COMPAQ

Microsoft Internet Information Server 3.0 Resource Failover Using Microsoft Cluster Server

TechNote

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Chapter 1
About This TechNote

Introduction

The purpose of this document is to provide a practical and effective way of implementing a successful Compaq ProLiant Cluster resource failover for Microsoft Internet Information Server.

Expected Audience

This document helps in the installation, configuration and administration of Microsoft Cluster Server with Microsoft Internet Information Server and assumes that the reader has working knowledge of the following:

- Installing and configuring Compaq Servers and Compaq ProLiant Cluster Servers
- Installing and configuring Microsoft Windows NT Server Enterprise
- Microsoft Windows NT Server interface and setting up and administering user accounts in a domain
- Installing and configuring Microsoft Internet Information Server
- Installing, configuring, and administering Microsoft Cluster Server

Text Conventions

This document uses the following conventions to distinguish elements of text:

Table 1-1
Text Conventions

Convention	Use
OK, CANCEL	Window command button labels appear in bold caps.
CTRL + DEL	Keyboard keys appear in bold caps. When you see a plus sign (+) between two keys, hold down the first key while you simultaneously press the second key.
c:\dirname\filename.exe	Path Names of items such as files, directories, resources, groups, and services appear in bold italics.
Select **Item** → **Item**	Items you select from a pull down menu appear in bold initial caps, separated by arrows for each submenu item.
USER INPUT	Information to be entered by the user is shown in uppercase and in a different typeface.

Chapter 2
Overview of a Failover

Types of Failover

In the first release of Microsoft Cluster Server, there are two types of failover: Service and Resource. Both types of failover allow for high levels of server and application availability.

In a service failover configuration, a service is defined to Microsoft Cluster Server as a resource. Once defined, the Failover Manager Process ensures that the service is running on only one member of the cluster at a given time. Although the service is running on only one member of the cluster at a time, the resource group where the service is defined uses a common name. Therefore, all services running on that resource group are available to all connected network client machines using the common name.

A more comprehensive model is the resource failover, which takes advantage of Independent Software Vendor's (ISV) cluster-aware resource DLLs to execute the failover. In a Resource Failover configuration, it is assumed that the service is running on both members of the cluster and that some resource such as a database or a Web Site fails over, and not the service.

Since most ISV applications do not yet have resources to make them cluster-aware, Service Failovers are the most common forms of implementing the failover in Microsoft Cluster Server. Microsoft provides a generic service resource DLL to allow these applications to function under Microsoft Cluster Server.

What are the Advantages of a Failover?

Both service and resource failovers provide a highly available computing environment with relative simplicity and can be used for both planned and unplanned service outages. A planned outage occurs when one of the members in the cluster is taken offline for upgrades or maintenance. An unplanned outage occurs when one of the members or the application on that member fails. During both types of outages, the services and/or resources can be moved to another member of the cluster. Since the clients communicate with a virtual server and not to the server directly, the failover can be transparent to the clients.

Note: This depends on the mechanism that allows the client and the clusters to re-establish a live connection to continue the services. For example, developing client software that automatically re-establishes a connection after losing it provides a near transparent failover.

What are the Disadvantages of a Failover?

One of the main disadvantages of a Microsoft Cluster Server Failover is that in a failover condition, the performance of the server taking over the work load of the failed server may degrade since it is now doing the work of both servers. However, by manually balancing the load and selecting the appropriate hardware, performance degradation can be minimized.

Another major disadvantage of a failover environment is that the state information of the application is not monitored. As a result, when the application fails over, an entire new instance of the application is started. Any work in progress is lost and data recovery must occur.

Chapter 3
Model Failover Environment

Introduction

The model environment presented here consists of two Compaq ProLiant servers sharing a ProLiant Storage Unit and its drives, networked to each other through a LAN and a dedicated server interconnect.

To enhance availability, Compaq strongly recommends the use of at least two PCI network cards per server. One of these cards should be connected to its counterpart in the other node of the cluster via a private hub or a special crossover cable, such as the one supplied in the cluster kit. These cards should be configured for cluster communication only. The other card in each server should be configured for both client access and cluster communication. This configuration allows the client network to provide an alternative path for the heartbeat should the dedicated connection fail.

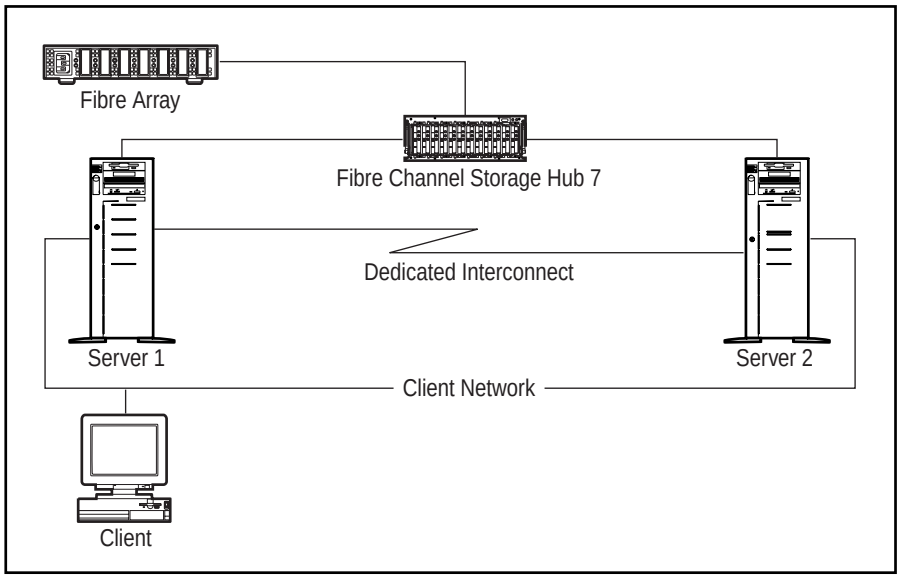

Figure 3-1. Standard ProLiant Cluster Configuration

For even higher availability, Compaq recommends the use of duplexed network cards configured for client access and cluster communication in addition to using a dedicated connection as described above.

Note: To create a cluster, a domain environment is required using TCP/IP as the network protocol. As a cluster, both servers should be configured to be servers in the domain. It is highly recommended that neither server in a cluster be used as a Primary or Backup domain controller.

Model Environment Naming Conventions

Table 3-1
System and Cluster Specifics

Operating System	Windows Enterprise Server 4.0 w/ Service Pack 3
Domain Name	WPDOMAIN
Name of Server 1	NODE1
IP Address of Server 1	110.2.30.103 (subnet mask 255.255.0.0)
IP Address of Interconnect	110.4.30.103 (subnet mask 255.255.0.0)
Name of Server 2	NODE2
IP Address of Server 2	110.2.30.104 (subnet mask 255.255.0.0)
IP Address of Interconnect	110.4.30.104 (subnet mask 255.255.0.0)
Name of Cluster	WPCLUSTER
IP Address of Cluster	110.2.30.120 (subnet mask 255.255.0.0)
Name of Virtual Server 1	IIS
IP Address of Virtual Server 1	110.2.30.121 (subnet mask 255.255.0.0)
IP Address of Interconnect	110.4.30.121 (subnet mask 255.255.0.0)

Table 3-2
Application Specifics

Service	INTERNET INFORMATION SERVER 3.0
Location of Executables	C:\Winnt\system32\inetsrv\
Location of Web Pages / Scripts	E:\Inetpub\wwwroot\; E:\Inetpub\scripts\

Table 3-3
IIS 3.0 Resource Group Specifics

Shared Disk	Disk E:
IP address	110.2.30.121 (subnet mask 255.255.0.0)
Network Name	IIS
Virtual Root Location	E:\Inetpub\wwwroot
Virtual Root Alias	WWWdirectory

Hardware Requirements

Server Configuration

Two Compaq ProLiant 2500 servers, each with:

- 1 processor / 64-Mbytes RAM on each server
- Compaq Integrated Netelligent 10/100 TX UTP Controller
- Compaq Netelligent 10/100 TX PCI UTP Network Interface Controller
- Compaq Fibre Channel Host PCI Controller

One Compaq ProLiant Fibre Channel Disk Storage System F2 with:

- Compaq ProLiant Fibre Channel Array Controller
- (2) 2.1 SCSI hard disk drives (RAID 1, 1 logical drive)

Client Configuration

Compaq Deskpro 2000 with:

- Compaq Netelligent 10/100 TX PCI UTP Network Interface Controller
- 32-Mbytes RAM

For detailed configuration information, see Appendix A.

Software Requirements

Server Configuration

- Compaq SmartStart and Support Software Release 3.5 or later
- Compaq Array Configuration Utility 1.20a or later
- Compaq NT Support Software Utility 2.03 or later
- Microsoft Windows NT Enterprise Server 4.0
- Microsoft Windows NT Service Pack 3
- Microsoft Cluster Server 1.0
- Microsoft Internet Information Server 3.0 or later

Client Configuration

- Compaq SmartStart and Support Software Release 3.5 or later
- Compaq NT Support Software Utility 2.03 or later
- Microsoft Windows NT Workstation 4.0
- Microsoft Windows NT Service Pack 3
- Microsoft Cluster Administrator 1.0
- Microsoft Internet Explorer 3.02 or later

Note: To create a cluster, a domain environment is required using TCP/IP as the network protocol. As a cluster, both servers as a cluster should be configured to be servers in the domain. It is highly recommended that neither server in a cluster be used as a Primary or Backup domain controller.

Chapter 4
Software Installation Process

Microsoft Cluster Server Installation

Microsoft Cluster Server must be installed on both servers before installing the application. For detailed instructions on how to setup a cluster refer to *Introduction to Compaq ProLiant Clusters*. This document also includes a section on troubleshooting. The following table details the necessary information to complete the installation of Microsoft Cluster Server on both servers.

Table 4-1
Microsoft Cluster Server Installation Specifics

Domain Name	WPDOMAIN
Cluster Name	WPCLUSTER
Cluster IP address	110.2.30.120 (subnet mask 255.255.0.0)
Shared Disks	Disk E:
Cluster Admin User / Password	Administrator / <password>
Location of Cluster Executables	Default (C:\WINNT\SYSTEM32)
Quorum Disk	Disk E:

This information as well as the information contained in Chapter 3, “Model Failover Environment”, is needed to install Microsoft Cluster Server.

Microsoft Internet Information Server 3.0 Installation

Microsoft IIS 3.0 is not a single install, but an upgrade from IIS 2.0. During the installation of Windows NT Enterprise 4.0, IIS 2.0 should be installed first then upgraded to IIS 3.0.

From any one of the cluster nodes that have access to Disk E:, perform the following:

1. Create a subfolder on drive E:\ named E:\INETPUB:

   E:\> MD INETPUB

2. Copy the C:\INETPUB files to E:\INETPUB folder:

   E:\> COPY C:\INETPUB*.* E:\INETPUB

Note: If the ***\Inetpub*** folder or portions of the ***\Inetpub*** folder are moved to the shared drive, make sure that only the files related to WWW service are moved.

Changing the WWW Service Directories

This only needs to be done if the user is going to be allowed to execute scripts. The parameter properties of the Virtual Root allow specification of the Virtual root location, which is ***E:\Inetpub\wwwroot***. For the Virtual Root, it is not necessary to change the entry in the Internet Service Manager. The cluster will automatically do this when creating the Virtual Root Resource. However, the Internet Service Manager can be used to specify the rest of the service directories that need to be executed from the shared disk.

Table 4-2
WWW Service Directories

Home Directory	C:\Inetpub\wwwroot (Default)
Scripts Directory (optional)	E:\Inetpub\scripts

From both of the cluster nodes, change the service /Scripts directory from ***C:\Inetpub\Scripts*** to ***E:\Inetpub\Scripts***.

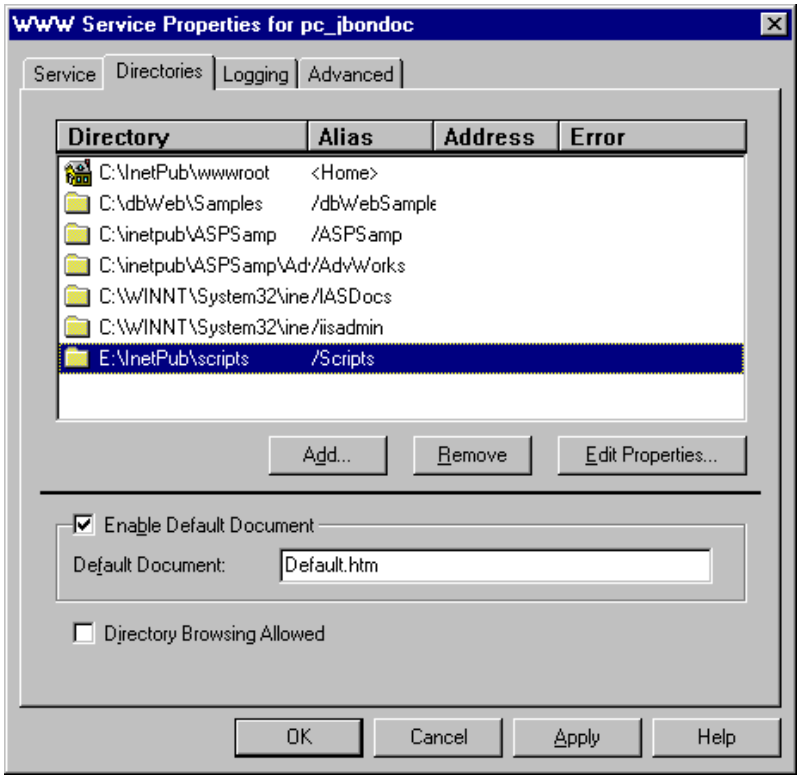

Figure 4-1. WWW Service Properties

Edit the Properties of the ***/Scripts*** directory to reflect the new ***/Scripts*** directory.

Chapter 5
Configuration of Microsoft Cluster Server

Creating the IIS 3.0 Resource Group

Use the following information to setup the IIS 3.0 Resource Group.

Table 5-1
IIS 3.0 Resource Group Properties

Resource Group Name	IIS
Preferred Nodes	NODE1
Failover Option	Default
Failback Option	Allow Failback, Failback Immediately

1. Enter the Name of the Resource Group. Click **NEXT**.

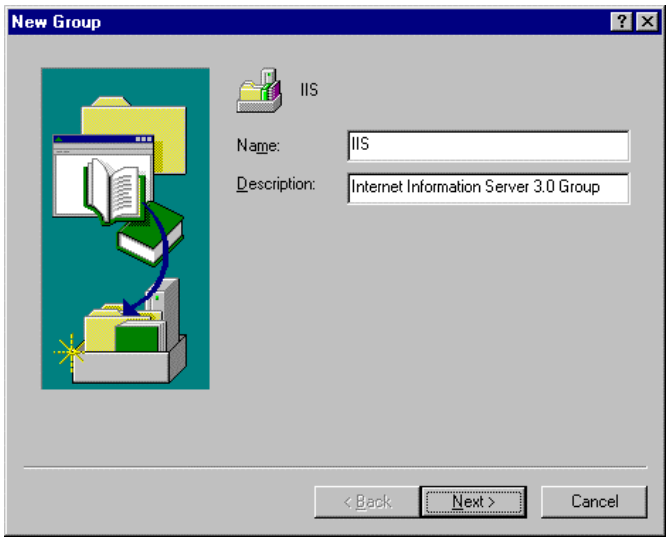

Figure 5-1. Name of Resource Group

2. Enter a preferred node if a failback is desired. For this model cluster, use NODE1 as a preferred server. Click **FINISH**.

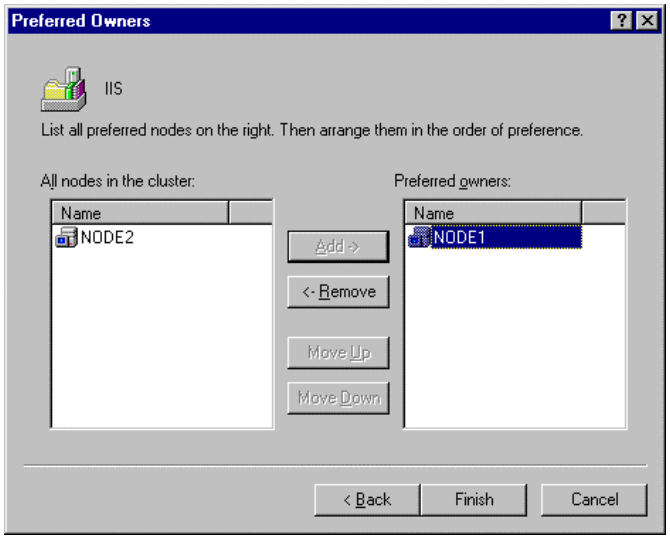

Figure 5-2. Preferred Nodes

It is possible to prevent a failback or allow a failback. If allowing a failback, choose a preferred server. Allowing a failback moves and restarts the service on the preferred server after a failover.

Dependencies

The following dependencies should be observed when creating the resources:

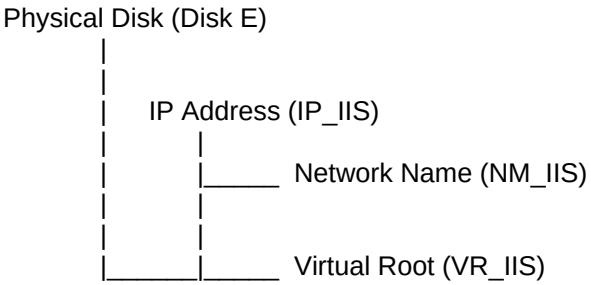

Figure 5-3. Group and Resource Name Dependencies

Creating the IIS 3.0 Resources

Use the following table to create the following resources for this group.

Table 5-2
Resource Group (IIS)

Physical Disk	Disk E:	Disk E:
IP Address	IP_IIS	110.2.30.121
Network Name	NM_IIS	IIS
Virtual Root	VR_IIS	E:\Inetpub\wwwroot

The following sections detail the configuration of each resource.

Physical Disk

Use the following information to setup the Shared Disk resource.

Table 5-3
IIS 3.0 Group (Physical Disk) Properties

Resource Name	Disk E:
Resource Type	Physical Disk
Shared Disk	Disk E:
Dependencies	None

Normally the Shared Disk resource already exists in the cluster and does not have to be created. Copy this Resource to the Resource Group that was just created or rename the Group where this resource is located.

IP Address

Use the following information to setup the IP Address resource.

Table 5-4
IIS 3.0 Group (IP Address) Properties

Resource Name	IP_IIS
Resource Type	IP Address
IP address	110.2.30.121 (subnet mask 255.255.0.0)
Dependencies	None

1. Enter the name of the IP Address resource. Click **NEXT**.

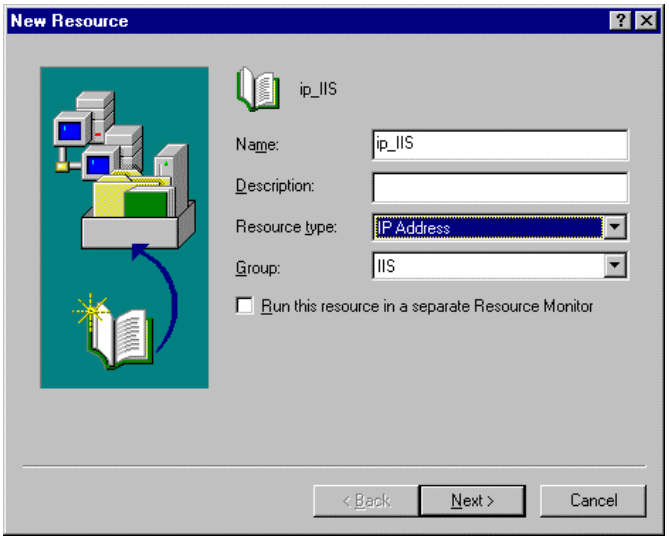

Figure 5-4. IP Address Name

2. Enter the possible nodes that the IP Address can host. Click **NEXT**.

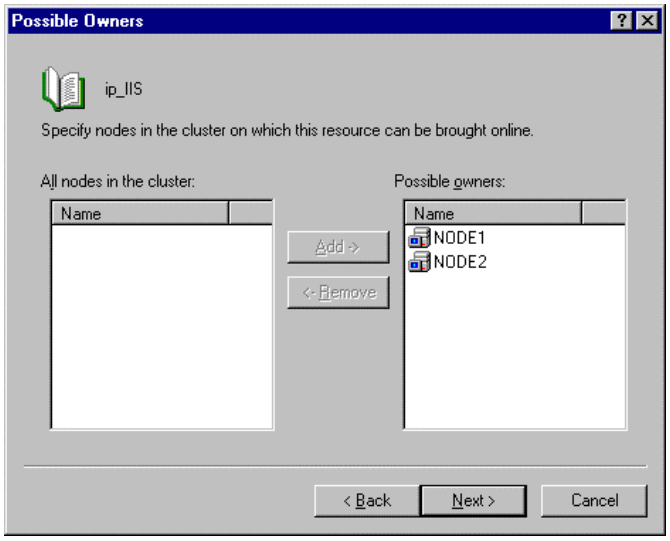

Figure 5-5. IP Address Possible Nodes

3. Since there are no dependencies, leave it blank. Click **NEXT**.

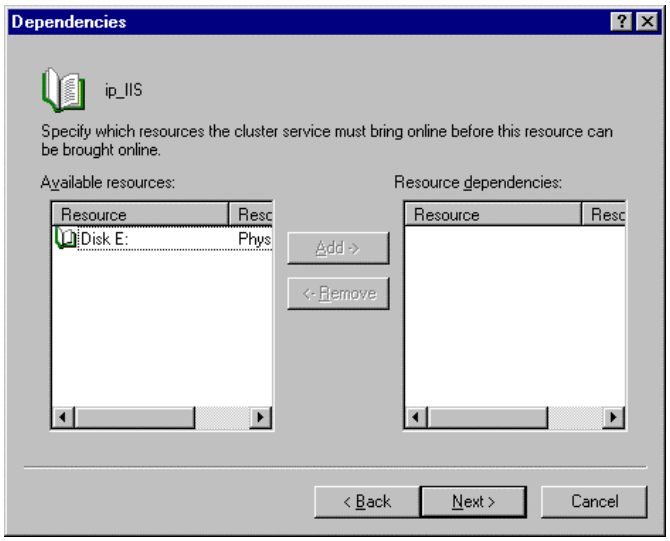

Figure 5-6. IP Address Dependencies

4. Enter the IP address of the virtual server for the IIS service, including the proper subnet mask, which should be the same subnet mask used for the domain. Click **FINISH**.

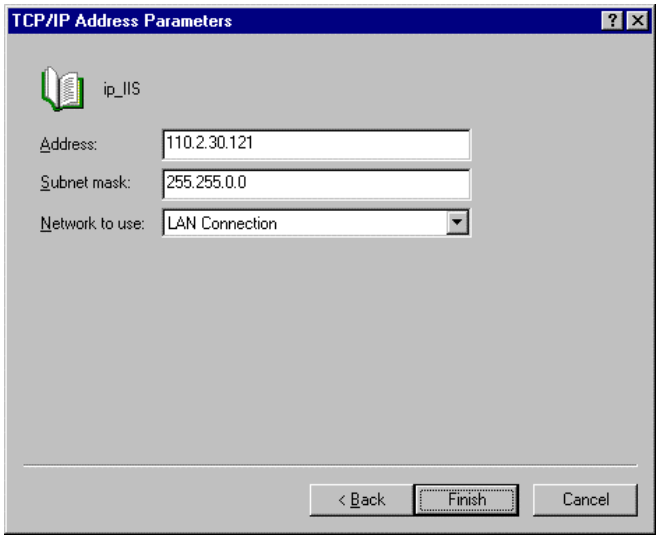

Figure 5-7. IP Address Parameters

Network Name

Use the following information to setup the Network Name resource.

Table 5-5
IIS 3.0 Group (Network Name) Resource

Resource Name	NM_IIS
Resource Type	Network Name
Network Name	IIS
Dependencies	IP_IIS

1. Enter the name of the Network Name resource. Click **NEXT**.

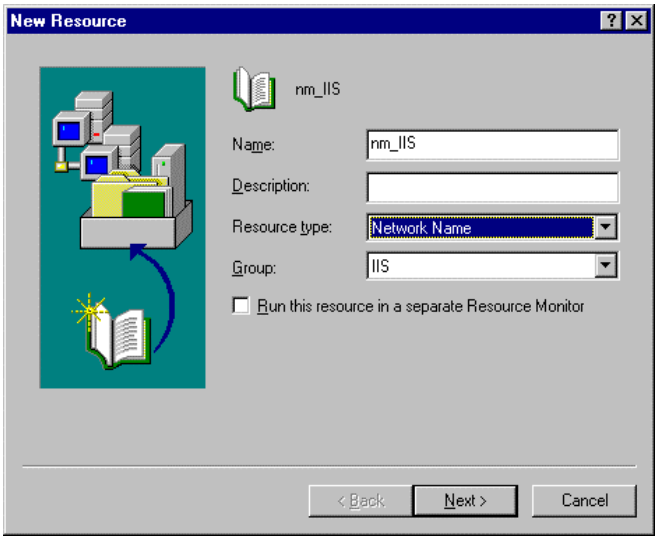

Figure 5-8. Network Name Resource Name

2. Enter the possible nodes that the resource can host. Click **NEXT**.

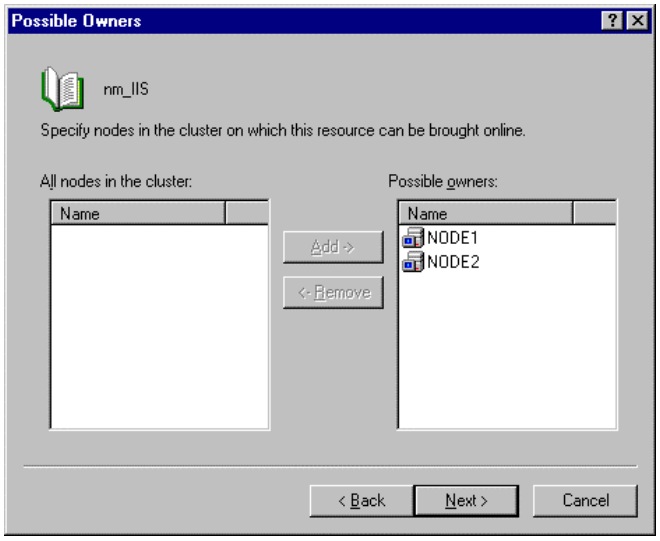

Figure 5-9. Network Name Resource Possible Nodes

3. Enter the dependencies of the resource. Select the IP_IIS resource only. Click **NEXT**.

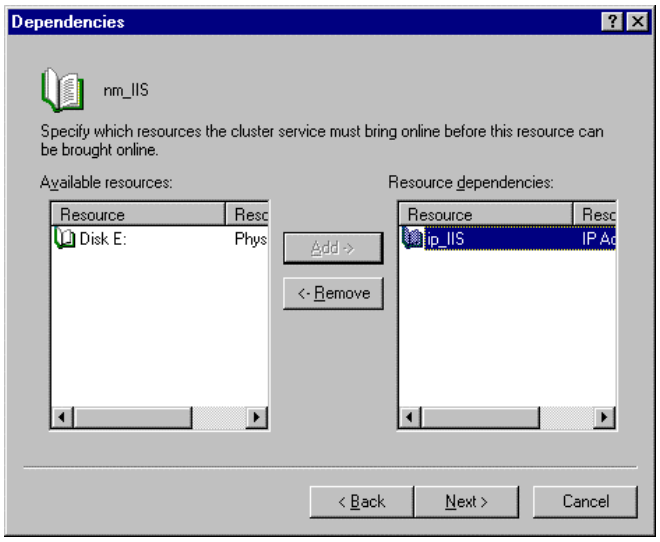

Figure 5-10. Network Name Resource Dependencies

4. Enter the name of the virtual server. Click **FINISH**.

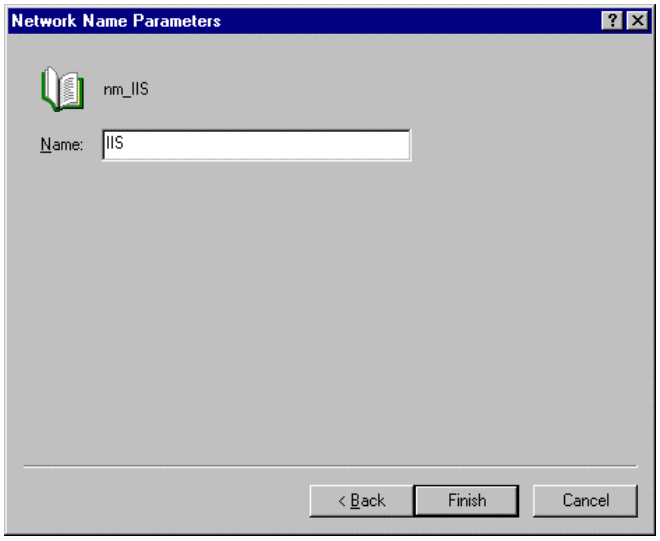

Figure 5-11. Network Name Resource Parameters

Virtual Root

Use the following information to setup the WWW Virtual Root Resource.

Table 5-6
IIS 3.0 Group (WWW Virtual Root) Resource

Resource Name	VR_IIS
Resource Type	Virtual Root
Virtual Root Location	E:\Inetpub\wwwroot
Virtual Root Alias	/WWWdirectory
Dependencies	Disk E: and IP_IIS

1. Enter the name of the Virtual Root resource for the WWW service. Click **NEXT**.

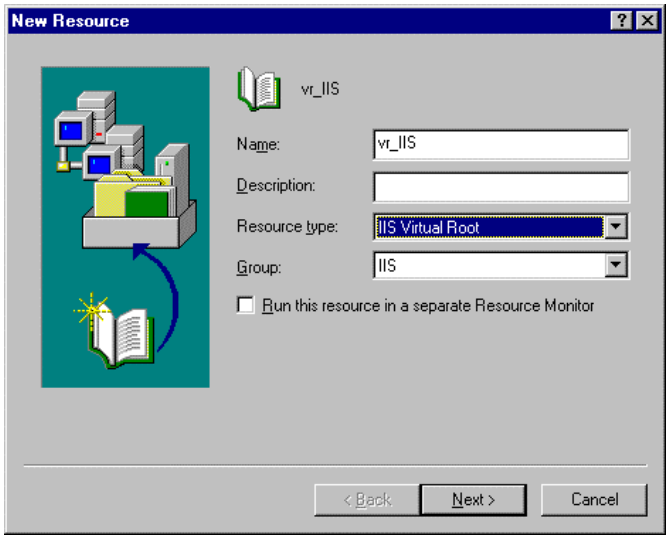

Figure 5-12. Virtual Root Name

2. Enter the possible nodes that you want the service to host. Click **Next**.

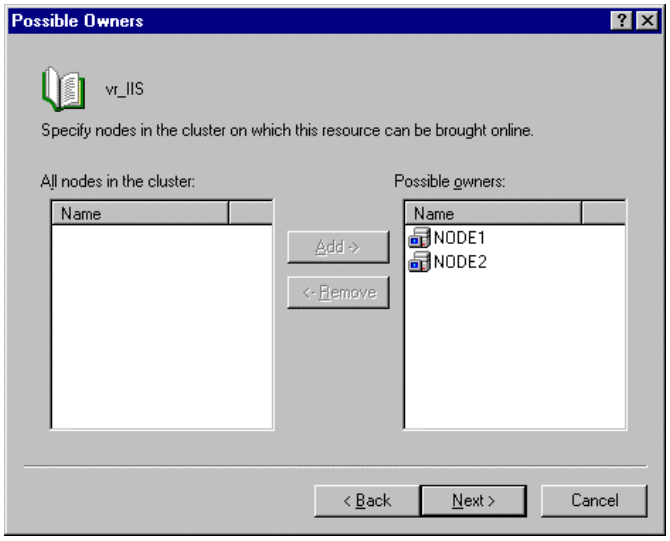

Figure 5-13. Virtual Root Possible Nodes

3. For dependencies, enter the Disk E: and IP_IIS. Click **NEXT**.

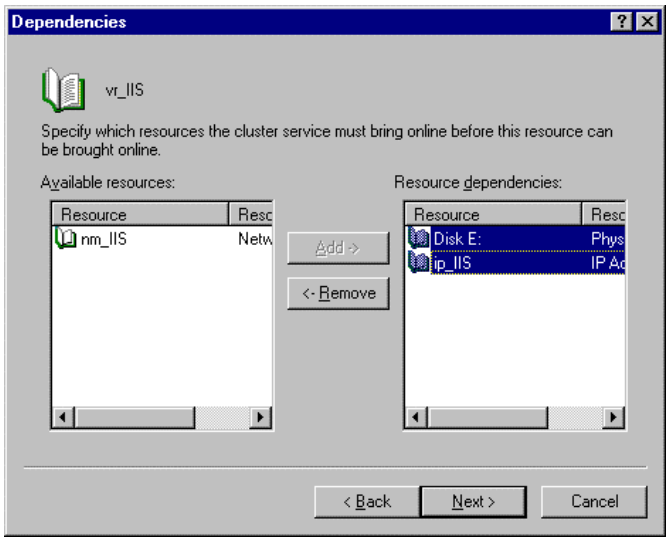

Figure 5-14. Virtual Root Dependencies

4. Enter the Virtual Root Directory and the Virtual Root Alias. Click **FINISH**.

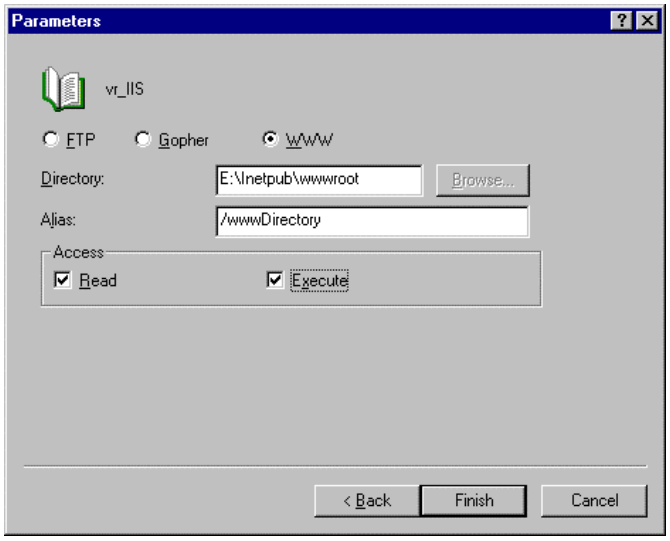

Figure 5-15. Virtual Root Parameter

To move the resource group immediately to the another node, change the Advanced Properties of each Resource by setting the Threshold value of the Restart to zero (0), and allow it to affect the whole group. This setting prevents the resource from re-starting on the same node, since it is set to zero. If a failure occurs on any resource on that resource group, it moves the whole resource group to the other cluster node and restarts the service.

Chapter 6
Verifying the Failover

To verify the failover, connect a client machine's web browser to the IP address that was defined for the Web Service in the group created in the Cluster Server Administrator.

Using the Cluster Administrator, move the group that was created from the server it is running on to the other server. On the client machine, refresh the current page. The client should experience a brief pause, and then refresh after the group has successfully moved to the other server and come online.

Appendix
Model Hardware Configuration

Server 1

Compaq ProLiant 2500, 2P P5/200, 64-Mb memory

Table A-1
Server Configuration Information

Slot Number	Description	IRQ
Embedded NIC	Netelligent 10/100 TX (Client Network)	5
Embedded Disk Ctrl	C875 Ultra Fast Wide SCSI Controller	14
Slot 1	Netelligent 10/100 TX (Interconnect Network)	9
Slot 2	Fibre Channel Host Adapter	11

Table A-2
Disk Configuration Information

Disk Controller	Controller Order	SCSI ID or Logical Drv	Disk Configuration	Raid Level	Drive Letter
Embedded Disk Ctrl	1st	0	4.3G	none	C
	2nd	5	CD-ROM	n/a	D
Fibre Host Ctrl	3rd	0	2 x 2.1-GB	1	E

Server 2

Compaq ProLiant 2500, 2P P5/200, 64-Mb memory

Table A-3
Server Configuration Information

Slot Number	Description	IRQ
Embedded NIC	Netelligent 10/100 TX (Client Network)	5
Embedded Disk Ctrl	C875 Ultra Fast Wide SCSI Controller	14
Slot 1	Netelligent 10/100 TX (Interconnect Network)	9
Slot 2	Fibre Channel Host Adapter	11

Table A-4
Disk Configuration Information

Disk Controller	Controller Order	SCSI ID or Logical Drv	Disk Configuration	Raid Level	Drive Letter
Embedded Disk Ctrl	1st	0	4.3-GB	none	C
	2nd	5	CD-ROM	n/a	D
Fibre Host Ctrl	3rd	0	2 x 2.1-GB	1	E

Glossary

Availability The ability of a system to appear to the users as if it was operating continuously, even though failures have occurred.

Cluster A cluster is a set of independent computer systems working together as a single system. The cluster software directs client requests to one of the systems in the cluster based on resource accessibility, server load, and application requirements. When a system in the cluster fails the cluster software will recover and disperse the work from the failed system amongst the remaining systems in the cluster. When the overall load exceeds the capabilities of the systems in the cluster, additional systems may be added to the cluster. The failure of a system in the cluster will not affect the other systems and in certain cases the client applications should be unaware of the failure, except for some loss of service for a short period of time.

Given the above definition, it would be hard to distinguish a cluster from a general distributed system; therefore, clusters provide the following additional capabilities:

- Every system in the cluster must have full connectivity and communications with all other systems in the cluster.
- Systems in the cluster know all the other systems in the cluster; they join in order to form a cluster. The cluster systems also know when systems join or leave the cluster, via a connection manager.
- Systems in the cluster know what resources are available on all other members of the cluster.
- There is a virtual circuit, provided by the connection manager that provides reliable delivery of messages between systems in the cluster.

Connect Descriptor A specially formatted description of the destination for a network connection. Connect descriptors are constructed using a set of keywords and values mapped to service names.

Failover The time it takes a resource to failover from one system to another. For example, if a resource is to be polled at a 1-second interval, then it may be determined that after two poll intervals, that a resource is dead and that it should be restarted or failed over. Also, assuming that the local restart count for the resource is 4, then 4 of these timeouts would be required before the resource is failed over to another system. Given a 1-second interval, there would be a period of 2 seconds times the 4 retries - or a total of 8 seconds before the resource failed over to another system.

Member A system which has joined a cluster.

Node *See* System.

Quorum A voting mechanism maintained by the connection manager. A simple quorum voting mechanism is used to indicate when more than half of the available votes are present in the cluster. Note that a member (or many members) in the cluster can have more than one vote. In addition, a resource available within the cluster can have a vote. This latter ability allows two systems cluster to function in the presence of a communication or system failure, by having the system that continues functioning and reserves the resource to obtain a quorum.

Quorum resource A quorum resource is any resource that has writable persistent storage for maintaining cluster database change log records.

Resource	A physical or logical entity that is managed. They include, but are not limited to: disks, tapes, printers, CD-ROMs, IP address, etc.
Server	The layer of software running on a cluster node which performs service registration or advertisement. Any software that uses this layer inherits its properties.
Server application	The actual application software running on a cluster node, regardless of whether it does service registration.
Service	A data set or operation set exported by application servers to their clients. This term is distinguished from a Windows NT Service.
Service Name	A short, convenient name mapped to a network address contained in a TNS connect descriptor. Users need only know the appropriate service name to make a TNS connection.
Shared disk	A cluster organization that requires all systems of the cluster to have access to shared Disks.
Shared nothing	A cluster organization in which disks are ‘owned’ by a single system of the cluster and requests for disk access is directed to the system that ‘owns’ the disk.
Shared resource	A cluster organization in which some resources are accessible to all systems in the cluster.

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