



EXPRESSCLUSTER X for Windows

Quick Start Guide for iSCSI Target Server

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1 About This Guide

1.1 Using This Guide

This guide provides a hands-on “Quick Start” set of instructions to create **Active/Standby** cluster system for iSCSI Target Server with EXPRESSCLUSTER X for Windows. The guide assumes users have Microsoft Windows system administration knowledge and skills with experience in installation and configuration of Microsoft Windows operating systems, networks, and iSCSI Target Server.

1.2 Revision History

Version	Date	Description
1	July, 2016	Initial Version

1.3 Evaluation Environment

This iSCSI Target Server clustering method has been evaluated with the following OS and software.

- Windows Server 2012 R2
- EXPRESSCLUSTER X 3.3 for Windows

1.4 For More Information

We have the following guides for instant support.

- **Getting Started Guide** – This guide explains general cluster concepts and overview of EXPRESSCLUSTER X functionality.
- **Installation and Configuration Guide** – This guide explains EXPRESSCLUSTER X installation and configuration procedures in detail.
- **Reference Guide** – This is a reference of commands that can be put in EXPRESSCLUSTER X scripts and maintenance commands that can be executed from the server command prompt.

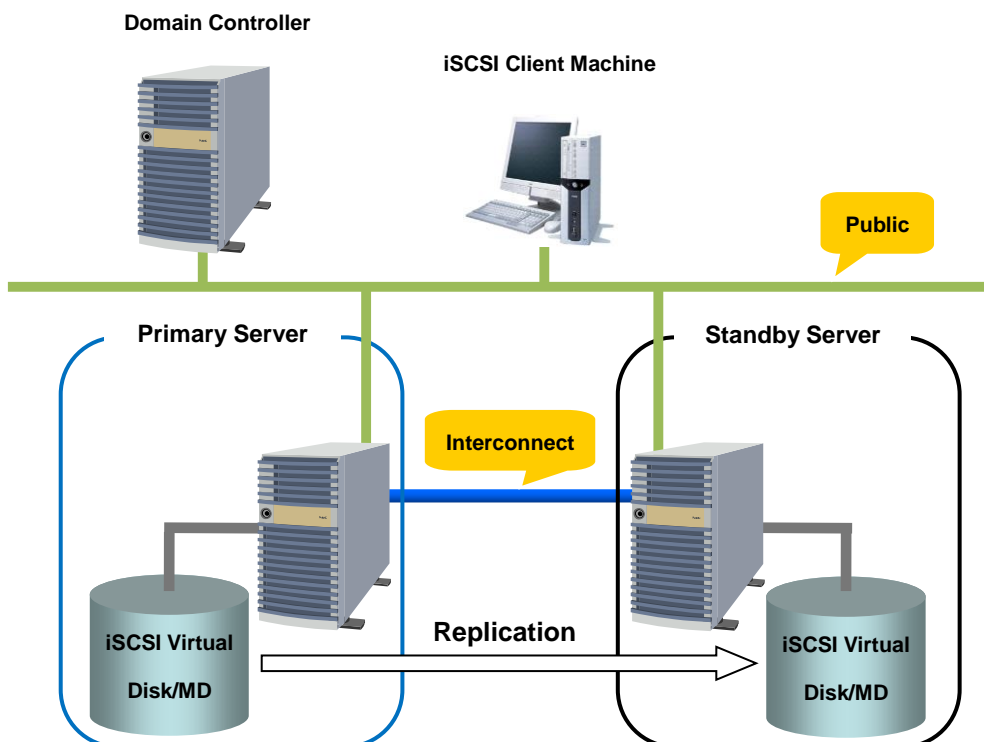
The guides listed above can also be found at

<http://www.nec.com/en/global/prod/expresscluster/en/support/manuals.html>

2 Overview

The general procedure to deploy EXPRESSCLUSTER X on two servers (referred to as Primary and Secondary), each with an iSCSI virtual disk which is mirrored between the servers, consists of the following major steps:

1. Perform system planning to determine requirements and specify configuration settings *prior* to the start of actual system installation and configuration.
2. Prepare the Secondary server, including OS installation and configuration.
3. Set up a Data Partition and Cluster Partition on both servers according to instructions in the EXPRESSCLUSTER X ***Installation and Configuration Guide***.
4. Install and configure EXPRESSCLUSTER X on the Primary and Secondary server.
5. Create and configure the EXPRESSCLUSTER X failover group to enable continuous protection and automatic recovery of the iSCSI virtual disk.
6. Upload the configuration file and start the cluster to complete deployment.



3 System Requirements and Planning

3.1 System Requirements

Both Windows Server 2012 R2 servers in the cluster require the installation of the iSCSI Target Server service. It can be installed using the **Add Roles and Features Wizard** in **Server Manager**, under the **File and Storage Services** section.

3.2 System Planning

Fill out the tables of the worksheet below to use for reference in the configuration sections of this guide. See also **9.2 Example System Planning Worksheet** for an example worksheet.

Machine #1: Primary Server (with iSCSI Target Server)

Machine #2: Secondary Server (with iSCSI Target Server)

Machine #3: Test Client Machine (with iSCSI Initiator)

Table 1: System Network Configuration

Machine	Hostname	Network	IP Address	DNS	MDC ¹
#1		NIC #1			
		NIC #2			
#2		NIC #1			
		NIC #2			
#3		NIC #1			N/A

Floating IP (FIP) Address : _____
Virtual Computer Name (vcom) : _____
iSCSI Target Name : _____

¹ MDC (Mirror Disk Connect) is network for data mirroring.

Table 2: System OS and Disk Configuration

Machine	OS	Disk 0 (OS)	Disk 1 (Data)
#1		Boot Partition: Drive Letter: Size:	Cluster Partition: Drive Letter: W Size (> 17 MB): 24MB
#2		Boot Partition: Drive Letter: Size:	Data Partition: Drive Letter: X Size: 50GB
#3			N/A

Table 3: System Logins and Passwords

Machine	Login	Password
#1		
#2		
#3		

4 EXPRESSCLUSTER X Installation

4.1 Install EXPRESSCLUSTER X on the Primary Server

1. Insert the EXPRESSCLUSTER X CD-ROM into a CD-ROM drive on the server.
2. In the pop-up window, click **NEC EXPRESSCLUSTER for Windows**.
3. Click on **NEC EXPRESSCLUSTER X 3.x for Windows**.
4. In the **Welcome** window, click **Next**.
5. In the **Choose Destination Location** window, click **Next**.
6. In the next window, click **Install**.
7. In the **Port Number** window, if necessary, modify the default port numbers. Click **Next**.
8. In the **Filter Settings of Shared Disk** window, click **Next**.
9. Click **Yes** in the **Confirmation** window to skip shared disk filtering.
10. In the **License Manager** window, click **Register**.
11. In the **License Registration** window, click **Register with License Information**.
12. In the **Product Selection** window, select the **OS** and **Product/Trial** types. For **Product Name**, click **EXPRESSCLUSTER X 3.x for Windows**. Click **Next**.
13. In the **License Unit Selection** window, depending on the type of license, enter the number of **CPU** or **Node Units**. Click **Next**.
14. In the **License Key Entry** window, enter the **Serial No.** and **License Key**. Click **Next**.
15. In the **License Registration Confirmation** window, confirm the information entered is correct. Click **Next**.
16. Click **OK**. If the license registration fails, start again from step 10.
17. Repeat steps 10 – 16 again for the **EXPRESSCLUSTER X Replicator 3.x for Windows** product license. Select **EXPRESSCLUSTER X Replicator 3.x for Windows** as the **Product Name** in step 12.
18. When the licenses have been successfully registered, click **Finish**.
19. On the **InstallShield Wizard Complete** window, click the **No, I will restart my computer later** option button, and then click **Finish**.
20. In the next window, click **Exit**. Click **Exit**. (Two times total).

4.2 Install EXPRESSCLUSTER X on the Secondary Server

Perform all of the steps in Section 4.1 on the **Secondary Server**.

4.3 Restart the Primary and Secondary Servers

First restart the **Primary Server**, and then restart the **Secondary Server**.

4.4 Confirm Connectivity between Servers

Ping the servers in the cluster to verify that there are no issues in connectivity. Also be sure that the ports used by EXPRESSCLUSTER are able to communicate through the Windows Firewall.

5 Base Cluster Setup

5.1 Start WebManager

Verify that Java Runtime Environment (JRE) is installed on a machine to be used for cluster management. See the installation requirements section of the EXPRESSCLUSTER X **Getting Started Guide** for a compatible version. For this guide, use the **Primary Server** for cluster management. Install JRE if necessary. Then start by accessing port 29003 of the **Primary Server** from the web browser of the cluster management machine, using the **Primary Server's** IP address. Example: http://10.0.0.2:29003. When the security warning window displays, select the **Always trust content from this publisher** check box. Click **Run**.

5.2 Create a Cluster

For all of the steps in the cluster creation project, refer to **Table 1** for the IP addresses and server names.

1. When the cluster manager is opened for the first time, there is a pop-up window with two options. Click **Start cluster generation wizard**.
2. In the confirmation window, click **Start Cluster Generation Wizard for standard edition**.
3. In the new window, type a **Cluster Name** (Example: iscsi_cluster), and click **Next**.
4. In the next window, to add another server to the cluster, click **Add**.
5. Type the **Server Name** or the **IP Address** of **Secondary Server**, and then click **OK**.
6. Both servers are now on the list. If the **Primary Server** is not in the top (Master Server) position, then move it up. Click **Next**.

5.3 Set Up the Network Configuration

1. EXPRESSCLUSTER X automatically detects the IP addresses of the servers. The primary network (**Interconnect**) is for heartbeat and mirroring the data; set the **MDC** on this row as **mdc1**. The secondary (Public) network is for heartbeat only. Click **Next**.
2. In the **NP Resolution** window, click **Next**.

5.4 Create a Failover Group

1. To add a group, in the **Cluster Generation Wizard**, in the **Group** section, click **Add**.
2. In the next window, select **failover** for group **Type**. Name the group (Example: iscsi_failover), click **Next**, and then click **Next**. (Two times total).
3. Select the default options for the **Group Attribute Settings**, and then click **Next**.

5.5 Create Resources for Base Cluster

1. In the **Group Resource** section of the **Cluster Generation Wizard**, to add a resource, click **Add**.
2. To add a floating IP address resource, from the **Type** drop down menu, select **floating ip resource**, and then click **Next**.
3. Verify the **Follow the default dependency** box is selected, and then click **Next**.
4. Verify the default options are correct, and then click **Next**.
5. Enter the floating IP address in the **IP Address** field and click **Finish**.
6. Add a virtual computer name resource by clicking **Add**.
7. From the **Type** drop down menu, select **virtual computer name resource**, and then click **Next**.
8. Uncheck the **Follow the default dependency** box.
9. Select the recently created **floating ip resource** in the right pane and click **Add**. Click **Next**.
10. Verify the default options are correct, and then click **Next**.
11. Enter the **Virtual Computer Name** chosen earlier (Example: vcom).
12. From the drop down menu under **Target FIP Resource Name**, select the floating IP address. Click **Finish**.
13. Add a mirror disk resource by clicking **Add**.
14. Click **Get License Info** to retrieve the active license for replication. (Note that there is no visible indication that it was successful).
15. To add a mirror disk resource, from the **Type** drop down menu, select **mirror disk resource**, and then click **Next**.
16. Verify the **Follow the default dependency** box is selected, and then click **Next**.

-
17. Verify the default options are correct, and then click **Next**.
 18. Select the **Primary Server** name and click **Add**.
 19. Click **Connect** to populate the server partitions.
 20. Select the drive letter of the data partition for mirroring (Example: X) in the **Data Partition** box, and the drive letter of the cluster partition (Example: W) in the **Cluster Partition** box. Click **OK**.

Note:

Specify different partitions for data partition and cluster partition. If the same partition is specified, data on the mirror disk may be corrupted.

21. Repeat steps 18 – 20 for the **Secondary Server**.
22. Click **Finish**.
23. Click **Finish**, and then click **Next**.
24. Click **Finish**.
25. Click **Yes** to enable recovery action when an error occurs in a monitor resource.

5.6 Upload the Cluster Configuration and Start Cluster

1. In the **Cluster Manager** window, click the **File** menu and then **Apply the Configuration File**. Click **OK**. Click **OK**. (Two times total).
2. After the upload is complete, change from **Config Mode** to **Operation Mode**.
3. Restart **Cluster Manager**. Click the **Service** menu, and then click **Restart Manager**. Click **OK**.
4. Click the **Service** menu, and then click **Start Cluster**. Click **OK**.
5. When the cluster tree displays after a few seconds, in the left pane of the **Cluster Manager** window, expand the **%failover group%** section, right click **%mirror disk%**, and click **Details** to monitor the disk synchronization progress. Mirror disk copy starts automatically, replicating data from the **Primary Server** to the **Secondary Server**.

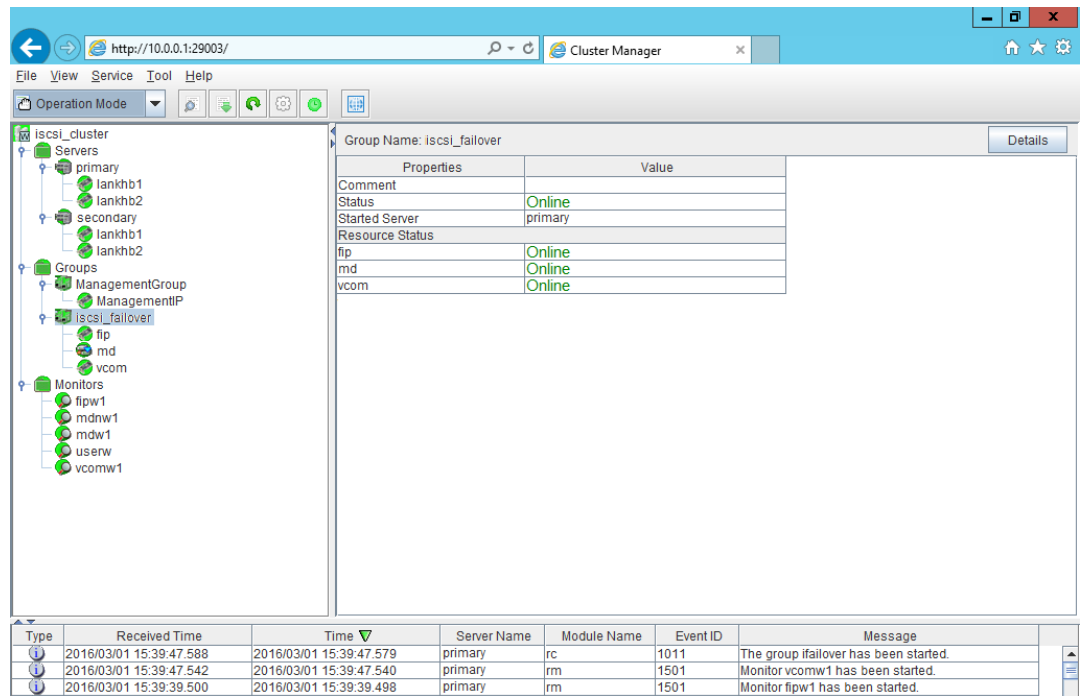
Note:

This step may take a while depending on the size of the data on the mirror disk partition.

6. After the copy completes, in the **Mirror Disk Helper** window, click

Close.

7. In the Cluster Manager window, all icons in the tree view should now be green. Refer to the figure below:



8. Move the **%failover group%** to the **Secondary Server** to verify that all group resources and monitor resources can be activated on **Secondary Server**. After verification, move the **%failover group%** back to the **Primary Server**.

Note:

These tests do not affect server functionality. It verifies that the mirror disks on each server in the cluster are functioning properly. The mirror disk is now controlled by EXPRESSCLUSTER X and is only accessible from the active server.

6 iSCSI Target Server Installation

6.1 Install iSCSI Target Server on the Primary Server

Do the following steps to install iSCSI Target Server.

1. Open a PowerShell window with Administrative rights.
2. If iSCSI Target Server role has not been installed, enter the following command.

```
PS> Install-WindowsFeature FS-iSCSITarget-Server
```

3. Create a directory on the mirror disk for the iSCSI virtual disk (Example: X:\iSCSIVirtualDisks).
4. Run the following command to create a virtual disk.

```
PS> New-IscsiVirtualDisk -Path "<drive letter>:\<folder>\<name>.vhdx" -Size <size>
```

Example:

```
PS> New-IscsiVirtualDisk -Path "X:\iSCSIVirtualDisks\lun1.vhdx" -Size 20GB
```

5. Run the following command to create an iSCSI Target.

```
PS> New-IscsiServerTarget <target name> -InitiatorIds "IPAddress:<client IP address>"
```

Example:

```
PS> New-IscsiServerTarget Target1 -InitiatorIds "IPAddress:10.0.0.101"
```

6. Run the following command to change iSCSI Target IQN.

```
PS> Set-IscsiServerTarget <target name> -TargetIqn "iqn.1991-05.com.microsoft:<vcom name>-<target name>-target"
```

Example:

```
PS> Set-IscsiServerTarget Target1 -TargetIqn "iqn.1991-05.com.microsoft:vcom-Target1-target"
```

7. Run the following command to assign the VHDX to the Target.

```
PS> Add-IscsiVirtualDiskTargetMapping <target name>
"<path to vhd>¥<name>.vhd"
```

Example:

```
PS> Add-IscsiVirtualDiskTargetMapping Target1 "X:¥:
iscsiVirtualDisks¥lun1.vhd"
```

8. Run the following command to stop **Microsoft iSCSI Software Target** service (wintarget).

```
PS> Stop-Service wintarget
```

6.2 Install iSCSI Target Server on the Secondary Server

Do the following steps to install iSCSI Target Server.

1. Move the **%failover_group%** to the **Secondary Server**.
2. Open a PowerShell window with Administrative rights on the **Secondary Server**.
3. If iSCSI Target has not been installed, enter the following command.

```
PS> Install-WindowsFeature FS-iscsiTarget-Server
```

4. Run the following command to import iSCSI virtual disk (VHDX).

```
PS> Import-IscsiVirtualDisk -Path "<path to
vhd>¥<name>.vhd"
```

Example:

```
PS> Import-IscsiVirtualDisk -Path
"X:¥iscsiVirtualDisks¥lun1.vhd"
```

5. Run the following command to create an iSCSI Target (using the same name on **Primary Server**).

```
PS> New-IscsiServerTarget <target name> -InitiatorIds
"IPAddress:<client IP address>"
```

Example:

```
PS> New-IscsiServerTarget Target1 -InitiatorIds
"IPAddress:10.0.0.101"
```

6. Run the following command to change iSCSI Target IQN.

```
PS> Set-IscsiServerTarget <target name> -TargetIqn  
"iqn.1991-05.com.microsoft:<vcom name>-<target  
name>-target"
```

Example:

```
PS> Set-IscsiServerTarget Target1 -TargetIqn  
"iqn.1991-05.com.microsoft:vcom-Target1-target"
```

7. Run the following command to assign the VHDX to the Target.

```
PS> Add-IscsiVirtualDiskTargetMapping <target name>  
"<path to vhd>¥<name>.vhd"
```

Example:

```
PS> Add-IscsiVirtualDiskTargetMapping Target1 "X:¥:  
iscsiVirtualDisks¥lun1.vhd"
```

8. Run the following command to stop **Microsoft iSCSI Software Target** service (wintarget).

```
PS> Stop-Service wintarget
```

7 iSCSI Target Server Cluster Setup

7.1 Add the First Set of Scripts

1. Download the script files for iSCSI Target Server clustering from the EXPRESSCLUSTER web site.

<http://www.nec.com/en/global/prod/expresscluster/en/support/Setup.html>

2. Unzip sample_scripts_iSCSITarget.zip and check if there are following folders and files.

script-wintarget1

Control-Wintarget.ps1

start.bat

stop.bat

script-wintarget2

Control-Wintarget.ps1

start.bat

stop.bat

3. Start the EXPRESSCLUSTER X **Cluster Manager**.
4. In the Cluster Manager window, change to **Config Mode**.
5. Right-click on the **%failover group%**, and then click **Add Resource**.
6. From the **Type** drop down menu, select **script resource**. As the resource **Name**, enter **script-wintarget1**. Click **Next**.
7. Uncheck the **Follow the default dependency** box, and then click **Next**.
8. Verify the default options are correct, and then click **Next**.
9. Select **start.bat** in the left pane and click the **Replace** button.
10. Navigate to the scripts that were downloaded, open the **script-wintarget1** folder, select the new **start.bat** file, and click **Open**.
11. Click **Yes** to replace.
12. Select **stop.bat** in the left pane and click the **Replace** button.
13. Navigate to the scripts that were downloaded, open the **script-wintarget1** folder, select the new **stop.bat** file, and click **Open**.
14. Click **Yes** to replace.
15. Click **Add** button.
16. Navigate to the scripts that were downloaded, open the **script-wintarget1** folder, select the **Control-Wintarget.ps1** file, and

-
- click **Open**.
 17. Click **OK** to add.
 18. Click the **Tuning** button.
 19. Enter 0 for **Normal Return Value** for the **start** and **stop** sections. Click **OK**.
 20. Click **Finish**.

7.2 Add the Second Set of Scripts

1. Right-click on the **%failover group%**, and then click **Add Resource**.
2. From the **Type** drop down menu, select **script resource**. As the resource **Name**, enter **script-wintarget2**. Click **Next**.
3. Uncheck the **Follow the default dependency** box.
4. Select the **%mirror disk%** resource in the right pane and click **Add**. Click **Next**.
5. Verify the default options are correct, and then click **Next**.
6. Select **start.bat** in the left pane and click the **Replace** button.
7. Navigate to the scripts that were downloaded, open the **script-wintarget2** folder, select the new **start.bat** file, and click **Open**.
8. Click **Yes** to replace.
9. Select **stop.bat** in the left pane and click the **Replace** button.
10. Navigate to the scripts that were downloaded, open the **script-wintarget2** folder, select the new **stop.bat** file, and click **Open**.
11. Click **Yes** to replace.
12. Click **Add** button.
13. Navigate to the scripts that were downloaded, open the **script-wintarget2** folder, select the **Control-Wintarget.ps1** file, and click **Open**.
14. Click **OK** to add.
15. Click the **Tuning** button.
16. Enter 0 for **Normal Return Value** for the **start** and **stop** sections. Click **OK**.
17. Click **Finish**.

7.3 Change Dependency of Resources

1. Click on the **%failover_group%** in the left pane.
2. Select the **Resources** tab in the right pane.

-
3. Right-click on the **%mirror_disk%** resource and select **Properties**. Select the **Dependency** tab and uncheck **Follow the default dependency**. Select **script-wintarget1** in the right pane, and click **Add**. Click **OK**.
 4. Right-click on the **%fip%** resource and select **Properties**. Select the **Dependency** tab and uncheck **Follow the default dependency**. Select **script-wintarget2** in the right pane, and click **Add**. Click **OK**.
 5. Click the **Entire Dependency** tab in the right pane and check the dependencies.

Depth	Name	Resource Type
0	script-wintarget1	1 st script resource
1	md	Mirror disk resource
2	script-wintarget2	2 nd script resource
3	fip	Floating IP resource
4	vcom	Virtual computer name resource

7.4 Upload the Cluster Configuration

1. In the **Cluster Manager** window, click the File menu, and then **Apply the Configuration File**. Click **OK** on confirmation message popup. If the upload ends successfully, click **OK**.
2. After the upload is complete, change to the **Operation Mode**.
3. Right-click on the **%failover_group%** and select **Start**. Select the **Primary Server** to start the group on and click **OK**.

8 iSCSI Initiator Setup

This chapter shows iSCSI Initiator setup example with Windows OS (ex. Windows Server 2012 R2, Windows 7).

1. Logon the client machine.
2. Open Control Panel.
3. Click **iSCSI Initiator**.
4. Enter the floating IP address (ex. 10.0.0.4) for **Target** on Targets tab and click **Quick Connect**.
5. Check if the iSCSI Target IQN shows on **Discovered targets** and **Status** is **Connected**.
6. Open Disk Management (diskmgmt.msc) and initialize disk.
7. Format disk and check if it is available to create folders and files.

Note:

This iSCSI Target clustering method is **NOT** suitable as a shared disk for Windows Server Failover Cluster (WSFC). Because it is needed to recover iSCSI Initiator connection manually on WSFC environment after failover.

Note:

When Linux iSCSI Initiator is used, it is recommended to increase the disk timeout. If it takes longer than disk timeout to complete failover/failback, the device that provided by iSCSI Target will be remounted with read-only mode and it is needed to dismount and mount the device manually to clear read-only mode.

9 Appendix

9.1 Test Cluster and Verify Functionality

9.1.1 Move the Failover Group

1. Using **Cluster Manager**, move the **%failover_group%** from the **Primary Server** to the **Secondary Server**. Verify that the iSCSI Initiator on the client maintains its connection to the iSCSI Target, which is now on the **Secondary Server**, and that the iSCSI virtual disk can be accessed by the client.
2. Move the **%failover_group%** back to the **Primary Server**. Verify that the iSCSI Initiator on the client maintains its connection to the iSCSI Target, which is now back on the **Primary Server**, and that the iSCSI virtual disk can be accessed by the client.

9.1.2 Failover on Server Shutdown

1. Shutdown the **Primary Server** manually or through **Cluster Manager**. This will initiate an automatic failover to the **Secondary Server**. The iSCSI Initiator on the client should maintain its connection to the iSCSI Target which is now on the **Secondary Server**. The iSCSI virtual disk should still be accessible by the client.
2. Return the **Primary Server** to the cluster by turning its power back on. Move the **%failover_group%** back to the **Primary Server**.

9.2 Example System Planning Worksheet

Machine #1: Primary Server

Machine #2: Secondary Server

Machine #3: Test Client Machine

Table 1: System Network Configuration

Machine	Hostname	Network	IP Address	DNS	MDC
#1	Primary	NIC #1	10.0.0.2	10.0.0.1	Do Not Use
		NIC #2	192.168.1.2	-----	mdc1
#2	Secondary	NIC #1	10.0.0.3	10.0.0.1	Do Not Use
		NIC #2	192.168.1.3	-----	mdc1
#3	Test-Client	NIC #1	10.0.0.101	10.0.0.1	N/A

Floating IP (FIP) Address : 10.0.0.4
Virtual Computer Name (vcom) : vcom
iSCSI Target Name : Target1

Table 2: System OS and Disk Configuration

Machine	OS	Disk 0 (OS)	Disk 1 (Data)
#1	Windows Server 2012 R2	Boot Partition: Drive Letter: C Size: 250GB	Cluster Partition: Drive Letter: W Size (> 17 MB): 24MB
#2	Windows Server 2012 R2	Boot Partition: Drive Letter: C Size: 250GB	Data Partition: Drive Letter: X Size: 50GB
#3	Windows 7	C: 150GB	N/A

Table 3: System Logins and Passwords

Machine	Login	Password
#1	Administrator	Admin1234
#2	Administrator	Admin1234
#3	User1	User1234