



# Intel® Integrated RAID Controller Clustering Guide

Users Guide, Version 0.9

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# Getting Started

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# 1

## Intended Audience

This documentation is intended for users who are experienced in configuring computer systems with new add-in cards or have had previous experience with Intel® Integrated RAID (IIR) controllers.

Read and adhere to all warnings, cautions, and notices in this guide and the other documents in the user documentation set supplied with this product.

## 1.1 Using the User Documentation Set

User documentation for this product is provided in four separate documents:

### Installation Quick Start Poster

The *Installation Quick Start Poster*, or *Quick Start Poster*, provides a high level view of installing and configuring an IIR Controller. Refer to the accompanying *Software Guide* for more detailed information.

### Hardware Installation and User's Guide

The *Hardware Installation and User's Guide*, or *Hardware Guide*, covers instructions for installing an IIR Controller and provides a guide to its features and specifications. For a particular IIR Controller, its hardware guide documents compatible RAID adapters, supported operating systems, standard features and optional features.

### Software Installation and User's Guide

The *Software Installation and User's Guide*, or *Software Guide*, contains:

- Quick installation of the IIR Controller software on a newly created bootable host drive with commonly used operating systems.
- Detailed instructions covering more complex software installation scenarios for all supported operating systems.
- Instructions for using the RAID Software Suite, the drivers, tools and utilities of the IIR Controller.

The first part of the software guide provides an overview of RAID technology and its features. Next, the guide documents various installation procedures for an IIR Controller and the RAID Software Suite, depending on the chosen OS configuration. The software guide then includes descriptions of the utilities, Storage Console (StorCon) and Storage Console Plus (StorCon+), to facilitate the configuration of the RAID subsystem. Finally, the guide provides details of all product features supported by the software and firmware. For further information refer to the Optional Features section of the appropriate hardware guide since not all features are applicable to all IIR Controllers.



## Clustering Guide

Clustering is applicable only for those RAID controllers that support this feature. See the Hardware Guide to determine if clustering is supported.

The Intel® Integrated RAID *Controller Clustering Guide*, or *Clustering Guide*, describes how to set up clustering configurations using IIR Controllers and IIR Controller software.

Information on Operating Systems, Cluster functionality, and other system details may be found in their corresponding system manuals.

### 1.1.1 Document Formats

All documents, with the exception of the quick start poster, are provided on the CD-ROM in both PDF and HTML format:

- **HTML**—To view online HTML documents, Click Documentation from the autorun menu or open <cdromdrive>:\docs\index.htm.
- **PDF**—Portable Document Format (PDF) documents can be opened, viewed, and printed with Adobe\* Acrobat Reader\* (not provided on the CD-ROM).

## 1.2 Introduction

For a successful installation of Microsoft® Cluster Server, it is critical that the person who performs the installation has detailed knowledge and experience in Operating System Installation and Maintenance, Clustering, and Intel Disk Array Controllers.

Using RAID and Cluster Systems significantly increases data security and availability. Under no circumstances does it relieve you from a careful and daily backup on tape or a similar backup media. This is the only method to protect your valuable data against total loss (e.g., through fire or theft), accidental deletion, or any other destroying impacts.

## 1.3 Clustering Overview

In today's information technology world, High Availability Systems are gaining more and more importance. The demands on these systems are not only the continuous availability of all important data, but also efficient resource sharing of the relatively expensive components. The secret behind the popular word "Clustering" is nothing more than the intelligent combination of several computer systems with the purpose of simultaneously increasing the security and computing power of the whole system. This "Cluster" appears to the user just like one single system with extraordinary characteristics. Special Clustering software, separate from the operating system, executes the controlling and management of the Cluster and its members.

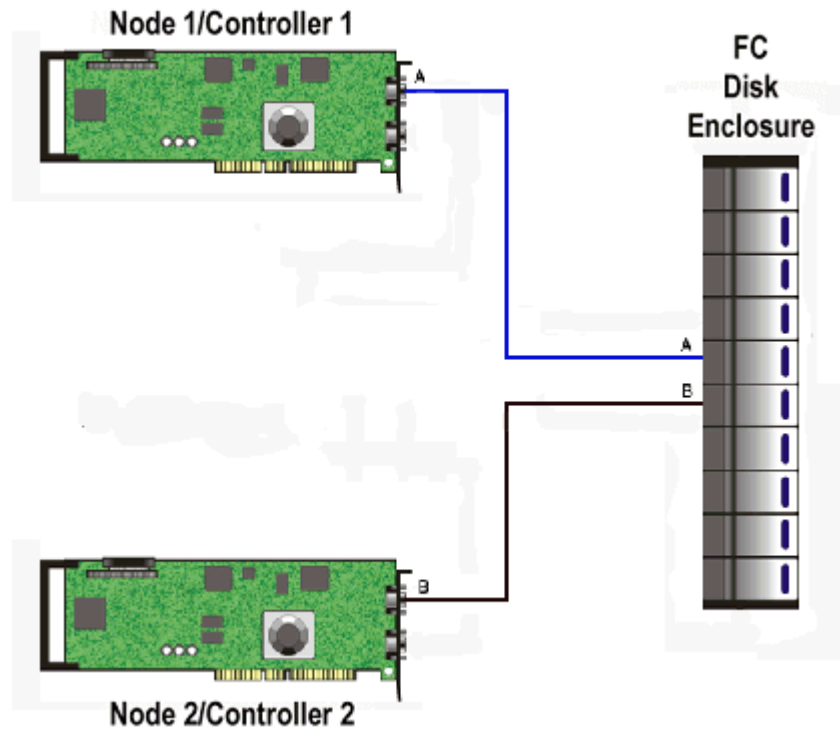
There are several strategies to designing Clustering systems. The focus of this guide is on host-based Intel RAID controllers in a **high availability** computer cluster. As a strategy to avoid “single points of failure” in such systems, the choice of host based RAID controllers for the nodes of a cluster system implements the appropriate redundancy and security in the mass storage part of the system.

## 1.4 Fibre Channel Sample Cluster Configurations

This section provides examples of two specific Fibre Channel (FC) Cluster configurations, Single Loop and Dual Loop, using FC Hubs. Your configuration may vary from the illustrations depending on your hardware. Consult the documentation for your FC Hub and FC Enclosure for specific information on setup and configuration of these hardware components.

## 1.4.1 Single-Loop Nodes

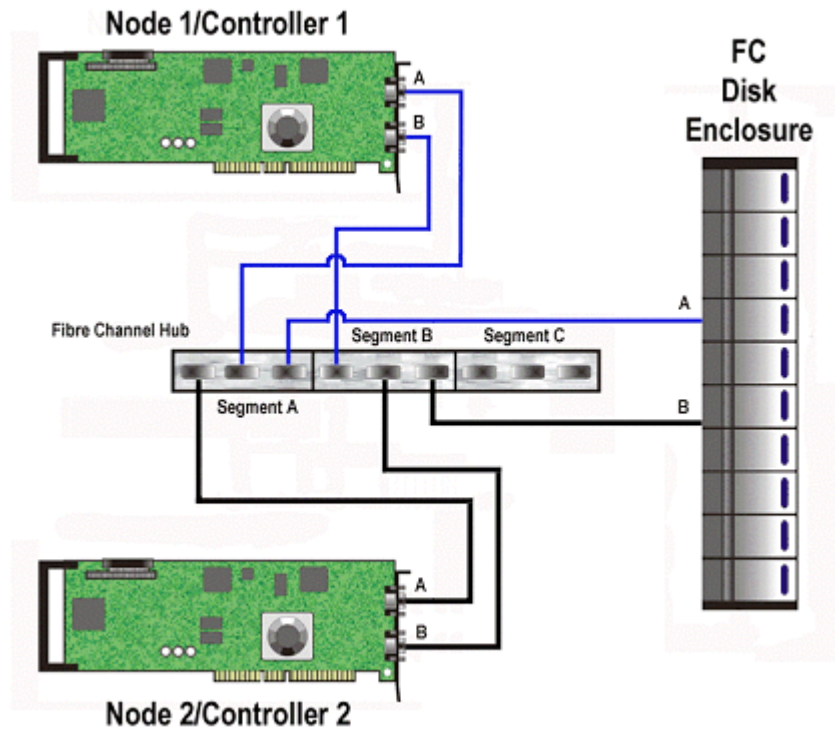
Figure 1-1. Single-Loop Nodes using Fibre Channel Hub





## 1.4.2 Dual-Loop Nodes

Figure 1-2. Dual-Loop Nodes using Fibre Channel Hub



**Note:** Your Fibre Channel hub may or may not support segmentation. See your FC hub documentation for details. If segmentation is not supported, two separate FC hubs are required for this configuration.

## Hardware Installation

## 2

### 2.1 Using Intel RAID Controllers in a Cluster Environment

In a cluster configuration, both IIR Controllers for the two nodes must be identical (i.e., same model and same firmware level).

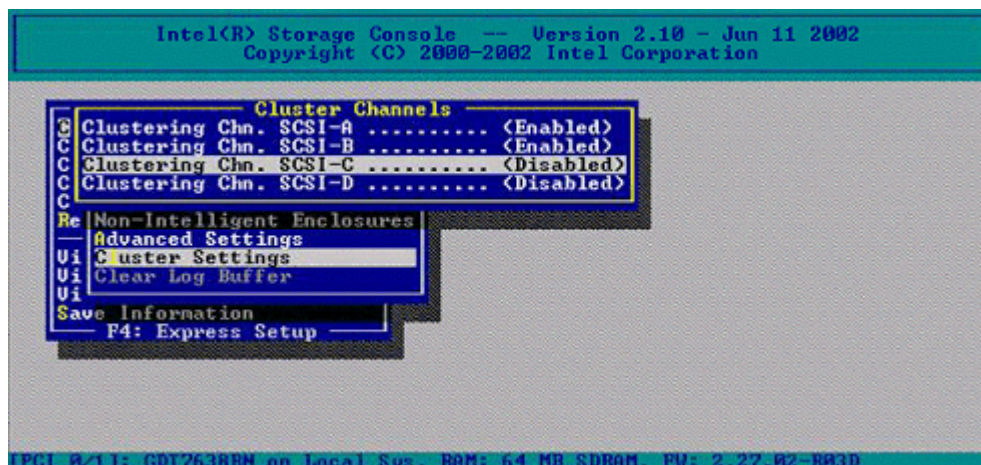
When choosing an external Fibre Channel enclosure, make sure that it is qualified for High-Available clustering operation and has proper connectors to support the cables and connectors (such as Media Interface Adapters, or MIAs) for configuring optical cabling. The same also applies to Fibre Channel Hubs (if used).

Unlike the IDs of the Wide/Ultra2 or Ultra 160 SCSI IOPs, the IDs of the Fibre Channel IOPs of the IIR Controllers are automatically set to different numbers when operated on one loop.

### 2.2 Reserving the Cluster Channels

Channels used as shared channels for Clustering have to be reserved and marked as Clustering Channels within the Storage Console (press <CTRL>+<G> at system boot level when the IIR BIOS appears). This applies to all IIR Controllers participating in the shared channels.

Figure 2-1. Reserving Cluster Channels



## 2.3 Begin Installation

Verify that your Cluster-enabled controllers are using the same controller firmware.

1. Configure your cluster environment using cabling and connectors that are appropriate for your clustering devices.
2. Enter X-ROM StorCon from one of the controllers in your cluster setup.
3. Reserve the Cluster Channels. (See [Section 2.2](#) for more information).

**Note:** You cannot continue unless this step is performed in advance. Failure to do so results in an error message (see [Figure 2-2](#)).

**Figure 2-2. Cluster Drive Type Warning**



```
Clustering is not enabled for the channel(s) this Host Drive is connected to.  
You must enable it to set the cluster drive type to 'Cluster'.
```

4. Create required clustered host drives noting these steps:
  - a. Ensure that you select “Y” (yes) to configure the drives as type “cluster” (see [Figure 2-3](#)).

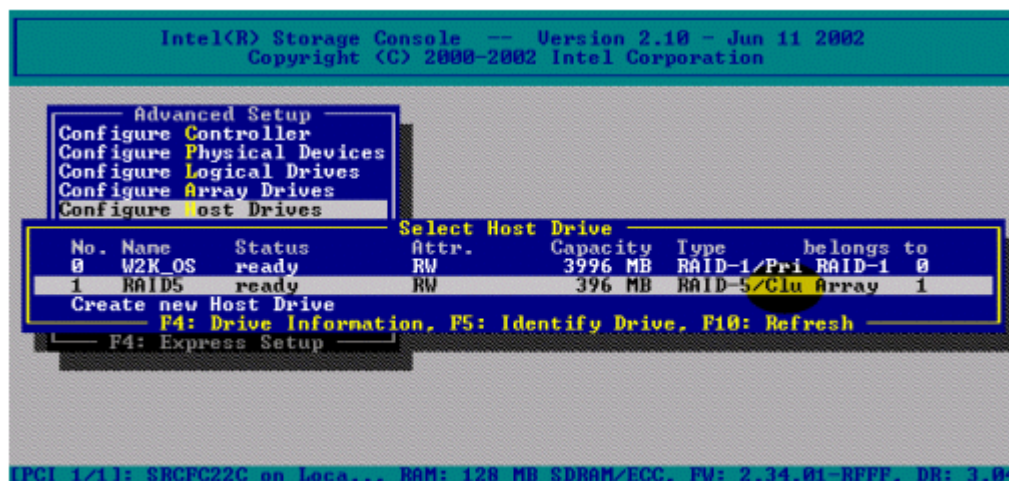
**Figure 2-3. Cluster Drive Type Confirmation**



```
Do you want to set the Host Drive type to 'Cluster'? <Y/N>
```

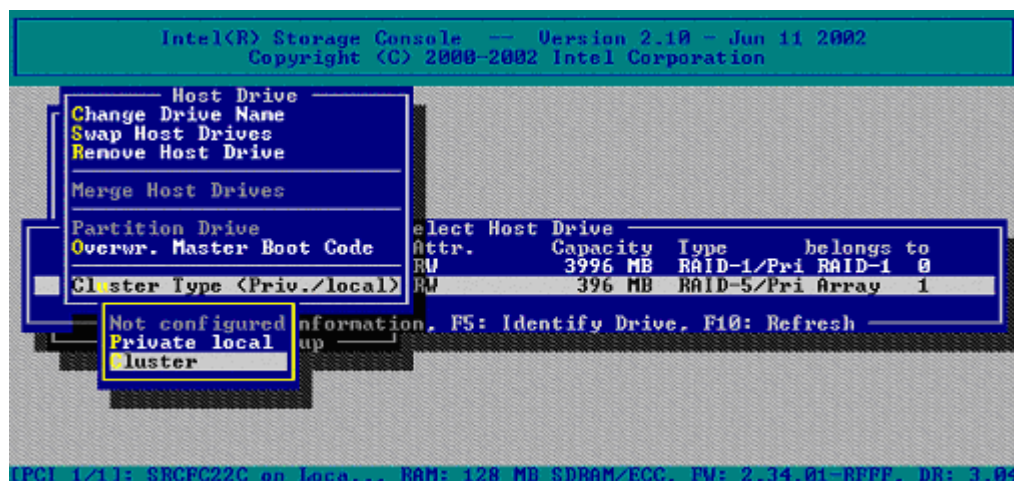
- b. If the drives are already created, go to the host drive menu and ensure that they are set to type “cluster” and not “private.” See [Figure 2-4](#) for details.

**Figure 2-4. Drive Type Verification**



5. If your host drives are not set to type “cluster,” select “Cluster Type” in the Host Drive menu, then select “Cluster.” See [Figure 2-5](#) for details.

**Figure 2-5. Changing Drive Type in StorCon**



**Note:** If you want to reserve host drives for only one node (such as the OS), set these host drives to type “private.” This is necessary if you want to use a host drive connected to the cluster controller as your boot device. The host drive is private for the node that is set up as private.

6. Load your Operating System on each node.
7. Load clustering software. Go to this link for a step-by-step guide to loading MS Cluster service:  
<http://www.microsoft.com/windows2000/techinfo/planning/server/clustersteps.asp>

# Microsoft Server Cluster Installation Notes

## for the IIR Controller

### 3

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One of the most commonly used Clustering software is the Microsoft Cluster Server (MCSC). The section provides information for using MSCS with your IIR Controller.

### 3.1 Overview

A Cluster Server is commonly comprised of 2 individual NT/2000 Servers, or *nodes*. Both of these nodes should at least be linked to a commonly used *shared storage bus*.

There must be a **Cluster File Share Storage** on the shared storage bus. File Share Storage is a sub-directory on the shared storage bus which contains all configuration information and the virtual registry of the cluster. This resource is an information-exchange area which is used by both nodes and applicables which may be running on these nodes. An MSCS cannot be configured or started without the File Share Storage Resource. In addition to this resource, other or more disk arrays are normally configured as shared user data hard disks. These disks must be NTFS formatted. (Consult your Microsoft Cluster documentation for detailed information on setting up File Share Storage).

If one of the nodes fails, the remaining server can take over its tasks. The application which is being carried out on the failed disk is then re-started on the second node. The application has to be installed on both server systems. Possible temporary data or information is stored on the File Share Storage. Corresponding cluster supporting applications can carry on the tasks from the point where the failed node stopped via this data and a corresponding API (Application Programming Interface). Other applications can be restarted. The whole process of taking over of tasks for other nodes is classed as a *failover* by Microsoft.

Furthermore, applications can operate on various nodes ensuring that all available resources are used to the optimum. An application cannot run on both nodes at the same time (*load balancing*). Microsoft, therefore, defined this as *static load balancing* (i.e., a static distribution of resources). Dynamic load balancing is not possible at the moment. A speed advantage is only possible if, for example, two different applications are running parallel on different nodes of a cluster server (e.g., a Web Server on Node 1 and an SQL database server on Node 2).

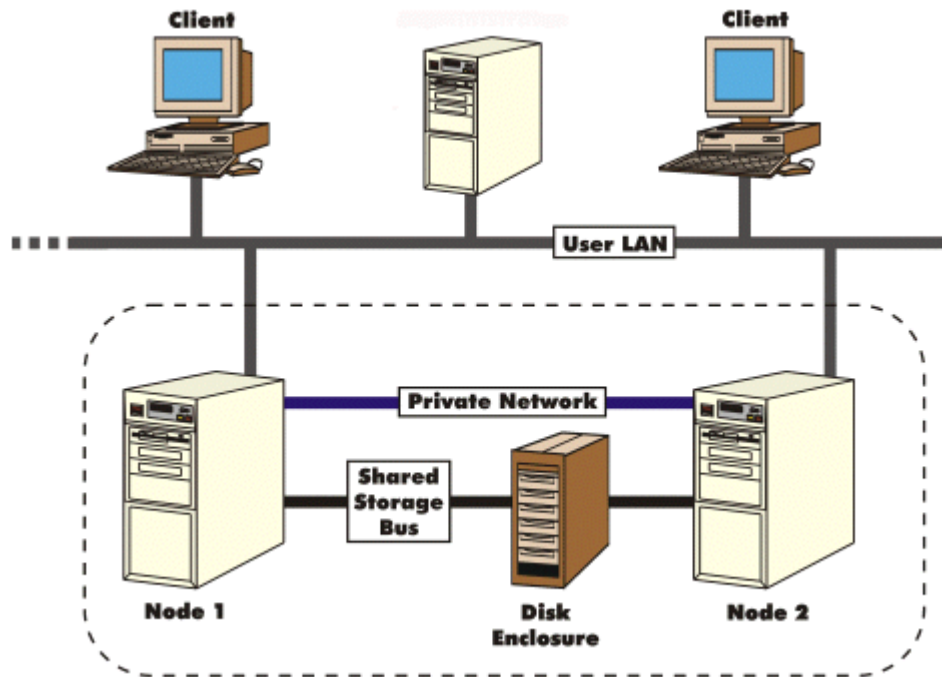
Microsoft urges OEMs with original MSCS equipment to use two *interconnects* (1 Public Network as User LAN and a Private Network for the Nodes). See [Figure 3-1](#). Both nodes can communicate with each other via the normal network (user LAN). It is possible to link the nodes with an additional network (private network).

Data on the hard disks of the Shared Storage Bus have to be protected by hardware RAID controllers. A software RAID solution is not supported. Microsoft recommends using suitable hardware RAID controllers for protecting data. It is important for these



controllers that the RAID configuration data is stored on the disks and not in an NVRAM. This guarantees that even if a controller fails, or after a controller has been exchanged, the RAID configuration remains intact.

**Figure 3-1. Microsoft Server Cluster**



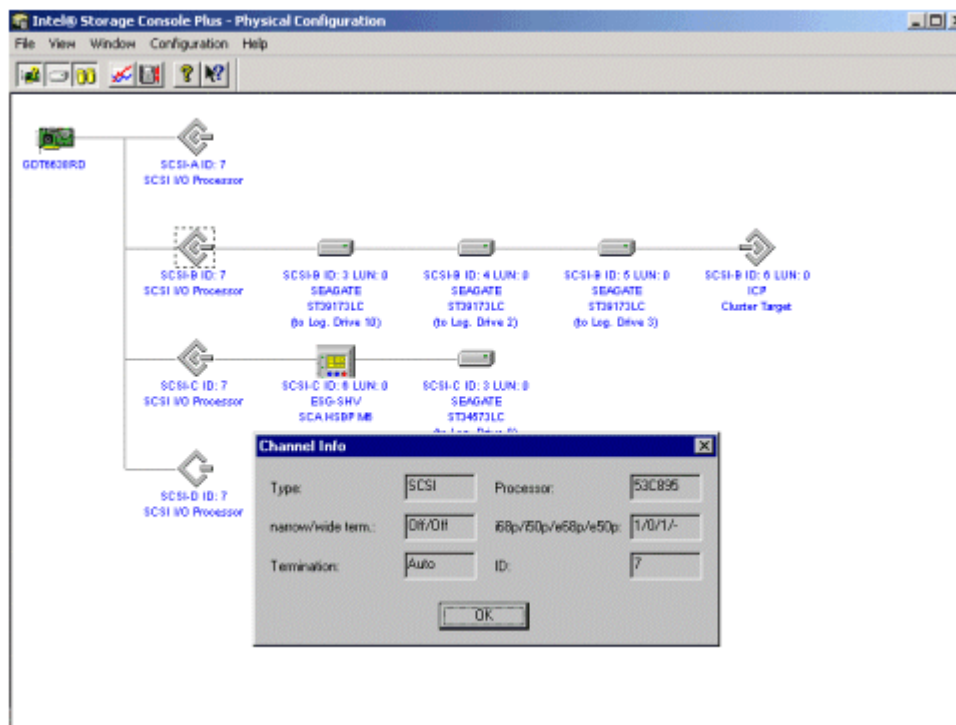
## 3.2 Clustering and Intel Storage Console Plus

This section contains a brief overview of Storage Console Plus (StorCon+) and its specific application to Clustering.

**Note:** See the *IIR Software Installation and Users Guide* (Chapter 10, “Storage Console Plus”) for a detailed description of StorCon+.

### 3.2.1 Display of Shared I/O Channels within StorCon+

Figure 3-2. Shared I/O Channels

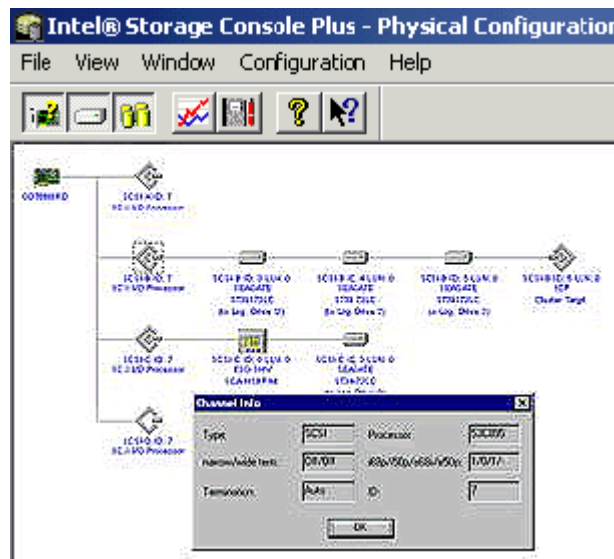




### 3.2.2 Shared I/O Channels within StorCon+

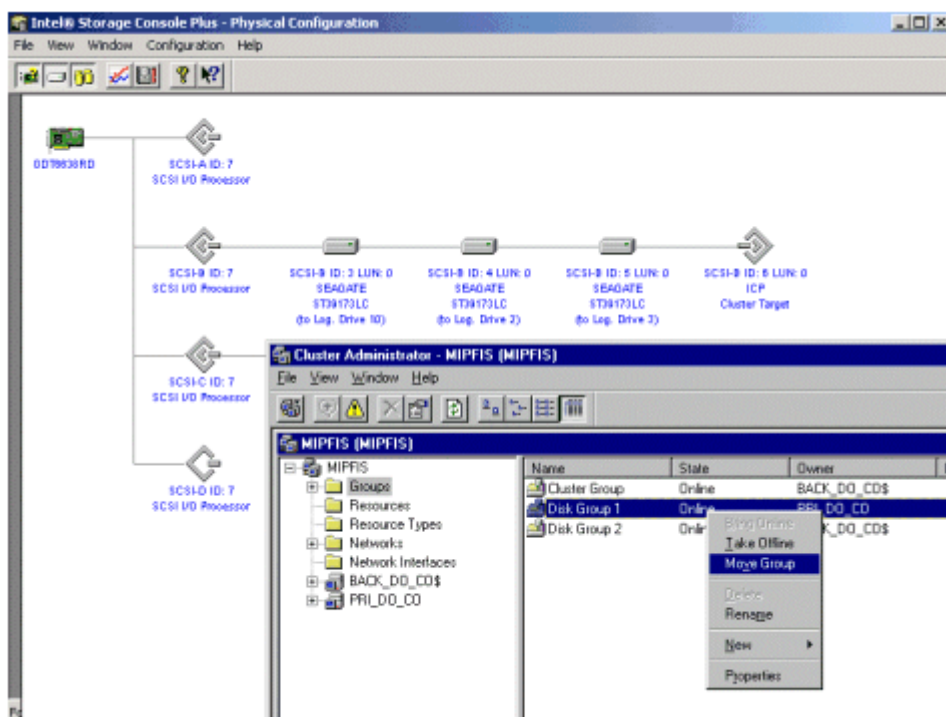
The example in [Figure 3-3](#) shows a SCSI channel with five SCSI hard disks. Two of these hard disks are set up as a RAID 1 disk array and are currently mounted on the IIR Controller of the other node and are not visible here. You can use the Cluster Administrator for Windows NT/2000 to move this resource back to the local RAID controller, in which case these disks would also be displayed here.

### Figure 3-3. Channel Settings



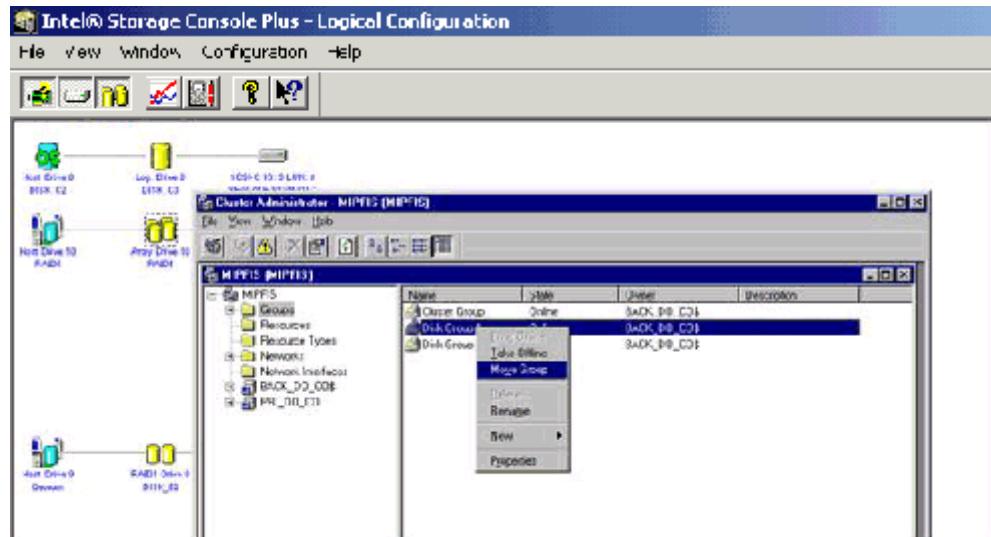
The two disk drives within the RAID 1 Disk Array are moved to the currently displayed IIR Controller as shown in Figure 3-4.

Figure 3-4. RAID 1 Disk Array Display



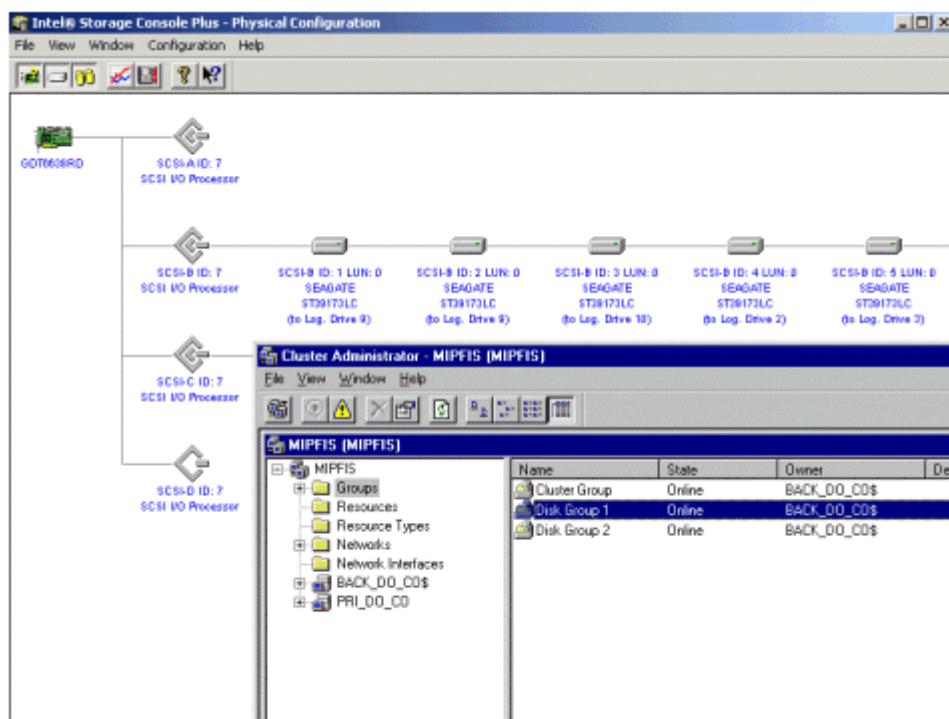
At logical level, the reversed procedure (moving this back to the other IIR Controller) is displayed in [Figure 3-5](#).

**Figure 3-5. RAID 1 Array Displayed (Reversed)**



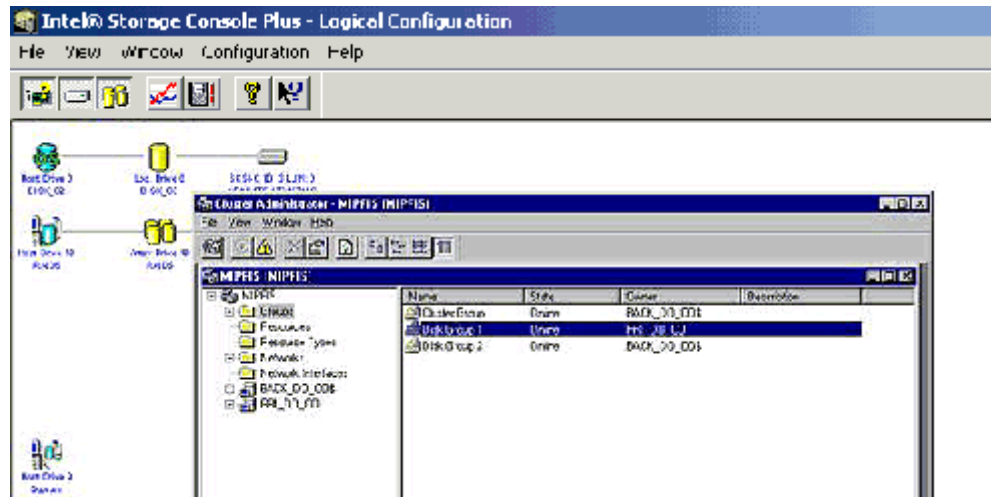
The shared Host Drive still belongs to this IIR Controller (see [Figure 3-6](#)). Now it is moved within the Cluster Administrator to the other node (with the other IIR Controller).

**Figure 3-6. Cluster Administrator**



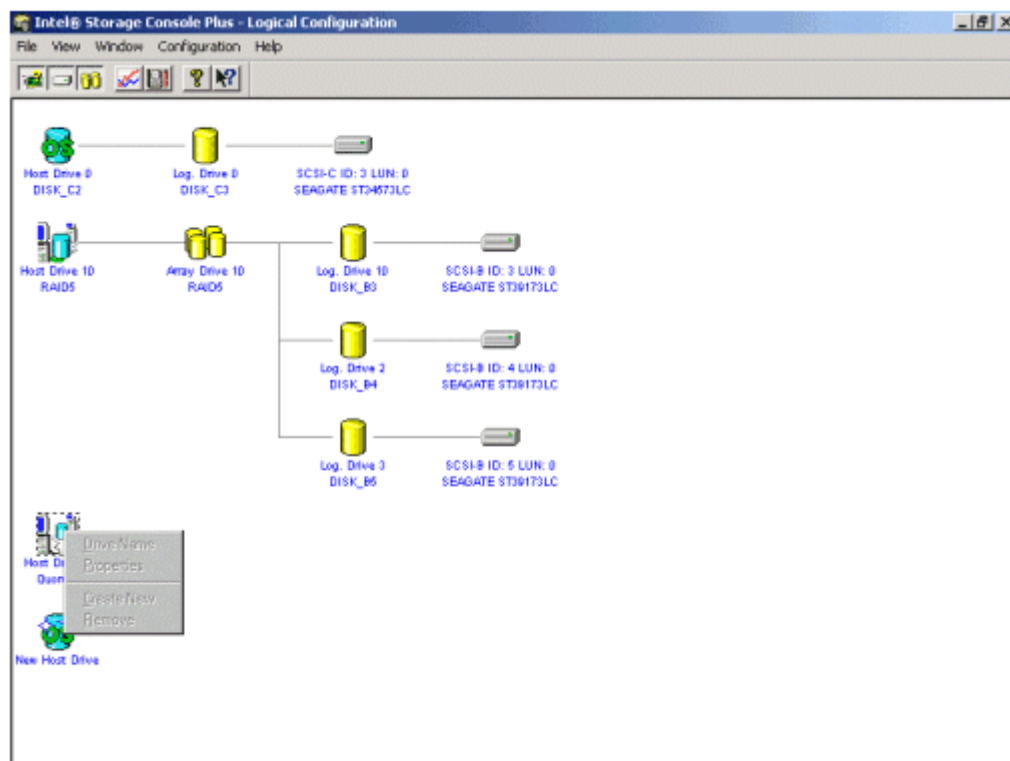
The Host Drive Icon changes showing that this Host Drive belongs to the other node (see [Figure 3-7](#)).

### Figure 3-7. Host Drive Transition to Another Node



No changes or modifications can be made on the Host Drive in [Figure 3-8](#). If you loaded the IIR StorCon+ on the other node, you would see the exact reversed situation. The RAID 5 Array Drive Icon would stand alone, showing that this Host Drive belongs to the other node, and the RAID1 Host Drive would be displayed with all its components, allowing for changes to the configuration.

**Figure 3-8. RAID 5 Array Display**



### 3.2.3 StorCon+ Icons and Clustering








#### 3.2.3.1 Toolbar

Upon Launching StorCon+, a “toolbar” appears to help you navigate through the user interface (see [Figure 3-9](#)). See [Table 3-1](#) for a description of each toolbar item.

**Figure 3-9. StorCon+ Toolbar**








**Table 3-1. Toolbar Descriptions**

Icon	Description
	Select a local or remote IIR Controller for further actions.
	Show and/or modify the IIR Controller and device settings.
	Show and/or modify the Logical Drive configuration.
	Show statistics.
	Show the IIR Controller events.
	Show information on the IIR StorCon+.
	Click on this icon and then on the icon you want online help.

### 3.2.3.2 Host Drives

Host drives are presented in the Logical Drive Configuration view of StorCon+. A description of the icons representing each type of host drive can be found in [Table 3-2](#). Note the three icons specifically relating to clustering.

**Table 3-2. Description of Host Drive Icons**

Icon	Description
	<b>Normal Host Drive:</b> This Host Drive belongs to the selected IIR Controller on a non-clustering I/O channel.
	<b>Local Mounted Cluster Drive:</b> A Cluster Drive is a Host Drive on a clustering I/O channel. This Host Drive is mounted on the selected IIR Controller.
	<b>Remote Mounted Cluster Drive:</b> A Cluster Drive is a Host Drive on a clustering I/O channel. This Host Drive is mounted on an IIR Controller in a different server.
	<b>Private Host Drive belonging to another IIR Controller:</b> This is a Host Drive on a clustering I/O channel. This Host Drive is configured as a Private
	<b>Create New Host Drive</b>

## 3.3 Clustering and the Intel Storage Console

In the IIR Storage Console (StorCon), all Host Drives shared in a Cluster are indicated by the extension “Clu.”

**Note:** See the *IIR Software Installation and Users Guide* (Chapter 9, “Storage Console”) for a detailed description of StorCon.