

HP-QLogic SSCM Software Evaluation

Evaluation report prepared under contract with QLogic Corporation

Introduction

There has been much confusion and discussion about the ease of installation and the ease of use of Fibre Channel storage. Some technology professionals, after looking at Fibre Channel storage technology, have decided that it is too complicated and have concluded that deploying iSCSI storage, running over Ethernet, would be simpler. Although Ethernet may be ubiquitous, many network administrators have little knowledge or experience managing storage. Basic storage management knowledge is needed to successfully manage storage regardless of the interface to the storage. QLogic Corporation commissioned Demartek to evaluate the ease of installation and the ease of use of HP StorageWorks Simple SAN Connection Manager (SSCM) enterprise software that QLogic developed for HP as part of the HP StorageWorks H-series Fibre Channel switch portfolio. SSCM enterprise software provides a simple, wizard-based procedure to configure and manage Fibre Channel SAN agent components, including host bus adapters, Fibre Channel switches, and storage arrays. SSCM allows a complete Fibre Channel SAN to be deployed in minutes.

In this report we compare deploying a Fibre Channel SAN with the SSCM enterprise software to deploying an iSCSI SAN in the traditional method.

Evaluation Environment

The evaluation environment consisted of two physical servers running Windows server 2008 R2, an HP StorageWorks H-series Fibre Channel switch, HP StorageWorks Fibre Channel storage, an EMC iSCSI storage device, and an Ethernet network switch.

Evaluation Summary

We found that the HP SSCM software handled all the nuances of Fibre Channel storage deployment in an automated fashion without manual intervention, and we were able to complete the process in approximately 15 minutes. For our tests, the hardware had already been removed from the shipping boxes, the adapters had been installed, and the appropriate cables had been connected. By contrast, the equivalent steps needed to deploy iSCSI storage using a leading iSCSI storage target took approximately 15 minutes, not counting the time to configure the VLAN for the Ethernet switch, but they included a mixture of automated and manual steps, some of which required us to provide very specific technical information to complete. Overall, we concluded that using SSCM made deploying Fibre Channel storage simpler and easier than deploying iSCSI storage.

1 – Similarities of Fibre Channel and iSCSI SANs

The basic function of Fibre Channel and iSCSI Storage Area Network (SAN) technologies is to provide block storage to host servers and to applications on those hosts. Both technologies connect host servers to storage devices in such a way that the storage devices appear to the hosts in the same way that direct attached storage devices appear to those hosts. These SAN technologies provide the ability to share storage devices among several hosts, while at the same time providing a pool of storage that can be assigned to only one host server or even just one application. In addition, the storage can be physically located some distance away from the host server.

Fibre Channel and iSCSI SAN technologies are typically deployed on a dedicated network with some sort of adapter in the application server, a switch in the network fabric, and a target storage device. The network cabling and interconnects can be either copper or fiber-optic. Fibre Channel and iSCSI both send and receive SCSI block storage commands, but each uses a different physical interface. An application running in the server typically cannot tell the difference between a Fibre Channel SAN and iSCSI SAN, except for the connection speed in some cases. A basic SAN hardware diagram that works for typical Fibre Channel and iSCSI technologies is shown below.



To deploy SAN storage, aside from removing the devices from the shipping boxes and connecting various electrical power and networking cables, the basic process usually has the following steps:

- Install or configure the management software for the storage device
- Provision storage on the storage device
- Assign the provisioned storage to host server
- Configure the host server so that it can access the newly provisioned storage
- Initialize and format the storage on the host server

In this report we compared deploying a Fibre Channel storage system using the HP Simple SAN Connection Manager software with deploying an iSCSI storage system following the usual steps needed to deploy iSCSI storage. In this comparison we looked for ease-of-installation and the number of manual steps needed to complete the deployment. The steps taken here were performed by an experienced storage administrator who is familiar with Fibre Channel storage and iSCSI storage.

2 – Deploying a Fibre Channel SAN with SSCM

In the past, deploying a Fibre Channel SAN has been described as complicated, tedious, or just plain difficult. Fibre Channel SANs include host bus adapters (HBAs), Fibre Channel switches, and Fibre Channel storage arrays. Each of these technology components has their own unique set of configuration parameters. In addition, Fibre Channel SANs require both zoning at the switch and LUN masking at the storage array. Some technology professionals, after looking at Fibre Channel storage technology, have decided that it is too complicated and have concluded that deploying iSCSI storage would be simpler.

HP worked with its partner QLogic to make deploying Fibre Channel SANs easier by creating HP's Simple SAN Connection Manager (SSCM) enterprise software that simplifies and automates the required deployment steps for a Fibre Channel SAN. In this report we compare deploying a Fibre Channel SAN using SSCM to deploying iSCSI storage in the traditional manner. These tests were run on servers running the Microsoft Windows Server 2008 R2 operating system.

We installed SSCM and deployed a complete Fibre Channel SAN using SSCM in approximately 15 minutes with approximately 32 mouse clicks, including a host server reboot. This process was simple, and the SSCM software guided us through each step from discovering all the hardware, selecting the desired disk drives, setting the RAID type for the disk drives, allocating the storage to the operating system, formatting the disk volume, and presenting it to the operating system. SSCM performed the necessary switch zoning on two switches and executed the LUN masking automatically.

SSCM Installation

Installing SSCM was very straightforward and the required steps are shown in the screenshots below. We did not reference any of the supplied user guides, but simply followed the installation steps provided by SSCM.





We did not include the optional HP StorageWorks SAN Designer or HP StorageWorks SAN Visibility options for this report.



During the installation of SSCM, we were asked to choose the storage array and we selected the HP StorageWorks MSA 2000 family, which was the type of disk array connected in our test environment. SSCM is supported with additional HP storage arrays.



SSCM discovered the connected and available Fibre Channel adapters and targets in the SAN automatically.

Show SAN Diagnostic	
This diagnostic window shows the HBA proper installation, dick OK. To stop the installation, d	الإلى ties and targets found on the system. To continue the dick Cancel.
Model: HPAJ764A 50:01:43:80:02:34:3D:D4	20:70:00:C0:FF:DB:29:14
1278	
Model: HPAJ764A 50:01:43:80:02:34:3D:D6	No Targets Connected
15202	
01	Cancel
1	



After discovering the Fibre Channel SAN components, SSCM displayed its installation progress.



Because we were not using the HP BladeSystem c-Class server and enclosures that are managed by Virtual Connect Enterprise Manager (VCEM), we skipped the following step. HP Blade System c-Class customers can configure SSCM to communicate with VCEM in order to get specific server blade, mezzanine card and IO information.

	<u>np</u>
Main Page	HP StorageWorks Simple SAN Connection Manager Install Wizard
Documentation Exit	If there are c-Class blade enclosures managed by Vitual Connect Enterprise Manager (VCEM) v6.1, providing a VCEM user's credentials (usermane/password) and the P address of VCEM server will allow Simple SAN Connection Manager to associate the individial blades to their respective enclosure. If you do not have a VCEM v6.1 or an HP c- Class enclosure in your SAN, please select "Skp" to continue.
	Case Sensitive Username:
	Case Sensitive Password:
	Set Sko
	Jet Skip
	Verson: 3.20.1
nstallation Wizard	Verson: 3.20.1
nstallation Wizard Main Page	Verson: 3.20.1 Verson: 3.20.1 HP StorageWorks Simple SAN Connection Manager Install Wizard
	Бр
Main Page	HP StorageWorks Simple SAN Connection Manager Install Wizard
Main Page Documentation	HP StorageWorks Simple SAN Connection Manager Install Wizard Your instalation is complete. A rebot is required in order to finsh. Plase save all your work and close all applications before
Main Page Documentation	HP StorageWorks Simple SAN Connection Manager Install Wizard Your instalation is complete. A reboot is required in order to finish. Please save all your work and close all applications before rebooting.
Main Page Documentation	HP StorageWorks Simple SAN Connection Manager Install Wizard Your instalation is complete. A reboot is required in order to finish. Please save all your work and close all applications before rebooting.
Main Page Documentation	HP StorageWorks Simple SAN Connection Manager Install Wizard Your instalation is complete. A reboot is required in order to finish. Please save all your work and close all applications before rebooting.
Main Page Documentation	HP StorageWorks Simple SAN Connection Manager Install Wizard Your instalation is complete. A reboot is required in order to finish. Please save all your work and close all applications before rebooting.
Documentation	HP StorageWorks Simple SAN Connection Manager Install Wizard Your instalation is complete. A reboot is required in order to finish. Please save all your work and close all applications before rebooting.
Main Page Documentation	HP StorageWorks Simple SAN Connection Manager Install Wizard Your instalation is complete. A reboot is required in order to finish. Please save all your work and close all applications before rebooting.

When the installation was complete, SSCM created a log file of the installation process for review.



SSCM Deployment

After rebooting the server, SSCM guided us through discovering the Fibre Channel switches and configuring the zoning on the switches. SSCM configured default zoning that placed the HBA in the server into the same zone as the storage that was discovered.



The first Fibre Channel switch had a default name of "FC Switch." In a new installation, the switch had a default address which normally would need to be changed to be used in an existing network infrastructure.





After giving the FC switch its IP address information, it needed to be given its administrative credentials.

Set	Switch Admin Passw	rord	ß	X
		# ()===		
	SN6000 FC Switch			-
	Account Login:	admin		
	Old Password:			
	New Password:			
	Verify Password:			
	Enter the current and the set the new password.	ne new admin password and re-ent Cancel to abort.	er to verify. Select OK to	
	The switch factory defa	ult password is "password".		
		QK	Cancel	

After providing the password for the switch, SSCM offered to configure default HBA zoning for the switch.



SSCM displayed all the components for the default zoning.

Set the switch default zoning			6	×	
Configure Default Zoning	g: SN6000 FC Switch			_	
Default zone set name: SE_Default_H	BA_ZoneSet			_	
Zone List	Switch Name (Port #)	Туре	Vendor		
SSCM-G3-DEMOSRV_Zone1					
5001438002343dd4	SN6000 FC Switch (0)	HBA			
	SN6000 FC Switch (10)	RAID Storage	HP		
		HP StorageW	Vorks Simple SAN Co	nnection Manager	×
			e HBA-based zoning ha tivated for switch: SN6	as been successfully configured a	nd
			tovated for switch: Sivo	000 FC Switch.	
				0	K
				-	
				-	
1					
	OK	Cancel	Help		



c

After completing the FC switch zoning, SSCM continued ahead to discover, identify, and configure the storage target in the SAN.

	HP Storag	geWorks Simple SAN Connection Manager	×
	?	SSCM has detected a MSA2000 array with a default uninitialized name. Do you want to create a new name for the array?	
		<u>Y</u> es <u>N</u> o	
reate Stor	age Subsys	stem Alias	x
Subsystem	Name:	Uninitialized Name	
Subsystem	Identifier:	HP StorageWorks P2000G3 FC/iSCSI T100R18	
	Please en msa2	enter the subsystem alias: 1000	Cancel
	HP Stora	geWorks Simple SAN Connection Manager	×
	?	The storage array model msa2000 is currently unconfigured. Do you want to initialize the storage based on a storage deployment template?	
		<u>Y</u> es <u>N</u> o	





After closing the configuration wizard, we were shown the current SAN topology.

hp HP StorageWorks Simple SAN Connection N	lanager	Real Provide American Americ	_ 8 ×
Eile Logical Disk Operations Advanced Operations	HBA & Switch Management Help		
🗎 🕼 😫 😫 健 🕼	0		(p)
Storage subsystem-Logical Disk View			
00002	Thysical Connection Map Lun Assignment Map	FC Switch	-) SSCM-G3-DEMOSRV
Server-Storage View	257000C0FFDB2914		
Ready			CAP NUM



When we connected a second switch to another server and repeated the switch IP address configuration steps, we were shown the final, multi-server, multi-path topology.

hp HP StorageWorks Simple SAN Connection N		_ 8 ×
<u>File</u> Logical Disk Operations <u>A</u> dvanced Operations	HBA & Switch Management Help	
🗒 🕼 😫 🗶 😫 🖉 🖉	Ø	
Storage subsystem-Logical Disk View	Physical Connection Map	
🗆 💀 Subsystem - Logical Disk		i
wsa2000	msa2000	
	Texaster T	
	00C0FF1823CA	
	00C0FF1823CB	(-) SERVER1
	Controller A:IP=10.33.67.139	9
	217000C0FFDB2914	50014380023cb914
	SN6000 FC Switch 1 207000C0FFDB2914	(-) SSCM-G3-DEMOSRV
	SN8000 FC Switch	1
	00C0FF182400	5001438002343dd4
		12018
	247000C0FFDB2914	
	Controller B/IP=10.33.67.140	
	€	
	00C0FF162401	
	257000C0FFDB2914	
Server-Storage View	1	
Ready		CAP NUM

Now that the SAN topology had been created, it was time to create a LUN for one of the servers using the SSCM menu or icons.

Create New Logical Disk Wiza	ırd	N	×
	Create New Logical Disk Wizard	4	
	This wizard helps create new Logical Disk from the storage subsystem:		
	msa2000		
	To continue, click Next		
	< <u>B</u> ack	<u>N</u> ext >	Cancel

We entered a name for the new storage pool and selected the disk drives to be included in the new storage pool. We provided the name "Storage Pool 1 – 6DR10" and chose no spares for this particular storage pool.

Create Storage Pool		×	9
Create Storage Pool from su	ubsystem: msa2000		
Select a group of drives to crea click on the Select All header.	ate a new storage pool. From this pool, you can create new Logical Disks	s (LUNs).To select/deselect all drives	5r
If you do not want to create st	torage pool, select the option at the bottom of this screen.		
pool or, if none selected, autor the drives themselves and igno	me storage subsystems require a list of drives (storage pool) be specifier matically select the drive(s) best suited for the logical disk's RAID type ar re the pool selected. documentation for its storage pool requirement.		
Create a new storage pool from	m the drive list		
Enter a Name for the			
Select All	Drive Name	Size	
V	HITACHI HUS 156045VLS600 s/n JVWRAR3L rev A5D0 id 0.0 (SAS) (Bus 1-S 419.17 GB	
V	HITACHI HUS156045VLS600 s/n JVWS5S1L rev A510 id 0.1 (SAS) (E	Bus 1-Sk 419.17 GB	
V	SEAGATE ST3450857SS s/n 3SK0Z1D400009046KD6Z rev 0006 id 0.	.2 (SAS) 419.17 GB	
▼	HITACHI HUS156045VLS600 s/n JVWRUS0L rev A510 id 0.3 (SAS) (i		
✓	HITACHI HUS 156045VLS600 s/n JVW3XHPL rev A510 id 0.5 (SAS	D StorageWorks Simple	SAN Connection Manager
▼	HITACHI HUS 156045VLS600 s/n JVWRU0ZL rev A5D0 id 0.6 (SAS	ir Storageworks Simple	
	HITACHI HUS 156045VLS600 s/n JVWRRN0L rev A5D0 id 0.7 (SAS		5
	HITACHI HUS156045VLS600 s/n JVXB28KJ rev A5D0 id 0.8 (SAS)		
Ē	HITACHI HUS156045VLS600 s/n JVWN3J2L rev A5D0 id 0.9 (SAS		assign unused drives as spares for the storage
	HITACHI HUS 156045VLS600 s/n JVWR 3D3L rev A510 id 0.10 (SA	ool?	
i i	HITACHI HUS156045VLS600 s/n JVX5AG7J rev A5D0 id 0.11 (SA		
			<u>Y</u> es <u>N</u> o
,			
Do not create the storage po	ool. The storage subsystem selects drive(s) for the new logical disk itself.		
			-
		Close	

We configured the six disk drives of the storage pool into a RAID1 storage pool.

New Logica	l Disk Parameters	₽.	? ×
	type, size and name for the new Logical Disk created from:	.0	
msa2000			
Type:	Write Performance Optimized Fault-Tolerant Storage (RAID-1)		-
Size:			
Size:	1,257 GB 💌		
	Maximum LUN size: 1257 GB		
Name:	6DR 10		_
	,		
			Help

For the next configuration choice, we needed to indicate the server that had access to this storage pool. The desired server name was highlighted and added to the list of servers to be allowed access.

New Logical Disk Server Presentation Select the server that can have access to the msa2000	e new logical disk created	from:	×
Servers and HBAs/Initiators available to allow access to the new Logical Disk:	ac	rvers and HBAs/Initiators all cess to the new Logical Disk	:
ERVER1	Add>	SSCM-G3-DEMOSR 5001438002343dd4	,
	< <u>R</u> emove		
	< Manual Add		
	ОК	Cancel	Help

The drive group details were presented for a final check. The list could be expanded to show all the disk drives and adapters allowed access to this storage.

List of Logical Dis msa2000	Treate New Logical Disk Wizard List of Logical Disk(s) to be create	d to the list to be created. Remove if mistakenly added.	ß
Alias - Size/Masking List/Drive Lis	Conliguie and Add new Logical Disk.	to the list to be cleated. Henrove it fillstake ity added.	
+ 6DR10 - 1287168 MB	List of Logical Disk(s) to msa2000	be created from:	
	Alias - Size/Masking List/Drive List	Туре	7
	⊡ 🗐 6DR10 - 1287168 MB	Write Performance Optimized Fault-Tolerant Storage (RAID-	1)
	Accessible HBA(s)		.,
	5001438002343dd4 (SSCM-G3	k	
	Contributing Drives		
	HITACHI HUS156045VLS600	s/	🦾 Add
	HITACHI HUS156045VLS600	3/	<u> </u>
	- SEAGATE ST3450857SS s/n 3	3S	
	HITACHI HUS156045VLS600	s/	
	HITACHI HUS156045VLS600 s	s/	
	HITACHI HUS156045VLS600 s	s/	Remov
			2



Create New Logical Disk Wiza	rard	2	×
	Complete the Create New Logica	Disk Wizard	
	You have completed the Create New Logical Disk Wizard for:		
X	msa2000 Summary of Logical Disk to be created:		
	Alias - Size Type		
	6DR10 - 1287168 MB Write Performance Optimized F	ault-Tolerant Storage	
	To begin the Logical Disk creation, click Finish		
	WARNING: Logical Disk creation may take a long time		
	< <u>B</u> ack	Finish Cance	•

Because we were using the Windows Server operating system, after the logical disk was created, SSCM offered the option to create and format the partition for that storage.

Cr	eate ar	nd Format Pa	rtitions From New/Existing Logical Disk		×
		Select newly	created logical disk (LUN) to create pa	rtition and format a	s disk!
			wly created storage (LUNs) below are assigne these new LUNs will show up as uninitialized d		If these systems are properly connected to the ment of those systems.
	61	letter, and fo	the application to automatically initialize, creat rmat the partitition with NTFS, please select t Ily makes the new LUNs ready for use to store	he LUNs and press CRE	ATE PARTITION button.
		If you do not Management	want this application to perform these steps tool.	now, you can do it later	r using this application or the systems' Disk
			application, select the CREATE & MANAGE PAF n menu's ADVANCED OPERATIONS option.	RTITION button on the	toolbar or the menu option with the same name
	V	Select All	LUN Name	LUN Size	Server Name
	<u> </u>	Select All	LUN Name 6DR 10	LUN Size 1287168.00 MB	Server Name SSCM-G3-DEMOSRV
	ব				

After SSCM had finished, it displayed the topology again, now showing a LUN assigned as a drive letter to the Windows Server operating system.



At this point, the drive letter was available to the operating system, and we were able to read and write data to the drive from the server we assigned to the disk resource with SSCM. The "E" drive is shown in the logical disk view on the left side of the screen. In addition to guiding the administrator through the configuration, SSCM validated that all the connections were working properly.

SSCM Summary

From start to finish, SSCM provided us the opportunity to primarily answer "next" or "OK" to the majority of the prompts. The other data we were prompted to enter included:

- One drop-down menu for the storage array type
- Two sets of IP addresses and network information for the two new FC switches
- Two passwords for the two FC switches
- One name for the storage array
- One name for the storage pool
- Check boxes for the disk drives to be included in the storage pool
- One drop-down menu for the RAID type and capacity
- One selection box for the desired server to be allowed access to the storage pool

SSCM handled all the complexity of Fibre Channel SAN configuration in such a way that we successfully deployed a complete, working Fibre Channel SAN in approximately 15 minutes. It was not necessary to manually configure an adapter, switch, or LUN masking, nor did we have to initialize or format a disk volume. We were able to use SSCM from start to finish, and at the end of the process SSCM provided formatted disk volumes available for our use. It seems that the only thing SSCM didn't do was take the storage out of the shipping boxes and connect the cables.

3 – Deploying iSCSI Storage Technology

Internet SCSI (iSCSI) is an industry standard developed to enable transmission of SCSI block storage commands and data over an existing IP network by using the TCP/IP protocol. The encapsulated SCSI commands and data can be transmitted over a local area network (LAN) or over a wide area network (WAN). As with traditional SCSI, an iSCSI storage solution requires at least one "initiator" residing on the application server and at least one "target" residing on the storage.

Typical iSCSI Storage Deployment Steps

For many iSCSI storage systems, deployment usually includes the following steps, with some variation depending upon the solution:

- Application server (initiator) first steps:
 - Open the iSCSI initiator management application
 - Record (or create, if necessary) the iSCSI Qualified Name (IQN) of the initiator found on the Configuration tab
- Storage device (target) steps
 - o Configure network settings of the iSCSI storage device
 - o Launch the iSCSI storage device management software
 - Enter the IP address of the initiator into the host application server information
 - Enter the initiator IQN into the host application server information
 - Create a storage pool or group
 - Select disk drives to be included in the storage pool
 - o Select RAID type for the disk drives in the storage pool
 - Create one or more LUNs (disk volumes) in the storage pool
 - o Assign the storage pool or disk volumes to the initiator IQN or host server
- Application server (initiator) steps
 - Open the iSCSI initiator management application
 - Enter the IP address of the iSCSI target into the target portal discovery section of the iSCSI initiator application
 - Begin an iSCSI session by connecting to the iSCSI target and performing an iSCSI logon
 - After the iSCSI management application has successfully logged on to the iSCSI target, launch the operating system disk management application
 - Initialize the new iSCSI disk volumes that have appeared
 - Create a partition on the new iSCSI disk volumes
 - o Format the new iSCSI disk volumes
- Network switch management steps
 - Create appropriate VLAN or other network management security to isolate the iSCSI traffic from regular LAN traffic

Each brand of iSCSI storage device has its own unique management look and feel, and method of performing functions. Many iSCSI storage solutions have wizards or similar tools to help perform the iSCSI target device configuration and provisioning of storage, but they cannot help with the application server steps or network switch management steps outlined above. These other steps are usually performed manually. Additional steps are needed for multi-path iSCSI sessions.

It took approximately 30 mouse clicks to perform the storage device (target) steps and the application server (initiator) steps described above, and were completed in approximately 15 minutes. This does not include the time it took to validate that all the connections were working properly. Additional time and steps (mouse clicks) were needed to manually configure the network switch appropriately for the iSCSI storage. Based on past experience, it would have taken additional time to install the Navisphere management software, but this software was already up and running on the iSCSI storage target.

Security for iSCSI

Security for iSCSI includes some security features in the iSCSI layer itself, separate from any security layers that may be present in the lower TCP, IP, and Ethernet layers. The iSCSI security features can be enabled or disabled as needed.

Because iSCSI runs over TCP/IP and Ethernet, each environment will need to address the issue of running storage traffic over the same network as the "public" LAN. Many will address this by running iSCSI storage traffic over a separate network or VLAN, which is the recommended best practice for applications using iSCSI storage.

Optional, additional steps for iSCSI storage include establishing and setting the Challenge Handshake Authentication Protocol (CHAP) secret in the iSCSI initiator and iSCSI target. The CHAP secret is used verify the identity of iSCSI host systems that are attempting to access storage targets over the TCP/IP network. In addition, iSCSI has an optional IPsec encryption feature that can be enabled for additional security.

iSCSI Deployment Example

For our comparison test, we used an EMC CX4 as our iSCSI storage target. The EMC CX4 management software, Navisphere, runs in a web browser and has wizards for provisioning and assigning storage to host application servers. We used the Navisphere wizards for as much of the process as possible. On the application server we used the Microsoft iSCSI initiator software that is a standard feature of the Windows Server operating system. Most of the iSCSI storage configuration steps were reasonably straightforward, but in a few places we had to know specific technical information in order to complete certain parts of the configuration.

For this test, Navisphere was previously installed and configured on the EMC CX4 storage system. We started a web browser and provided the browser with the address of Navisphere running on the CX4 storage system.

iSCSI Storage Target Steps

It should be noted that iSCSI storage targets from different vendors will have different menus, procedures, and wizards for identifying host servers, provisioning storage, and other related storage management tasks. While the specific steps to accomplish these functions for other iSCSI storage targets may be somewhat different, the steps shown below work specifically for the EMC CX4 and are representative of similar steps that would need to be taken on other iSCSI targets. It cannot be assumed that a network administrator would have sufficient knowledge or experience to intuitively know which steps should be taken to complete these tasks.



For the first step, we created a host system for the CX4 and provided the IP address and IQN of our iSCSI host initiator. Other hosts were already defined before we began this test.

Oemartek

Navisphere 6 - Windows	Internet Explorer					_ 8 ×
	33.66.166/start.html		💌 😵 Certificate Er	ror 🗟 😏 🗙 🔽 🛛	ng	- م
🖕 Favorites 🛛 🚖 🏉 Sugg	gested Sites 🝷 🙋 Web Slice (Gallery 🝷				
Navisphere 6				🔓 • 🖻] - 📑 🖶 - Page -	Safety • Tools • 🕢 •
<u>Eile View T</u> ools T <u>a</u> sks <u>W</u>	<u>V</u> indow Help					-
I			LUN 💌 Se	arch	Advanced	No Alerts
Storage Management	Enterprise Storage 1					_ & ×
	Filter By: All	•				
Provision	😫 CX4-120 - Connectivit	ty Status				_ 🗆 🗵
	Host Initiators MirrorView	v Initiators SAN Copy Initiators			🛹 St	orage Group is enabled
Assign		Initiator Name 🖌		Storage Groups Colfax-57	Registered Logged In	SP - port
Expand Expand Import Virtual Server Information		13.66. 19; Fibre; Host Agent not read [10.33.66.17; Fibre; Manualy registered; 16:201; Fibre; Manualy registered; 10.33.66.15; Fibre; Manualy registered; 10.33.66.15; Fibre; Manualy registered; 110.33.66.22; Fibre; Manualy regist [10.33.66.22; Fibre; Manualy regist	ered; Host Agent not reachal Host Agent not reachable] Host Agent not reachable] ed; Host Agent not reachable t Agent not reachable]	RX200B-Port2 RX200T-Port2 e] RX300S6-S11-15 RX600S5_RH-W2		
	•					
	Refresh <u>A</u> LL	Refresh Detail	Crea <u>t</u> e	Edit <u>R</u> egister	<u>D</u> eregister	
Monitoring					<u>O</u> K <u>C</u> a	ncel <u>H</u> elp
Replication						
Reporting						
Service	1					
				I	Naviadmin [manager -	Local] 🏧 🎒 🧕
Done				👩 😝 Internet Protecte	d Mode: Off	🐴 • 🔍 100% • 🎾

We knew to use the "connectivity status" command in Navisphere to create the iSCSI initiator record.

Create Initiator Record		2
Initiator Information		
WWN/IQN: iqn. 1991-05.com.microsoft:sscm-g3-demosrvr		
SP - port: A-2 (ISCSI) 💌		
Initiator Type: CLARiiON Open	Faile	over Mode: 1
Host Information	Ν	
	C Existing Host	C Selected Host
Host Name: SSCM-G3-DemoSrvr	Browse Host	
IP Address: 192, 168, 1, 120		

After the host application server (initiator) information was entered by copying the IQN from the application server, we could provision and assign the storage to that host. Navisphere understands several different types of initiators and for this implementation we knew to select "CLARiiON Open" as the initiator type.



Storage Provisioning W	zard		
	Select Servers		4
	You may assign LUNs to one or more se If a server is already in a storage group server is not in a storage group, a new server and the LUNs. (• Assign LUNs to the servers. • Continue without assigning LUNs al If you do not see the server you want. • Server List Filter For:	p, the LUNs will storage group t this time.	
	Name	IP	Operating Syster
			Unknown
			Windows Server 20
	SSCM-G3-DemoSrvr	192.168.1.120	
	<u>R</u> efresh		
	< <u>B</u> ack	Next >	<u>Finish</u>





Storage Provisioning Wi		Ct	Deal			<u>_</u> D×
	Selec Stora	ge Pool, or	ge Pool in create a r		your LUNs. You ma	y use an existing
					New S	to <u>r</u> age Pool
	ID	RAID	Drive	Free Space	Max Contig. Free	Properties
	0	RAID 5 RAID 5	FC FC	201.722 GB 593.112 GB	200.722 GB 593.112 GB	Storag Storag
	2 3	RAID 5 Hot Spare	FC	549.112 GB 0.000 GB	529.112 GB 0.000 GB	Storag
			<	K Back	ext >Einish	Cancel



General Advanced Storage Pool Parameters Storage Pool Type: RAID Group Storage Pool Name: RAID Group 4 RAID Type: Unbound Number of Disks: 1 Disks • Olisks • Disks • Disks • Disk Capacity Model Drive T State Power Saving	CX4-120 - Create
Storage Pool Type: RAID Group Storage Pool ID: 4 Storage Pool Name: RAID Group 4 RAID Type: Unbound Number of Disks: 1 Disks • Object Genetic Object Total Raw Capacity: 268.403 GB Disk Capacity Model Disk Capacity Model	General Advanced
Storage Pool ID: 4 Storage Pool Name: RAID Group 4 RAID Type: Unbound Number of Disks: 1 Disks • Object Use Power Saving Eligible Disks C Manual Select Disk Capacity Model Drive T State Power Saving State	Storage Pool Parame
Storage Pool Name: RAID Group 4 RAID Type: Unbound Number of Disks: 1 Disks • Ó Automatic Use Power Saving Eligible Disks C Manual Select Total Raw Capacity: 268.403 GB Disk Capacity Model Disk Capacity Model	Storage Pool Type:
RAID Type: Unbound Number of Disks: 1 Disks • Of Manual Select Disk Capacity Model Drive T State Power Saving	Storage Pool ID:
Number of Disks: 1 Disks © Automatic Use Power Saving Eligible Disks © Manual Select Disk Capacity Model Drive T State Power Saving	Storage Pool Name:
Disks Image: Comparison of the second seco	RAID Type:
Image: Constraint of the second s	Number of Disks:
C Manual Select Total Raw Capacity: 268.403 GB Disk Capacity Model Drive T State Power Savin	Disks
Disk Capacity Model Drive T State Power Savir	• A <u>u</u> tomatic
	C Manual
Plus 0 Endosure 0 Disk 13 268.403 STE30065 CLA FC Un No	Bus 0 Enclosure
	•
Apoly Cancel Help	

Cor	nfirm: Create Storage Pool
ş	Initiate Create RAID Group operation?
	Do you wish to continue?

I Me	ssage: Create Storage Pool 🛛 🔀	
0	RAID Group 4 was created successfully.	
	<u>Ō</u> K	



Storage Provisioning Wi	zard	_ _ _ _ ×
	LUN Properties	R
	Number of LUNs: 1 Image: Constraint of the second seco	equence number will
	< <u>B</u> ack <u>N</u> ext >	Einish <u>C</u> ancel



Storage Provisioning Wi	zard	- IX
	Select Folder	
	You have the option of adding LUNS to a folder. C Continue without adding LUNS to a folder Add the LUNs to one of the following folder New Folder C Create New Folder Folder Name RX2008 RX2007 RX600-S5 TX200-8	
	< <u>B</u> ack <u>N</u> ext > ⊑nish	<u>C</u> ancel

Storage Provisioning Wi	zard 🛛 🚬 🗆 🗙
	Summary
	Please review the following summary information. If the information is correct, click "Finish" to complete the operation. To change any values, use the Back button.
	Server(s): SSCM-G3-DemoSrvr Storage System: CX4-120 LUN Name: SSCM-LUN1 RAID Type: Disk Capacity: 50 GB Number of LUNs: 1 Storage Pool: RAID Group 4
BBB	Folder Name: SSCM-folder
	<u>S</u> ave As
	< Back Next > Finish Cancel



iSCSI Host Initiator Steps

After the storage device provisioning steps were completed on the storage target, the next step was to configure the iSCSI initiator on the host application server. Although not difficult, configuring the iSCSI host initiator assumes some familiarity with iSCSI storage management.

For this process we used the Microsoft iSCSI initiator software, which requires manual steps to complete. The first steps to configure the iSCSI initiator began on the discovery tab.

Discovery Tab

The discovery tab provided the list of discovered iSCSI target portals available to this initiator. The target portal is the primary IP address of the iSCSI target solution. Some target solutions use a virtual IP address and some iSCSI target solutions provide the first actual IP address of the solution. If there are no target portals listed, they can be added by IP address or DNS name. Generally a target portal only has to be entered once, and the iSCSI initiator will remember the target portal for future sessions. We added the IP address of the EMC CX4 storage system to the list of discovered portals.



iSCSI Init	SI Initiator Properties						
Targets	Targets Discovery Favorite Targets Volumes and Devices RADIUS Configuration						
-	Target portals						
	The system will look for Targets on following portals:						
	ess 168.1.10	Port 3260	Adapter Default	IP addr Default			
191.	166.1.10	3280	Delaut	Default			
To ac	ld a target port	al, dick Discover F	ortal.	Discover Po	rtal		
	move a target p dick Remove.	ortal, select the a	address above and	Remov	e		
	ervers system is registe	red on the follow	ng įSNS servers:	Refres	h		
Nam	e						
To ac	dd an iSNS serve	r, dick Add Serve	r.	Add Serve	er		
	To remove an ISNS server, select the server above and then click Remove.						
Mon	e about Discove	ry and ISNS					
			ОК	Cancel	Apply		

Targets Tab

The targets tab provided the list of individual targets available to the iSCSI initiator. The IQN for the iSCSI storage device was listed with the status of inactive.

SCSI Initiator Properties	×
Targets Discovery Favorite Targets Volumes and Devices	RADIUS Configuration
Ouidk Connect	
To discover and log on to a target using a basic connection, t DNS name of the target and then click Quick Connect.	ype the IP address or
Target:	Quick Connect
Discovered targets	
	<u>R</u> efresh
Name	Status
ign. 1992-04.com.emc:cx.apm00103600607.a2	Inactive
To connect using advanced options, select a target and then dick Connect.	Connect
To completely disconnect a target, select the target and then dick Disconnect.	Disconnect
For target properties, including configuration of sessions, select the target and click Properties.	Properties
For configuration of devices associated with a target, select the target and then click Devices.	De <u>v</u> ices
More about basic iSCSI connections and targets	
OK	Cancel Apply

To gain access to the target the initiator must "logon" to the target. This was accomplished by pressing the connect button. We accepted the default settings for the connection and did not enable multipath for this test.

Connect To Target	×
Target name:	
ign.1992-04.com.emc:cx.apm00103600607.a2	
Add this connection to the list of Favorite Targets. This will make the system automatically attempt to restore the connection every time this computer restarts.	
Enable multi-path	
Advanced OK	Cancel

This resulted in the target showing a status of connected and the iSCSI logon process was complete.

SI Initiator F	roperties				×
argets Disco	very Favorite Targets	Volumes and Devices	RADIUS	Configuration	
Quick Connect					
	nd log on to a target us the target and then did	ing a basic connection, k Quick Connect.	type the IP	address or	
Target:			Q	uick Connect	1
Discovered ta	gets				7
				<u>R</u> efresh	
Name			Status		
ign. 1992-04.	com.emc:cx.apm00103	600607.a2	Connecter	d	
To connect u	ing advanced options	relact a target and the			
To connect us dick Connect.		select a target and then		Cognect	
dick Connect. To completely then click Disc	disconnect a target, se onnect.	elect the target and		Connect Disconnect	
dick Connect. To completely then dick Disc For target pro	disconnect a target, se	elect the target and guration of sessions,			
dick Connect. To completely then click Disc For target pro- select the targ	disconnect a target, so onnect. operties, including confi get and dick Properties	elect the target and guration of sessions,		Disconnect	
dick Connect. To completely then dick Disc For target pro select the target For configura the target and	disconnect a target, so onnect. perties, including confi get and click Properties tion of devices associat	elect the target and guration of sessions, ed with a target, select		Disconnect	
dick Connect. To completely then dick Disc For target pro select the target For configura the target and	disconnect a target, so onnect. uperties, including confi get and click Properties ion of devices associat d then click Devices.	elect the target and guration of sessions, ed with a target, select		Disconnect	
dick Connect. To completely then dick Disc For target pro select the target For configura the target and	disconnect a target, so onnect. uperties, including confi get and click Properties ion of devices associat d then click Devices.	elect the target and guration of sessions, ed with a target, select		Disconnect Properties Deyjces	

At this point, the disk volume we configured on the storage target through Navisphere appeared as a physical disk to Windows. We launched the Logical Disk Manager in Windows and performed the following manual steps:

- Brought the disk online
- Initialized the disk
- Formatted the volume

Network Settings

We had previously configured the network with the appropriate VLAN settings to ensure the appropriate security for the connection between the iSCSI initiator and the iSCSI target.

Summary of iSCSI Deployment Steps

Although the iSCSI deployment steps on the storage target may be partially or fully automated depending on the particular iSCSI storage target, the entire iSCSI storage deployment process often requires manual intervention on the part of the administrator. Our deployment of iSCSI storage involved a combination of automated steps along with steps requiring manual intervention.

Summary and Conclusion

We found that the deployment of this Fibre Channel storage using SSCM required no manual intervention but was a complete end-to-end deployment completely driven by the SSCM software. By contrast, the iSCSI storage deployment required a mixture of automated software tools along with manual deployment steps, and required specific technical information to complete.

	HP SSCM and Fibre Channel Storage	iSCSI Storage
Approximate time to complete installation and deployment as tested	15 minutes	15 minutes
Time includes installation of management software	Yes	No (Note 1)
Number of switches configured by automated software	2	0
Wizard-driven host information placed into storage target	Yes	No
Wizard-driven storage target configuration (RAID, disk groups, etc.)	Yes	Yes
Wizard-driven host initiator configuration	Yes	No
Wizard-driven switch management configuration	Yes	No
Host server reboot required	Yes	No
Number of applications used to complete the installation and deployment	1	3 – 4 depending on solution
Approximate total time from installation to reading/writing data on LUN (including all steps) for equivalent out-of-box experience	15 minutes	30 minutes – 2 hours (Note 2)

<u>Note 1</u>: For this test, Navisphere, the storage array management software, was already installed. If this had been a new installation of this iSCSI storage array, Navisphere would have needed to be installed, requiring extra time.

<u>Note 2</u>: These times are based on our experience of installing a variety of iSCSI storage systems fresh out of the box. Some iSCSI storage targets have no target management software pre-installed, so extra steps and time are needed. Time must also be allotted to configure the Ethernet switches appropriately (VLAN, etc.) for iSCSI storage systems.



Appendix – Evaluation Environment

Servers (two):

- Dual-processor Intel Xeon E5640, 2.67GHz
- 12GB RAM
- Windows Server 2008 R2

Adapters:

• HP StorageWorks 82Q 8Gb Dual Port PCI-e Fibre Channel HBA

Switches:

• HP StorageWorks SN6000 Fibre Channel Switch (qty. 2)

Storage targets:

- HP StorageWorks MSA2000
- EMC CX4-120

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