Demartek

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.

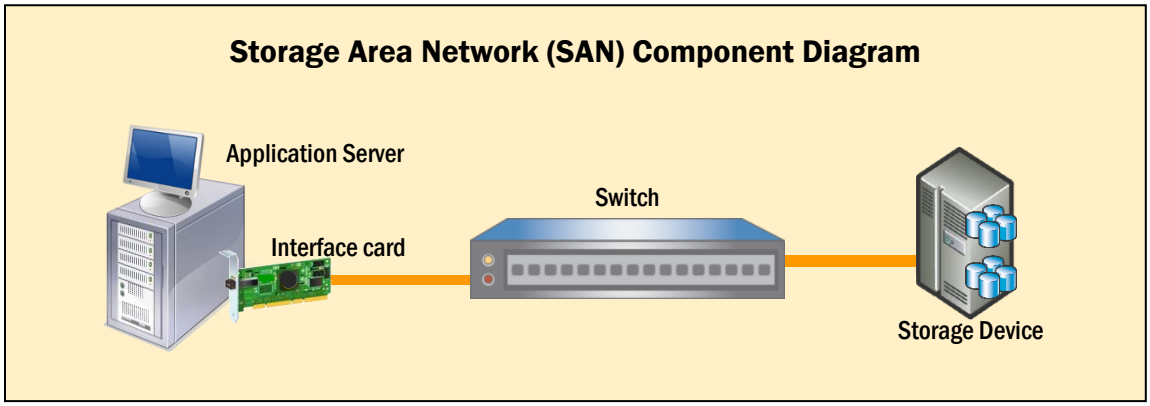
Evaluation Summary

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

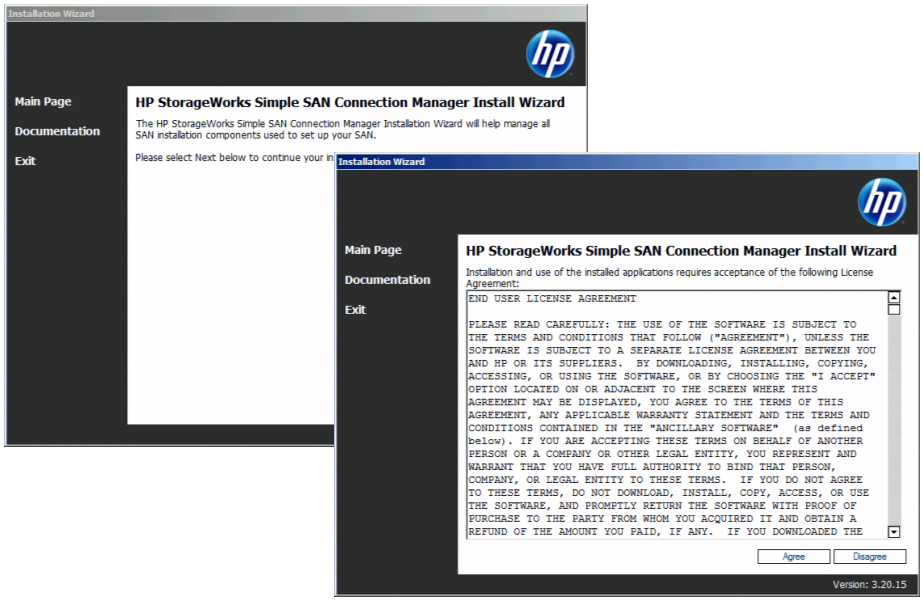
In the past, deploying a Fibre Channel SAN has been described as complicated, tedious, or just plain difficult. Fibre Channel SANs include host bus adapters (HBAs), Fibre Channel switches, and Fibre Channel storage arrays. Each of these technology components has their own unique set of configuration 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.

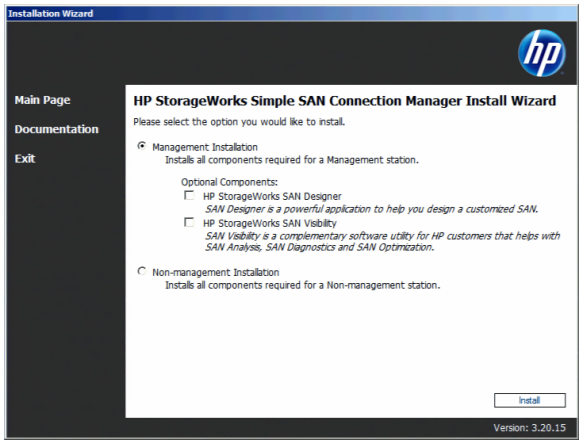
We installed SSCM and deployed a complete Fibre Channel SAN using SSCM in approximately 15 minutes with approximately 32 mouse clicks, including a host server reboot. This process was simple, and the SSCM software guided us through each step from discovering all the hardware, selecting the desired disk 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

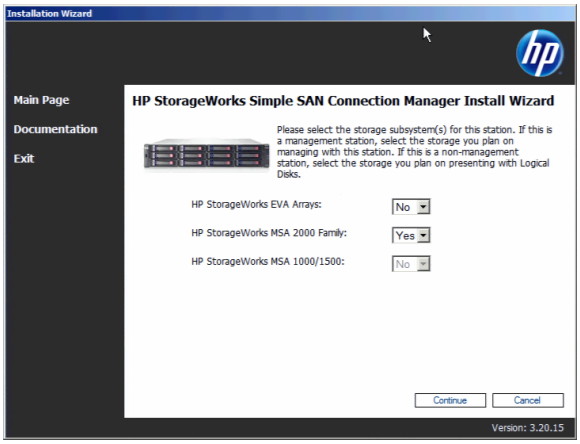
Installing SSCM was very straightforward and the required steps are shown in the screenshots below. We did not reference any of the supplied user guides, but simply followed the installation steps provided by SSCM.



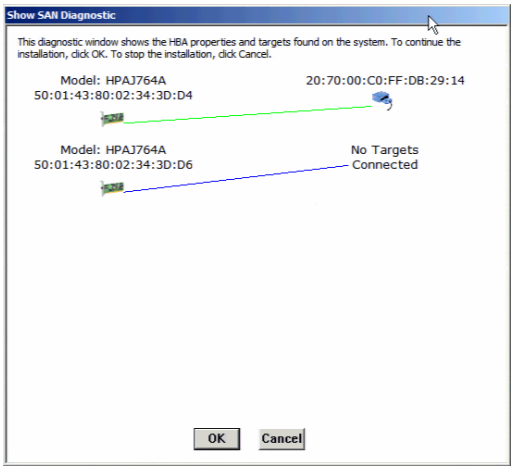
We did not include the optional HP StorageWorks SAN Designer or HP StorageWorks SAN Visibility options for this report.



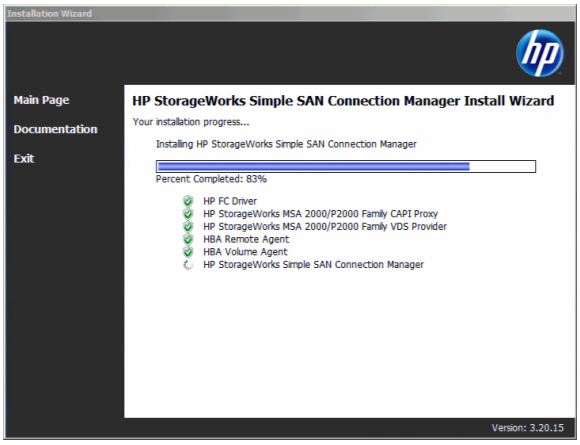
During the installation of SSCM, we were asked to choose the storage array and we selected the HP StorageWorks MSA 2000 family, which was the type of disk array connected in our test environment. SSCM is supported with additional HP storage arrays.



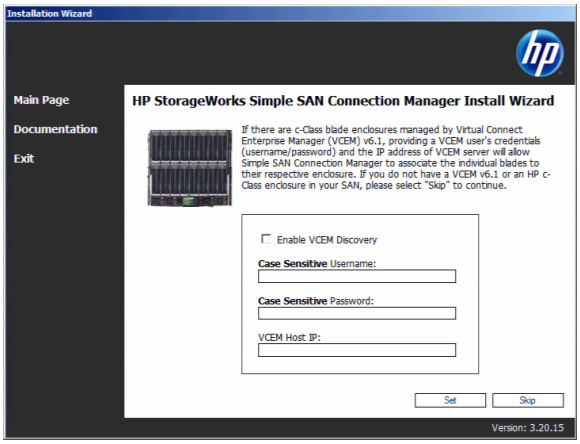
SSCM discovered the connected and available Fibre Channel adapters and targets in the SAN automatically.

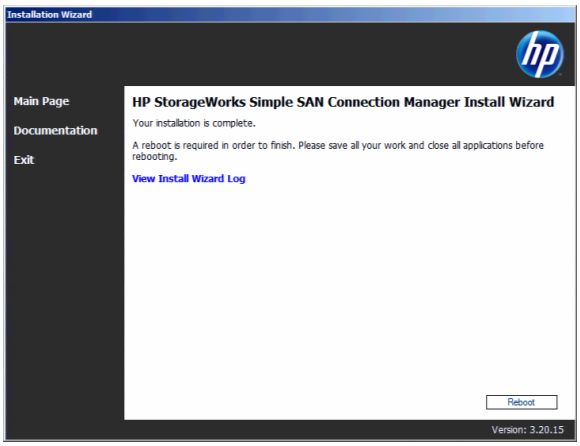


After discovering the Fibre Channel SAN components, SSCM displayed its installation progress.



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.

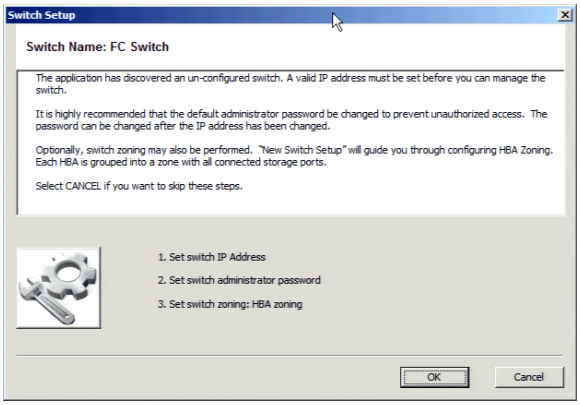




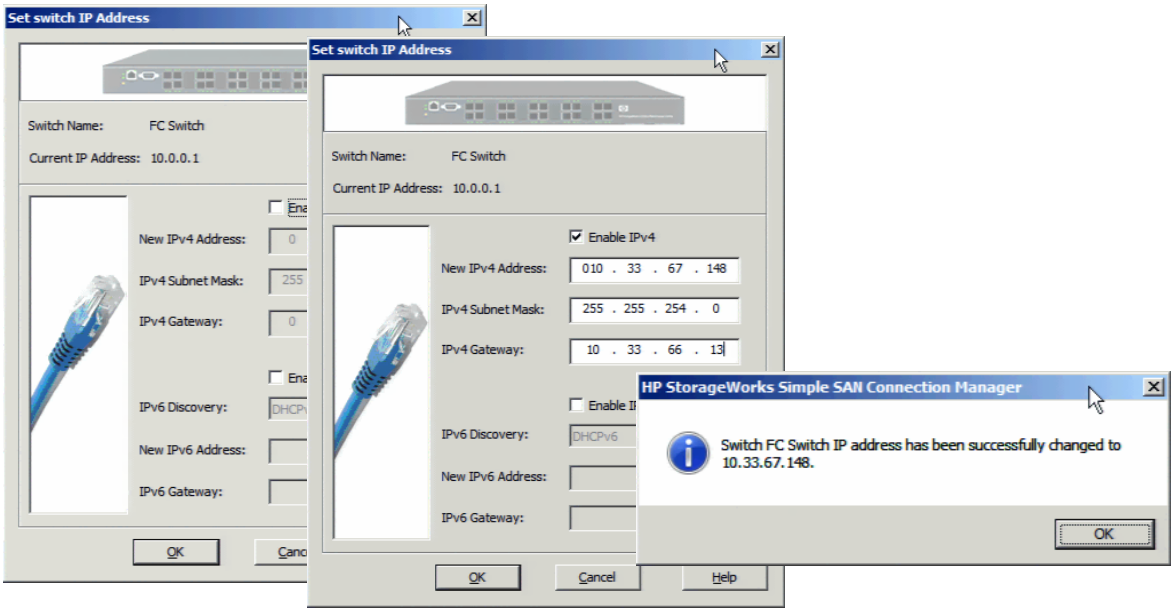
When the installation was complete, SSCM created a log file of the installation process for review.

SSCM Deployment

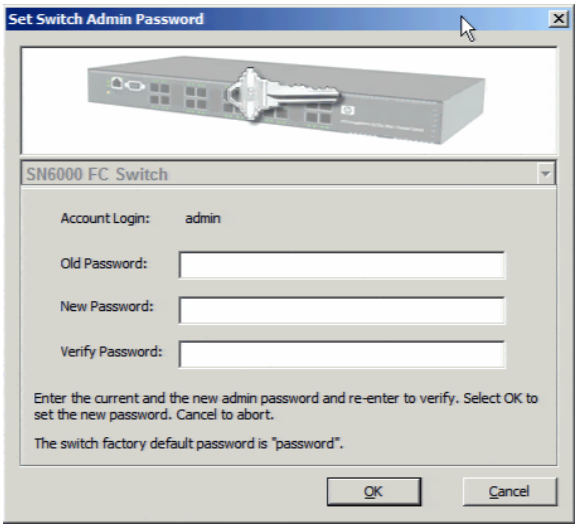
After rebooting the server, SSCM guided us through discovering the Fibre Channel switches and configuring the zoning on the switches. SSCM configured default zoning that placed the HBA in the server into the same zone as the storage that was discovered.



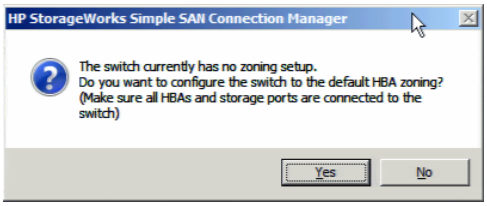
The first Fibre Channel switch had a default name of "FC Switch." In a new installation, the switch had a default address which normally would need to be changed to be used in an existing network infrastructure.



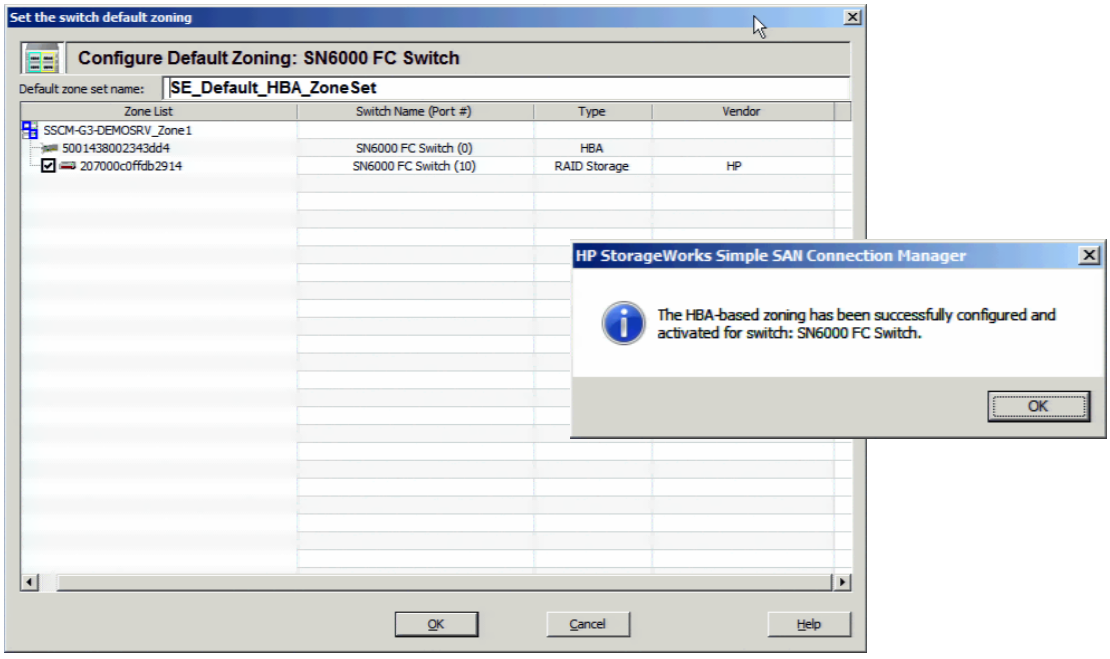
After giving the FC switch its IP address information, it needed to be given its administrative credentials.



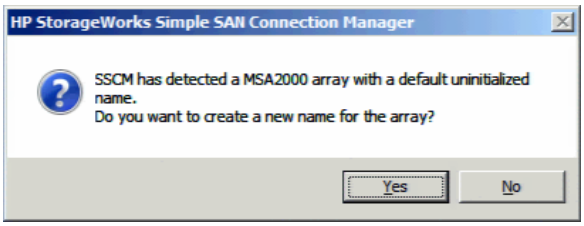
After providing the password for the switch, SSCM offered to configure default HBA zoning for the switch.

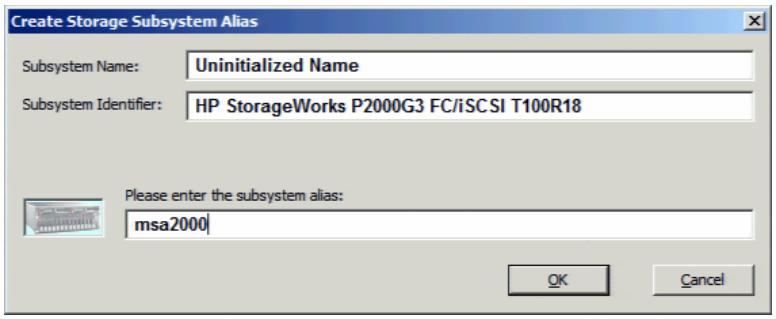


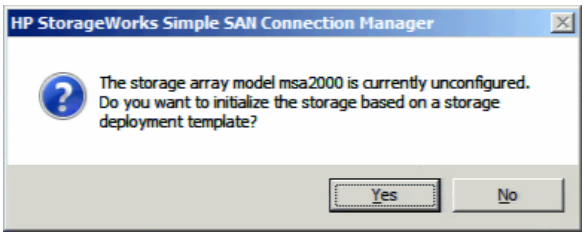
SSCM displayed all the components for the default zoning.

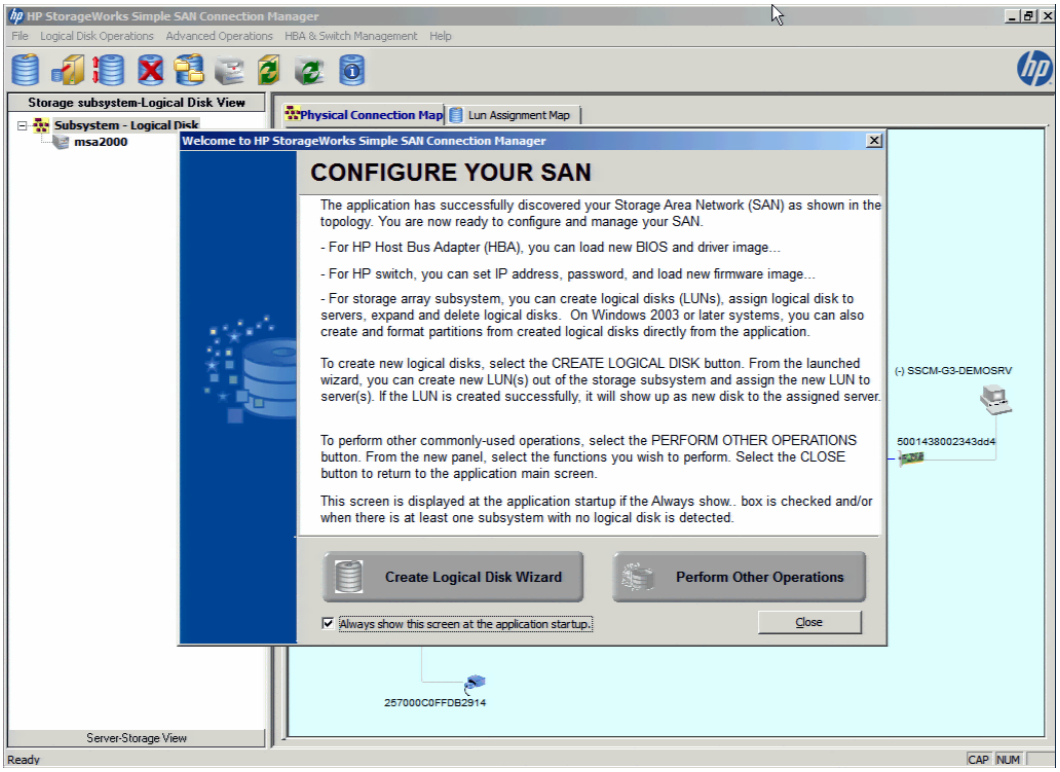


After completing the FC switch zoning, SSCM continued ahead to discover, identify, and configure the storage target in the SAN.

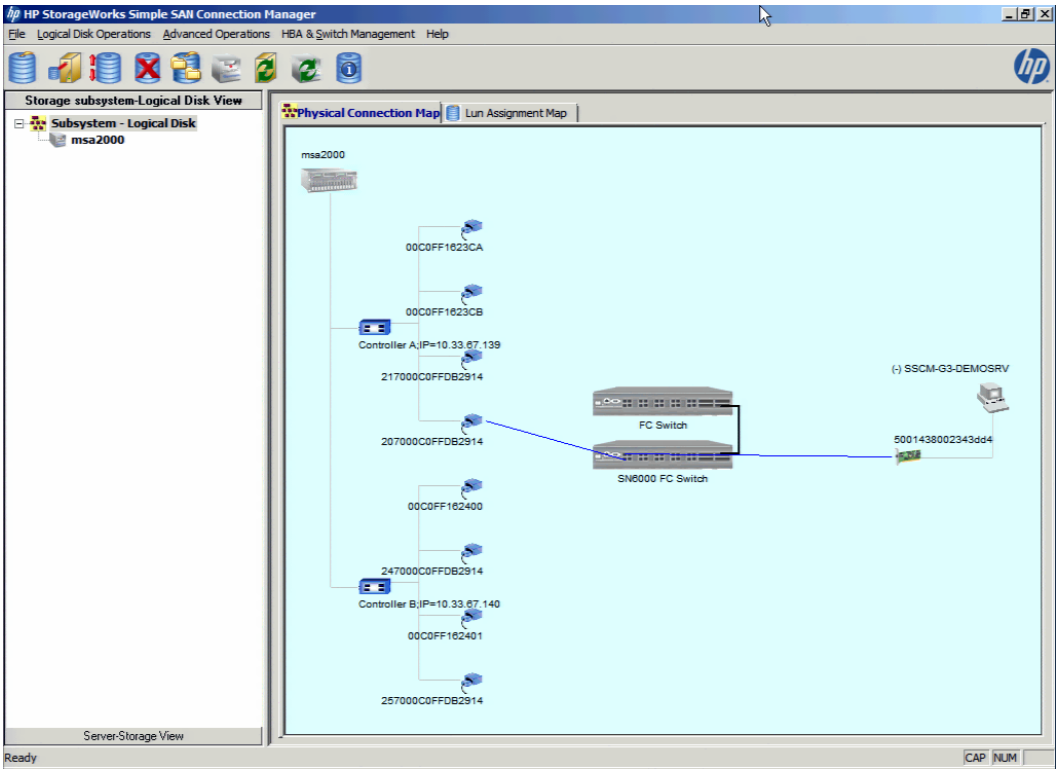




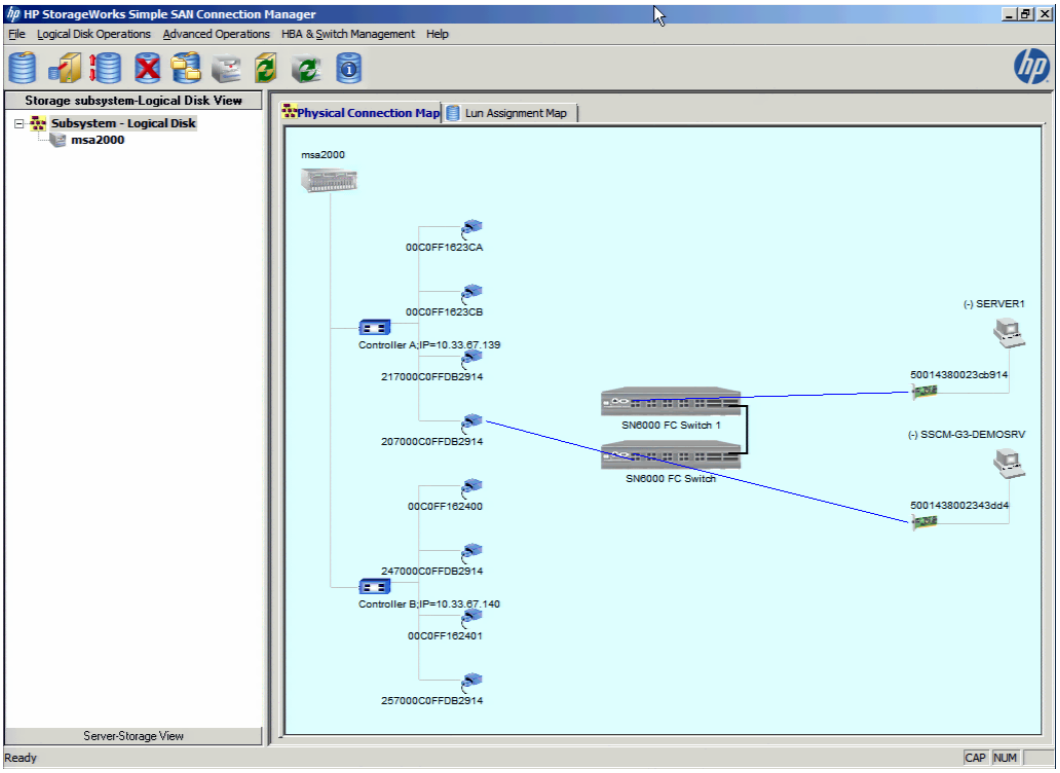




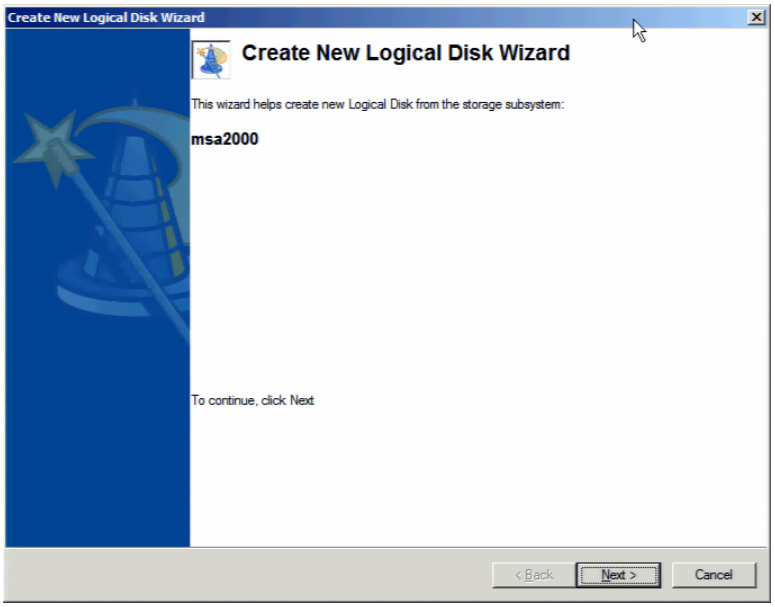
After closing the configuration wizard, we were shown the current SAN topology.



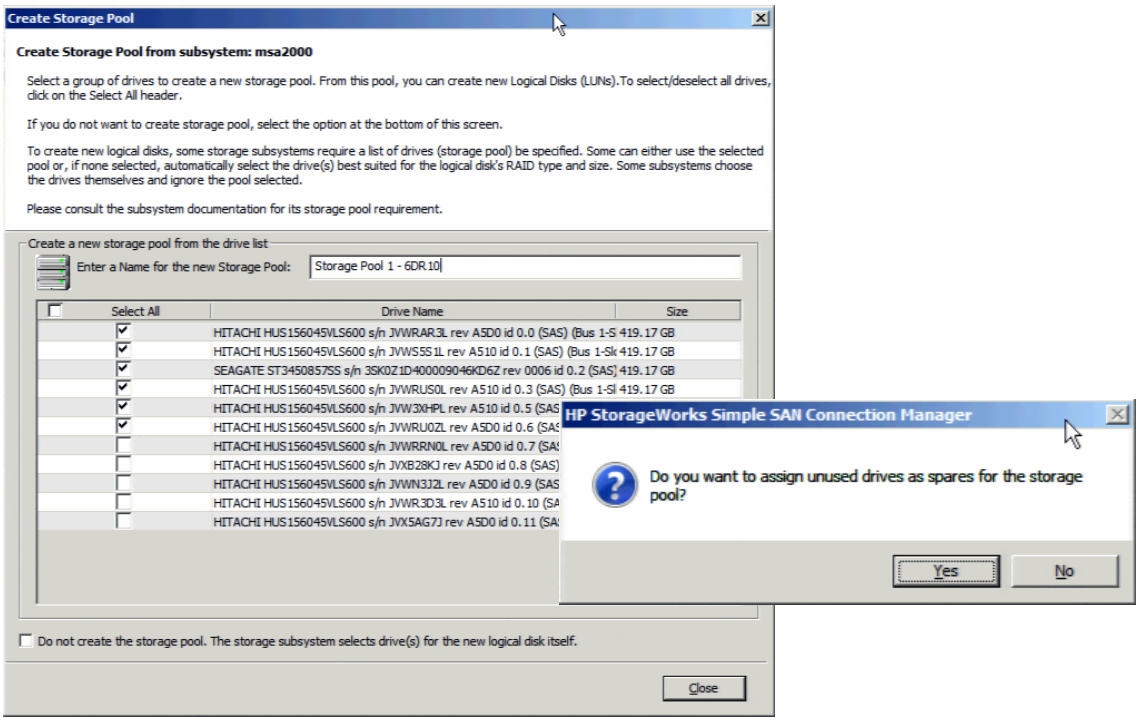
When we connected a second switch to another server and repeated the switch IP address configuration steps, we were shown the final, multi-server, multi-path topology.



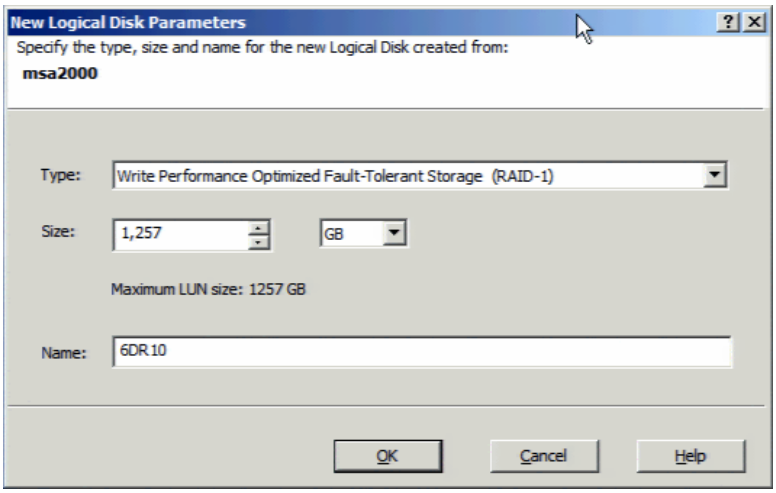
Now that the SAN topology had been created, it was time to create a LUN for one of the servers using the SSCM menu or icons.



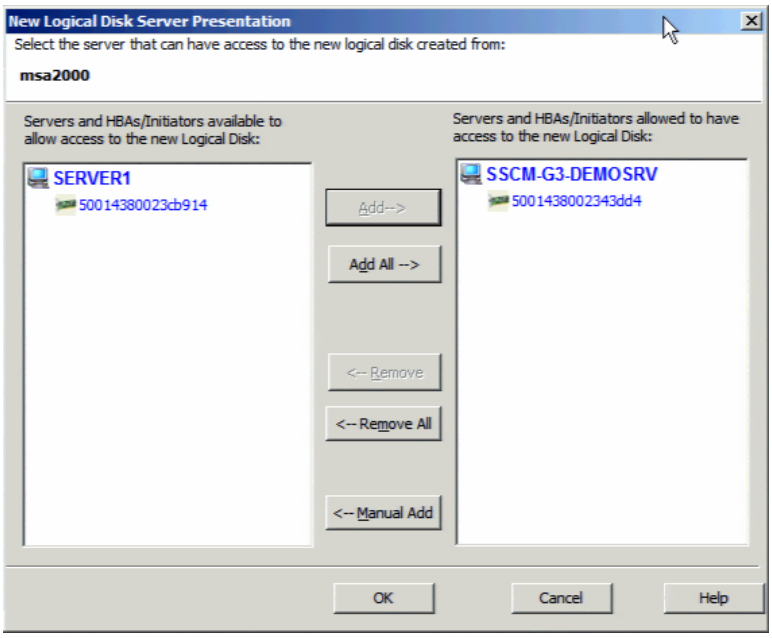
We entered a name for the new storage pool and selected the disk drives to be included in the new storage pool. We provided the name "Storage Pool 1 – 6DR10" and chose no spares for this particular storage pool.



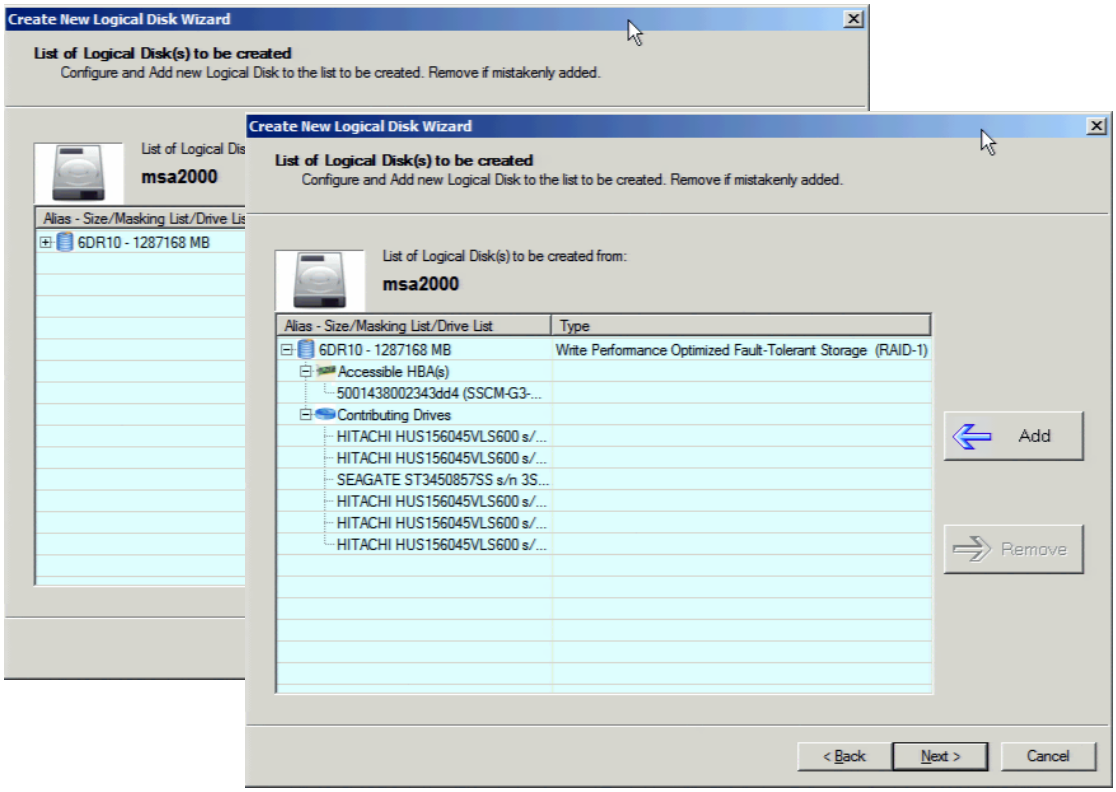
We configured the six disk drives of the storage pool into a RAID1 storage pool.

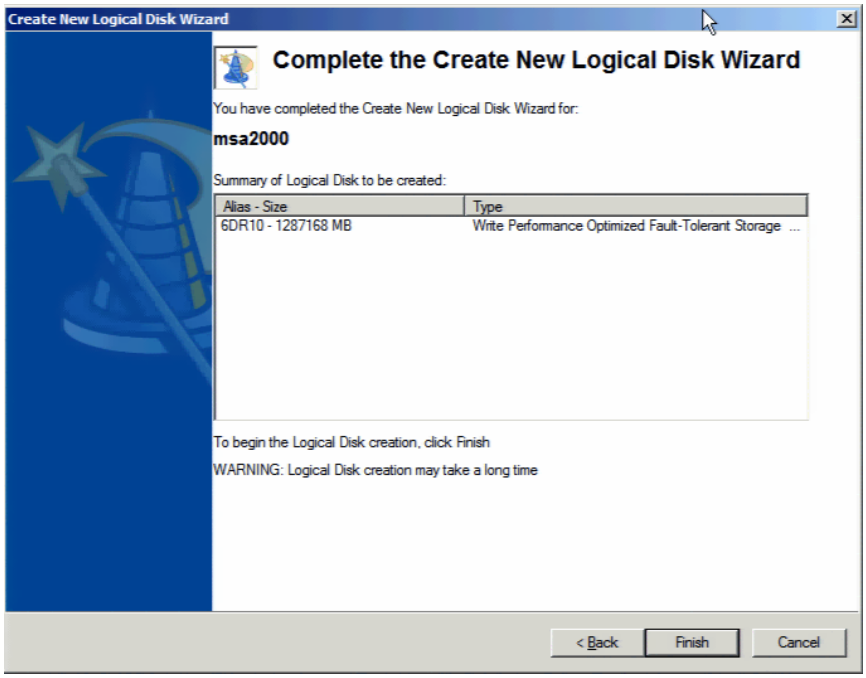


For the next configuration choice, we needed to indicate the server that had access to this storage pool. The desired server name was highlighted and added to the list of servers to be allowed access.

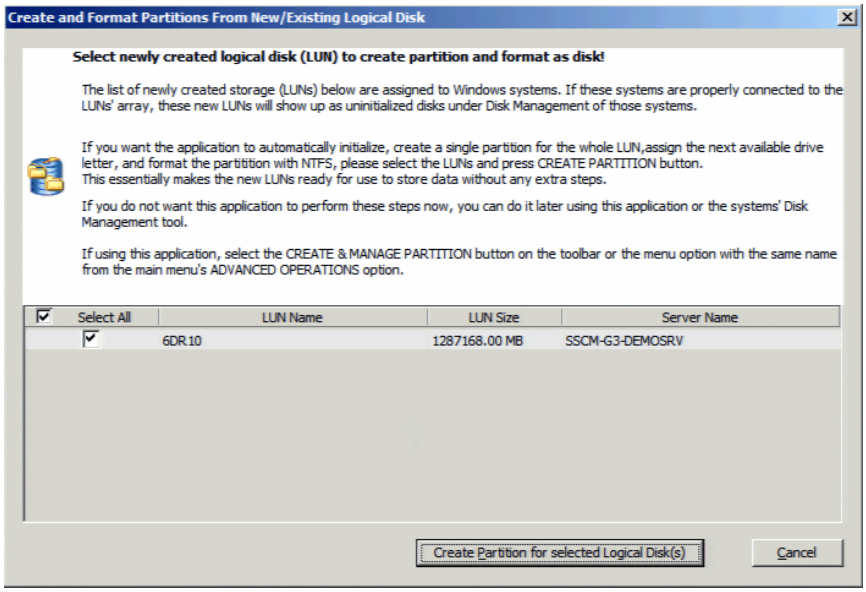


The drive group details were presented for a final check. The list could be expanded to show all the disk drives and adapters allowed access to this storage.

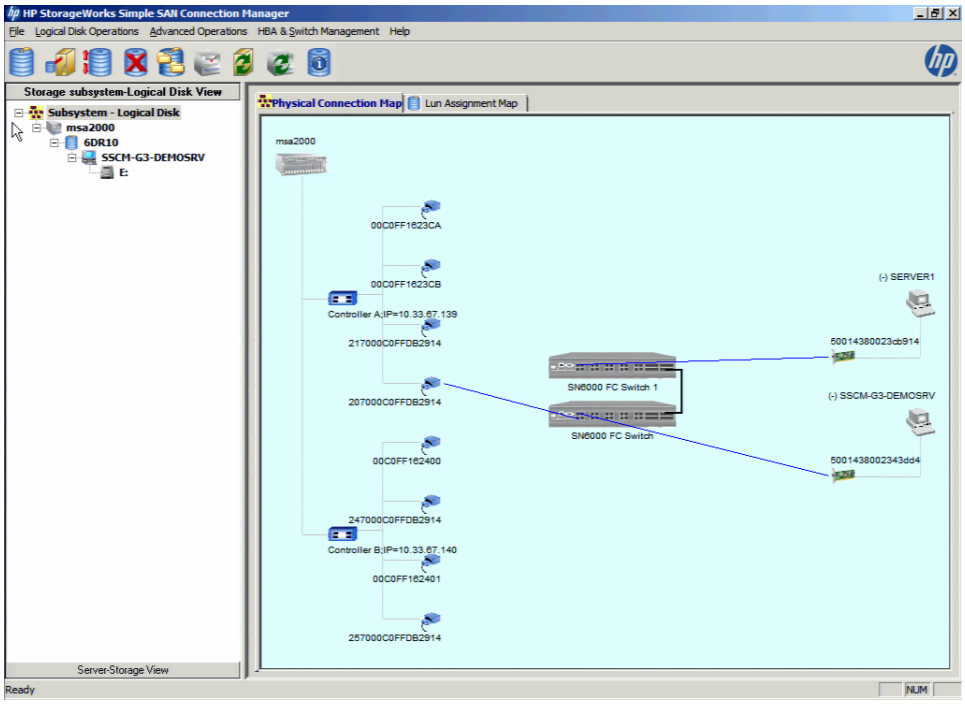




Because we were using the Windows Server operating system, after the logical disk was created, SSCM offered the option to create and format the partition for that storage.



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
  - Configure network settings of the iSCSI storage device
  - 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
  - Select RAID type for the disk drives in the storage pool
  - Create one or more LUNs (disk volumes) in the storage pool
  - 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
  - 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.

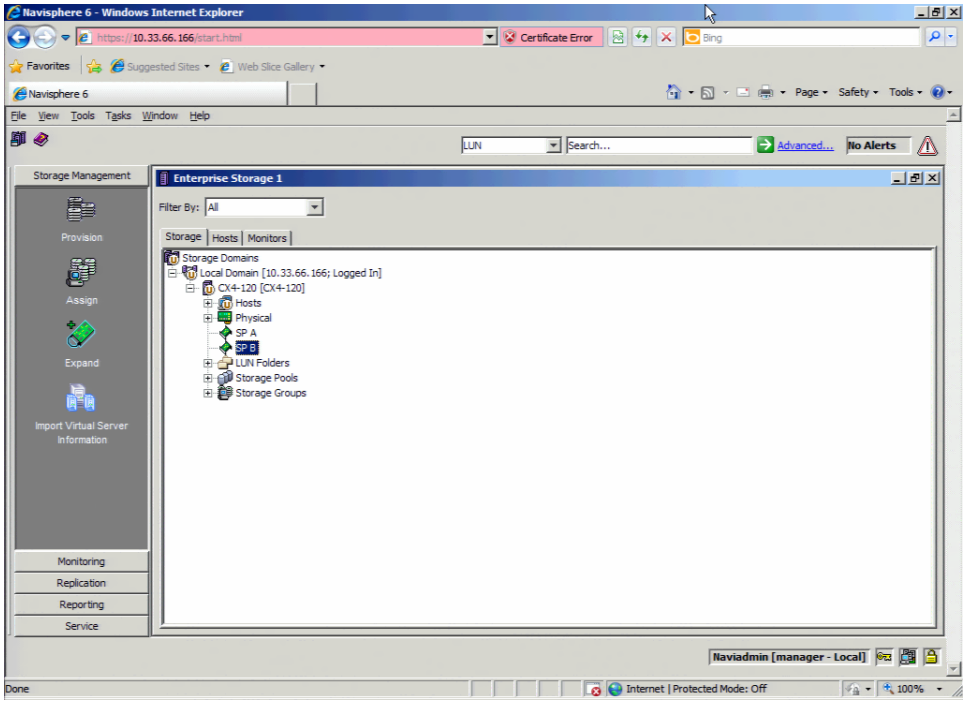
iSCSI Deployment Example

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.

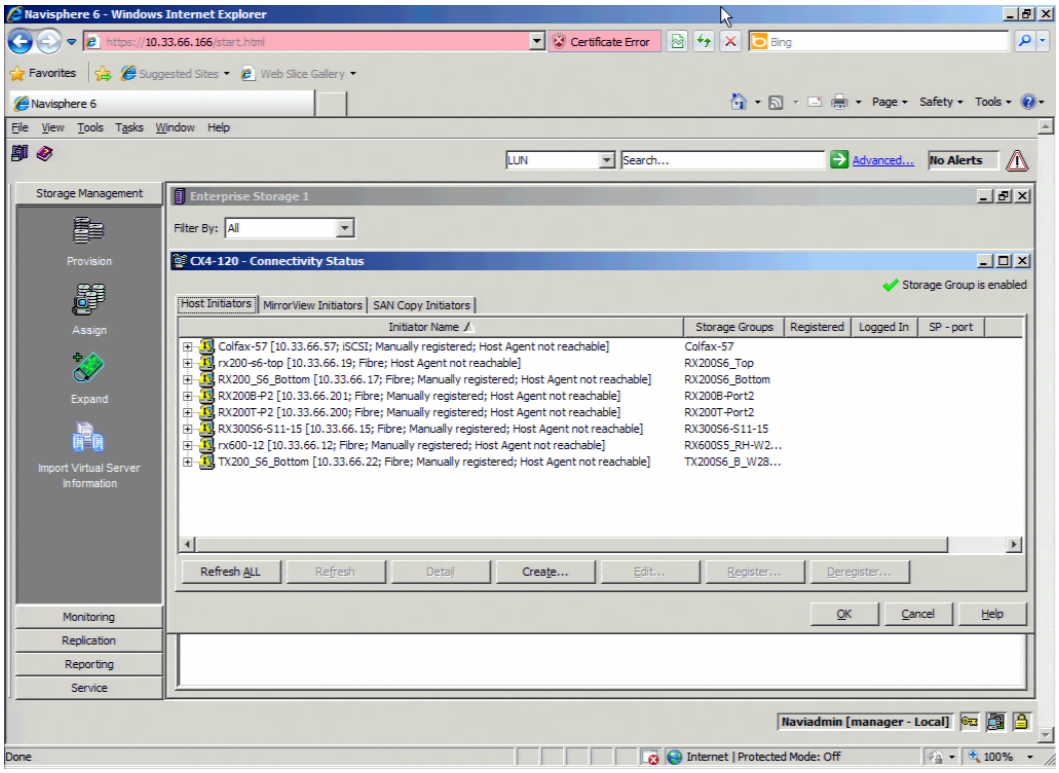
For this test, Navisphere was previously installed and configured on the EMC CX4 storage system. We started a web browser and provided the browser with the address of Navisphere running on the CX4 storage system.

iSCSI Storage Target Steps

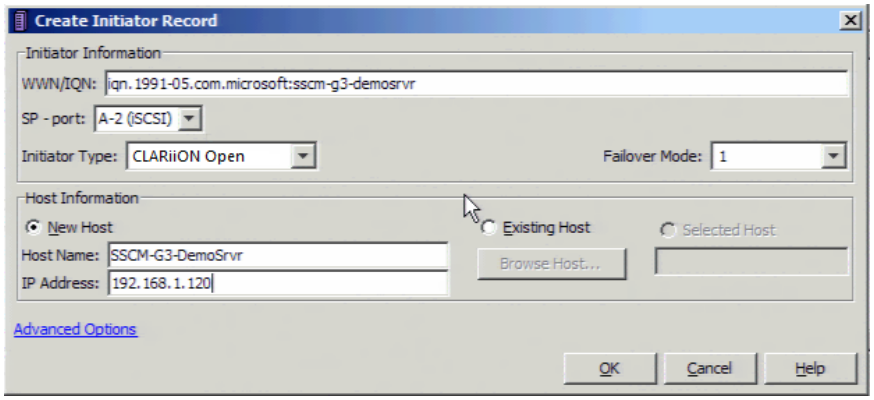
It should be noted that iSCSI storage targets from different vendors will have different menus, procedures, and wizards for identifying host servers, provisioning storage, and other related storage management tasks. While the specific steps to accomplish these functions for other iSCSI storage targets 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.



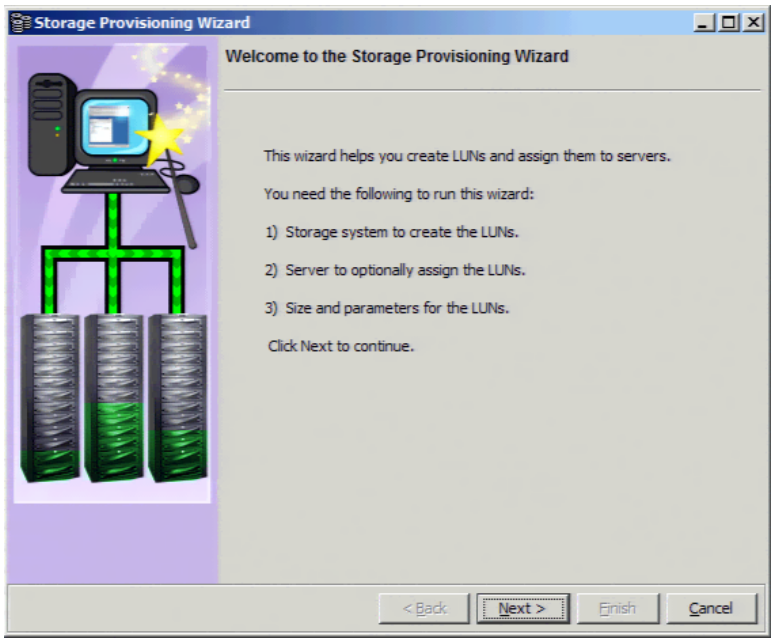
For the first step, we created a host system for the CX4 and provided the IP address and IQN of our iSCSI host initiator. Other hosts were already defined before we began this test.

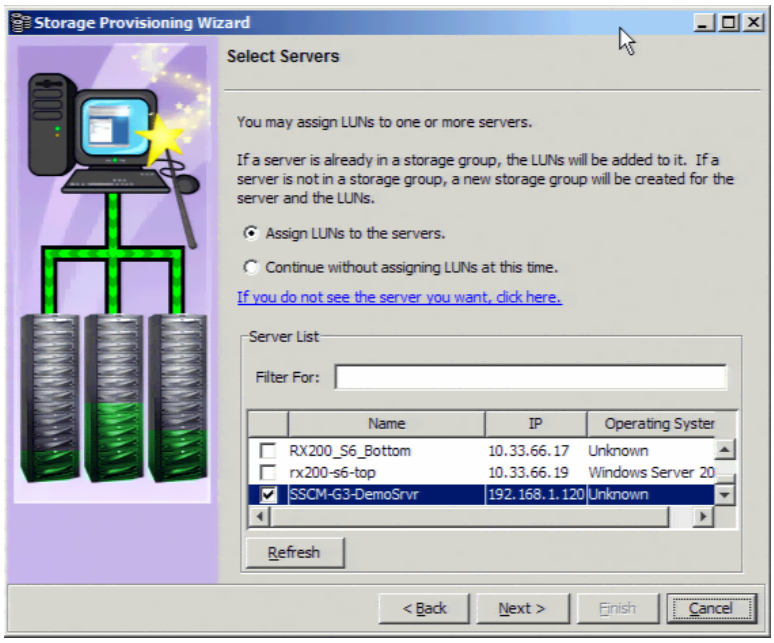


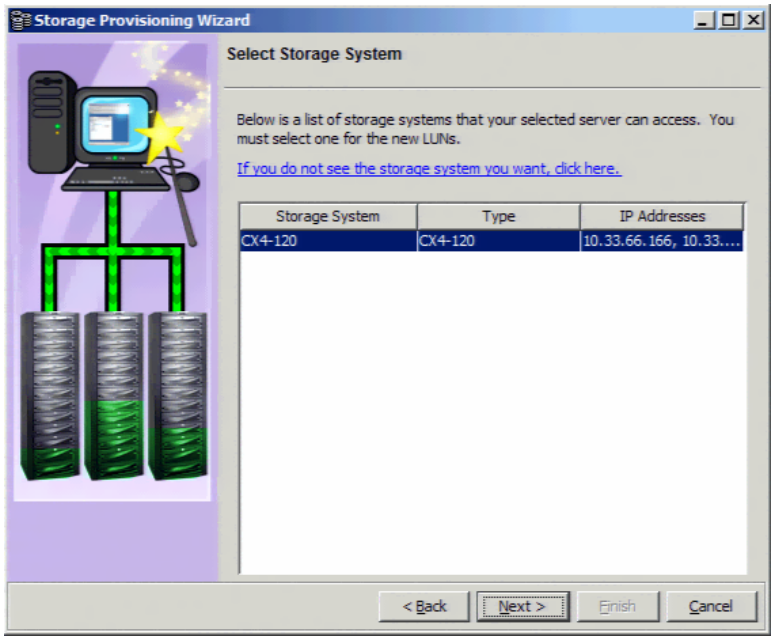
We knew to use the "connectivity status" command in Navisphere to create the iSCSI initiator record.

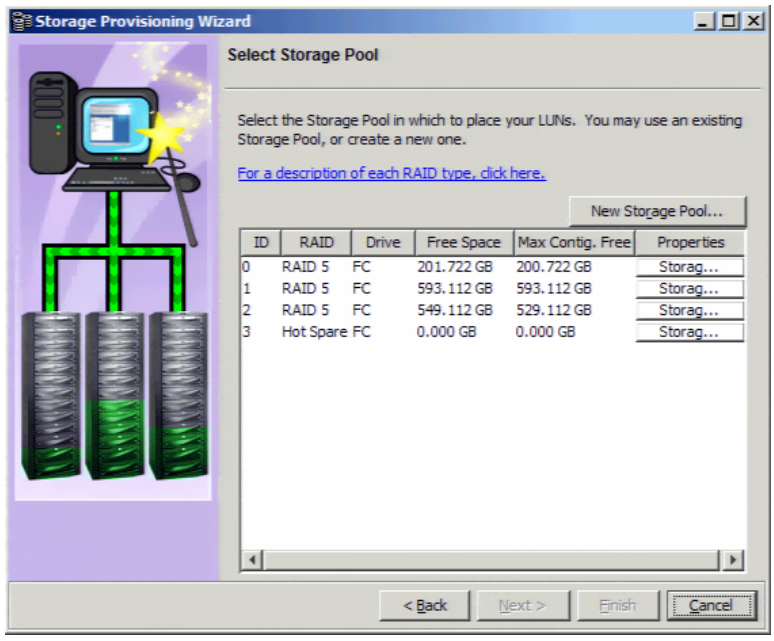


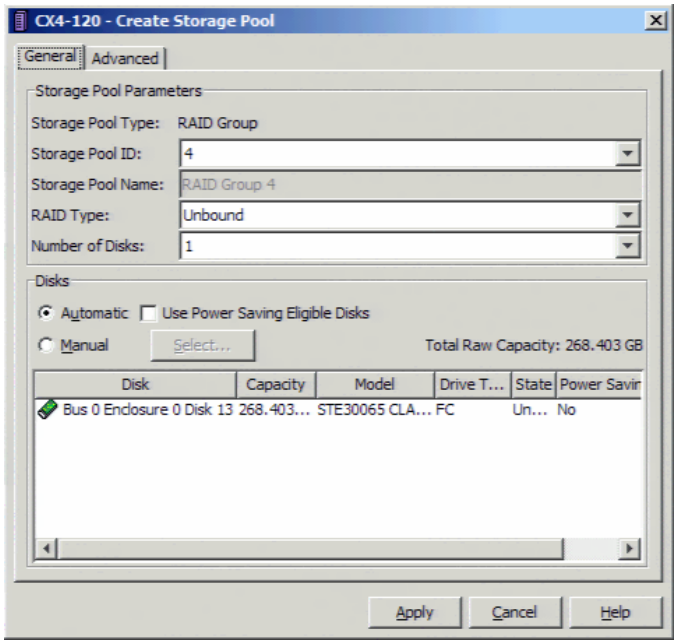
After the host application server (initiator) information was entered by copying the IQN from the application server, we could provision and assign the storage to that host. Navisphere understands several different types of initiators and for this implementation we knew to select "CLARiiON Open" as the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

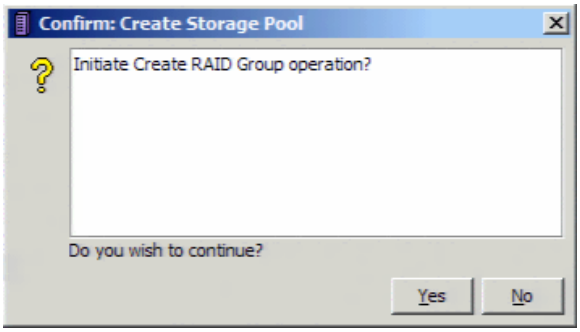

Storage Provisioning Wizard
Welcome to the Storage Provisioning Wizard
This wizard helps you create LUNs and assign them to servers.
You need the following to run this wizard:
1) Storage system to create the LUNs.
2) Server to optionally assign the LUNs.
3) Size and parameters for the LUNs.
Click Next to continue.
< Back
Next >
Finish
Cancel

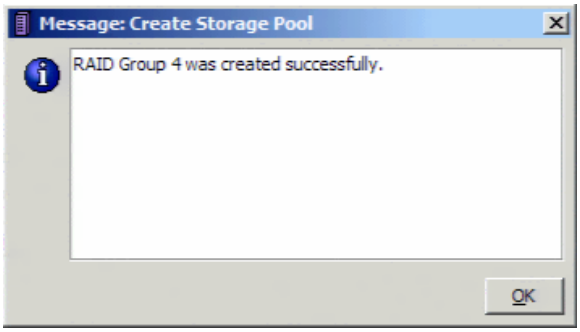

Storage Provisioning Wizard
Select Servers
You may assign LUNs to one or more servers.
If a server is already in a storage group, the LUNs will be added to it. If a server is not in a storage group, a new storage group will be created for the server and the LUNs.
Assign LUNs to the servers.
Continue without assigning LUNs at this time.
If you do not see the server you want, click here.
Server List
Filter For:
Name
IP
Operating Syster
RX200_S6_Bottom
10.33.66.17
Unknown
rx200-s6-top
10.33.66.19
Windows Server 20
SSCM-G3-DemoSrvr
192.168.1.120
Unknown
Refresh
< Back
Next >
Finish
Cancel

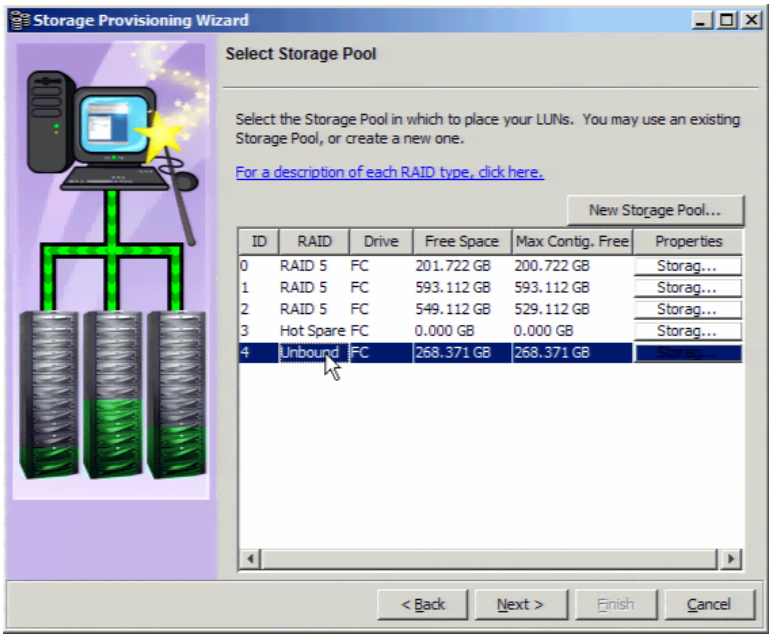

Storage Provisioning Wizard
Select Storage System
Below is a list of storage systems that your selected server can access. You must select one for the new LUNs.
If you do not see the storage system you want, click here.
Storage System
Type
IP Addresses
CX4-120
CX4-120
10.33.66.166, 10.33....
< Back
Next >
Finish
Cancel

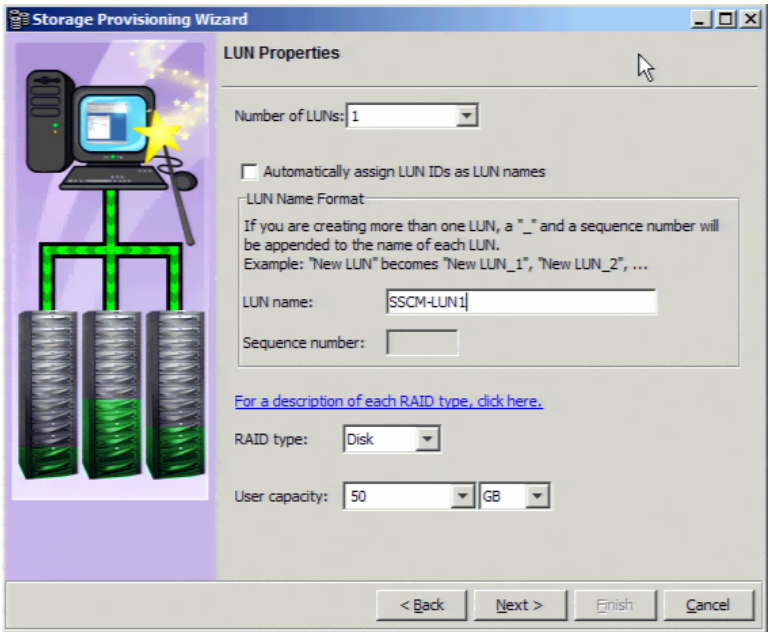

Storage Provisioning Wizard
Select Storage Pool
Select the Storage Pool in which to place your LUNs. You may use an existing Storage Pool, or create a new one.
For a description of each RAID type, click here.
New Storage Pool...
ID
RAID
Drive
Free Space
Max Contig. Free
Properties
0 RAID 5 FC 201.722 GB 200.722 GB Storag...
1 RAID 5 FC 593.112 GB 593.112 GB Storag...
2 RAID 5 FC 549.112 GB 529.112 GB Storag...
3 Hot Spare FC 0.000 GB 0.000 GB Storag...
< Back
Next >
Finish
Cancel

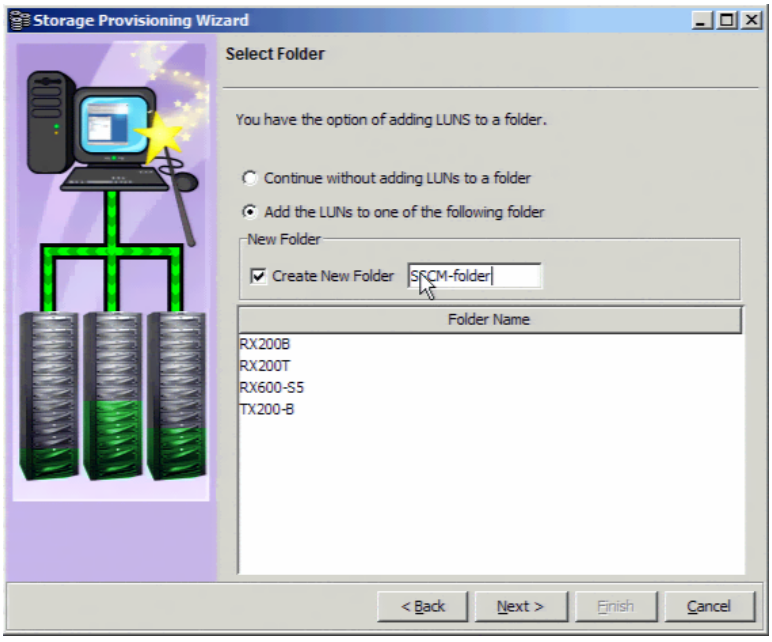

CX4-120 - Create Storage Pool
General
Advanced
Storage Pool Parameters
Storage Pool Type: RAID Group
Storage Pool ID: 4
Storage Pool Name: RAID Group 4
RAID Type: Unbound
Number of Disks: 1
Disks
Automatic
Use Power Saving Eligible Disks
Manual
Select...
Total Raw Capacity: 268.403 GB
Disk
Capacity
Model
Drive T...
State
Power Savir
Bus 0 Enclosure 0 Disk 13 268.403... STE30065 CLA... FC Un... No
Apply
Cancel
Help

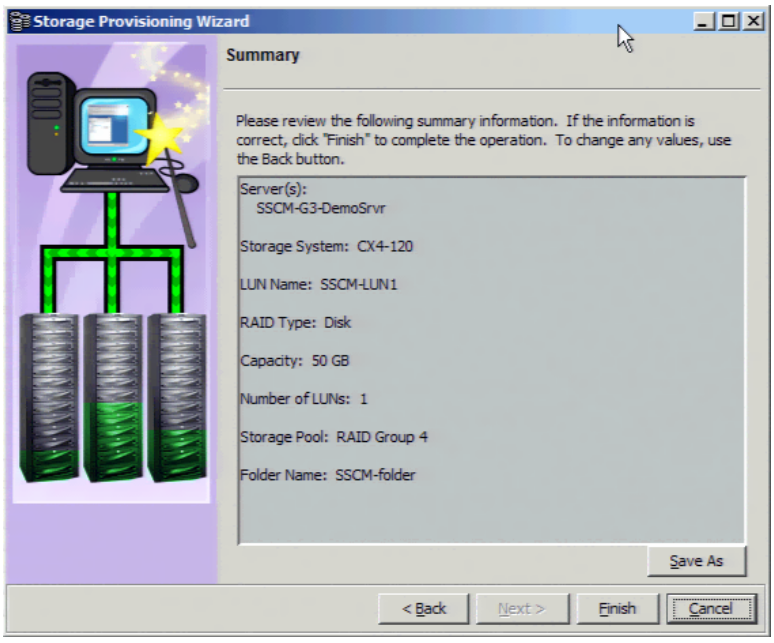

Confirm: Create Storage Pool
Initiate Create RAID Group operation?
Do you wish to continue?
Yes
No

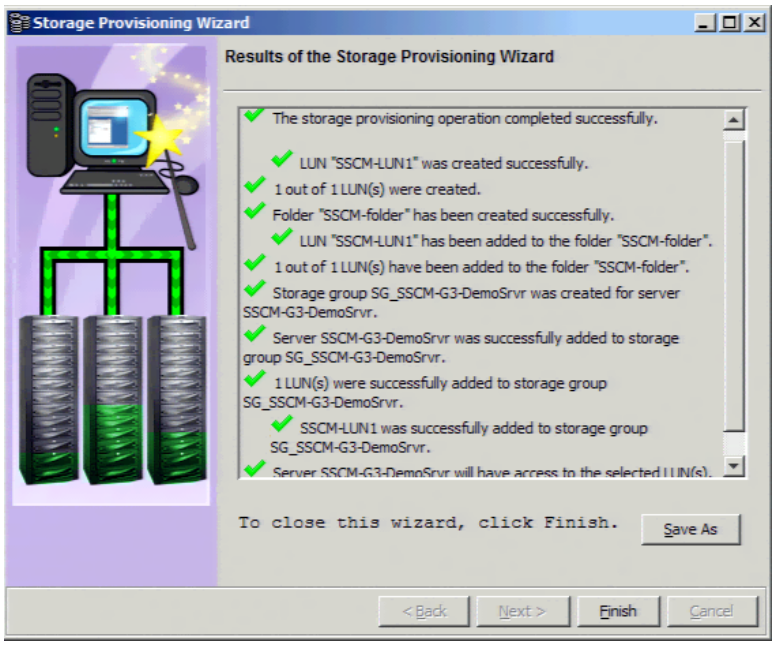

Message: Create Storage Pool
RAID Group 4 was created successfully.
OK


Storage Provisioning Wizard
Select Storage Pool
Select the Storage Pool in which to place your LUNs. You may use an existing Storage Pool, or create a new one.
For a description of each RAID type, click here.
New Storage Pool...
ID RAID Drive Free Space Max Contig. Free Properties
0 RAID 5 FC 201.722 GB 200.722 GB Storag...
1 RAID 5 FC 593.112 GB 593.112 GB Storag...
2 RAID 5 FC 549.112 GB 529.112 GB Storag...
3 Hot Spare FC 0.000 GB 0.000 GB Storag...
4 Unbound FC 268.371 GB 268.371 GB
< Back
Next >
Finish
Cancel


Storage Provisioning Wizard
LUN Properties
Number of LUNs: 1
Automatically assign LUN IDs as LUN names
LUN Name Format
If you are creating more than one LUN, a "_" and a sequence number will be appended to the name of each LUN.
Example: "New LUN" becomes "New LUN_1", "New LUN_2", ...
LUN name: SSCM-LUN 1
Sequence number:
For a description of each RAID type, click here.
RAID type: Disk
User capacity: 50 GB
< Back
Next >
Finish
Cancel


Storage Provisioning Wizard
Select Folder
You have the option of adding LUNS to a folder.
Continue without adding LUNs to a folder
Add the LUNs to one of the following folder
New Folder
Create New Folder
SSCM-folder
Folder Name
RX200B
RX200T
RX600-S5
TX200-B
< Back
Next >
Finish
Cancel


Storage Provisioning Wizard
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
Folder Name: SSCM-folder
Save As
< Back
Next >
Finish
Cancel



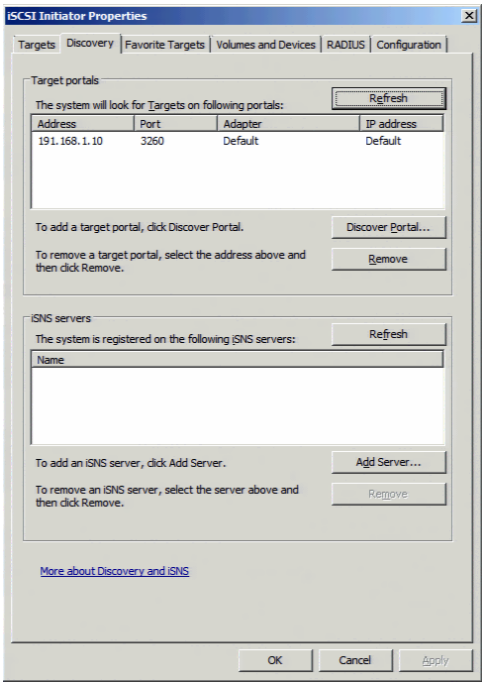
iSCSI Host Initiator Steps

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.

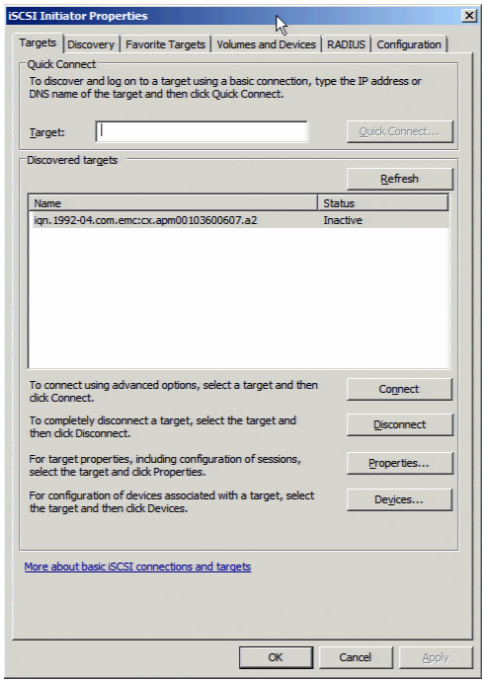
Discovery Tab

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.

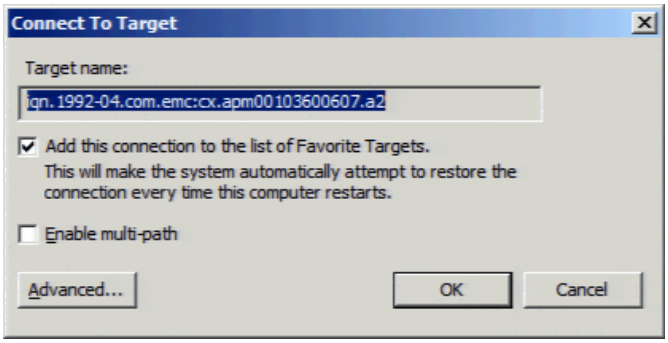


Targets Tab

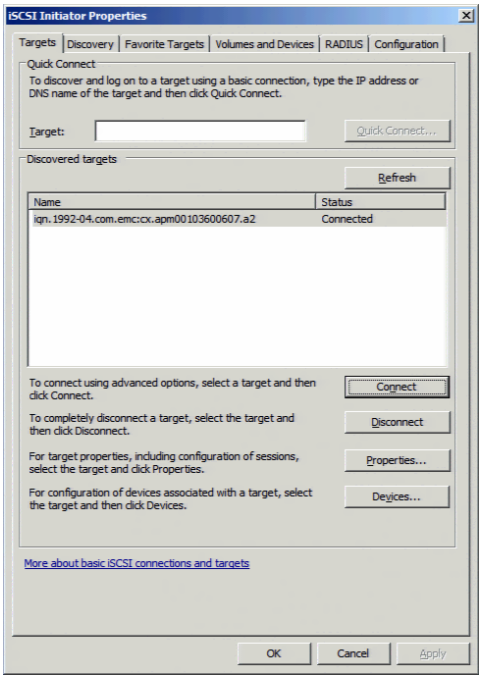
The targets tab provided the list of individual targets available to the iSCSI initiator. The IQN for the iSCSI storage device was listed with the status of inactive.



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.



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



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)

Note 1: 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.

Note 2: 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