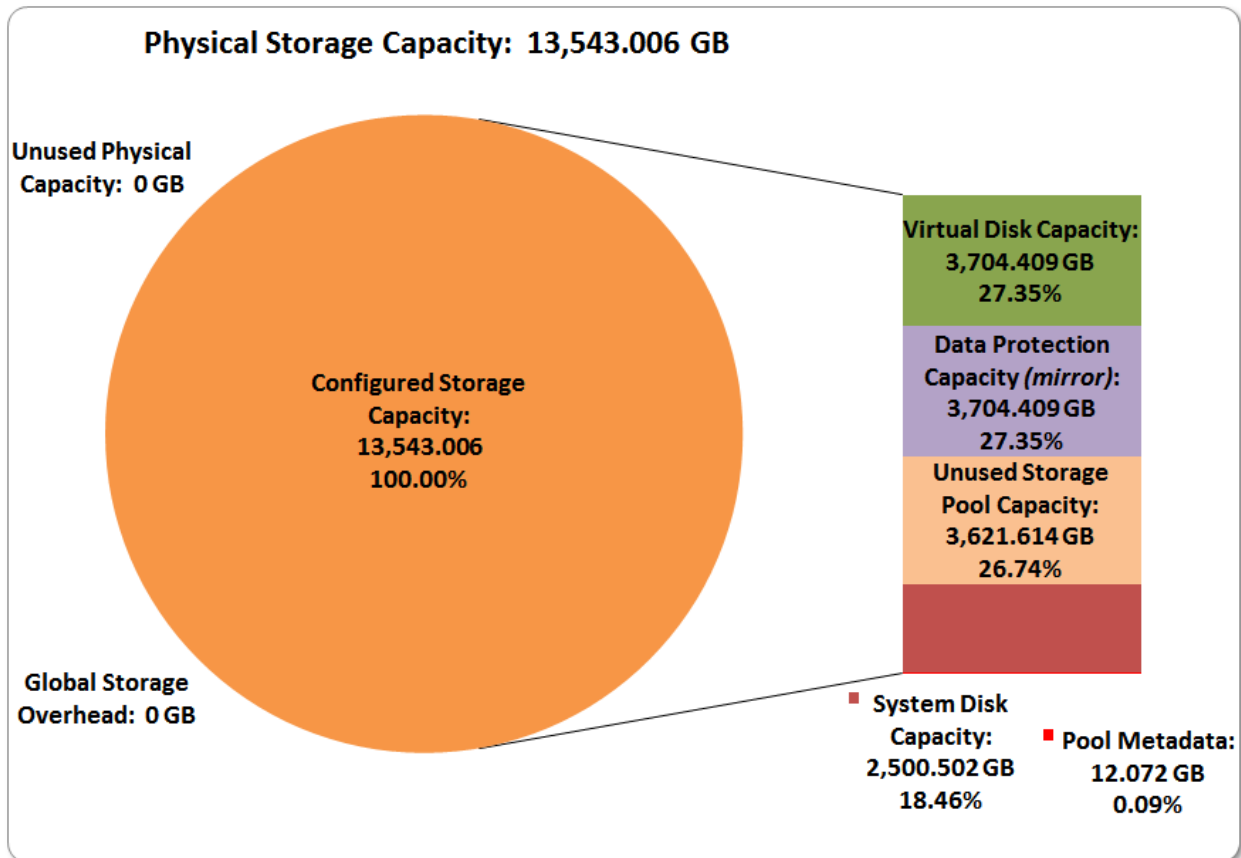
Total Price includes the cost of the Priced Storage Configuration plus three years of hardware maintenance and software support as detailed on page [9](#).

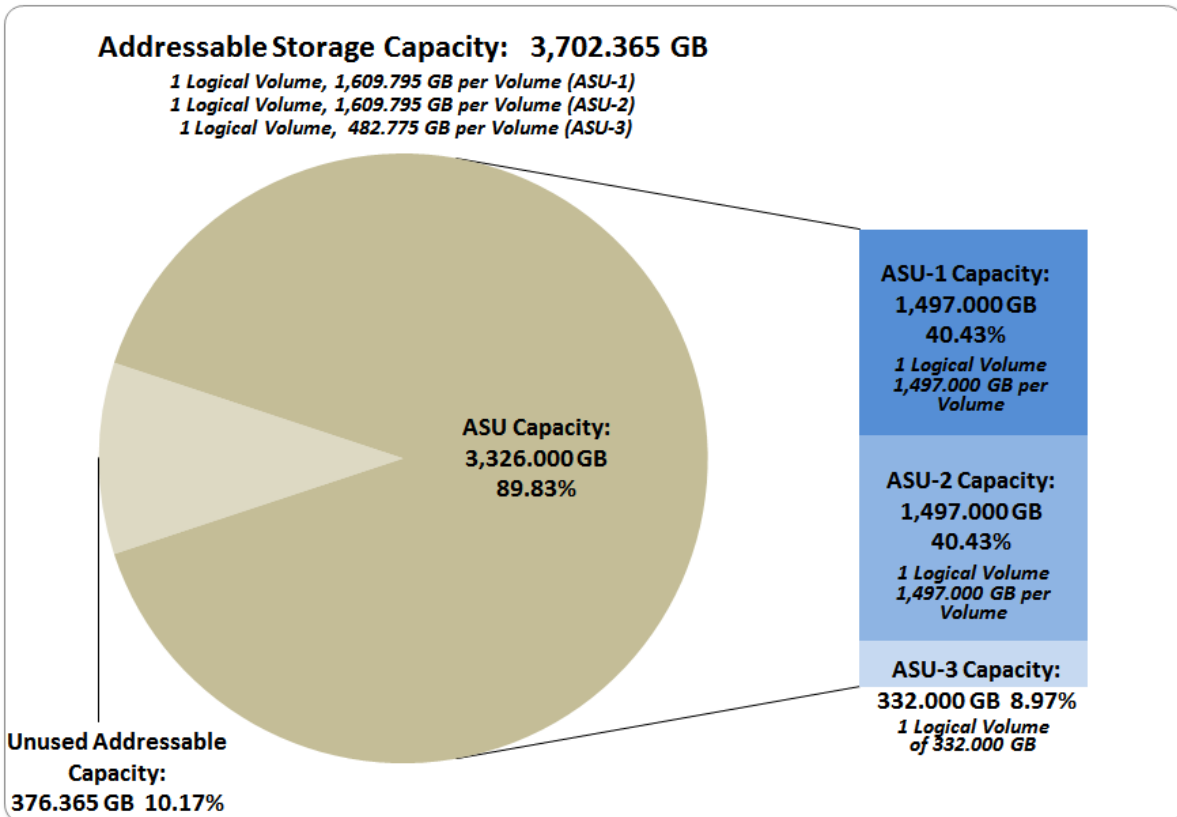
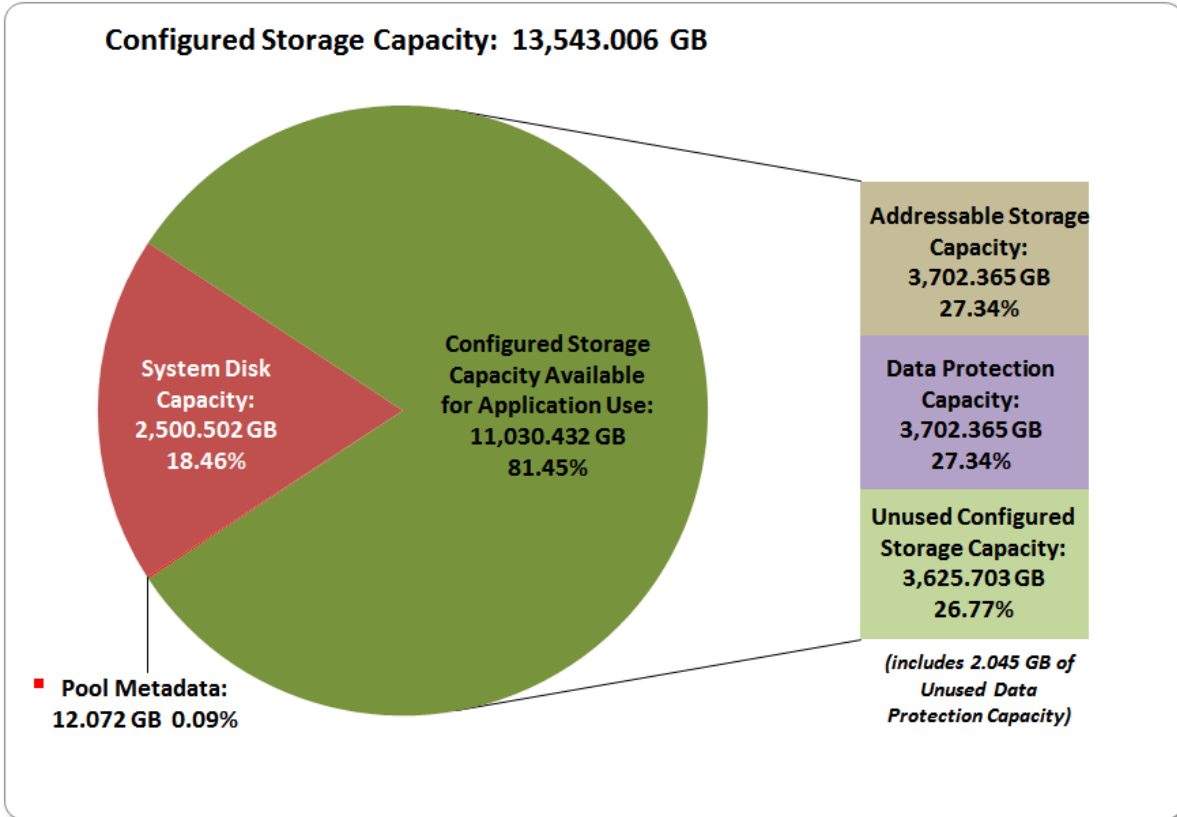
Currency Used is formal name for the currency used in calculating the **Total Price** and **SPC-1 Price-Performance™**. That currency may be the local currency of the **Target Country** or the currency of a difference country (*non-local currency*).

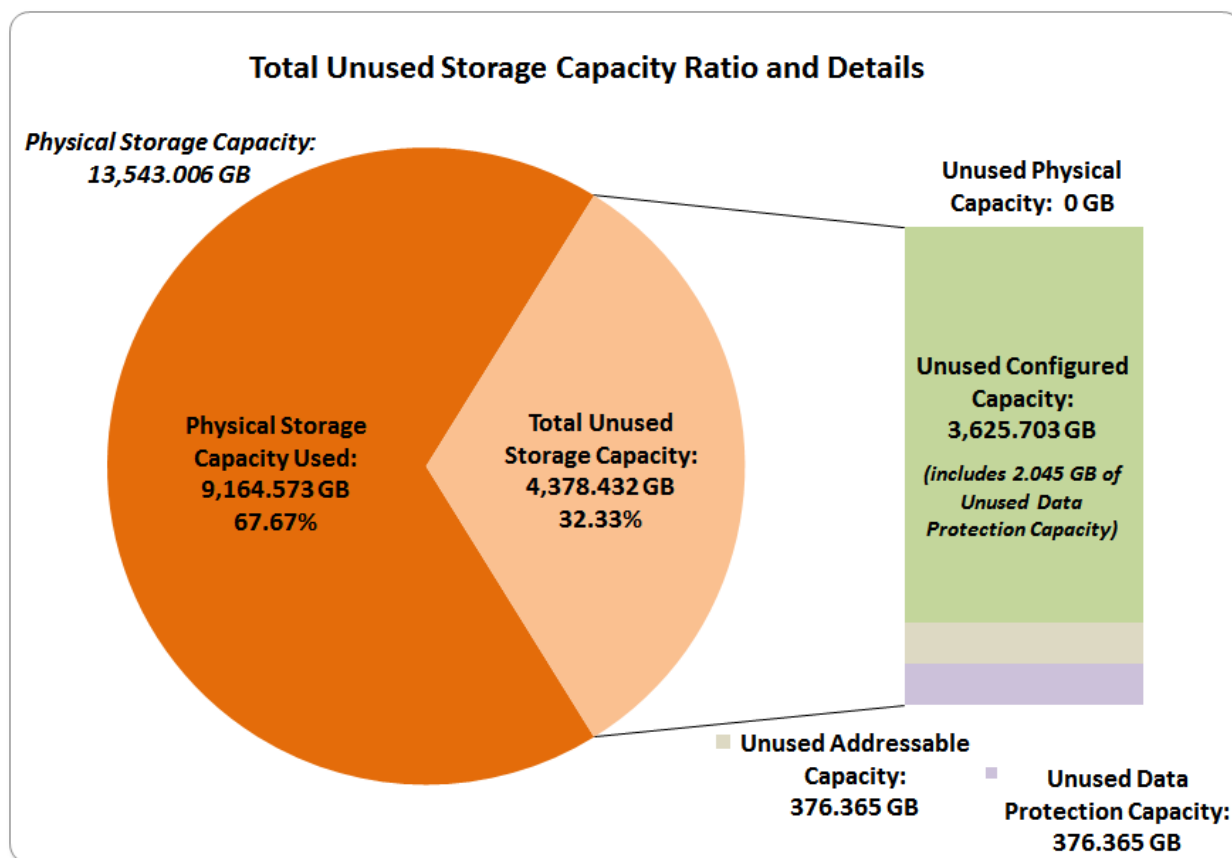
The **Target Country** is the country in which the Priced Storage Configuration is available for sale and in which the required hardware maintenance and software support is provided either directly from the Test Sponsor or indirectly via a third-party supplier.

Storage Capacities, Relationships, and Utilization

The following four charts and table document the various storage capacities, used in this benchmark, and their relationships, as well as the storage utilization values required to be reported.







SPC-1 Storage Capacity Utilization	
Application Utilization	32.33%
Protected Application Utilization	49.12%
Unused Storage Ratio	32.33%

Application Utilization:

Application Utilization: Total ASU Capacity (3,326.000 GB) divided by Physical Storage Capacity (13,543.006 GB).

Protected Application Utilization: (Total ASU Capacity (3,326.000 GB) plus total Data Protection Capacity (3,704.509 GB) minus unused Data Protection Capacity (378.409 GB)) divided by Physical Storage Capacity (13,543.006 GB).

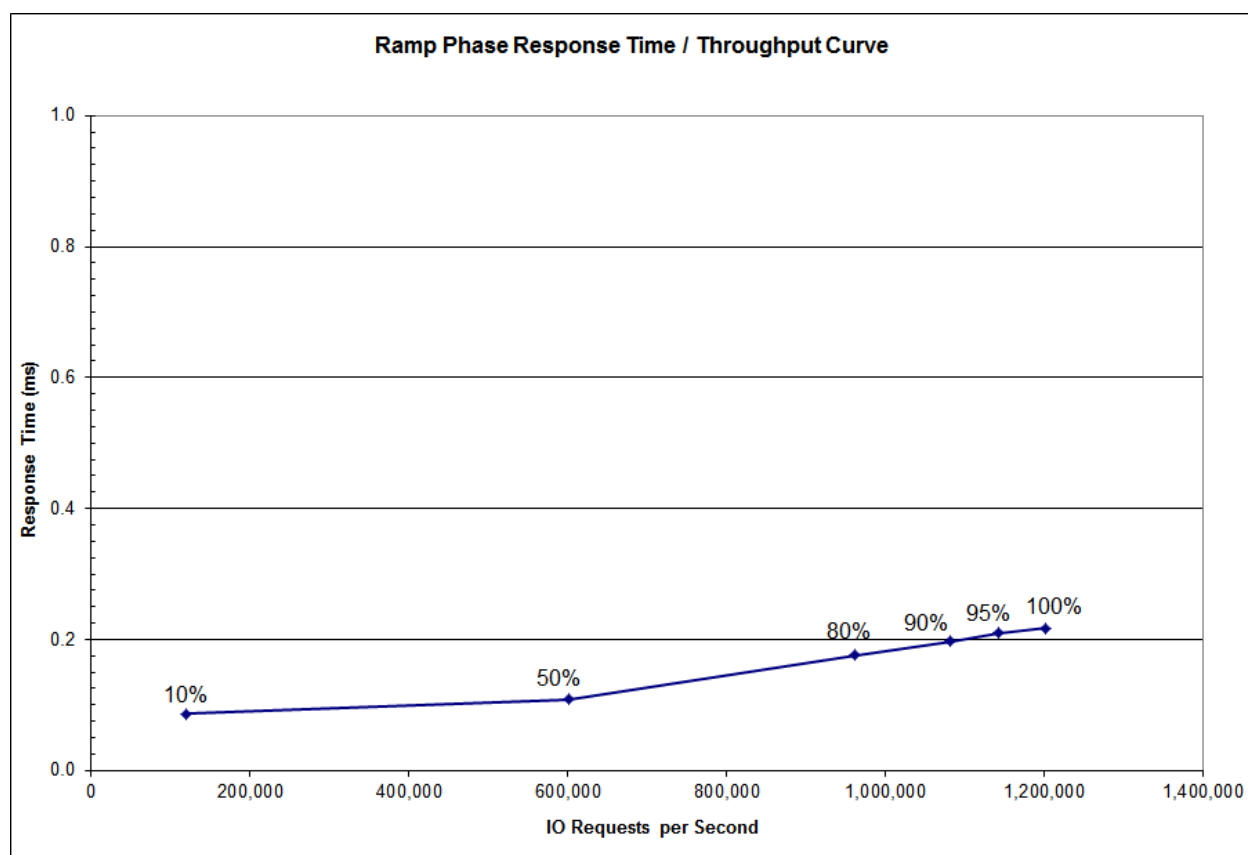
Unused Storage Ratio: Total Unused Capacity (4,378.432 GB) divided by Physical Storage Capacity (13,543.006 GB) and may not exceed 45%.

Detailed information for the various storage capacities and utilizations is available on pages 25-26 in the Full Disclosure Report.

Response Time – Throughput Curve

The Response Time-Throughput Curve illustrates the Average Response Time (milliseconds) and I/O Request Throughput at 100%, 95%, 90%, 80%, 50%, and 10% of the workload level used to generate the SPC-1 IOPS™ metric.

The Average Response Time measured at the any of the above load points cannot exceed 30 milliseconds or the benchmark measurement is invalid.



Response Time – Throughput Data

	10% Load	50% Load	80% Load	90% Load	95% Load	100% Load
I/O Request Throughput	120,251.64	601,236.81	961,968.26	1,082,314.26	1,142,289.52	1,201,961.83
Average Response Time (ms):						
All ASUs	0.09	0.11	0.18	0.20	0.21	0.22
ASU-1	0.08	0.10	0.18	0.20	0.22	0.22
ASU-2	0.12	0.15	0.22	0.24	0.26	0.28
ASU-3	0.09	0.10	0.14	0.17	0.18	0.19
Reads	0.10	0.13	0.24	0.26	0.27	0.27
Writes	0.08	0.10	0.14	0.16	0.17	0.18

Priced Storage Configuration Pricing

The Priced Storage Configuration pricing information is not embedded in this document due to its size and format. The pricing information is available via the following hyperlink:

[Priced Storage Configuration Pricing](#)

The above pricing includes hardware maintenance and software support for three years, 7 days per week, 24 hours per day. The hardware maintenance and software support provides the following:

- Acknowledgement of new and existing problems within four (4) hours.
- Onsite presence of a qualified maintenance engineer or provision of a customer replaceable part within four (4) hours of the above acknowledgement for any hardware failure that results in an inoperative Priced Storage Configuration that can be remedied by the repair or replacement of a Priced Storage Configuration component.

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

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

Priced Storage Configuration Diagram (*logical*)

DataCore SANSymphony 10.0
(Dual Node, High Availability Hyper-converged)

DataCore SANSymphony 10.0
(Dual Node, High Availability Hyper-converged)



Lenovo X3650 M5 Server (A) *10 – 16Gb FC connections*

Lenovo X3650 M5 Server (E)

- 2 – 4-port QLE2694 FC 16GB HBAs**
- 1 – 2-port QLE2692 FC 16GB HBA**
(10 – 16GB ports)

- 2 – 4-port QLE2694 FC 16GB HBAs**
- 1 – 2-port QLE2692 FC 16GB HBA**
(10 – 16GB ports)

- Server RAID M1215 Controller (*internal*)**
- 1 – 2 TB 5.4K SATA HDD (*system HDD*)**
- 15 – 240 GB 6 Gb SATA SFF SSDs**

- Server RAID M1215 Controller (*internal*)**
- 1 – 500 GB SATA SSD (*system SSD*)**
- 15 – 240 GB 6 Gb SATA SFF SSDs**

- Server RAID M1215 Controller (*external*)**
- 3 – 240 GB 6 Gb SATA SFF SSDs**
- 4 – 300 GB 12Gb 15K SAS SFF HDDs**

- Server RAID M1215 Controller (*external*)**
- 3 – 240 GB 6 Gb SATA SFF SSDs**
- 4 – 300 GB 12Gb 15K SAS SFF HDDs**

Priced Storage Configuration Components

Priced Storage Configuration
<p>DataCore SANsymphony 10.0 <i>(Dual Node, High Availability, Hyper-converged)</i></p>
<p>1 – Lenovo X3650 M5 Server, each with:</p> <ul style="list-style-type: none"> 2 – Intel® Xeon® 2.30 GHz E5-2696 V3 processors each with 18 cores, 45 MB Intel Smart Cache 768 GB main memory <i>(508 GB configured for DataCore SANsymphony 10.0)</i> Windows 2008 R2 Enterprise Server w/SP1 PCIe <ul style="list-style-type: none"> 2 – 4-port QLE2694 16Gb HBAs 1 – 2-port QLE2692 16Gb HBA <i>(10 – 16Gb ports total)</i> 1 – Server RAID M1215 SAS/SATA Controller <i>(internal)</i> 1 – Server RAID M1215 SAS/SATA Controllers <i>(external)</i> 1 – System Disk <i>(connected to the internal controller)</i> <ul style="list-style-type: none"> Server A: 2TB, 5.4K SATA HDD Server E: Samsun 850EVO 2.5" 500GB SATA III SSD 1 – Samsung 850EVO 2.5" 500GB SATA III SSD <i>(Server E system SSD, connected to the internal controller)</i> 15 – 240 GB, 6 Gb SATA SFF SSDs <i>(Samsung SM863 MZ-7KM204E)</i> <i>(connected to the internal controller)</i> 3 – 240 GB, 6 Gb SATA SFF SSDs <i>(Samsung SM863 MZ-7KM204E)</i> <i>(connected to the external controller)</i> 4 – 300 GB, 12 Gb, 15K SAS SFF HDDs (HGST Ultrastar C15K600) <i>(connected to the external controller)</i>
<p>2 – APC Smart UPS X 1500VA Rack/Tower 120V – SMX1500RM2UAPC</p>