Lenovo ThinkSystem SR650 and DataCore Software Validation Tests

Shows which ThinkSystem servers and storage are now DataCore Ready

Describes the functional tests that were performed

Details the ThinkSystem DS6200 Storage Array certification

Provides assurance that ThinkSystem hardware is suitable for a DataCore solution

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Abstract

The document describes the functional tests performed and the test environment used in achieving DataCore Ready certification based on Lenovo® ThinkSystem™ servers and Lenovo DS6200 Storage.

This document is intended for technical personnel who are interested in the details behind the ThinkSystem and DataCore validation testing. This includes Lenovo and Business Partner presales engineers, DataCore Solution Architects, Lenovo and DataCore customer support engineers, and technical experts working at our customers.

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Introduction

Lenovo and DataCore have successfully conducted a series of tests to certify Software-Defined Storage solutions based on Lenovo ThinkSystem servers and DataCore Software. Two SR650 servers running DataCore SANsymphony software were used for functional verification. In addition, Lenovo DS6200 Storage Array was successfully certified as a shared external storage array attached to both DataCore nodes. Testing was performed at the Lenovo lab facility in Morrisville, North Carolina in May 2018.

These validation tests are designed to provide customers assurance and confidence that SDS solutions based on Lenovo ThinkSystem servers and DataCore software have been thoroughly tested and have successfully gone through the strict DataCore Ready certification process.

Lenovo ThinkSystem servers and DataCore software provide customers with a powerful set of Software Defined Storage solutions delivering unique value in terms of extreme high performance, no single point of failure deployments and advanced functionality. These solutions are helping customer take their new or existing storage environments to a new level while providing a solid infrastructure designed to manage growth over a long period of time.

Component overview

Figure 1 shows the test environment used for the Lenovo ThinkSystem and DataCore software functional tests.

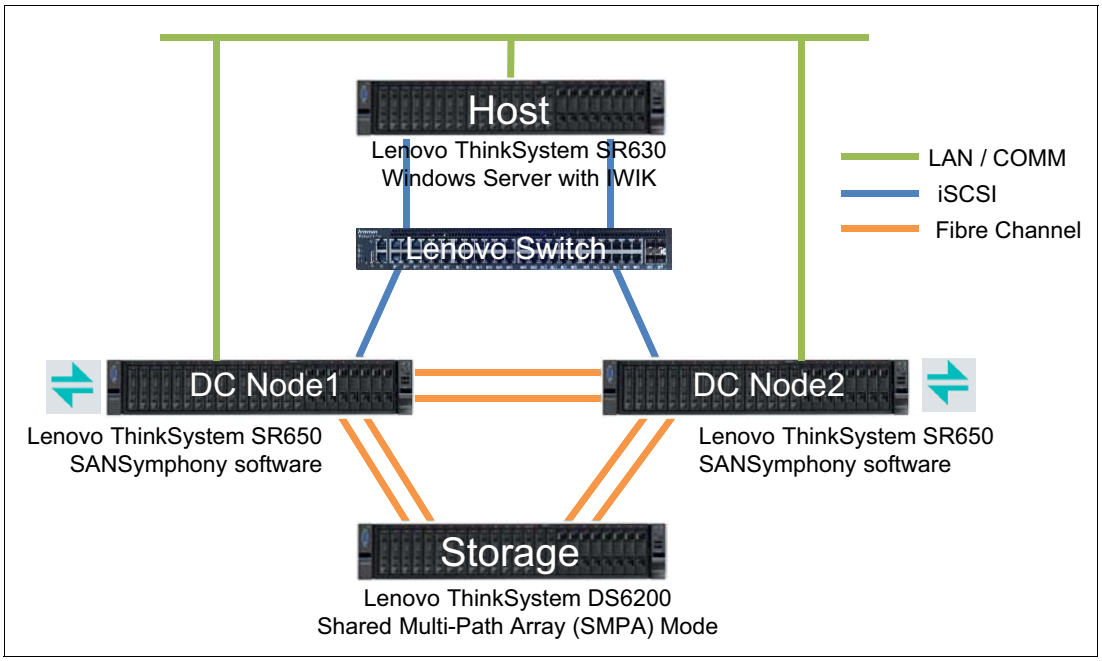

Figure 1 Lenovo – DataCore Test Environment

The key components are:

- 1x Windows Server as Host / Load Generator (iSCSI connectivity)
- 2x Lenovo ThinkSystem SR650 Servers as DataCore nodes (Fibre Channel connectivity for node mirroring)

- 1x Lenovo ThinkSystem DS6200 Storage Array (Fibre Channel connectivity to DataCore nodes)

Detailed components

This section provides a detailed view of the Lenovo ThinkSystem servers and DataCore software components used during the DataCore Ready certification tests.

Table 1 lists the components in the host system.

Table 1 Lenovo ThinkSystem SR630 components as Host System

Component	Host System
Server	
Server Name	7X02-J10026NL
Server Make/Model	Lenovo ThinkSystem SR630
Motherboard BIOS revision	IVE116S-1.20
OS - Type (e.g. MS, AIX, SOLARIS)	Windows Server 2016
Fibre Channel HBAs	
Multi-pathing solution used	DataCore WIK 4.0.2
SAN attached Ethernet Ports	
Number of Ports	2
NIC Make/Model	Intel Ethernet Connection X722 for 10GbE
Software iSCSI Driver	Windows 2016 MS iSCSI initiator
Multi-pathing solution used	WIK 4.0.2
Teaming Used (Yes/No)	No

Table 2 lists the components of the DataCore Nodes.

Table 2 Lenovo ThinkSystem SR650 components as DataCore Nodes

DataCore Server	VHost or DS #1	VHost or DS #2
Server Name	WIN-FKL5AUBA5D6	WIN-PECK0O4D6G2
Manufacturer / Model	Lenovo ThinkSystem SR650 server	Lenovo ThinkSystem SR650 server
CPU (speed, type and count)	Intel Xeon Gold 6148 CPU @ 2.40GHz, 2394 MHz, 20 cores, 40 logical processors	Intel Xeon Gold 6148 CPU @ 2.40GHz, 2394 MHz, 20 cores, 40 logical processors
Memory (Quantity)	768 GB	768 GB
UPS (Y/N)	House	House
Slot #1: NIC/HBA (Make/Model,FW,driver,Type)	QLogic QLE-2742	QLogic QLE-2742
Slot #2: NIC/HBA (Make/Model,FW,driver,Type)	QLogic QLE-2662	QLogic QLE-2662

DataCore Server	VHost or DS #1	VHost or DS #2
NIC Teaming Y/N (if Y which ports)	N	N

Table 3 lists the DataCore Software on each node.

Table 3 DataCore software components used

DataCore Options	DataCore Node 1	DataCore Node 2
DataCore Product/Version	SANsymphony 10 PSP7 Update 1	SANsymphony 10 PSP7 Update 1
FC	Included	Included

Table 4 lists the configuration of the Lenovo DS6200 Storage Array.

Table 4 Lenovo DS6200 Storage Array configuration

Lenovo	DataCore Node 1	DataCore Node 2
Make / Model	Lenovo DS6200 Storage Array	Lenovo DS6200 Storage Array
Controller Firmware	G250R007	G250R007
Cache Size	16GB	16GB
Number of Controllers	2	2
Number of Ports	4	4
Number of RAID sets	1	1
RAID set N	See Table 5	See Table 5
Number of LUNs/RAID set	2 LUNs, 1 RAID sets	2 LUNs, 1 RAID sets

Table 5 Lenovo DS6200 Storage Array detailed view

Controller ID: A	Controller ID: B
Serial Number: 11S01DC512Y010DH768028	Serial Number: 11S01DC512Y010DH76801D
Hardware Version: 5.0	Hardware Version: 5.0
CPLD Version: 3.6	CPLD Version: 3.6
MAC Address: 00:C0:FF:29:66:1E	MAC Address: 00:C0:FF:29:66:4E
WWNN: 208000C0FF2992B1	WWNN: 208000C0FF2992B1
IP Address: 172.70.70.68	IP Address: 172.70.70.69
IP Subnet Mask: 255.255.255.0	IP Subnet Mask: 255.255.255.0
IP Gateway: 172.70.70.1	IP Gateway: 172.70.70.1
Disks: 24	Disks: 24
Virtual Pools: 2	Virtual Pools: 2
Disk Groups: 12	Disk Groups: 12m
System Cache Memory (MB): 16384	System Cache Memory (MB): 16384
Host Ports: 4	Host Ports: 4

Controller ID: A	Controller ID: B
Disk Channels: 2	Disk Channels: 2
Disk Bus Type: SAS	Disk Bus Type: SAS
Status: Operational	Status: Operational
Failed Over to This Controller: No	Failed Over to This Controller: No
Fail Over Reason: Not applicable	Fail Over Reason: Not applicable
Multi-core: Enabled	Multi-core: Enabled
Health: OK	Health: OK
Health Reason:	Health Reason:
Health Recommendation:	Health Recommendation:
Position: Top	Position: Bottom
Phy Isolation: Enabled	Phy Isolation: Enabled
Controller Redundancy Mode: Active-Active ULP	Controller Redundancy Mode: Active-Active ULP
Controller Redundancy Status: Redundant	Controller Redundancy Status: Redundant

Functional tests

This section provides the Functional Test Plan (FTP) used to validate the functionality of DataCore software on Lenovo ThinkSystem servers required to achieve DataCore Ready certification.

Single non-mirrored vDisk

This section describes the single non-mirrored vDisk functional tests performed.

DataCore Node: WIN-FKL5AUBA5D6
Host server: WIN-PECK0O4D6G2
Customer Name: Lenovo
Certified Installer: Bob Strachan

Table 6 Single non-mirrored vDisk functional test

Step	What to do	Where to do it	What to look for	Status
1	Create a Test Pool	SANsymphony Management Console	Status Running	Completed
2	Add a raw disk to Test Pool	SANsymphony Management Console	Available pool space = ~98%	Completed
3	Create a 2TB virtual disk	SANsymphony Management Console	Configuration successfully applied	Completed
4	Serve the virtual disk to the host server	SANsymphony Management Console	Verify virtual disk status reads as follows: Status = Up to date	Completed

Step	What to do	Where to do it	What to look for	Status
5	Verify the Host sees the virtual disk	Host / Disk Management	View the properties of LUN to ensure the virtual disk is assigned to appropriate Host and is approximately 2TB.	Completed
6	Partition, format and mount the new virtual disk	Host / Disk Management	The virtual disk is successfully partitioned.	Completed
7	Copy an amount of data to the new disk less than or equal to the physical space available of the disk assigned in step 2.	Host / Disk Management	Check the Pool Usage	Completed

DataCore MPIO

Table 7 describes the DataCore Multi-Path I/O (MPIO) functional tests performed.

Table 7 DataCore MPIO functional test

Step	What to do	Where to do it	What to look for	Status
1	Configure a 10GB mirrored vdisk. Serve up the mirrored vdisk to the Host down 2 separate paths.	DataCore Node1 (active) / Virtual Disks	After a few moments the mirrored vdisk Mirror status will read as follows: Status = Redundancy Failed	Completed
2	View the mirrored vdisk status.	Virtual Disks / this new Virtual Disk / Info Tab	Status changes very quickly, it will show: Full Recovery Pending, In Full Recovery, then Up to Date	Completed
3	Verify the Host sees the served mirrored vdisk.	Host	A new 10 GB vdisk is visible	Completed
4	Partition, format and mount the new mirrored vdisk.	Host	The mirrored vdisk is successfully formatted.	Completed
5	Open MPIO Console.	Host / MPIO Console / Volumes	Verify that the mirrored vdisk has two paths. Ensure DataCore Server1 Path is active and DataCore Node2 path is passive.	Completed
The following steps 6, 7 and 8 need to occur during the file copy (step 6). Read steps 6, 7 and 8 before the start of the file copy. Close all unrelated windows and applications. During the file copy (Host), DataCore Node1 (active) will fail-over to DataCore Node2 (standby) path.				
6	Copy data (or send continuous IO) that does not exceed the size of the vdisk. The file-copy will be used to generate data activity during any fail-over and recovery process.	Host	Verify that the data transfer/file copy is occurring.	Completed
7	Simulate a failure by "Stopping" DataCore Node1 (active) during the file transfer.	Right-Click on DataCore Node1 (active) / "Stop DataCore Server"	DataCore Node1 is stopped.	Completed

Step	What to do	Where to do it	What to look for	Status
8	View the mirrored vdisk status.	Virtual Disks / this new Virtual Disk / Info Tab	The Info Tab will read as follows: Status = Redundancy Failed Stopped Server Data Status: Log recovery pending. On the running Server Data Status: Up to Date Host Access: Read/Write	Completed
9	Verify the served MPIO path on DataCore Node1 has failed-over to the DataCore Node2 MPIO path.	Host / MPIO Console / Volumes	Ensure the MPIO path status on both DataCore Servers reads as follows: DataCore Node1 STATE = Failed or path is removed. DataCore Node2 STATE = Active. “MPIO Management” refresh maybe required.	Completed
10	"Start" DataCore Node1, to initiate mirror recovery.	Right-Click on DataCore Node1 / "Start DataCore Server"	DataCore Node1 is started.	Completed
11	View the mirrored vdisk status.	Virtual Disks / this new Virtual Disk / Info Tab	The recovery back to the mirror can take up to several minutes. The Info tab will display as follows: Status = Redundancy failed Diagnostic = In Log Recovery. After the recovery is complete, the status window will read as follows: Status = Up to Date	Completed
12	Refresh MPIO Management and ensure 2 MPIO paths are available and online.	Host / MPIO Console / Volumes	Both MPIO paths are online.	Completed
13	Verify MPIO path states on DataCore Node1 and DataCore Node2.	Host / MPIO Console / Volumes	Ensure the MPIO path status on DataCore Servers reads as follows: DataCore Node1 STATE = Active DataCore Node2 STATE = Passive Note: failback is a timed process, please be patient and an “MPIO Management” refresh may be required.	Completed
14	View the data content of the mirrored vdisk	Host	Ensure the data content of the mirrored vdisk is valid. The data should match what was previously copied in step 6.	Completed

Reboot

Table 8 describes the Reboot functional tests performed.

Table 8 Reboot functional test

Step	What to do	Where to do it	What to look for	Status
1	Copy data (or send continuous IO) that does not exceed the size of the vdisk. The file-copy will be used to generate data activity during any fail-over and recovery process.	Host	Host can write without failures	Completed
2	Stop DataCore Node1	SANsymphony Management Console > Select Server name > Right-click > Stop	Host can write without failures. NOTE: IO may pause during failover operations	Completed
3	Reboot DataCore Node1	Operating System	Host can write without failures. Paths are removed from the Host.	Completed
4	Start DataCore Node1	SANsymphony Management Console > Select Server name > Right-click > Start	Host can write without failures	Completed
5	Wait for vdisk status to become up-to-date		Host has found all paths to the vdisk	Completed
6	Stop DataCore Node2	SANsymphony Management Console > Select Server name > Right-click > Stop	Host can write without failures. NOTE: IO may pause during failover operations	Completed
7	Reboot DataCore Node2	Operating System	Host can write without failures. Paths are removed from the Host.	Completed
8	Start DataCore Node2	SANsymphony Management Console > Select Server name > Right-click > Start	Host can write without failures	Completed
9	Wait for vdisk status to become up-to-date			Completed

DataCore Support Bundles Upload

Table 9 describes the DataCore support bundles upload functional tests performed.

Table 9 DataCore support bundles upload functional test

Step	What to do	Where to do it	What to look for	Status
1	Select Upload Support Bundle	SANsymphony Management Console	Must use the incident number that was created for the Customer Information incident	Completed
2	Verify the upload completes	SANsymphony Management Console	Look in the event log and verify the upload has completed	Completed

SMPA (Shared Multi Port Array) Basic Tests

Table 10 describes the Shared Multi-Port Array (SMPA) functional tests performed.

DataCore Node1: WIN-FKL5AUBA5D6
DataCore Node2: WIN-PECK0O4D6G2
Array Model: Lenovo DS6200
Certified Installer: Bob Strachan

Table 10 Shared Multi Port Array (SMPA) functional test

Step	What to do	Where to do it	What to look for	Status
1	Present LUNs from a SMPA to all SANsymphony servers that will share the LUN	On the array	Array software shows LUNs mapped	Completed
2	Rescan for LUNs on DataCore Servers	SANsymphony Management Console > Select each Server name > Right-click > Rescan Ports	Physical Disk should now be present in the UI	Completed
3	Create a shared pool	SANsymphony Management Console > Disk Pools	Pool should be created and visible on all servers NOTE: Pool will be in reclamation use small LUNs to minimize the time for pool initialization.	Completed
4	Create a Single (non-mirrored) vdisk from DataCore Node1	SANsymphony Management Console	The vdisk is successfully created and up-to-date	Completed
5	Serve the vdisk to a Host	SANsymphony Management Console > Hosts	Discover the disk on the Host and write to it	Completed
	What to Do	Where to Do It	What to Look For	•
6	Create a Single (non-mirrored) vdisk from DataCore Node2	SANsymphony Management Console	The vdisk is successfully created and up-to-date	Completed
7	Serve the vdisk to a Host	SANsymphony Management Console > Hosts	Discover the disk on the Host and write to it	Completed
8	Create a Single (non-mirrored) vdisk from DataCore Node N+1	SANsymphony Management Console	The vdisk is successfully created and up-to-date	Completed
9	Serve the vdisk to a Host	SANsymphony Management Console > Hosts	Discover the disk on the Host and write to it	Completed
10	Create a Dual (mirrored) vdisk from DataCore Node1	SANsymphony Management Console	The vdisk is successfully created and up-to-date	Completed
11	Serve the vdisk to a Host	SANsymphony Management Console > Hosts	Discover the disk on the Host and write to it	Completed
12	Create a Dual (mirrored) vdisk from DataCore Node2	SANsymphony Management Console	The vdisk is successfully created and up-to-date	Completed
13	Serve the vdisk to a Host	SANsymphony Management Console > Hosts	Discover the disk on the Host and write to it	Completed

Step	What to do	Where to do it	What to look for	Status
14	Create a Dual (mirrored) vdisk from DataCore Node N+1	SANsymphony Management Console	The vDisk is successfully created and up-to-date	
15	Serve the vdisk to a Host	SANsymphony Management Console > Hosts	Discover the disk on the Host and write to it	

SMPA Add Disk

Table 11 describes the Shared Multi-Port Array (SMPA) Add Disk functional tests performed.

Table 11 Shared Multi Port Array (SMPA) Add Disk functional test

Step	What to do	Where to do it	What to look for	Status
1	Present a new LUN from a SMPA to all SANsymphony servers that will share the LUN	On the array	Array software shows LUNs mapped	Completed
2	Rescan for LUNs on DataCore Servers	SANsymphony Management Console > Select each Server name > Right-click > Rescan Ports	Physical Disk should now be present in the UI under Physical Disks	Completed
3	Assign new LUN to existing shared pool on authorized DataCore servers	SANsymphony Management Console	Pool should be created and visible on all servers NOTE: new LUN will go into reclamation	Completed

SMPA MPIO Tests

Table 12 describes the Shared Multi-Port Array (SMPA) Multi-Path I/O (MPIO) functional tests performed.

Table 12 Shared Multi Port Array (SMPA) MPIO functional test

Step	What to do	Where to do it	What to look for	Status
1	Send continuous IO from Host to Dual vdisk	Host	Host can write without failures	Completed
2	Disconnect a path to the Shared Storage from DataCore Node1 used in the vdisk	Switch/Cable	Host can write without failures (NOTE: Host IO may pause during failover operations)	Completed
3	Replace disconnected path	Switch/Cable	Host can write without failures	Completed
4	Rescan for LUNs on DataCore Servers	SANsymphony Management Console > Select each Server name > Right-click > Rescan Ports	Path should return to the storage. Verify in the appropriate UI	Completed
5	Disconnect a path to Shared Storage from DataCore Node2 used in the vdisk	Switch/Cable	Host can write without failures (NOTE: Host IO may pause during failover operations)	Completed
6	Disconnect all paths to Shared Storage on DataCore Node2 used in the vdisk	Switch/Cable	Host can write without failures (NOTE: Host IO may pause during failover operations)	Completed

Step	What to do	Where to do it	What to look for	Status
7	Replace all disconnected paths	Switch/Cable	Host can write without failures	Completed
8	Rescan for LUNs on DataCore Nodes	SANsymphony Management Console > Select each Server name > Right-click > Rescan Ports	Paths should return to the storage. Verify in the appropriate UI	Completed
	What to Do	Where to Do It	What to Look For	Completed
9	Disconnect all paths to Shared Storage to a particular Controller on the array	Switch/Cable	Host can write without failures (NOTE: Host IO may pause during failover operations)	Completed
10	Replace all disconnected paths	Switch/Cable	Host can write without failures	Completed

Conclusion

Based on Functional tests performed, the Lenovo ThinkSystem servers are now certified as DataCore Ready Software Defined Storage solutions. Lenovo ThinkSystem servers and DataCore software provide a powerful platform for customers who are looking for high availability (no single point of failure), extremely high performance, and advanced rich functionality to enhance their storage infrastructure.

Lenovo ThinkSystem servers bring state of art hardware capability in terms of processors, memory, internal storage and strong networking connectivity options. They are a solid foundation as DataCore nodes. DataCore software brings its multi-core parallel I/O processing, along with its rich set of advanced storage features, which when configured on Lenovo ThinkSystem servers, deliver a unique value proposition to the market.

About DataCore Ready Certification

The DataCore Ready designation is awarded to third party products that have successfully met the verification criteria set by DataCore through the successful execution of a functional test plan and performance envelope tests. While DataCore solutions interoperate with common open and industry standard products, those that earn the “DataCore Ready” designation have completed additional verification testing.

Additional resources

For more information, see these resources

- DataCore home page for the Lenovo partnership

  https://www.datacore.com/lenovo
- Lenovo ThinkSystem SR650 datasheet:

  https://lenovopress.com/ds0032-lenovo-thinksystem-sr650
- Lenovo ThinkSystem SR630 datasheet

  https://lenovopress.com/ds0031-lenovo-thinksystem-sr630

- Lenovo ThinkSystem DS6200 datasheet:

  https://lenovopress.com/ds0007-lenovo-thinksystem-ds6200

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