Intel® RAID High Available Solution

Best Practices White Paper

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Enterprise Platforms and Services Division - Marketing

Revision History

Date	Revision Number	Modifications
October, 2013	1.0	Initial release.

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1. Introduction

1.1   Background

The Intel RAID High Availability (HA) Solution is designed for small-to-medium businesses, remote/branch offices or private cloud environments that need a high availability configuration of a server with local storage. This configuration of the Intel RAID HA solution provides two servers, two hardware RAID controllers and shared local storage with SAS disk drives. This solution takes advantage of Microsoft Windows Failover clustering technology to provide the high availability environment in a two-node cluster and takes advantage of the SAS interface to allow sharing of storage. The overall design goal is to provide the high availability solution with a simple installation and ease-of-use experience for the user or value-added-reseller.

1.2   Requirements and Configuration Diagram

The Intel RAID HA solution requires the following:

- Two Intel servers (R2312 or equivalent)
- Two Intel hardware RAID Controllers (RS25SB008) plus the enablement key for each controller (AXXRPFKHA2)
- The AXXRPFKHA2 enablement key kit which contains 2 keys, 1 key for each controller
- External JBOD (JBOD2224S2DP)
- Supported SAS disk drives that are SCSI3-PR Compliant (SATA drives are not supported, see the Tested Hardware and OS List for the RAID controller on support.Intel.com.)
- SAS cables connecting the servers to the JBOD storage unit
- Microsoft Windows Server 2012 or Microsoft Windows Server 2008 R2 with Failover Cluster Server support
- Support for a private network connection between the two servers
- Support for a public network connection for each server
- Active directory support for the two servers
- A DNS server located on the public network

This solution fits into a typical infrastructure and includes "server node 1," "server node 2" and the "External JBOD SAS Drive Enclosure" as indicated in the diagram below. As with any server cluster solution, there needs to be a private LAN dedicated to cluster server communications in addition to the public LAN that communicates with client systems. The public network must provide Domain and Active Directory services, as well as DNS services to the failover cluster server.
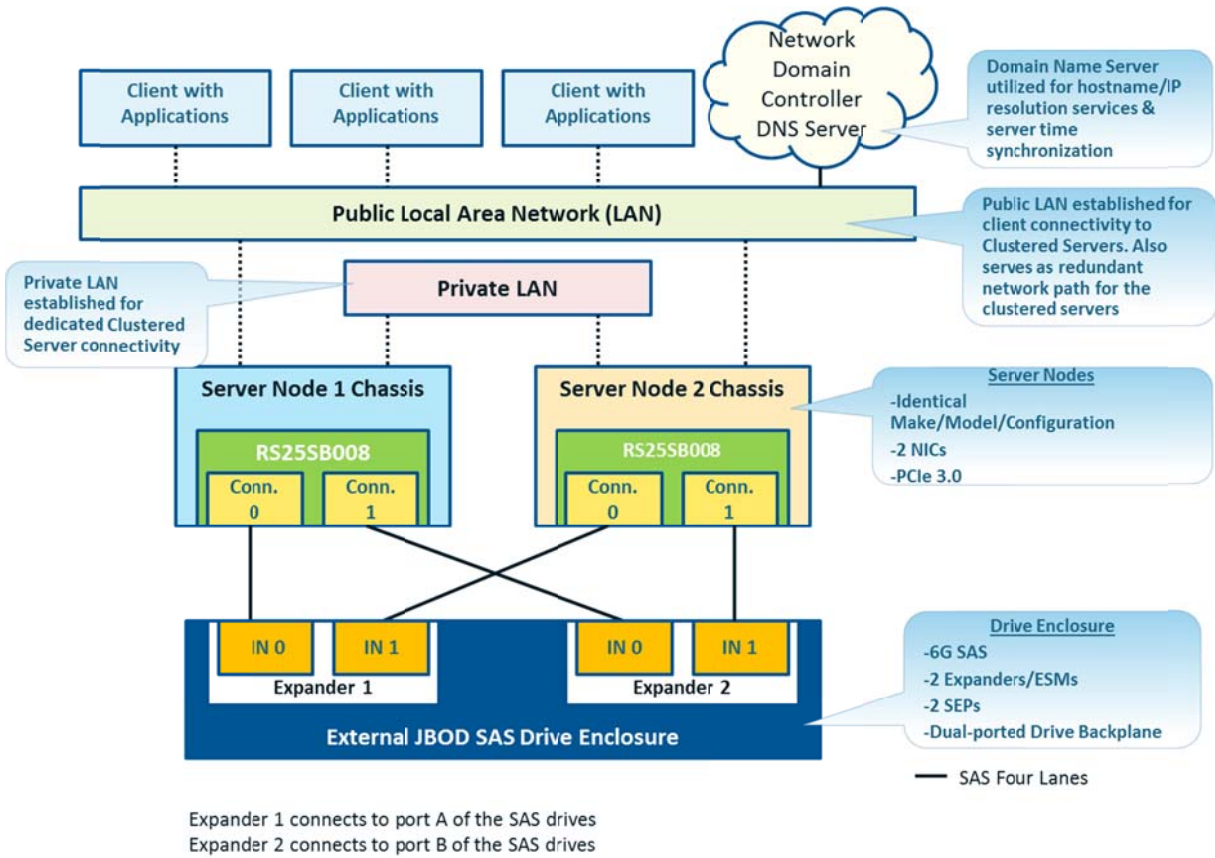
Figure 1. Two Server and JBOD Configuration Diagram

2. Installation

The installation process is detailed below. Some of these steps are performed using the server BIOS/UEFI utilities before the operating system is installed and some are performed after the operating system is installed and use operating system tools.

Important note: Because a server cluster will be created, some of the steps require updates to be applied to one server, and then to the second server before proceeding to the following step.

2.1 Download Release Package

Use RAID FW, driver, RWC2, CLI and SMI-S in IR3_2208_HA-DAS_release_package_1.0 drop or later version. The latest version is available on the Intel Support Website at: www.intel.com/support (Search "High Availability Software").

A USB flash drive is needed to store the images from the release package, and will be used to install them via the server BIOS/UEFI setup tools.

The release package is a single, zipped file. This file must be unzipped. Inside this package is a PDF document and five zipped files. Each of these five zipped files must be unzipped. The resulting five file folders and their contents are required to be copied to the USB flash drive.

2.2 Install Release Package

To install the package updates, enter the BIOS Boot Manager and then the EFI Shell on server node 1.

Tip: Do not plug the USB flash drive with the updates into the server until after you are in the BIOS setup.
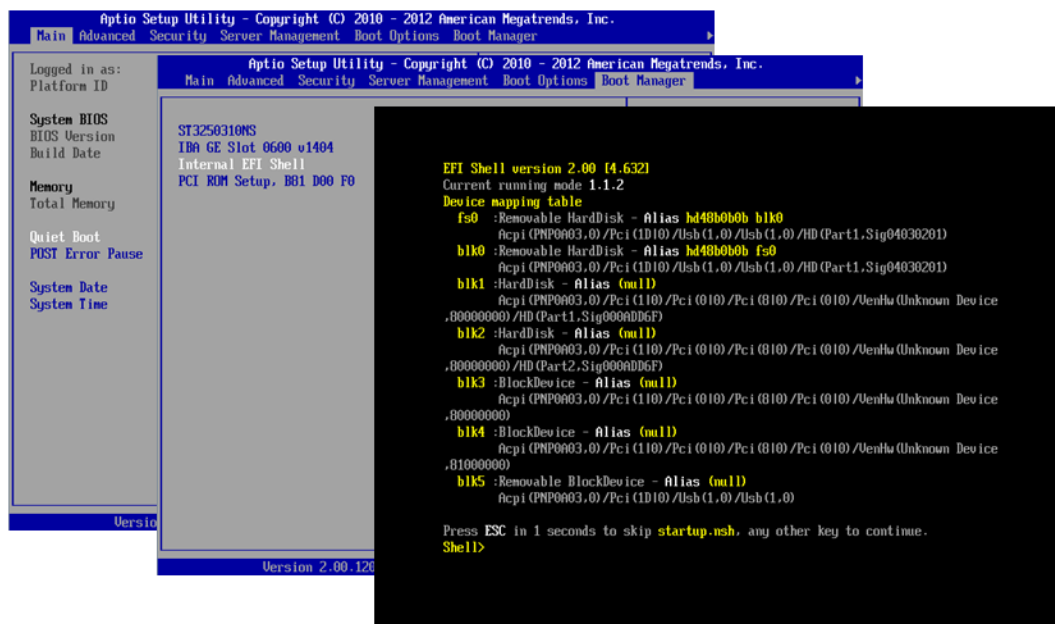

Figure 2. Enter the BIOS Boot Manager and EFI Shell

Using the EFI Shell, navigate (using the "cd" command) to the folder named:
ir3_2208-HADAS_FWPKG-v23.6.0-0086

Figure 3. Install the Release Package

Run the shell script named: UPDATE.NSH

Once the package completes its download restart the server and repeat for the second server.

2.3   Install and Update the HA RAID Controllers

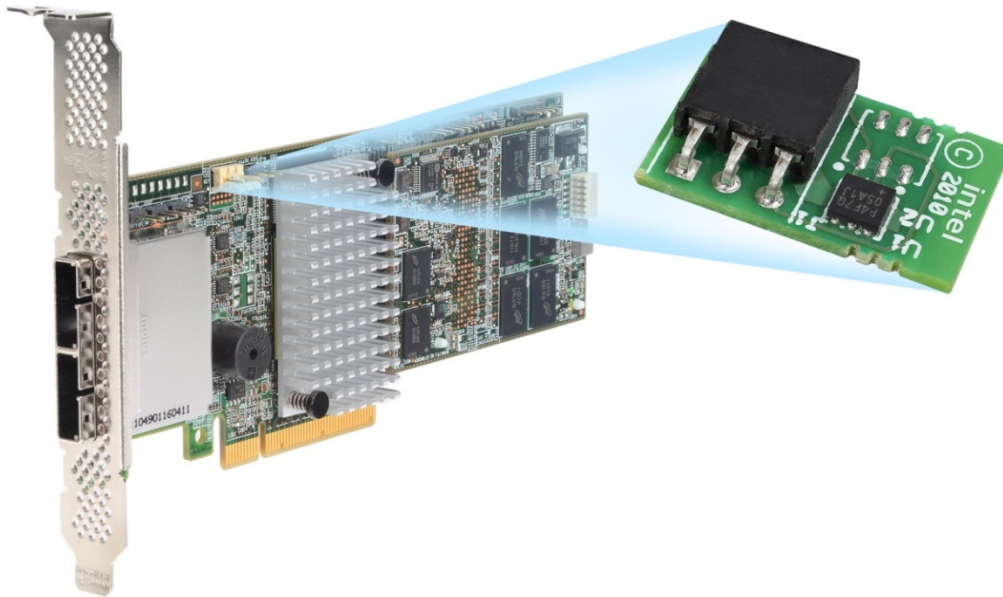To install the RAID controller HA key, shut down the server, remove the power cords, open the lid and install the HA key onto the RAID controller.

Figure 4. Install the RAID Controller HA Key

Repeat this process for both servers.

After each HA key has been installed on each of the RAID controllers in each of the servers, close the lid on the servers. Remove the USB flash drive containing the drivers.

Install the SAS disk drives into the JBOD storage unit and then power on the JBOD storage unit.

Note: SATA disk drives are not supported with this solution. Supported SAS disk drives are dual-ported and are required for the HA RAID solution.

Connect the SAS cables between the servers and the external JBOD storage unit, as exactly as shown in the Figure 1. Two Server and JBOD Configuration Diagram.

Verify that a private LAN exists between the two servers. This private LAN connection will be used for the cluster "heart beat" and related cluster server communications.

The public LAN must have a Windows Domain Controller and DNS server. The HA RAID cluster nodes should not be a domain controller nor or DNS server.

After connecting the SAS cables, reconnect the power cords into the servers and power on the servers.

2.4   Operating System Installation

The operating system can be installed to drives connected to the raid controller, or to drives connected to the on server board ports.

Example #1: Install two hard disk drives or SSDs (SSDs are an excellent choice due to the faster boot that they provide) with at least 200Gb capacity and connect them to the on server board SAS or SATA ports; and configure them as a mirror using either RSTe or ESRT2 server board raid options. For additional information consult the documentation for the server system chosen for use.

Example #2: Configure a virtual drive using drives connected the RS25SB008 RAID Controller, however, there must be enough capacity in the remaining drives connected to the raid controller to configure a Quorum drive and volumes for shared failover. For additional information, see the RAID controller hardware guide.

Install Windows Server from the DVD or using typical methods. After the installation of Windows Server has begun, install the USB flash drive with the drivers into a USB port on the server, as the installation process will require drivers contained on that USB flash drive.

The Windows installation will pause because it will be unable to find the storage until the drivers are loaded. Using the USB flash drive containing the drivers, navigate to the appropriate folder containing the drivers for the HA RAID controller.
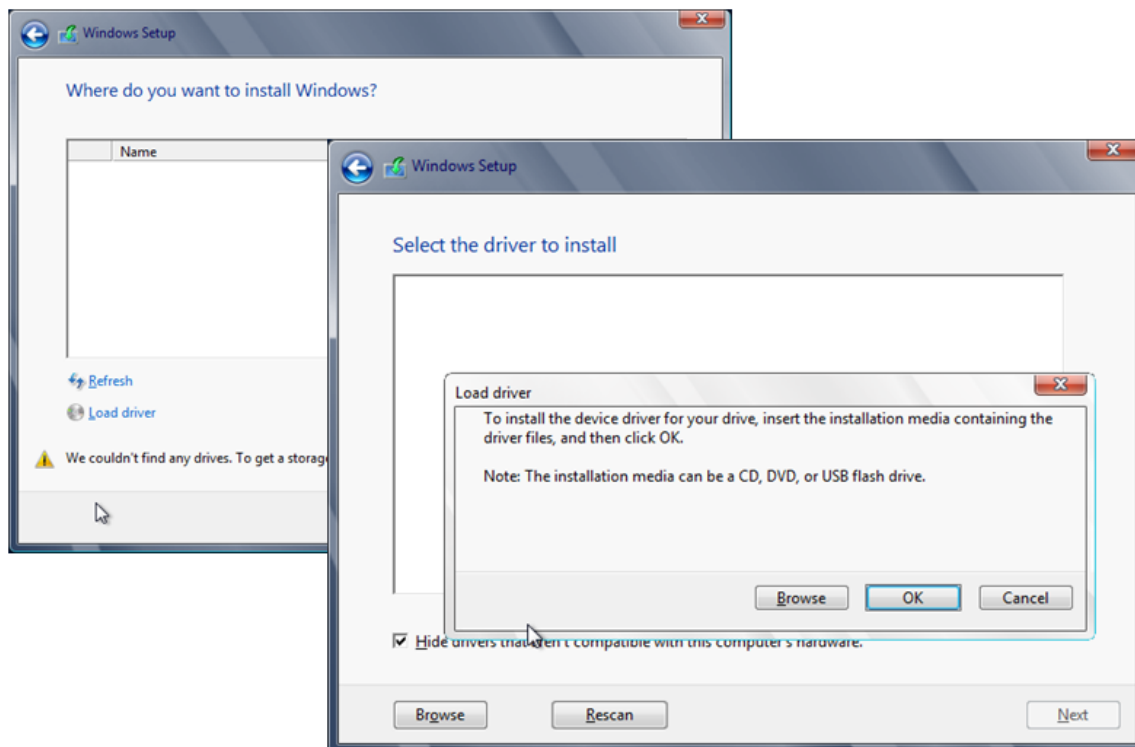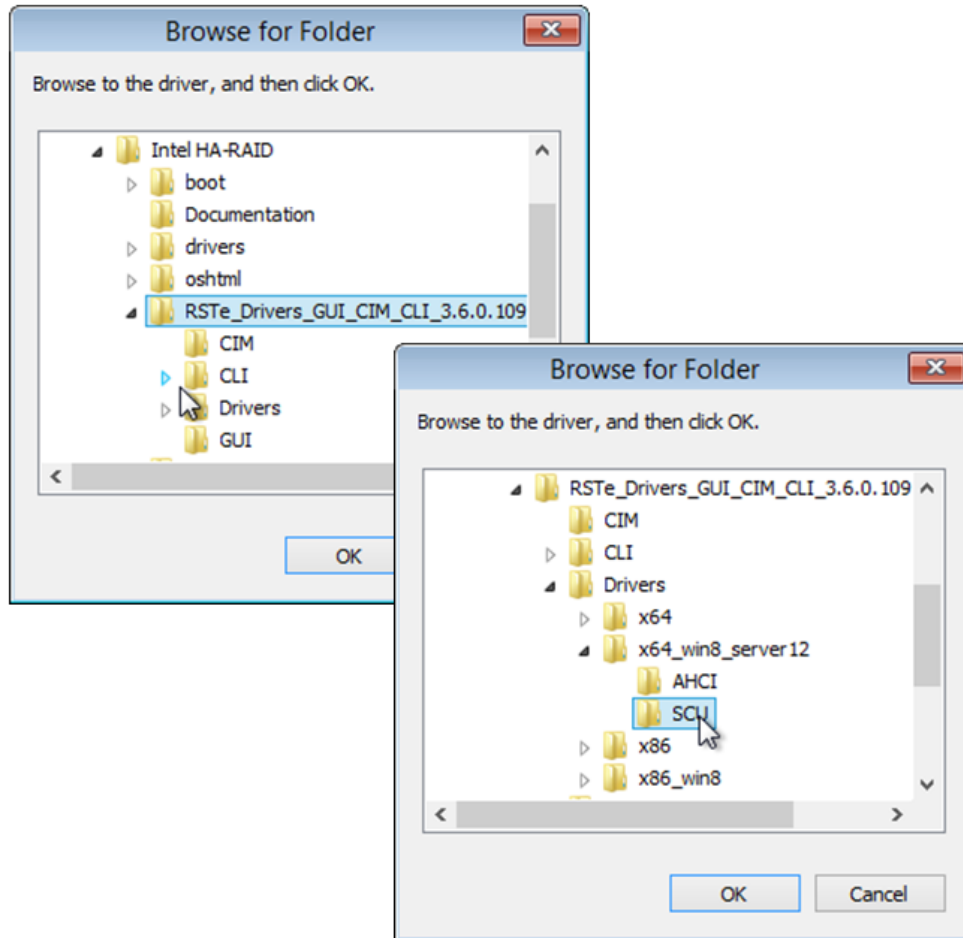

Figure 5. Load Driver

Figure 6. Browse to the Driver

After the drivers have been installed, the Windows installation will see the storage in the JBOD unit. A drive can be selected for the operating system, and the installation will proceed as normal.

This process is repeated on the second server.

After Windows Server has been installed on each server, the "Windows Standards-Based Storage Management" (SMI-S) feature needs to be installed.
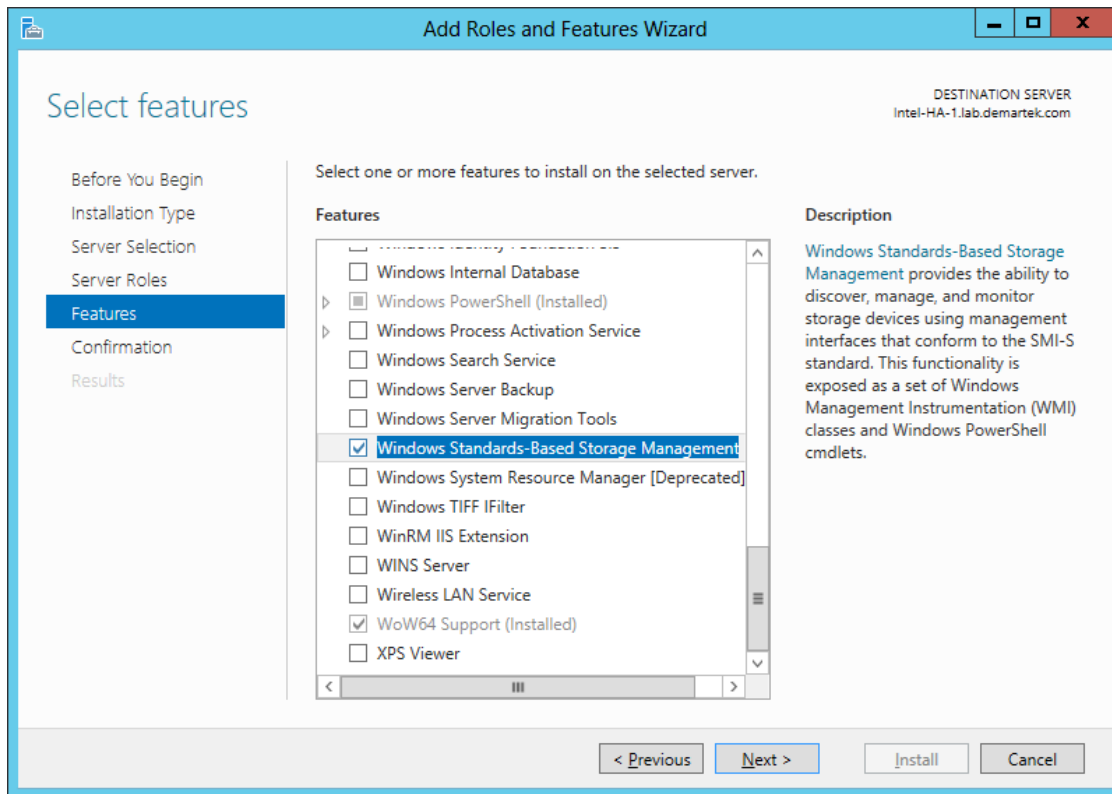

Figure 7. Install the SMI-S Feature

2.5   IP Addresses

IP addresses need to be configured for the NICs in each server. Static IP addresses are recommended for the public LAN. Static IP addresses are required for the private LAN used for cluster communication.

2.6   Failover Clustering Feature

After the static IP addresses have been configured on both servers, the failover clustering feature can be enabled.
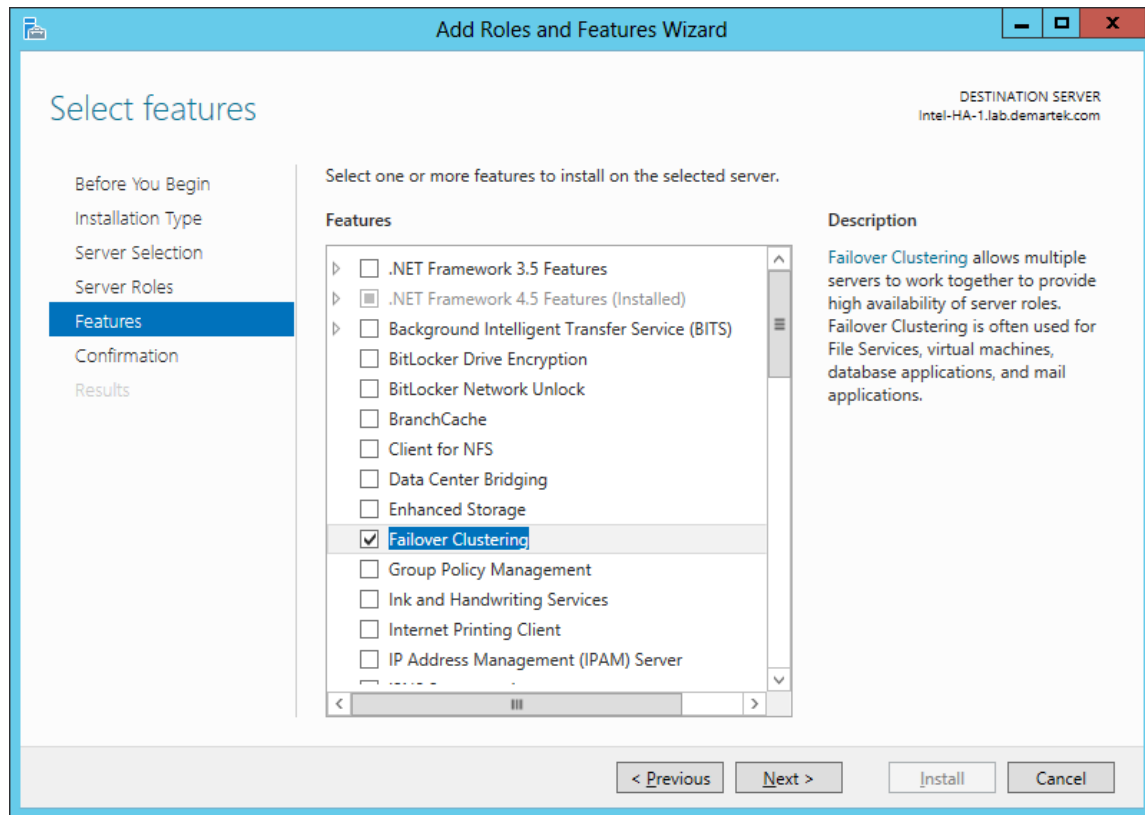
Figure 8. Enable the Failover Clustering Feature

At this point, verify that the RS25SB008 drivers are up to date. These drivers are located on the USB flash drive containing the drivers.

2.7   RAID Web Console 2

RAID Web Console 2 provides a way to manage the RAID volumes on the JBOD storage unit, including the creation of virtual drives (VD), RAID group configuration, and other related storage functions. It can be used to create one quorum disk and at least one volume that will be shared between the server cluster nodes. Additional volumes may be created as needed.

Install the "RAID Web Console 2" (RWC2) onto each server. This is found in this location on the USB flash drive containing the drivers.

ir3_Windows_RWC2v13.04.03.0

A shortcut will be installed on the desktop at the completion of the installation. Administrator privileges are equivalent are required for the login used to access RWC2.

The dashboard view from the RAID Web Console is shown below.

Figure 9. Intel® RAID Web Console 2

2.8   Registry Change to Enable Clustered RAID

A registry change is required to enable support for Clustered Windows Servers using clustered RAID controllers. Edit the registry as described in the Microsoft Knowledge Base article: http://support.microsoft.com/kb/2839292.

To add the key to the registry, follow these steps:

1. Open **Registry editor** (regedit.exe).

2. Locate and then **select** the following registry subkey:

   HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\ClusDIsk\Parameters

3. Right-click on the **Parameters** key and then choose **New**.

4. Select **DWORD** and give it a name of **AllowBusTypeRAID**.

5. Once the key is created, give it a value of **0x01**.

6. Click on **OK**.

7. Exit the Registry editor.

8. Restart the computer (see note below).

This registry change is required on both of the servers.

Important note: For best results, the restart of the servers after applying the registry change should occur at the same time, to allow the servers to communicate with the JBOD simultaneously upon re-boot.

2.9   Failover Cluster Manager

After the reboot of both server nodes, start the Failover Cluster Manager on one of the server nodes. The first step is to validate the cluster configuration. The two nodes of the cluster need to be identified, and can be provided by entering their names directly or searching for them on the network.
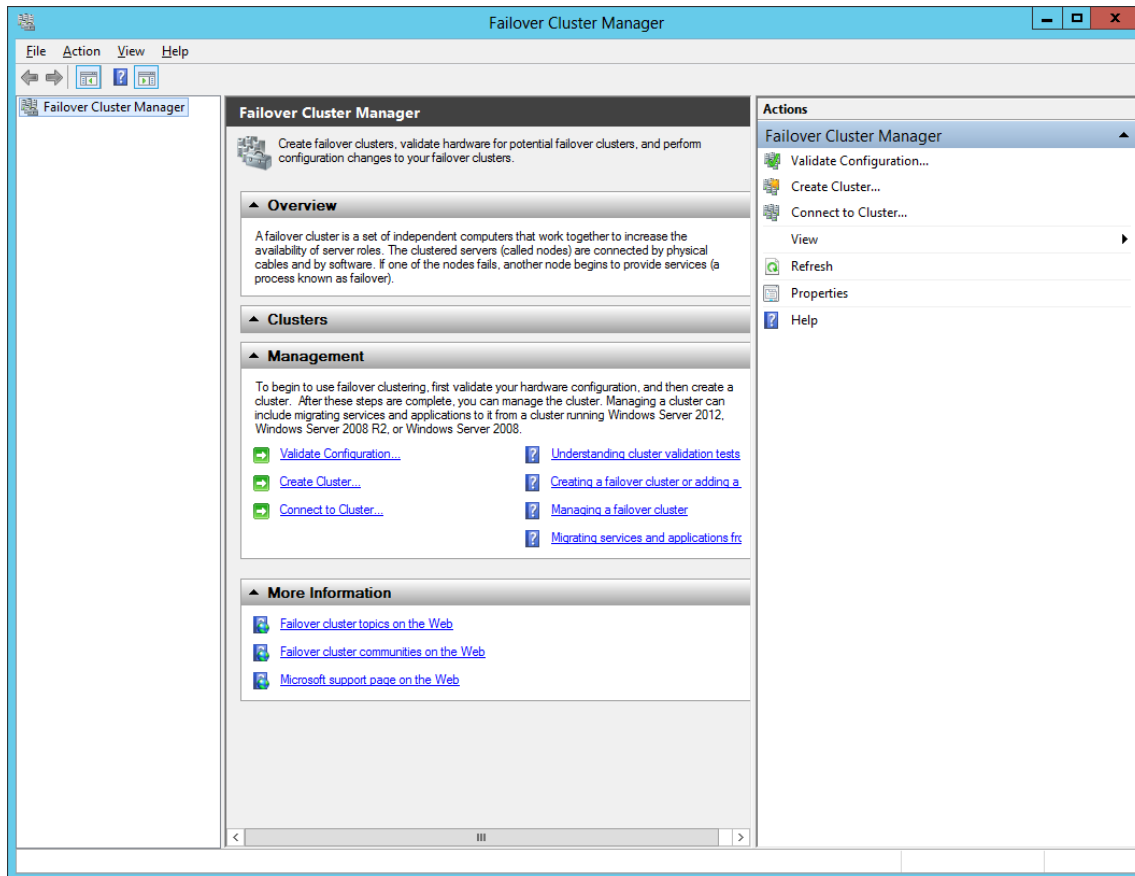

Figure 10. Failover Cluster Manager

First, the Validate Configuration wizard steps through the process of identifying the nodes that are participating in the cluster. After identifying the two nodes, a summary will be provided.
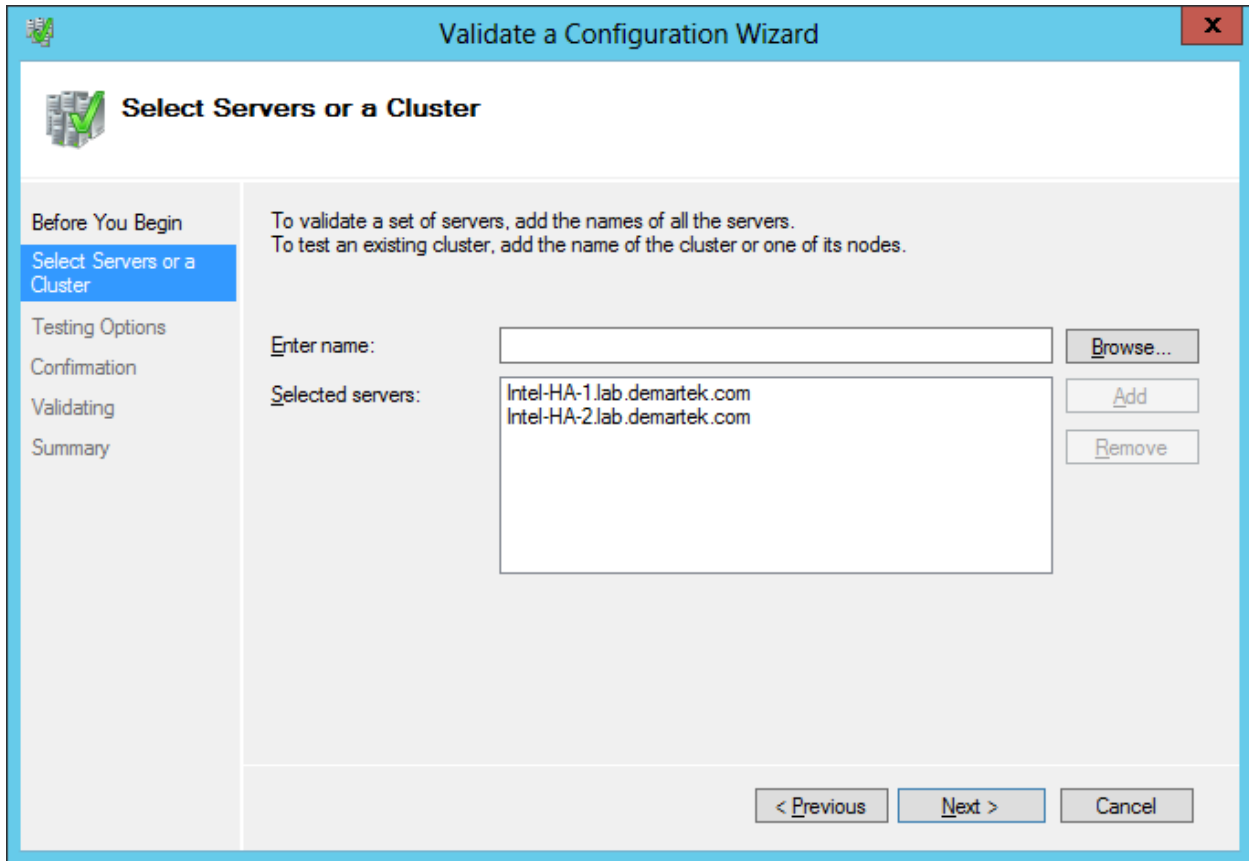

Figure 11. Validate a Configuration Wizard – Select Servers or a Cluster

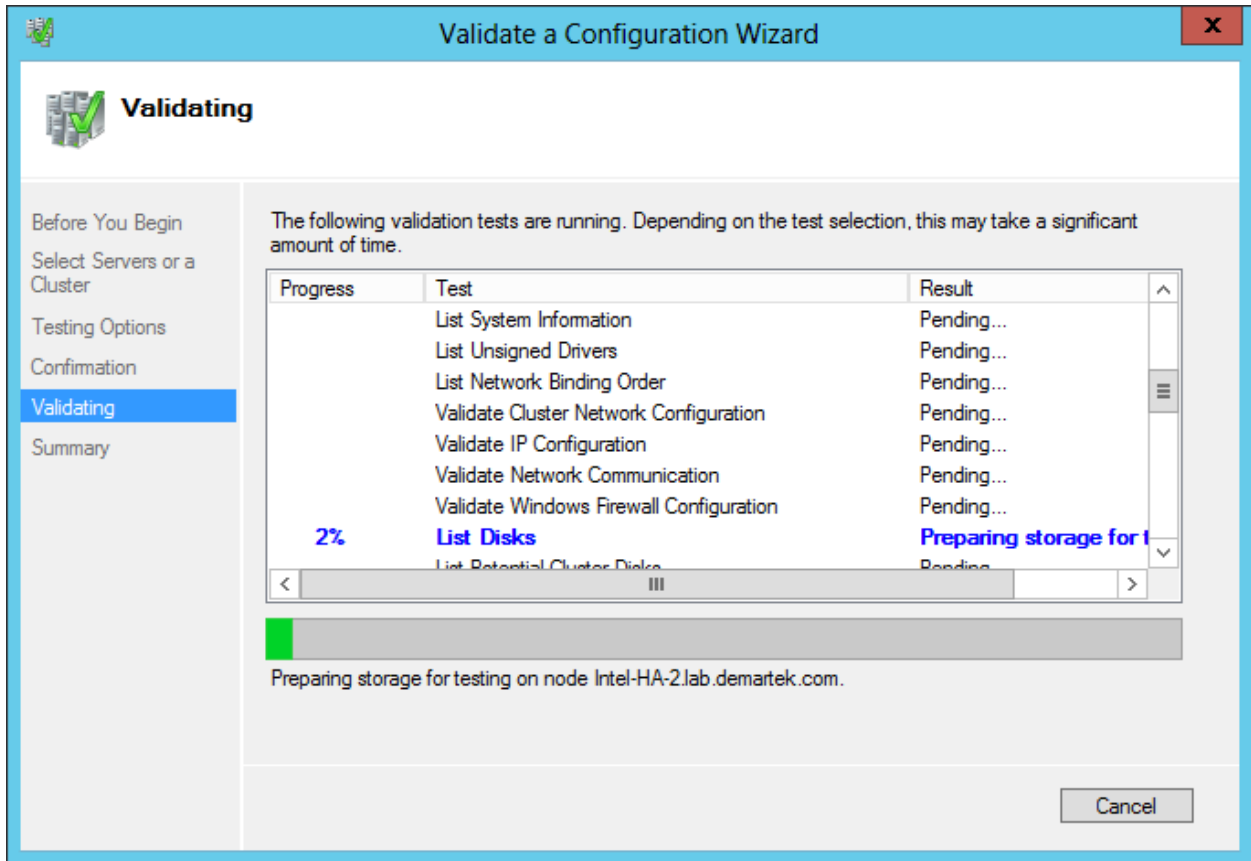After the nodes have been identified, the disks (volumes) that will participate in the cluster are tested.

Figure 12. Validate a Configuration Wizard – Validating

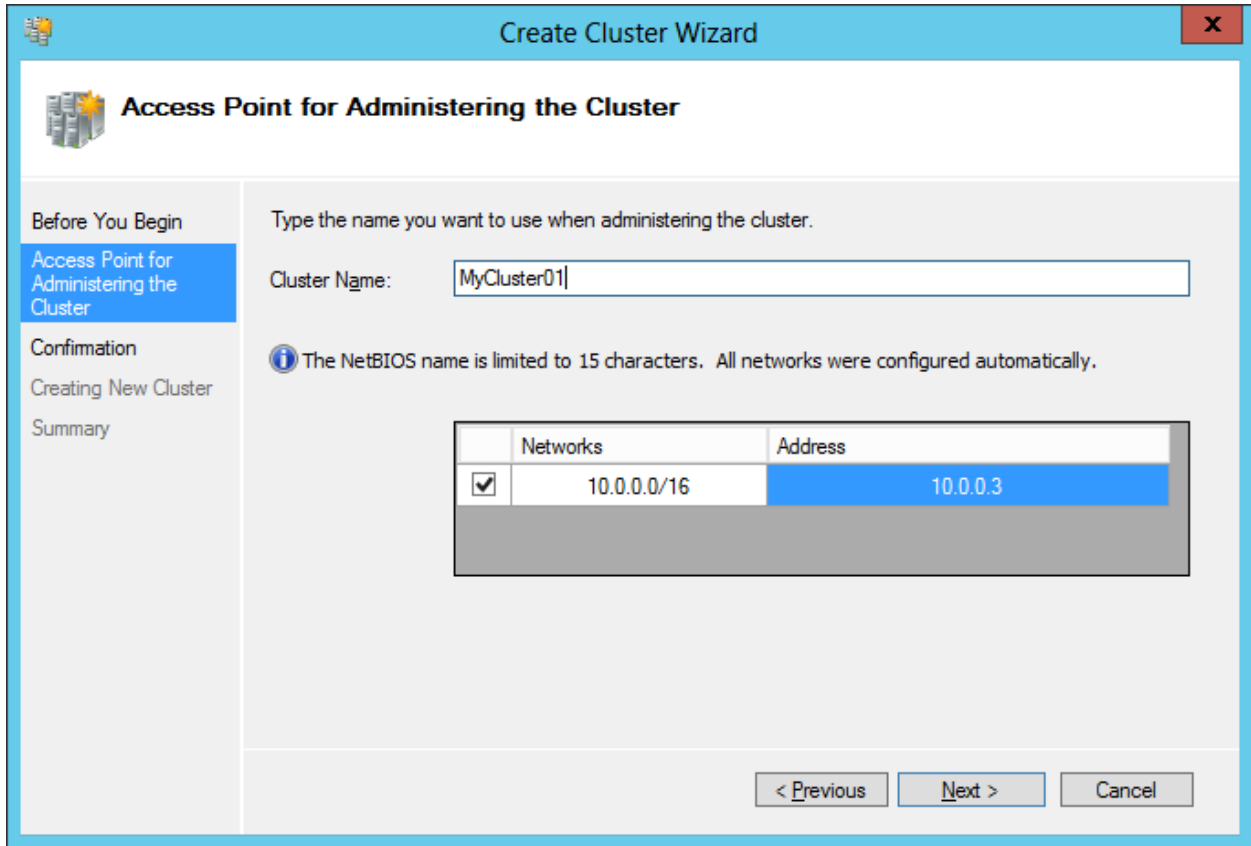After the disks have been tested, the wizard requests a name for the cluster.

Figure 13. Create Cluster Wizard – Access Point for Administering the Cluster

After the cluster name has been provided and the network addresses identified, the wizard provides a summary.

Important note: In this example, the option to "add all eligible storage to the cluster" has been cleared (see image below), so that only specific volumes will be allocated to the cluster. This option is normally checked by default.
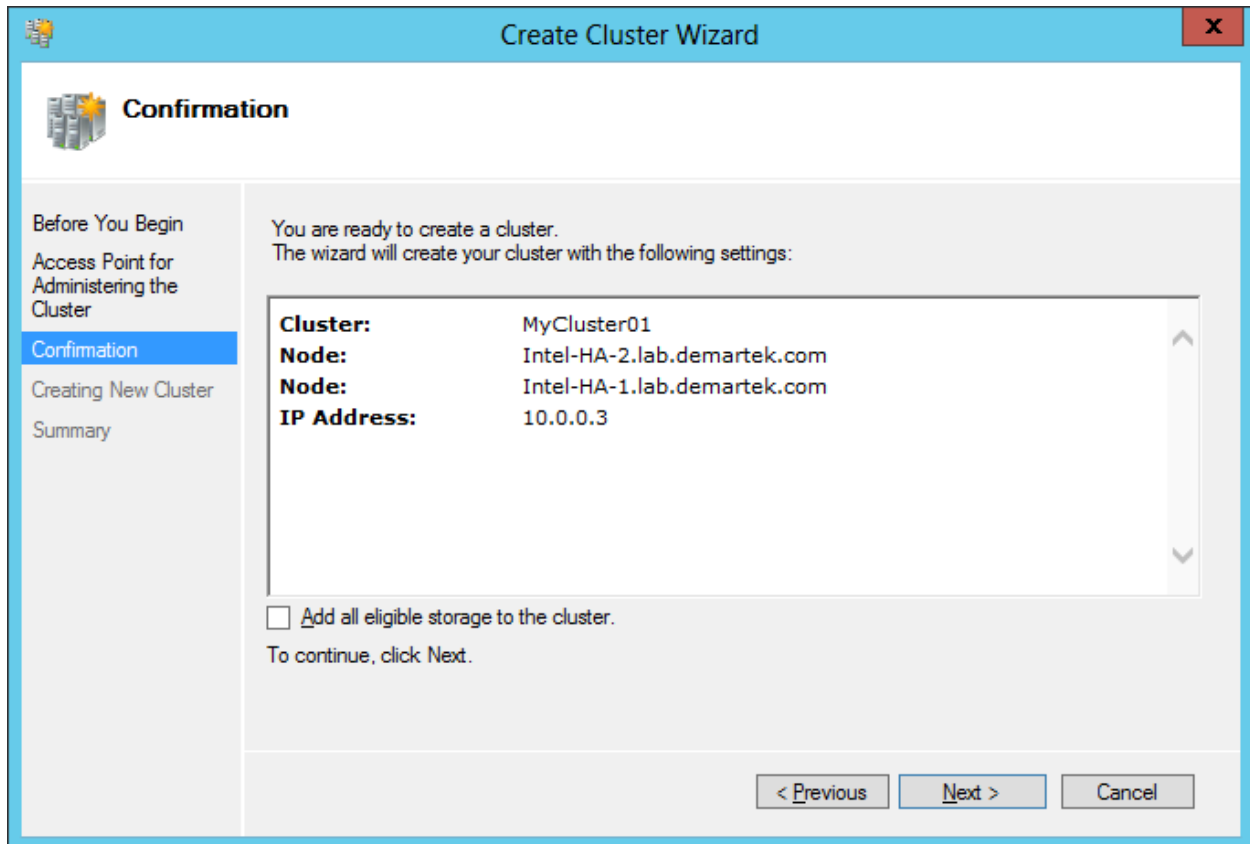

Figure 14. Create Cluster Wizard – Confirmation

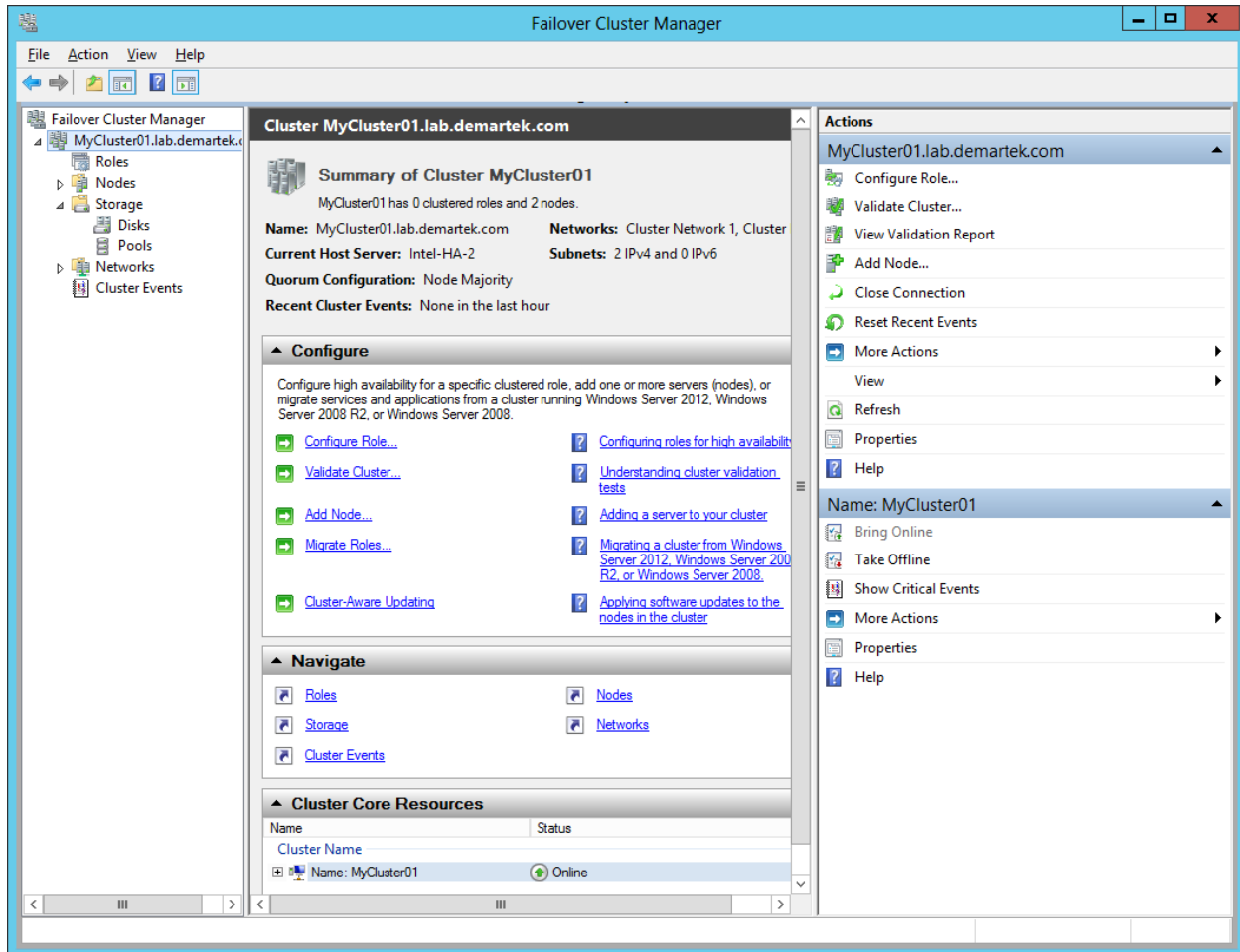The wizard completes the creation of the cluster, with the exception of assigning disks to the cluster.

Figure 15. Creation of Cluster Completed

The process to assign disks to the cluster is initiated by selecting "Disks" on the left panel, then "Add Disk." The available disks are presented and then displayed. In this example, we selected only two of the disks.
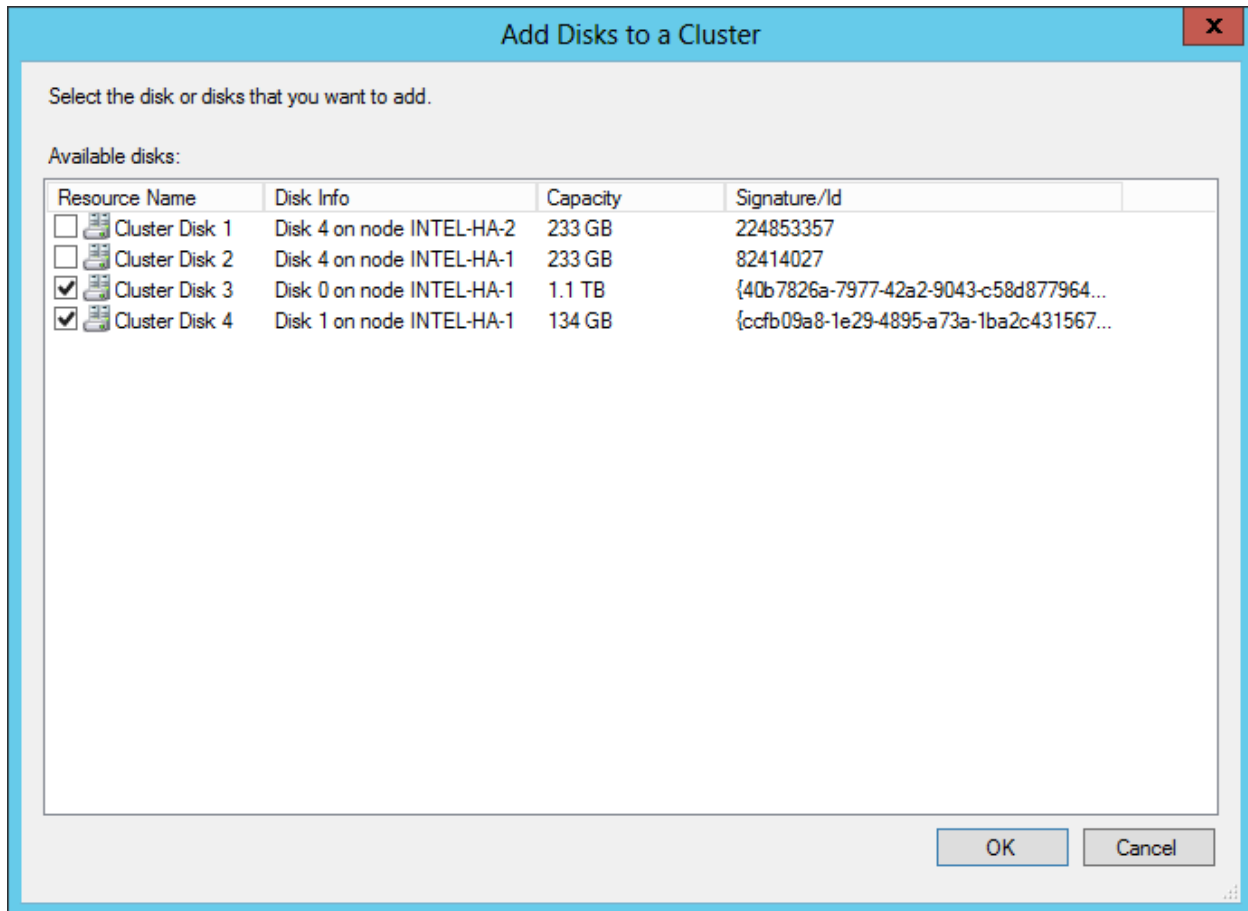
Figure 16. Add Disks to a Cluster

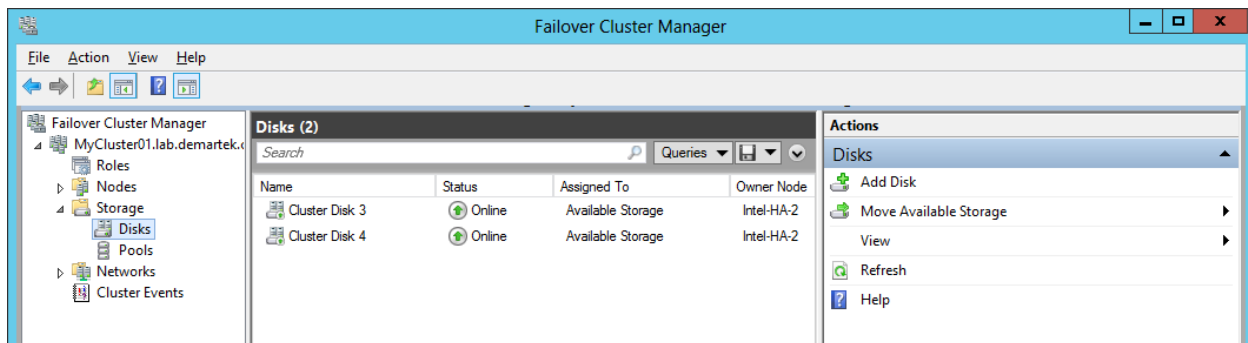When complete, the cluster disks are available to the cluster.

Figure 17. Cluster Disks Added

In the Cluster Manager, select the cluster "MyCluster01" on the left panel, then select "More Actions" in the right panel and select "Configure Cluster Quorum Settings." The wizard will step through the process of configuring the quorum witness. The smaller capacity disk in this example will be used for the cluster quorum disk witness.

Because this is the installation of the cluster, the quorum disk must be added, using the following selections:

- ▪ "Add or change the quorum witness"
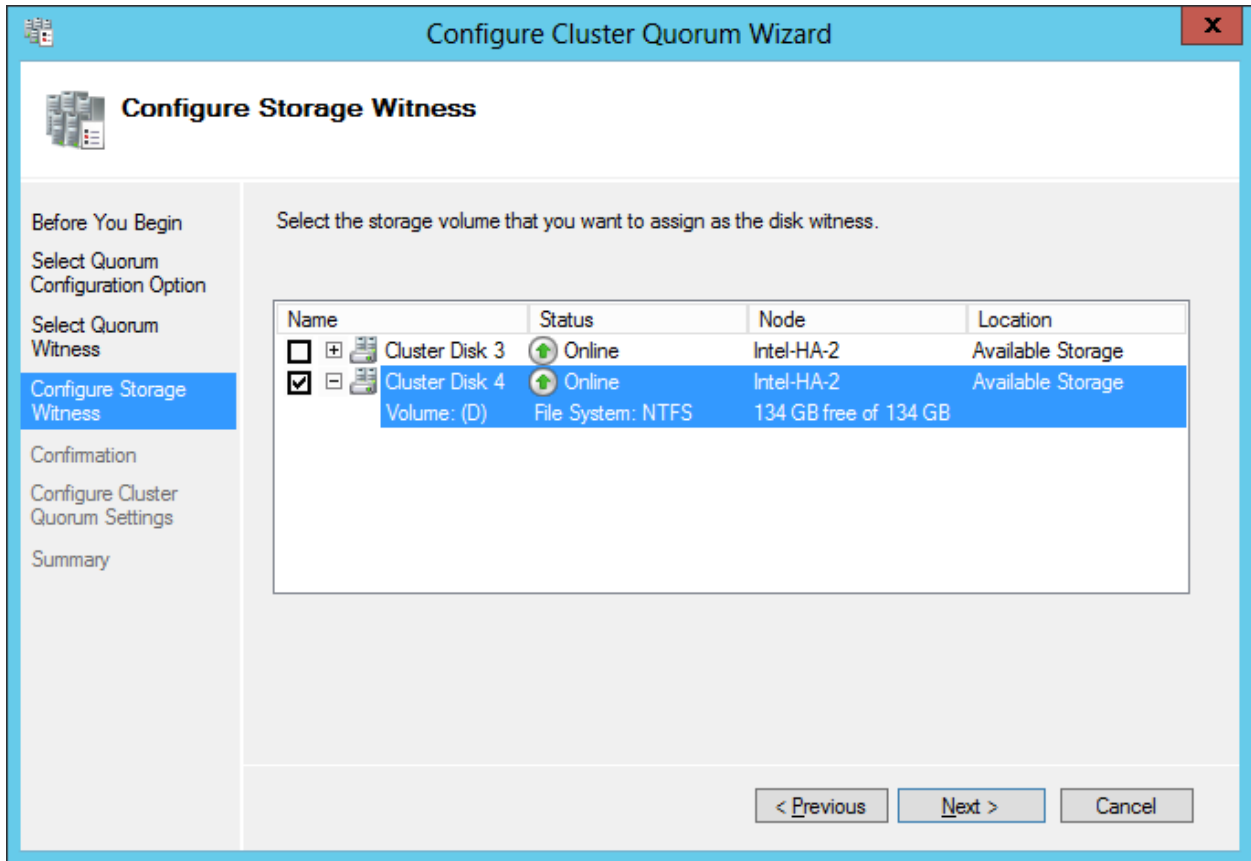- ▪ Followed by "Configure a disk witness"

Figure 18. Configure Cluster Quorum

When completed, the quorum disk witness is shown in the cluster storage.
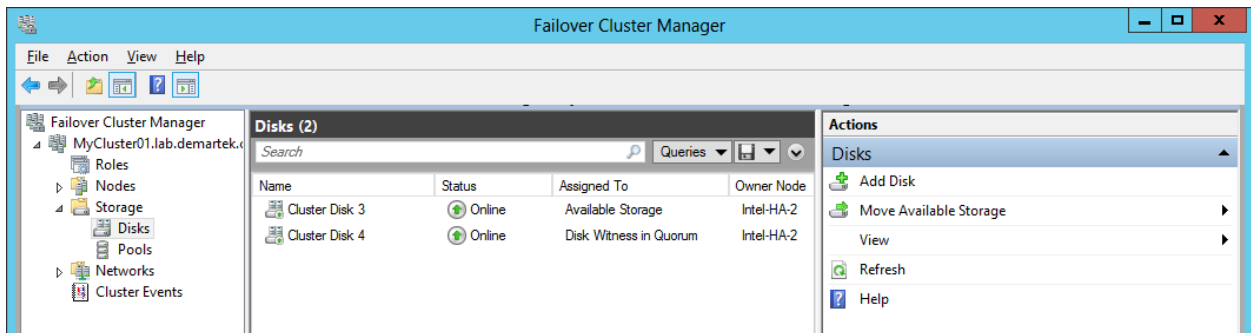

Figure 19. Quorum Disk Witness Shown

The final step is to bring the clustered shared volume online to both nodes of the cluster, by selecting the disk and selecting "Add to Cluster Shared Volumes" on the right panel or by right-clicking on the mouse.
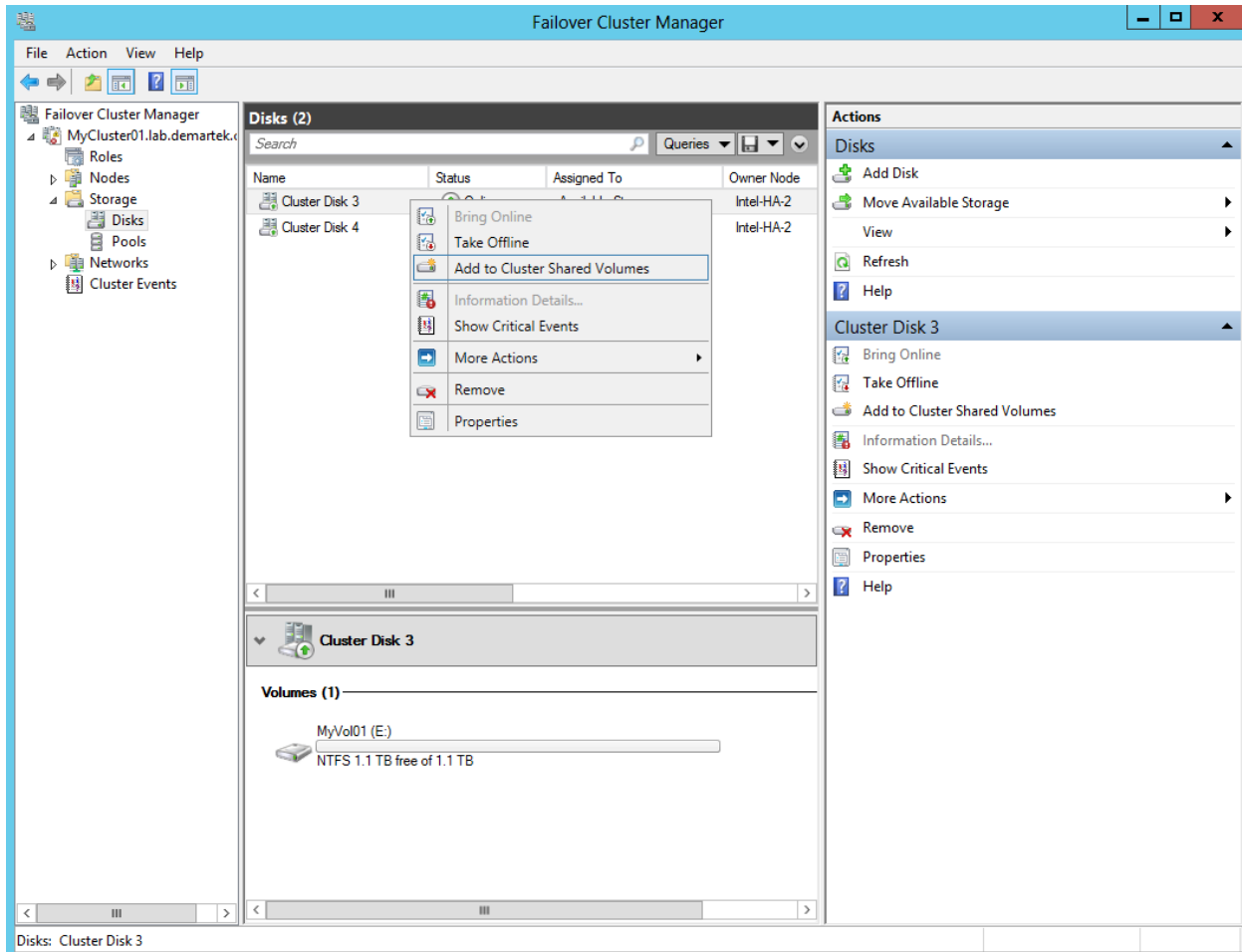

Figure 20. Add to Cluster Shared Volumes

The disks in the cluster should be changed from read-only to read-write in the disk management.

The cluster is now operational.

For additional information regarding Intel® RAID High Availability and Intel® RAID, visit www.intel.com/go/RAID.

Reference Documents

R2312 Server*	http://ark.intel.com/products/65399
RS25SB008	http://www.intel.com/content/www/us/en/servers/raid/raid-controller-rs25sb008.html
AXXRPFKHA2	http://ark.intel.com/products/76542/Intel-RAID-Premium-Feature-Key-AXXRPFKHA2?q=Intel® RAID Premium Feature Key AXXRPFKHA2
JBOD2224S2DP	http://www.intel.com/content/www/us/en/server-systems/storage-system-jbod2224s2dp-front-image.html?wapkw=jbod2224s2dp
Intel Test Hardware and O.S. List	http://www.intel.com/support/motherboards/server/rs25ab080/sb/CS-033039.htm
Microsoft Windows Server 2012 Failover Clustering	http://technet.microsoft.com/en-us/library/hh831579.aspx
Microsoft Windows Server 2008 R2 Failover Clustering	http://technet.microsoft.com/en-us/library/ff182338(v=ws.10).aspx

*This server system is an example of a server that is compatible with this configuration; for a complete list of servers supported by this RAID controller see the RS25SB008 Tested Hardware and Operating System List above.